



CLEAN ENERGY TRANSITION PLAN

PART II – COMMUNITY PLAN

West Pikeland Township



May 2023

Developed with the support of Practical Energy Solutions a division of Spotts, Stevens and McCoy

Community Clean Energy Transition Plan
West Pikeland Township



We are looking towards the future.

A future where we can breathe easier, knowing we've set the course to a quality, healthy, economical, and sustainable life in West Pikeland Township.

A Clean Energy Future.



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1.0 Community-Wide Transition Introduction

Those of us who live and work in West Pikeland have a permanent stake in this community, and the township government is charged with planning for the best interest of the community over the long term. This responsibility should be used to convene stakeholders to develop a shared vision regarding how best to undertake mutually beneficial actions to accomplish the transition to building efficiency, the electrification of buildings and vehicles, and the steady increase in renewable energy use.

The township government plays a unique role as a model for the community and as a neutral convener. The township has chosen to lead by example to reduce its emissions and commit to a clean energy future—detailed in the West Pikeland Township Clean Energy Transition Plan Part I Municipal Plan—and will work with all of our community sectors to enable and support a transition to low-carbon energy. The leadership role of the township can be applied to enable voluntary private action through convening and planning partnerships with private-sector leaders, as well as programs to address barriers to action. Coordinated, community-driven efforts to promote energy-saving programs may increase involvement in voluntary programs and lead to significantly higher participation rates and levels of energy savings for residents and commercial consumers. Such efforts to organize action can help to identify and cultivate “champions for efficiency and energy transition” who can use, in turn, their roles in the community to lead.

Influencing the practices and business models of a few building owners with large holdings as well as those of major service providers, such as construction firms and management companies, can change expectations, and transform local markets. Real estate and construction markets often operate at a wider scale, so improved practices in West Pikeland can have regional impacts.

The sections of this report present:

- Current Energy Use and Greenhouse Gas Emissions (Section 2.0)
- Greenhouse Gas Emission Reduction Strategies (Section 3.0)
- Organizational Approach (Section 4.0)
- Participation of Community Sectors (Section 5.0)



2.0 Current Energy Use and Emissions

Pennsylvania has historically been a major producer and consumer of energy. According to the US Energy Information Administration Pennsylvania is ranked 6th in total energy consumption in the country. Globally, Pennsylvania's energy consumption is responsible for 0.5% of greenhouse gas emissions. Based on 2015 data, it is estimated West Pikeland accounts for approximately 0.01% of the energy consumption in Pennsylvania. All municipalities within the state need to contribute to the emissions reductions necessary to eliminate greenhouse gas (GHG) emissions by 2050 or earlier. The identification of the emissions of GHGs in each municipality is a first step in this effort. Understanding the energy use and infrastructure in the township provides direction for deciding what actions will lay the foundation for achieving our goals by 2035 and 2050.

West Pikeland Township is predominantly rural residential with some planned residential development and some small commercial village areas along routes 113 and 401.



The purpose of creating an energy profile is to establish a municipal energy baseline and a community energy baseline, as well as to identify the largest energy users in the area. These baselines include all relevant sectors and serve as starting points for the analysis of potential program and policy recommendations. Understanding energy use at the community level helps us clarify which programs and projects will fit our community needs best as we plan for a transition to energy efficiency and renewable energy. The municipal baseline is also critical as it helps to determine which actions we can take in the short term and how we can support community-wide action.

The most recent comprehensive assessment of the energy usage and emissions of GHGs in the southeastern Pennsylvania area was conducted for the year 2015 by the Delaware Valley Regional Planning Commission (DVRPC). The energy and emissions data contained in this inventory are available for West Pikeland Township.

The GHG emissions in West Pikeland Township are presented in Table 1 and Figure 1. Table 2 presents detailed information on fuel usage, fuel costs, and GHG emissions by fuel type for each of the residential, commercial/industrial, highway, and rail transit sectors.

The emissions from energy use in buildings and in transportation together account for 92% of the GHG emissions in West Pikeland Township. Solid waste generated in the area accounts for 4% of



the emissions, which represents gas emitted from landfills to which West Pikeland Township's waste is sent. Aside from the generation of solid waste and farming operations, virtually all of the GHG emissions in West Pikeland Township come from building energy usage and road vehicles.

Table 1. 2015 Emission Inventory of West Pikeland Township - DVRPC

Sector	Metric Tons CO ₂ e	Percent of Total
Residential	11,281	36%
Commercial and Industrial	7,665	24%
Highway	10,179	32%
Rail Transit	70	0.2%
Solid Waste	1,217	4%
Natural Gas Systems	59	0.2%
Agriculture	854	3%
Wastewater	125	0%
Industrial Processes	0	0.0%
TOTAL	31,450	100%

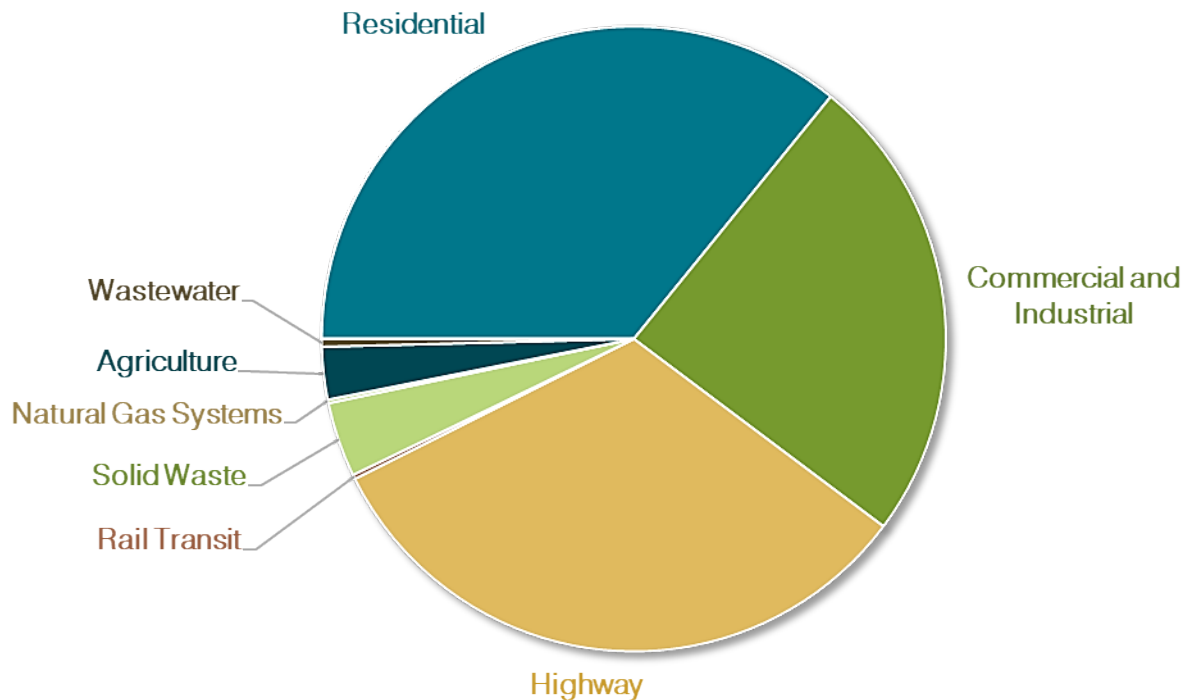


Figure 1. 2015 GHG Emission Inventory of West Pikeland Twp.



Table 2. 2015 Fuel Information for Top Emitting Sectors for West Pikeland Twp.

Residential	Electricity	Natural Gas	Fuel Oil	LPG	Total
Energy Content - Billion BTU	49	34	27	32	142
Energy by Physical Units	14,468,655	323,353	194,629	379,944	--
Physical Units	kilowatt-hr.	therms	gallons	gallons	--
Emissions (MTCO2 e)	5,499	1,806	1,988	1,988	11,281
Energy Expenditure (\$)	\$1,973,695	\$357,515	\$516,529	\$895,336	\$3,743,075
Commercial & Industrial	Electricity	Natural Gas	Fuel Oil	LPG	Total
Energy Content - Billion BTU	55	3	10	10	78
Energy by Physical Units	16,157,951	26,331	73,034	120,398	--
Physical Units	kilowatt-hr.	therms	gallons	gallons	--
Emissions (MTCO2 e)	6,142	147	746	630	7,665
Energy Expenditure (\$)	\$1,356,772	\$22,118	\$180,527	\$150,825	\$1,710,242
Highway	Gasoline	Diesel	Total		
Energy Content - Billion BTU	99	33	132		
Energy by Physical Units (gal.)	822,880	237,334	--		
Emissions (MTCO2 e)	--	--	10,179		
Energy Expenditure (\$)	\$2,073,657	\$694,678	\$2,768,335		



3.0 GHG Emission Reduction Strategies

There are four basic strategies for eliminating man-made emissions in West Pikeland. It is both feasible and economically viable to drastically cut climate-changing emissions using current technologies. Not all strategies can be carried out solely on the municipal level, but township government will be involved in or affected by all of them. Figure 2 shows the strategies, with energy efficiency serving as the foundation of change: the less energy we require, the smaller and more affordable the renewable energy systems and purchases become. Importantly, all four can be undertaken simultaneously, with good planning and energy management, to meet climate goals.

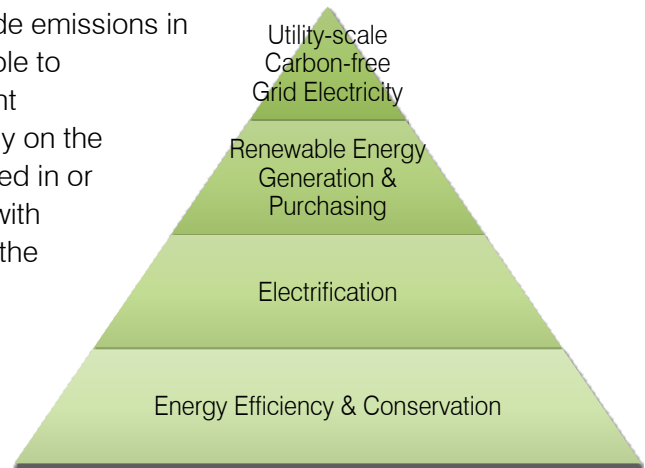


Figure 2. The Energy Pyramid

- **Increase the efficiency** of energy use and reduce unnecessary energy consumption.

Energy efficiency can get us 50% of the way to the elimination of emissions from energy sources—it would take twice as much renewable energy to get to zero GHG emissions without implementing energy efficiency measures.¹

- **Electrification of buildings**

The use of electricity for heating and cooling in buildings facilitates the conversion sources of energy powered by renewable resources. Oil, propane, or natural gas can never emit fewer direct GHGs due to the combustion process. Electricity can provide both heating and cooling at very high efficiency with the added advantage of eliminating combustion.

- **Electrification of transportation**

The conversion from internal combustion engine vehicles to electric vehicles facilitates the conversion to electric sources of energy, which can be powered by renewable energy. Use of gasoline or diesel fuel can never emit fewer GHGs due to the nature of the process.

- Conversion of electricity generation from fossil fuels to **clean renewable sources**.

A critical step in a clean energy future is replacing fossil fuel-based electricity generation at the power plant with carbon-free sources such as solar, wind, nuclear, and hydro power.

Electrification is directly supported by on-site renewable electricity generation, which further cuts emissions and bolsters resilience when paired with on-site battery storage.

“If we electrify everything, we’ll only need 40-50% of the energy we currently use to do all the things that we do today. And we can produce all that energy cleanly, domestically in America.”

~ Dr. Saul Griffith, renowned inventor and co-founder of *Rewiring America*

¹ American Council for an Energy-Efficient Economy; Halfway There: Energy Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050; September 2019; aceee.org/research-report/u1907.



3.1 What These Changes Will Look Like in West Pikeland Township

Table 3 shows the foundational steps residents and small business/small commercial building owners need to take to make this transition. Specifically, it shows the *average* rate at which the transition to energy efficiency and electrification needs to occur for homes, businesses, and motor vehicles. Importantly, these changes will start gradually and extend over a period of thirty years, because we have accounted for the need to make these changes practically, for example when HVAC systems and vehicles near their end of life and it is time to replace them anyway. Consequently, the rate of change at the start of the transition will start out slow (less than average initially) and accelerate over time.

Table 3 shows that *on average* 48 out of the approximately 1,442 housing units in West Pikeland would undergo weatherization improvements each year, many with funding and rebates from governmental agencies and PECO. Additionally, *on average* 48 housing units will be upgraded each year with more efficient ENERGY STAR appliances and LED lighting as the existing appliances and light bulbs need replacement anyway, receiving rebates for these purchases. Twenty-three oil and propane furnaces would be replaced each year (when the furnace needs to be replaced) with high efficiency heat pumps saving money on operating costs. Thirteen gas-fired furnaces would be replaced each year *on average* (when the furnace needs to be replaced) with high-efficiency heat pumps saving money on operating costs starting later (for instance in 2026), because of the economics of the conversion. All of these changes would start at lower levels than the average as the residents and the businesses become familiar with the transition.

Although the purchase of EVs will start up slowly, *on average* from 2020 to 2050, 106 more vehicles owned by residents and businesses in West Pikeland will be EVs. And due to improved mass transit and more integrated land use, the reduction of vehicle trips, and telecommuting, the passenger vehicle trips of 12 people will be eliminated. The great changes that we need to make are relatively easy when started now and made over a period of 30 years.

Importantly, to make the complete transition to clean energy, the energy we do use must be sourced from clean, renewable sources. Natural gas and fuel oil are not clean renewable energy sources; they are fossil fuels that, as Table 2 shows, are currently responsible for 34% of fossil fuel energy use in all buildings throughout the township. Clean renewable energy sources include on-site solar generation and through-the-grid purchasing of renewable energy (solar, wind, hydro). Anyone can buy renewable energy through the grid.



Table 3. Rate of Change in West Pikeland Township: Residential and Vehicles

Sector		Strategy	For West Pikeland	
			Avg. Quantity Change/Yr.	Units
Residential (houses and apartments)	New	Highly efficient new housing to replace existing housing	7	Housing Units
	Existing Houses	Increased thermal efficiency through weatherization	48	Housing Units
		Increase in electrical efficiency through energy eff. lighting and Energy Star appliances	48	Housing Units
		Oil and LPG heating replaced with heat pumps when existing furnace dies	23	Housing Units
		Natural gas heating replaced with heat pumps when existing furnace dies	13	Housing Units
Cars and Light-Duty Trucks		Residents purchase electric cars when replacing existing vehicles	106	EVs
		Decrease in Vehicle Miles Traveled due to trip elimination	12	Equivalent People



3.2 Benefits

In addition to the greenhouse gas benefits, energy-efficient buildings powered by clean fuels and electricity do far more than reduce emissions.

- **Health.** Improving energy efficiency in buildings creates conditions that support improved health and well-being for occupants. The reduction in use of heating oil and natural gas reduce local air pollution that translates to improved public health. Energy-efficient buildings also have better thermal quality and less mold caused by dampness. Positive health outcomes from better air quality and thermal comfort are consistently strongest among vulnerable groups, including children, the elderly, and those with pre-existing illnesses.
- **Economic savings.** The cheapest form of energy is that which isn't used. Higher efficiencies and decreased losses mean less energy is required to be produced and purchased, allowing a return on the investment and more predictable future costs.
- **Support for the local economy.** The hundreds of retrofits required for West Pikeland to achieve carbon neutrality will also result in job creation in broadening markets and will increase the asset value of both renter- and owner-occupied buildings.
- **Resilience.** A changing world requires awareness of our ability to continue our ways of life in the face of natural and national adversities. Maintaining domestic energy supply keeps our lights on and allows independence of that supply.
- **Environment.** One of the main reasons we have chosen this place to establish our lives and livelihoods is because of mutual appreciation of the natural world around us. From infrastructure expansion to water system pollution to noise pollution and climate effects, we undoubtedly have an impact on the world around us. Our responsibility is to be stewards to the environment and limit the impact we have on it. By doing so, it will better serve us and live on for generations to come.



4.0 Organizational Approach

West Pikeland Township will coordinate with the Clean Energy Transition Team (CETT) alongside the Environmental Advisory Council, the part of whose mission is to work with the West Pikeland community on energy efficiency programs and the transition to clean, renewable energy.

The Clean Energy Transition Team will:

- Educate itself on the actions necessary to efficiently transition the municipality to renewable energy
- Provide advice, guidance, and recommendations to the Board of Supervisors on policies to achieve goals related to sustainable practices and initiatives
- Plan for and coordinate energy transition initiatives approved by management and/or Board of Supervisors
- Research and plan for new initiatives as the energy transition proceeds
- Educate and consult with energy users in the community regarding timely and cost-effective actions to increase energy efficiency and transition to clean renewable energy
- Monitor the implementation of adopted initiatives and progress in energy conservation and efficiency and transition to renewable energy
- Prepare and undertake procedures to maintain the effectiveness of changes made
- Coordinate funding and financing for related projects
- Work toward implementation alongside associated groups such as the Vision Partnership Program Grant team, Phoenixville Clean Energy Alliance, Phoenixville Regional Planning Committee, and West Chester Area Coalition of Governments
- Report to the municipal officials on a periodic basis
- Report progress of the Township's municipal progress to the community



5.0 Community Actions

While clean energy transition plans are often, but not always, led by local governments, effective planning engages the spectrum of energy consumers and community sectors. Inclusion of community partners helps ensure the plan is relevant and is meeting a range of community goals with broad-based support for implementation. Inclusive sector engagement can also generate ownership, encourage cross-sector collaboration, inspire complementary action, increase general awareness, and build capacity related to energy management.

A community-wide transition needs vigorous and enthusiastic leadership to succeed. The support of the supervisors and staff is essential to a successful program. Support from key private sector and non-governmental high energy users can be vital as they too set an example for others in the community. By recognizing achievements of leaders and innovators in the broader community, the township can help publicize and mainstream climate adaptation and mitigation measures.

The Township will provide information and encouragement to all stakeholders in the community to use energy efficiently, to transition to the electrification of HVAC, appliances and vehicles, and to use renewable energy.

Key sectors in West Pikeland include:

- Residential
- Commercial
- Institutional: Education and non-profit (public & private schools, health facilities, community services)
- Energy (PECO, renewable energy installers, efficiency professionals, etc.)

Cost & Impacts

Calculating expected emissions reductions for each action requires assumptions about degree of implementation, technology, and individual behavioral changes several years into the future. The uncertainty associated with these assumptions makes it difficult to assign the exact reduction achievable by each action. To provide a simple but useful reference for reduction potential, an arrow symbol represents the emission reductions associated with each action.

- **Low impact**
- ↗ **Moderate impact**
- ↑ **High impact**

Cost is an important factor in the decision-making process. While an action's cost will depend on each specific situation, a general indication of the relative cost of an action are depicted with dollar symbols.

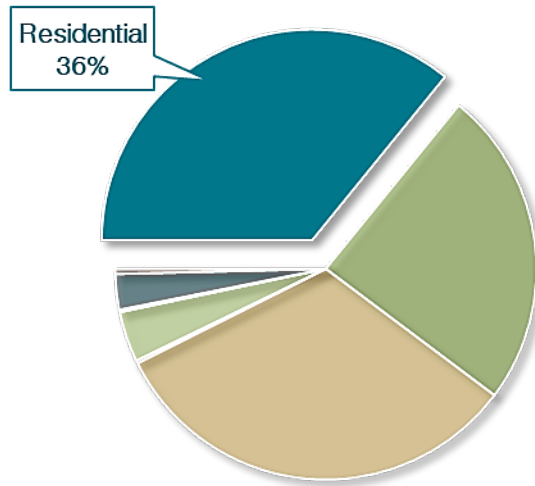
- **No cost**
- \$ **Low cost**
- \$\$ **Moderate cost**
- \$\$\$ **Higher cost**



5.1 Residential Actions

As residents of the community, everyone is critical to the success of the plan and, as constituents of your municipal officials, can exert influence over this process. The operation of homes and activities within the community represent a significant portion of the energy consumed by the community as a whole, presenting not only the opportunity to reduce that consumption, but also emphasizing the major role everyone can play in providing a safe, healthy, progressive, and forward-looking community.

Modification of energy use habits is a start to using existing equipment more efficiently, the key is in education and continual awareness.





Residential Efficiency

Target: Increase efficiency of 48 homes per year.

Resource: energy.gov [Homeowner's Energy Savings Hub](#)² for more information and incentives.

Action R-A: Assess the efficiency of your home. - | →

1. Use PECO's in-home or virtual Energy Assessment
 - A [\\$50 virtual PECO energy assessment](#) offers a big return for a small investment³
 - A [Free Energy Checkup](#) will help improve home health, safety and comfort⁴
2. Use ENERGY STAR's Home Advisor – custom recommendations and progress tracking
 - The [ENERGY STAR Home Advisor](#) can help improve home energy efficiency while adding comfort and value⁵
 - EPA's Home Energy Yardstick (HEY) provides a simple assessment of your home's annual energy use compared to similar homes⁶



Action R-B: Reduce home energy consumption \$ | →

Visit energystar.gov/campaign/waysToSave for all actions. **High-impact actions include:**

1. Turn off lights and appliances when not actively in use
2. Use Smart Power Strips, which help automatically turn off devices not in use
3. Use a programmable thermostat: only heat or cool when needed
 - [ENERGY STAR Smart Thermostats](#)⁷
4. Use a ceiling fan instead of air conditioning
5. Use drying racks instead of the clothes dryer

Weatherizing and switching to ENERGY STAR-rated appliances alone will cut your utility bill \$45/year on average and, over 30 years, save West Pikeland residents \$1M in energy costs!

Action R-C: Increase the efficiency of energy-using equipment \$-\$\$ | ↗

Choose energy-efficient products when it comes time to replace equipment and appliances.

ENERGY-STAR-rated products are widely available and typically have no to very little premium cost over non-rated products, but save money over time by using less energy.

1. Lighting – use LED lights
 - \$ [PECO provides Instant Discounts for qualified LED lights!](#)⁸
2. Electronics – look for the ENERGY STAR label on audio and video, phone, cable boxes or wireless routers, and variable-speed pool pumps

² energy.gov/save/homeowners

³ peco.com/WaysToSave/ForYourHome/Pages/EnergyAssessment.aspx

⁴ peco.com/WaysToSave/ForYourHome/Pages/FreeEnergyCheckUp.aspx

⁵ energystar.gov/campaign/assessYourHome

⁶ portfoliomanager.energystar.gov/pm/hey (not supported on internet explorer)

⁷ energystar.gov/products/smart_thermostats

⁸ peco.com/WaysToSave/ForYourHome/Pages/SmartLightingDiscounts.aspx



3. Appliances – look for the ENERGY STAR label and high efficiency ratings for Clothes Washers, Dishwashers, Refrigerators/Freezers, Air Purifiers, and dehumidifiers.
 - Use the [ENERGY STAR product finder](#) to shop.⁹
 - [PECO will pick up your old, working refrigerator or freezer and pay you \\$75!](#)¹⁰
 - [PECO provides rebates for ENERGY STAR appliances](#)¹¹
4. Windows and doors – Heat gain and heat loss through windows are responsible for 25% to 30% of residential heating and cooling energy use.
 - [Update or replace windows](#)¹²

Action R-D: Reduce energy loss

\$\$ | ↗



Increase sealing and insulation: Sealing, weatherization, and improving insulation is often the most cost effective way to improve efficiency and comfort.

- Take advantage of the [tax credit](#)¹³ for 10% of the cost of insulation (weather stripping, spray foam, caulk, house wrap) up to \$500.

Action R-E: Transportation efficiency – reduce vehicle miles traveled

- | →

Target: Reduce vehicle miles traveled by just 0.3% per year (if you drive 15,000 miles/year, that's only 45 fewer miles). Start now by combining trips to the grocery, hardware, and other locations.

Reduction in travel by cars and light-duty trucks: These strategies decrease the vehicle miles of travel and associated energy usage. Reductions in travel can be achieved by:

1. Diversion of trips to public transit and elimination of the need for trips through telecommuting for work and meetings
2. Favor walking, bicycling, and public transit
3. Consolidation of trips for greater efficiency

Municipal Support Actions:

- Promote residential energy efficiency PECO audits for all households
- Promote energy efficiency opportunities through outreach, workshops, and challenges
- Collaborate with PECO to identify and provide free audits for low income households
- Collaborate with PECO to share information for residential rebates and incentives
- [Sponsor activities related to the National Energy Efficiency Day](#)¹⁴
- Promote auxiliary activities such as tree planting which can help shade home and reduce cooling requirements, with the added benefit of carbon sequestration
- Steady changes in land use patterns which favor walking, bicycling, and public transit

⁹ energystar.gov/productfinder/

¹⁰ pecoeportal.com/partner/recycling

¹¹ peco.com/WaystoSave/ForYourHome/Pages/ApplianceRebates.aspx

¹² energy.gov/energysaver/update-or-replace-windows

¹³ energystar.gov/about/federal_tax_credits/non_business_energy_property_tax_credits

¹⁴ energyefficiencyday.org/



Renters: You Can Take Action Too!

While not directly responsible for all improvements in their rented homes, residents who rent still have a role to play in conservation, efficiency, and advocacy.

1. Advocate for energy efficient improvements for your health and financial stability.
2. Turn off lights & fans
3. Plug electronics into a smart power strip
4. Choose ENERGY STAR equipment including: TVs, media devices
5. Use LED lights
6. Weatherstrip around windows and doors

See energy.gov's [Clean Energy Hub for Renters](#)



Municipal Support Actions:

- Create policies or voluntary compliance programs to implement energy efficiency upgrades for rental units
- Encourage and incentivize energy efficiency retrofits in rental housing
- Encourage enrollment in the [Better Building Challenge for Multi-family Units](#) ¹⁵
- Require energy disclosure for rental properties or sponsor a voluntary disclosure program
- Pilot green leasing strategies to address the landlord and tenant split initiative
- Create a targeted outreach strategy to engage renters ¹⁶
- Partner with PECO to improve tenants' access to energy-usage data, audits and rebates

¹⁵ hudexchange.info/programs/better-buildings-multifamily-initiative/

¹⁶ energy.gov/save/renters



Residential Electrification

Target: Upgrade 36 systems with high-efficiency all-electric systems per year, on average.

Moving away from fossil fuels allows homeowners to improve the health and safety of their homes and reap the benefits of inherently higher efficiencies of many combustion replacements with electric motors. Electrification also paves the way to renewable energy sources. When it's time to replace heating and cooling equipment, appliances, and cars, that's the prime opportunity to electrify. Doing so saves money and cuts greenhouse gas pollution.

➤ A detailed resource when you want to dive in is [Rewiring America's Electrify Everything guide](#)¹⁷.

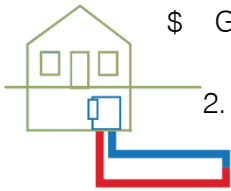
Action R-F: Increase the efficiency of your heating & cooling system with high-efficiency electric heat pumps

\$\$-\$\$\$ | ↑↑



1. **Heat and cool with one system:** Choose high-efficiency, cold climate-rated air-source or ductless “mini-split” heat pumps (great for older homes without ductwork!) to cut heating energy use and emissions by 50% and save 20-70% on heating and cooling bills.

- [ENERGY STAR Air Source Heat Pumps](#)¹⁸
 - [ENERGY STAR Ductless Heating and Cooling](#)¹⁹
 - [How Much Money do Heat Pumps Save?](#)²⁰
- \$ Get a [tax credit](#) for 30% of the heat pump cost.



2. Choose a geothermal heat pump system. Requires land area and extra upfront cost, but provides the highest savings!

- [ENERGY STAR Geothermal Heat Pumps](#)²¹
- \$ [PECO Heating and Cooling equipment rebates](#)²²
- \$ Take advantage of the [Residential Clean Energy Tax Credit](#)²³ for up to 30% of the geothermal heat pump cost.

Avg. Annual Savings with Heat Pump over Existing Equipment

Natural gas furnace	\$105
Electric furnace	\$815
Propane furnace	\$855
Baseboard heaters	\$1,287
Fuel oil boiler	\$929
Fuel oil furnace	\$947
Natural gas boiler	\$199

¹⁷ [Electrify Everything in Your Home \(rewiringamerica.org\)](#)

¹⁸ [energystar.gov/products/air_source_heat_pumps](#)

¹⁹ [energystar.gov/products/ductless_heating_cooling](#)

²⁰ [carbonswitch.com/heat-pump-savings/](#)

²¹ [energystar.gov/products/geothermal_heat_pumps](#)

²² [peco.com/WaystoSave/ForYourHome/Pages/HVACRebates.aspx](#)

²³ [energystar.gov/about/federal_tax_credits/geothermal_heat_pumps](#)



No combustion means better indoor air quality because there are no direct emissions such as carbon dioxide, NOx, or carbon monoxide.

Action R-G: Use electric stoves, especially induction \$\$ | ↗

With induction cooking technology, up to 85-90% of the energy consumed is transferred to the food, compared to about 75-80% for traditional electric systems and 30-40% for gas.

42%
increased asthma risk in homes with gas stoves

Additionally, the elimination of indoor combustion has documented health benefits.



Action R-H: Increase the efficiency of and electrify hot water heating systems with a heat pump water heater \$\$ | ↗

A heat pump water heater is **3-5x more efficient** than electric or gas heating and can save a family of four on average \$470 per year

\$ [PECO provides rebates for ENERGY STAR Heat Pump Water Heaters](#)²⁴

Action R-I: Use electric landscaping equipment \$ | →

Electric landscaping equipment not only facilitates electrification of the household, but are quieter, require less maintenance, and are healthier than gas-powered alternatives.

Action R-J: Electric vehicles \$\$\$ | ↑↑

Target: Switch to an EV, on average, by 106 cars/year through 2050.



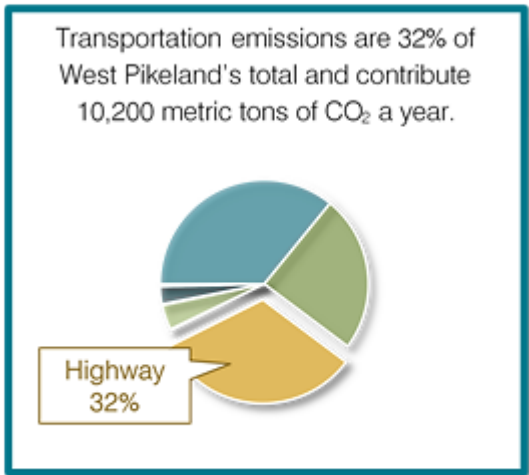
Electric vehicles reduce fuel costs by over half because of the high efficiency of electric-drive components.

Today's light-duty electric vehicles can exceed 130 MPGe (miles per gallon equivalent)²⁵.

EV drivers pay just \$1.22 to drive the same distance a conventional car goes on a gallon of gasoline.

Use [this calculator](#) to see how much you'll save.

- \$ Get a [tax credit](#) for up to \$7,500 for a new EV. Be sure it [qualifies](#) before buying.
- \$ Get a [\\$2,000 rebate](#) from the Commonwealth of PA and a [\\$50 rebate](#) for PECO just for buying an EV.



²⁴ [peco.com/WaystoSave/ForYourHome/Pages/WaterHeatingRebates.aspx](https://www.peco.com/WaystoSave/ForYourHome/Pages/WaterHeatingRebates.aspx)

²⁵ U.S. Department of Energy, Alternative Fuels Data Center. Electric Vehicle Benefits and Considerations. afdc.energy.gov/fuels/electricity_benefits.html



CASE STUDY: *The Perfect Roadmap for a clean, green, comfortable home.*

One local homeowner, motivated to lower his energy footprint, set off to follow the energy pyramid: conservation first, efficiency second, and renewables third.

- ✓ To conserve energy and identify efficiency projects, he signed up for a free PECO energy audit and a blower door test to identify areas of air leakage and poor insulation. The energy auditor directed him to replace attic insulation, seal windows, shut off lights when rooms are unoccupied, and plug electronics into outlet strips so they can be easily turned off when not in use.
- ✓ The homeowner began programming his thermostat back 8-10° during unoccupied times.
- ✓ When he needed a new refrigerator and dishwasher, he chose an ENERGY STAR refrigerator and dishwasher, and he replaced all lights with high-efficiency LED lights inside and out.
- ✓ The energy audit revealed that oil heat and a seven-year-old central air conditioning system with a failing compressor contributed to high energy use and utility bills. So, when the homeowner was faced with replacing his failing equipment, he knew the best course of action was to invest in energy-efficient upgrades. He upgraded to a new heat pump hot water heater, and replaced the oil furnace and central air conditioner with a super high-efficiency air source heat pump (18 SEER).
- ✓ The homeowner financed this project with a \$15,000, 0.99% low-interest loan and paid an additional \$3,200 to cover all project costs out of pocket. The measures saved the homeowner 37%, or \$1,320 annually, on his utility bill. His monthly utility savings of \$110 nearly cover the \$131 monthly loan payment.
Most importantly, says this enthusiastic homeowner, the house is now electrified and ready for the next step: **Go 100% renewable electricity!** He currently purchases 100% *green-e certified* wind power from an electricity generation supplier and, in the future, he plans to add solar panels so he can generate the carbon-free electricity on site. He will then purchase an electric vehicle that will be charged with 100% clean power at home!

Municipal Support Actions:

In cooperation with PECO and local energy professionals, encourage renewable heating and cooling upgrades:

- Establish and/or strengthen marketing and educational campaigns to raise awareness and understanding of building electrification technologies
- Electrified heating and cooling group purchasing campaigns: Host or support a community group campaign that aims to raise awareness, educate residents, and connect prospective customers with qualified contractors that may be able to offer heat pump installations at a discounted rate
- Electrified heating and cooling financial incentives: Identify and provide incentives to reduce the upfront costs of building electrification technologies.
- Take down barriers to future electrification, including consideration of EV-ready ordinances.



Residential Renewable Energy

Action R-K: Procure renewable electricity

\$ | ↗

Electricity is distributed through PECO's power lines, but in Pennsylvania you can purchase energy produced by a different company—many have the option of 100% renewable power.

Electricity enters the grid from many different sources, ranging from nuclear and gas to wind and solar power, making it impossible to know exactly where electricity is coming from at any given time. However, residents can purchase “renewable energy credits” that represent electricity generated by renewable energy sources and delivered into the grid on your behalf.

- ✓ **To buy green electricity**, filter for “Renewable Energy, PA Wind, Renewable PA, or Solar” on papowerswitch.com

More on Renewable Energy Credits:

One REC is produced when a renewable energy source generates one megawatt-hour (MWh) of electricity. For example: if a wind power facility produces 5 MWh of electricity, they have 5 RECs to keep or sell. If you buy those RECs, you are buying the “renewable” aspect of the electricity from the wind farm, and can say 5 MWh of your electricity came from a clean renewable source.

Action R-L: Install a solar array on or at your home

\$\$\$ | ↑↑



With open roof or ground space, your home can be a renewable power plant, potentially providing all your energy after electrification of energy-consuming needs. You will still be connected to the PECO power grid, allowing full operation if the solar array is not producing; net-metering captures the value of all power produced.

Paired with battery storage, your home's renewable power plant can outlast most PECO outages.

Solar power is an investment in the future, but the established residential market provides a variety of methods for you to make the commitment:

1. **Self-purchase** – you purchase and own the system. The system pays back with the savings on reduced electrical bill plus revenue from RECs.
2. **Lease** – pay \$0 upfront and pay a fixed fee back over time to a 3rd party, who often also covers all maintenance, monitoring, and warranties. You still see electric bill savings.
3. **Power Purchase Agreement** – pay \$0 upfront and pay for the energy produced by the system over time to a 3rd party, who often also covers all maintenance, monitoring, and warranties. You still see electric bill savings.

Resources:

- ✓ Explore your home's solar potential: sunroof.withgoogle.com/ or [PECO Solar Calculator](#)²⁶
- \$ [Homeowner's Guide to Federal Solar Tax Credits](#)²⁷

²⁶ secure.peco.com/mygeneration/?_ga=2.119262400.892110680.1681482608-1669318191.1680197143

²⁷ energy.gov/eere/solar/homeowners-guide-federal-tax-credit-solar-photovoltaics



CASE STUDY: Electrification and Renewables

Save Big with Federal and PECO Incentives

	Project Cost	Inflation Reduction Act Tax Credit	PECO Rebate	Project Cost After Incentives	Annual Utility Bill Savings
<i>Scenario 1:</i>					
High efficiency heat pump, 3 tons	\$ 8,500	\$ 2,000	\$ 300		\$ 240
Solar array, 5kW	\$ 16,000	\$ 4,800			\$ 1,500
	\$ 24,500	\$ 6,800	\$ 300	\$ 17,400	\$ 1,740
<i>Scenario 2:</i>					
Geothermal	\$ 22,000	\$ 6,600			\$ 1,200
Solar array	\$ 11,000	\$ 3,300			\$ 1,000
	\$ 33,000	\$ 9,900		\$ 23,100	\$ 2,200

The average homeowner can now save approximately 20-30% on project costs when the time comes to replace HVAC systems and install solar PV. What’s more, installing a high-efficiency heat pump or a geothermal heating/air conditioning system will cut the residential utility bill anywhere from 10-15% (heat pump) to 50% or more (geothermal), for savings that last for many years. And, solar panels will pay off in about 10 years if you opt to purchase them outright, or you can take out a loan and still save on your electricity bill, with no out of pocket costs since the utility savings will cover the loan payment (plus some!).



Action R-M: Use solar thermal systems to supplement pool heating and hot water needs

\$\$ | ↗

Use the “free heat” from the sun to heat the water for your house and pool.

Municipal Support Actions:

In cooperation with PECO and local energy professionals, encourage renewable energy sources:

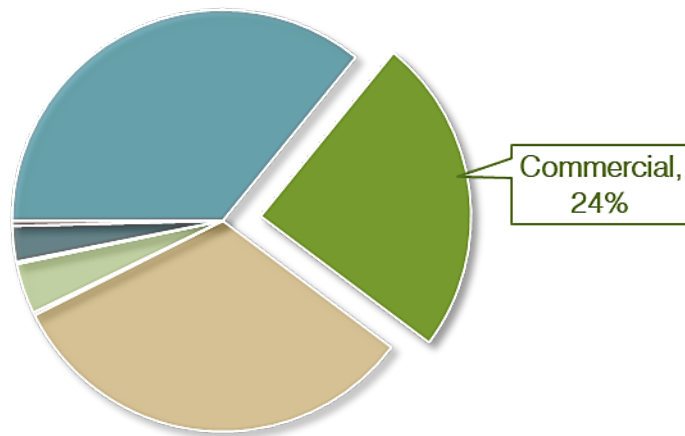
- Establish and/or strengthen marketing and educational campaigns to raise awareness and understanding of renewable technologies
- Renewable heating and cooling group purchasing campaigns: Host or support a community group purchasing campaign that aims to raise awareness, educate residents, and connect prospective customers with qualified contractors that may be able to offer solar installations at a discounted rate
- Renewable systems incentives: Identify and provide incentives to reduce the upfront costs of renewables implementation.
- Take down barriers to future renewables, including solar-ready ordinances.



5.2 Commercial Sector

Commercial buildings and industrial plants are responsible for nearly half of U.S. energy use and greenhouse gas emissions. West Pikeland’s commercial sector alone represents more than one-fifth of the Township’s GHG emissions. Different sectors need tailored solutions, and each sector can play its part in reducing emissions.

Businesses are often in the forefront of energy efficiency efforts because these actions have demonstrated favorable returns on their investments for decades, saving money while burnishing their image as companies that run sustainable operations.





Commercial Efficiency

Action C-A: Benchmark & document energy performance

- | →



When reducing energy use, the old phrase “**You can’t manage what you don’t measure**” holds very true. Measuring and benchmarking energy performance is the first step toward cutting excess consumption for commercial buildings larger than 5,000 sf. To get started:

1. Use ENERGY STAR’s Portfolio Manager to measure and compare your building’s energy use with similar buildings across the country. This is an easy and free way to see how much opportunity you have to reduce energy use and save money on utility bills. Portfolio Manager also allows you to compare your own energy use over time to track progress. Learn more:
 - [How does Portfolio Manager help you save?](#) ²⁸
 - You can earn recognition for high performance with [Energy Star Building Certification](#) ²⁹
2. [Get in the competitive spirit and make better progress by joining the Better Buildings Challenge](#) ³⁰

Action C-B: Identify and implement opportunities to save energy and money

- or \$ | ↗

1. Hire a pro to conduct an energy audit of your facility’s building envelope, HVAC and lighting systems, and overall energy use—then act on specific energy savings recommendations from the auditor. Recommendations typically range from weatherizing the building with insulation and sealing, upgrading aging HVAC and lighting equipment to more energy-efficient systems, and improving your ability to manage the systems through better controls. (See Action C-D.)
2. [Conduct and internal ENERGY STAR Treasure hunt](#) ³¹

Action C-C: Manage your building’s systems

\$ | ↑



Whether your commercial building is old or new, there are inevitable energy and cost savings opportunities, because even the most sophisticated, new buildings waste significant energy and money due to lack of operational control and management.

This is one of the most important short-term actions you can take to cut utility bills and reduce climate-changing pollution that result from your operations. More about controls:

²⁸ energystar.gov/buildings/benchmark

²⁹ energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification

³⁰ betterbuildingsolutioncenter.energy.gov/challenge

³¹ energystar.gov/buildings/save_energy_commercial_buildings/treasure_hunts



- [Lighting Controls | Department of Energy](#)³². Lighting controls include dimmers, motion sensors, occupancy sensors, vacancy sensors, photosensors, and timers.
- See how HVAC controls can cut building energy consumption up to 29% by sequencing operations, optimizing settings based on occupancy patterns, and detecting inadequate equipment operations or installation deficiencies:
[Building Controls | Department of Energy](#)³³
- Here's how to better manage your building: [Checklists of Energy-Saving Measures](#)³⁴
- Check out these Operation & Maintenance best practices: [Tune It Up, Turn It Off, And Check It Out](#)³⁵

If you have tenants, take a tip from [New York State's highly successful energy-saving tenant relations program](#).

Action C-D: Let the federal Inflation Reduction Act (IRA) be your guide to saving big on energy efficiency and clean energy



1. The IRA of 2022 makes the **single largest investment** in climate and energy in American history. It contains a wide range of credits designed to accelerate the transition to cleaner energy production, including:
 - \$ *Business energy investment tax credit* of **6% to 50%** for solar water heat, geothermal, solar PV, fuel cells, wind, and more.
 - \$ *Clean electricity production tax credit* (in lieu of investment tax credit) based on a per-kWh credit of \$0.025 for wind and geothermal and \$0.013 for other technologies) for **10 full years** of operation of geothermal, solar, wind, biomass, and hydroelectric systems
 - \$ *Energy-efficient commercial buildings tax deduction* of **\$0.30-\$1.80 per sf** (adjusted annually for inflation) for insulation, efficient water heaters, lighting systems, controls, HVAC systems, weatherization, and more.
 - \$ *Alternative fuel vehicle refueling property tax credit* of **6%** up to \$100,000 for **each single item** including Level 2 EV and direct-current, fast EV charging equipment.
 - \$ *Qualified commercial clean vehicle tax credit* of **30%** for commercial clean vehicles.

Read more here:

- ✓ [The Inflation Reduction Act | US EPA](#)
- ✓ [Federal Income Tax Credits and Incentives for Energy Efficiency | ENERGY STAR](#)

2. Combine this with the [PECO incentive and rebate programs](#), and commercial customers really win big.³⁶

³² energy.gov/energysaver/lighting-controls

³³ energy.gov/eere/buildings/building-controls

³⁴ energystar.gov/buildings/save_energy_commercial_buildings/ways_save/checklists

³⁵ energystar.gov/buildings/save_energy_commercial_buildings/ways_save/om_best_practices

³⁶ peco.com/WaysToSave/ForYourBusiness/Pages/Incentives.aspx



CASE STUDY: Save Big with Federal and PECO Incentives

	Project Cost	Inflation Reduction Act Tax Credit*	PECO Rebate	Utility Savings/Year**
LED Lighting (25 fixtures)	\$ 15,018	\$ 24,125	\$ 550 +20% bonus	\$ 1,115
All-electric Tankless Hot Water Heater	\$ 500		\$ 5,000 +20% bonus	\$ 23
100% Heat Pump Heating/AC	\$ 72,375		\$ 1,437	
Initial Project Cost	\$ 87,893			
Total Credits/Rebates	\$ 30,785			
New Project Cost (35% reduction)	\$ 57,108			
Annual Utility Bill Savings**	\$ 2,575			

*179D Commercial Energy Efficiency Tax Deduction

**At today's utility rates. Savings will increase in future years as rates increase.

The owners of a 9,650 sf office building needed to upgrade their lighting system, hot water heater, and HVAC due mostly to age. In fact, aging systems requiring ongoing repairs and replacement represent one of the greatest opportunities to maximize energy efficiency and make a move toward electrification. This real-world example shows how the federal IRA and PECO incentives help business owners achieve these goals. Here, the owners receive a **35%** reduction in the project cost, enabling them to install state-of-the-art, efficient electric equipment for thousands of dollars **less** than a conventional “in-kind” equipment replacement. The project will also cut the business’s utility bill by **24% every year** for the life of the new equipment – allowing the business to reap operational savings year after year.³⁷

Municipal Support Actions:

- Promote the use of ENERGY STAR Portfolio Manager and [Energy Star Building Certification](#)³⁸ through a coordinated outreach program for different commercial groups
- Provide technical support to help building owners to begin benchmarking and certification
- Consult with PECO on audits for major stakeholders (multifamily housing, businesses, etc.)
- Encourage local businesses and business associations (Chambers of Commerce, etc.) to enroll in the [Better Building Challenge for the commercial sector](#)³⁹
- Promote energy efficiency improvements for businesses
- Remove permitting and implementation barriers

³⁷ nysersda.ny.gov/Business-and-Industry/Commercial-Real-Estate/Energy-Efficiency-for-Commercial-Tenants

³⁸ energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification

³⁹ betterbuildingsolutioncenter.energy.gov/challenge/sector/commercial



Commercial Electrification

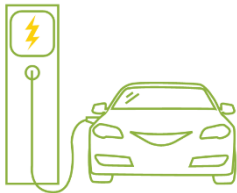
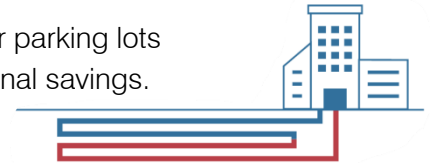
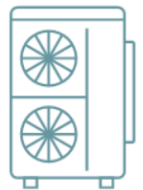
To meet decarbonization goals, commercial buildings are evolving towards beneficial electrification: the process of replacing fossil fuel-powered furnaces, boilers, and water heaters with efficient technologies such as cold climate electric heat pumps. When paired with renewable energy, these electric alternatives drastically reduce a building's carbon footprint. More and more jurisdictions are considering electrification in energy codes as a key tool to meet climate targets. Building owners and developers should consider all-electric options in retrofit projects or in their designs for new construction projects so they can be part of the solution.⁴⁰

Action C-E: Electrify commercial building heating equipment

\$ to \$\$\$ | ↑

For more information on how electrification works for your bottom line and our planet, see: [How Will We Electrify Existing Buildings?](#)⁴¹

1. **When it's time to replace old systems, heat and cool with high-efficiency heat pumps or variable refrigerant flow systems.** New technology heat pumps work in cold weather! The key is to recruit energy experts and HVAC installers with real expertise in energy efficiency and decarbonization. Read more about this growing trend and how it works:
 - ✓ [Building Electrification Is Reaching Critical Mass in Commercial Facilities - Facilities Management Insights \(facilitiesnet.com\)](#)
2. Consider a **geothermal heat pump system**, especially with land or parking lots available, for heating and cooling and realize substantial operational savings.
3. Use **heat-pump hot water heaters**.



Action C-F: Provide electric vehicle charging for employees and customers

\$\$\$ | →

Resources:

- ✓ [Workplace Charging for Electric Vehicles](#)⁴²
- ✓ [Workplace Charging Employer Workshop Toolkit](#)⁴³

Action C-G: Electrify your fleet

\$\$\$ | ↑



Electric vehicles can **reduce fuel costs dramatically** because of the high efficiency of electric-drive components. Today's light-duty electric vehicles can exceed 130 MPGe (miles per gallon equivalent)⁴⁴. Additional savings are realized with decreased maintenance.

⁴⁰ U.S. EPA & DOE ENERGY STAR. Using Clean Energy in Commercial Buildings. energystar.gov/buildings/about_us/using_clean_energy

⁴¹ phcppros.com/articles/12928-how-will-we-electrify-existing-buildings

⁴² afdc.energy.gov/fuels/electricity_charging_workplace.html

⁴³ cleancities.energy.gov/technical-assistance/workplace-charging/

⁴⁴ U.S. Department of Energy, Alternative Fuels Data Center. Electric Vehicle Benefits and Considerations. afdc.energy.gov/fuels/electricity_benefits.html



- Replacement of internal combustion engine (ICE) vehicles with electric vehicles (EVs):** A substantial reduction in energy usage in vehicles can be achieved simply by replacing ICE vehicles with EVs when it is time to purchase a new car. An EV is conservatively 68% more efficient than an ICE vehicle. An ICE vehicle is only about 17%–21% efficient in converting energy to power, whereas an EV is over 77% efficient⁴⁵.
- Energy efficiency in medium- and heavy-duty trucks (MDTs and HDTs):** Tesla has developed a long-distance, electric-powered tractor trailer that it demonstrates meets all industry technical and economic requirements.⁴⁶ Volvo, and Freightliner are also developing electric powered trucks.⁴⁷
- In addition to federal, state, or local incentives that can lower their purchase price, **EVs offer high fuel economy and lower operating cost.** Light-duty all-electric vehicle Operation and Maintenance averages about 3 cents per mile according to the U.S. General Services Administration. EVs achieve their best fuel economy during stop-and-go driving conditions typical of many fleet applications. Electricity prices are also less volatile than those of gasoline/diesel, making it easier to predict fuel costs over time. Finally, lower off-peak electric rates may be available for charging, which further reduces EV fuel costs.

 - \$ Electric Vehicles for Fleets: [US DoE Alternative Fuels Data Center](#)⁴⁸
 - \$ Federal Tax Credits for All-Electric and Plug-in Hybrid Vehicles: [fueleconomy.gov Tax Incentives](#)⁴⁹

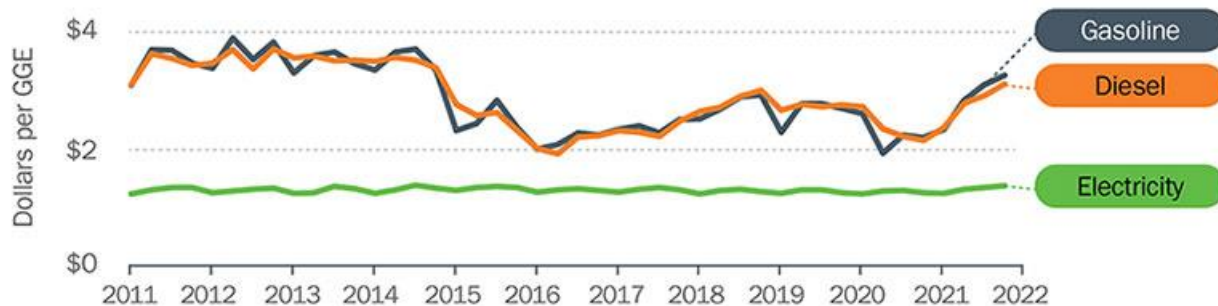


Figure 3. Electricity Prices Compared to Gasoline and Diesel - Low and stable.⁵⁰

Resource: Fleet Electrification:
[Your Roadmap to Drive: Vehicle Electrification](#)

⁴⁵ [fueleconomy.gov/feg/evtech.shtml](#)

⁴⁶ [tesla.com/semi](#)

⁴⁷ [aceee.org/blog-post/2020/02/electrification-opportunities-many-not-all-applications](#)

⁴⁸ [afdc.energy.gov/vehicles/electric_fleets.html](#)

⁴⁹ [fueleconomy.gov/feg/taxevb.shtml](#)

⁵⁰ U.S. DOE Alternative Fuels Data Center [afdc.energy.gov/vehicles/electric_fleets.html](#)



Municipal Support Actions:

- Promote energy efficiency opportunities through outreach, workshops, and block or specific commercial sector challenges
- Identify and provide incentives for energy efficiency retrofits
- Collaborate with PECO to provide rebates and incentives to replace old or inefficient boilers and furnaces with air-source and geothermal heat pumps
- Inform local businesses about Commercial Property Assessed Clean Energy (CPACE) to fund renewable installations and energy efficiency
- Educate regarding the benefits of cool roofs to reduce heating and cooling needs;
- Promote [workshops and programs offered by regional Green Building United](#)⁵¹

⁵¹ greenbuildingunited.org/



Commercial Renewable Energy

Action C-H: Procure renewable energy

\$ | ↗

1. Utility Green Power Products: While electricity is distributed through PECO's power lines, in Pennsylvania you have the opportunity to choose a different company to produce that energy. Many electricity providers offer the option of 100% renewable power.



- Filter for "Renewable Energy, PA Wind, Renewable PA, or Solar" on papowerswitch.com.
 - Be sure to look for solar and wind that is, preferably, locally produced
 - Small hydropower is also environmentally sound
 - Other sources defined by PA as "renewable" are not clean, including waste coal, so we advise taking a hard look at your chosen provider's energy source mix.
 - The goal is to keep it clean and carbon-free

2. Procure Renewable Energy Credits (RECs). These certificates give you the rights to the environmental, social, and other beneficial attributes of renewable electricity that is produced elsewhere and fed into the grid.

- ✓ Learn more about RECs and how they work: [Renewable Energy Certificates \(RECs\) | US EPA](https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs)⁵²
- ✓ Navigate the REC market and find out how to purchase them here: [Where Can I Buy Renewable Energy Credits \(RECs\)? | EnergySage](https://energysage.com/other-clean-options/renewable-energy-credits-recs/where-to-buy-renewable-energy-credits-recs/)⁵³

Action C-I: Install on-site renewable energy systems including solar panels

\$\$\$ | ↑↑

Businesses can get free solar assessments from local installers to determine if your property is ideal for solar. These installers will provide an ROI based on the financing programs available, which include lease programs as well as up front system purchases. It is an ideal way to determine what your opportunities are and how solar energy can save you money while making your business more resilient! These professionals will help navigate questions like:

1. Best location for the system, including rooftops and parking lots:
 - Site Considerations: [US EPA Renewable Site Considerations](https://www.epa.gov/green-power-markets/site-considerations)⁵⁴
 - Virtual Meter Aggregation – Businesses can produce power at another company-owned site under your same PECO account and apply that electricity production to any companion sites within two miles.
2. Costs and benefits of pairing the system with battery back-up, to allow continuous operation through utility power outages. Battery backed-up renewable energy systems can help keep your operations going in the face of grid issues.



⁵² <http://epa.gov/green-power-markets/renewable-energy-certificates-recs>

⁵³ <http://energysage.com/other-clean-options/renewable-energy-credits-recs/where-to-buy-renewable-energy-credits-recs/>

⁵⁴ epa.gov/green-power-markets/site-considerations



3. Financing options:

- **Direct cash purchase or conventional loan.**
- **PPA – Power purchase agreement:** Similar to leasing or “renting” a solar panel system. Simply, a solar company or PPA financier covers all the costs to buy solar equipment and install it. Though the solar panel system is located on your property, they own it and therefore take care of any necessary maintenance. They then “sell” back to you the energy the system produces, similar to how a utility sells you energy.
 - ✓ For more information on PPAs:
[Power Purchase Agreements: What You Need To Know | EnergySage](#)⁵⁵
 - ✓ See this 5-step example of a PPA process:
[Solar Power Purchase Agreement Advances Renewable Energy at Colorado State University](#)
- **C-PACE – Commercial Property-Assessed Clean Energy:** A great new financing program that helps commercial property owners pay for renewable energy and energy efficiency projects through their tax bills. This way, as a commercial property owner, you don’t need to pay off these building upgrades if you decide to sell the property in the future. The future owner will take on the remaining costs. It is a win-win for your business and the planet!
 - ✓ Learn how to take control of energy upgrade and renewable energy project costs here:
[Pennsylvania C-PACE](#)⁵⁶

Municipal Support Actions:

In cooperation with PECO and local energy professionals, encourage renewable energy sources:

- Establish and/or strengthen marketing and educational campaigns to raise awareness and understanding of renewable technologies
- Renewable heating and cooling group purchasing campaigns: Host or support a community group purchasing campaign that aims to raise awareness, educate residents, and connect prospective customers with qualified contractors that may be able to offer solar installations at a discounted rate
- Renewable systems incentives: Identify and provide incentives to reduce the upfront costs of renewables implementation.
- Take down barriers to future renewables, including solar-ready ordinances.

⁵⁵ news.energysage.com/power-purchase-agreements-overview/

⁵⁶ pennsylvaniacpace.org/



5.3 Institutional – Education and Non-Profit Sectors

Education

West Pikeland Township is part of the Downingtown Area School District and is home to many of the students, teachers, and families that attend the public and private schools in the area. Our schools provide a valuable function in educating and engaging staff, students, and families to take a leadership role in promoting energy conservation and efficiency and implementing renewable energy systems. Schools are a great way to instill the importance of responsible energy use not only in the classroom and in the building, but extending to each student’s home and future.

➤ [ENERGY STAR Building Upgrade Manual Chapter 10: K-12 Schools](#)⁵⁵

School Efficiency

According to the [ENERGY STAR](#)⁵⁷, America’s schools spend more than \$7.5 billion every year on energy – the largest operating expense for school districts after salaries and benefits. Of that cost, space heating, cooling, and lighting typically account for nearly 70% of school energy use.

Action E-A: Get committed



Often, the first step to cutting energy use is getting everyone on the same page. Take a tip from the Radnor School Board, which unanimously passed a resolution calling for 100% clean energy and electric buses. The resolution came after months of student campaigning. Read more here: [Resolution Establishes District’s Intent To Transition To 100% Clean Energy And Transport By 2030](#)⁵⁸

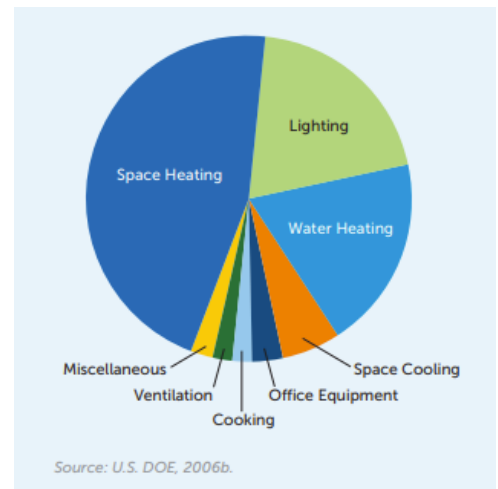


Figure 4. Average Breakdown of Energy Use in K-12 Schools

SIERRA CLUB

North Brunswick, NJ | login | SHOP | JOIN | RENEW

About Us | Explore Issues | Take Action | Get Outside | **Donate**

Radnor School Board Unanimously Passes Resolution for 100% Clean Energy and Electric Buses After Months of Student Campaigning

Resolution Establishes District’s Intent To Transition To 100% Clean Energy And Transport By 2030

August 31, 2020

⁵⁷ energystar.gov/sites/default/files/buildings/tools/EPA_BUM_CH10_Schools.pdf

⁵⁸ sierraclub.org/press-releases/2021/09/radnor-school-board-unanimously-passes-resolution-for-100-clean-energy-and



Action E-B: Benchmark energy use



1. Use ENERGY STAR Portfolio Manager to measure and compare your building's energy use to that of similar schools across the country, for a good idea of how much energy is wasted. Use this free tool to track energy and utility cost savings over time.
 - ✓ [How does Portfolio Manager help you save?](#)⁵⁹
 - ✓ Earn recognition for high performance with [Energy Star Building Certification](#)⁶⁰
2. Join the Better Building Challenge: betterbuildingsolutioncenter.energy.gov/challenge:
 - a. Partners agree to:
 - i. Conduct an energy efficiency assessment of their building portfolio and pledge an organization-wide energy savings goal
 - ii. Take action by showcasing an energy efficiency project and implementing a plan to achieve lasting energy savings
 - iii. Report results by sharing cost-effective approaches for saving energy and performance data that demonstrate their success.
 - b. U.S. Department of Energy agrees to:
 - i. Provide expert technical and energy efficiency solution development assistance
 - ii. Connect partners with a network of allies (including financial organizations) that can help them achieve their energy savings pledges
 - iii. Publicly recognize partners for achieving energy and cost savings and applying innovative energy efficiency solutions.

ENGAGE STUDENTS WITH ENERGY-FOCUSED CURRICULA

K-12 schools and institutions of higher education are integrating sustainability education across the entire curriculum. This integration is critical to our future success in fighting climate change and transitioning to a low-carbon energy economy.

For background on sustainability across the curriculum:

- ✓ [Sustainability Across the Curriculum | AACSB](#)⁶¹
- ✓ Become a K12 Eco-School by partnering with the National Wildlife Federation, which offers a host of tools for educators: [National Wildlife Federation curriculum](#)⁶²



⁵⁹ energystar.gov/buildings/benchmark

⁶⁰ energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification

⁶¹ aacs.edu/insights/articles/2022/03/sustainability-across-the-curriculum

⁶² nwf.org/Educational-Resources/Educator-Tools



Action E-C: Implement energy use behavioral changes, especially when out of session. - | ↗

Energy conservation can minimize electrical and fuel usage, especially when the school is closed or out of session. Just by setting temperatures and ventilation back, you can make notable progress!



Resources:

- ✓ [Energy Efficiency Programs in K-12 Schools \(epa.gov\)](https://www.epa.gov/energy/energy-efficiency-programs-k-12-schools) ⁶³
- ✓ [K-12 School Districts | Better Buildings Initiative \(energy.gov\)](https://www.energy.gov/better-buildings-initiative) ⁶⁴

Action E-D: Provide anti-idling guidance at the building and school bus stops - | ↗



Diesel exhaust is carcinogenic and contains significant levels of particulate matter (PM), a direct cause of childhood asthma. PM concentrations are known to be four times higher inside the back of a school bus than outside, so cutting the engine in lieu of idling can have real benefits for the environment and students.

In addition, the [US EPA states](https://www.epa.gov/air-quality/anti-idling)⁶⁵:

- Continuous idling for more than three minutes emits more PM than a restart. Emissions after a restart contain less carbon monoxide, nitrogen oxides, and other pollutants than if the school bus idled continuously over a 10-minute period
- Running an engine at low speed (idling) causes twice the wear as driving at regular speeds
- School bus engines do not need to idle more than a few minutes to warm up in cold weather: engine manufacturers generally recommend no more than three to five minutes

Read more about the whys and hows of implementing an anti-idling program for school buses here: [School Bus Idle Reduction | US EPA](https://www.epa.gov/school-bus-idle-reduction) ⁶⁵

School Electrification

Action E-E: Go all-electric and make energy-efficient equipment choices

\$ to \$\$ | ↑

The best time to upgrade heating and cooling equipment with efficient, all-electric equipment is when it starts to require too much maintenance and repair or when it's at the end of its expected service life.

West Chester University did it. The University instituted a campus-wide initiative to eliminate its coal-fired steam plant and electric chillers and, with \$27M in state and federal funds plus funds from the school itself, they achieved their objective and are saving nearly 50% on their utility bill every year. Importantly, it all began when the president signed on to the American College & University Presidents' Climate Commitment: making a public commitment and following through with a plan and policy is the most important first step in making real change!

Read all about it here: [Geothermal Initiative at WCU: Sustainability for Institutional Success](https://www.wcupa.edu/Sustainability/documents/WestChesterUniversityGeothermalNACUBOSAP2014.pdf) ⁶⁶

⁶³ [epa.gov/sites/default/files/2017-06/documents/k-12_guide.pdf](https://www.epa.gov/sites/default/files/2017-06/documents/k-12_guide.pdf)

⁶⁴ betterbuildingsolutioncenter.energy.gov/sectors/k-12-school-districts

⁶⁵ [epa.gov/dera/school-bus-idle-reduction](https://www.epa.gov/dera/school-bus-idle-reduction)

⁶⁶ [wcupa.edu/Sustainability/documents/WestChesterUniversityGeothermalNACUBOSAP2014.pdf](https://www.wcupa.edu/Sustainability/documents/WestChesterUniversityGeothermalNACUBOSAP2014.pdf)



Today, the incentives to make energy-saving investments are bigger than they have ever been, thanks to the Inflation Reduction Act. **For the first time in history, the federal government is allowing nonprofits to benefit from tax credits offered to the for-profit sector through a “direct cash pay” option.** Schools and nonprofits can take advantage of the direct pay incentive, which will cover from 6% to 70% of project costs beginning construction before 2025. Read more about it [here](#).⁶⁷

Action E-F: Give Students a Clean Ride to School! Use electric buses & vehicles \$ to \$\$\$ | ↑



As school buses are retired, implement gradual electrification of the school bus fleet. The 2021 American Rescue Plan offers rebates to school districts and fleet owners to replace diesel buses with new electric buses ([\\$300,000 per bus](#)⁶⁸), and the Inflation Reduction Act (IRA) makes school buses eligible for electrification funds through the [Clean Heavy Duty Vehicles program](#)⁶⁹ run by the EPA. The new commercial vehicle tax credit (which can be claimed by all nonprofits as a direct cash payment option), can be claimed for either 30% the cost of an electric school bus, or the incremental cost between an electric and conventional bus for a value of up to \$40,000 for Class 6 or 7 buses. Funds will be available until 2031.

- ✓ For background on electric buses and how to adopt them into your fleet, go to US DOE's [Electric School Bus Education](#)⁷⁰

The first step is to coordinate charging infrastructure for the fleet. A tax credit of up to \$100,000 is also available for a “single item” charging infrastructure.

Work with the school district to make aggregated hybrid and EV purchases and charging infrastructure planning or to obtain leasing contracts for a reduced price.

School Renewable Energy

Action E-G: Procure renewable electricity

\$ | ↗



School districts can purchase renewable energy through the power grid simply by shopping for it on [PAPowerSwitch.com](#). Many providers offer 100% renewable power, and you can select local wind/solar energy to be directed into PECO's power grid.

Purchasing renewable electricity in coordination with other schools in the district or with other districts can decrease the cost and increase the impact.

⁶⁷ bricker.com/people/justin-cook/insights-resources/publications/inflation-reduction-act-direct-payments-to-nonprofits-and-political-subdivisions-for-clean-energy-projects

⁶⁸ epa.gov/dera/2021-american-rescue-plan-arp-electric-school-bus-rebates

⁶⁹ stonline.com/special-reports/inflation-reduction-act-offers-latest-school-bus-electrification-funding-opportunities/

⁷⁰ afdc.energy.gov/vehicles/electric_school_buses.html



Electricity enters the grid from many different sources, ranging from nuclear and gas to wind and solar power. However, purchased “renewable energy certificates” (RECs) represent electricity generated by renewable energy sources and delivered into the grid on your behalf.

One REC is produced when a renewable energy source generates one megawatt-hour (MWh) of electricity and delivers it to the grid. For example, if a wind power facility produces 5 MWh of electricity, they have 5 RECs to keep or sell. If you buy those RECs, you are buying the “renewable” aspect of the electricity from the wind farm, and you can say that 5 MWh of your electricity use came from a clean renewable source.

- ✓ To buy green electricity, filter for “Renewable Energy, PA Wind, Renewable PA, or Solar” on papowerswitch.com. Be sure to search as a commercial (not residential) customer.

Action E-H: Install on-site renewable energy systems, solar panels

\$\$ to \$\$\$ | ↑↑

1. Prioritize areas like rooftops and parking lots

- Site Considerations: [US EPA Renewable Site Considerations](#)⁵⁴
- Virtual Meter Aggregation – Produce power at another site under the same PECO account and apply that electricity production to any site within two miles.



2. Aggregate installations with multiple district schools to enhance economies of scale.

3. Financing options:

- **Direct cash purchase** or **conventional loan**.
- **PPA – Power purchase agreement:** Similar to leasing a system. A solar company or financier covers costs to buy and install solar equipment; they own and maintain it. They then “sell” back energy the system produces, similar to a utility.
 - ✓ For more information on PPAs: [Power Purchase Agreements: What You Need To Know | EnergySage](#)⁷¹
 - ✓ See this 5-step example of a PPA process: [Solar PPA Advances Renewable Energy at CSU](#)

4. Include education on the renewable energy system in the student curriculum with hands-on interaction.

Municipal Support Actions:

Promote clean energy commitments and target setting by the Downingtown Area School District and other educational institutions.

- Investigate the options for a Power Purchase Agreement for renewable electricity procurement for all district schools

⁷¹ news.energysage.com/power-purchase-agreements-overview/



Nonprofits, Congregations, and Other Institutions

Owners and operators of institutions (such as hospitals, universities, religious organizations, and retirement homes and continuing care facilities) are large energy users and have a stake in reducing their energy costs. They often have productive relationships with their municipal officials that may be leveraged to obtain their interest and cooperation.

Non-profit organizations are medium-to-large energy users and have a stake in reducing their energy costs, since they often operate on limited funding. As with large institutions and businesses, it is in their interest to work with their municipality to reduce their energy use and costs, while contributing to the long-term sustainability of the community. Houses of worship, community centers, and social service offices are included in this sector.

Faith traditions and community support resources teach the importance of stewarding natural and financial resources. Below are just a few of the important potential benefits of strategic and cost-effective energy stewardship: ⁷²

- Save money that can be redirected to the basic mission.
- Reduce energy-related pollution that threatens human life and health directly, and indirectly through damage to life-supporting ecosystems.
- Conserve natural resources for future generations.
- Improve the overall comfort and appearance of your space.
- Extend the useful lifespan of your facility and its equipment.
- Increase the asset value of the facility.
- Support the credibility of capital campaigns by demonstrating that stewardship of funds is “practiced as well as preached”.
- Improve creditworthiness for financing new construction or remodeling.
- Engage the time and talents of members, especially youth groups.
- Serve as a model of energy and financial stewardship

➤ [ENERGY STAR Action Workbook for Congregations](#)

⁷² ENERGY STAR Action Workbook for Congregations
energystar.gov/sites/default/files/tools/ENERGYSTAR_Congregations_AWB_April%202022_508.pdf



Non-Profit & Congregation Efficiency

Action N-A: Assess the efficiency of your facility - | →



Use ENERGY STAR Portfolio Manager to measure and compare your energy to similar buildings and past consumption.

- ✓ How does Portfolio Manager help you save?
energystar.gov/buildings/benchmark

Action N-B: Assess and track energy use - | →

Use ENERGY STAR's Portfolio Manager to measure and compare your building's energy use with similar buildings across the country. This is an easy and free way to see how much opportunity you have to reduce energy use and save money on utility bills. Portfolio Manager also allows you to compare your own energy use over time to track progress.

- ✓ [How does Portfolio Manager help you save?](#)⁷³
- ✓ Earn recognition for high performance with [Energy Star Building Certification](#)⁷⁴
- ✓ Join the Better Building Challenge: betterbuildingsolutioncenter.energy.gov/challenge

Action N-C: Reduce energy consumption - | ↗



Visit energystar.gov/campaign/waysToSave for all actions. **High-impact actions include:**

1. Turn off lights and appliances when not actively in use.
2. Use Smart Power Strips, which help automatically turn off devices not in use.
3. Use a [programmable thermostat](#)⁷⁵ to only heat or cool when needed.

Action N-D: Increase the efficiency of your energy-using equipment and facility \$ to \$\$ | ↑

Choose energy-efficient products when it comes time to replace equipment and appliances.

ENERGY STAR-rated products typically have no or little premium cost over non-rated products, but save money over time by using less energy.

1. Lighting – Use LED lights:
 - \$ [PECO provides Instant Discounts for qualified LED lights!](#)⁷⁶
2. Appliances & Equipment – Look for the ENERGY STAR label and high efficiency ratings for Office Equipment and Kitchen and Food Equipment:
 - \$ [PECO provides rebates for ENERGY STAR appliances](#)⁷⁷
3. Sealing and insulation: Sealing and insulating is often the most cost effective way to improve efficiency and comfort, especially in older buildings.

Read tips here:

- ✓ [Seal and Insulate with ENERGY STAR](#)



⁷³ energystar.gov/buildings/benchmark

⁷⁴ energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification

⁷⁵ energystar.gov/products/smart_thermostats

⁷⁶ peco.com/WaystoSave/ForYourHome/Pages/SmartLightingDiscounts.aspx

⁷⁷ peco.com/WaystoSave/ForYourHome/Pages/ApplianceRebates.aspx



Non-Profit & Congregation Electrification

Action N-F: Electrify heating equipment

\$ to \$\$ | ↑

When it's time to replace old heating and cooling systems, that's the prime opportunity to electrify using high-efficiency heat pumps for heating & cooling. Save money and cut pollution—and open opportunities to improve comfort with better-performing equipment and zoning so all spaces in can be conditioned according to occupant needs. Moving away from fossil fuels improves the health and safety of indoor environments and benefits from inherently higher efficiencies. Electrification paves the way to renewable energy sources, because only electricity can be generated with clean carbon-free fuel sources such as the sun, tides, and wind.

1. Heat and cool with high-efficiency heat pumps or variable refrigerant flow systems.

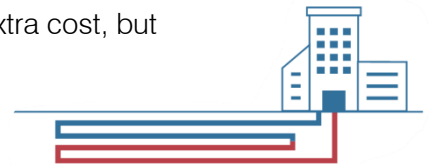
Air-source heat pumps cut heating energy use and emissions by 50% and save 20-70% on heating and cooling bills:

- ✓ [ENERGY STAR Air Source Heat Pumps](#)⁷⁸
- ✓ [ENERGY STAR Ductless Heating and Cooling](#)⁷⁹
- ✓ [How Much Money do Heat Pumps Save?](#)⁸⁰



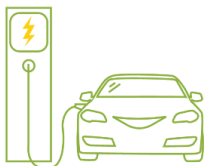
2. Choose a geothermal heat pump system. Requires land area and extra cost, but provides the highest savings!

- ✓ [ENERGY STAR Geothermal Heat Pumps](#)⁸¹
- \$ [PECO Heating and Cooling equipment rebates](#)⁸²



Action N-G: Provide electric vehicle charging

\$\$ | ↗



Allow your community to re-charge while at your facility, encouraging their use of zero-emission vehicles and displaying your commitment to the sustainability of your community. Not sure how to proceed? Read “EV Charging Explained” [here](#),⁸³ and learn how to set it up [here](#).⁸⁴

Action N-H: Use electric vehicles

\$ to \$\$ | ↑↑



If any vehicles are used for operations, **transition to electric vehicles when existing vehicles are retired.**

- ✓ [Electric Vehicles for Fleets](#)⁸⁵
- \$ [Federal Tax Credits for All-Electric and Plug-in Hybrid Vehicles](#)⁸⁶

⁷⁸ energystar.gov/products/air_source_heat_pumps

⁷⁹ energystar.gov/products/ductless_heating_cooling

⁸⁰ carbonswitch.com/heat-pump-savings/

⁸¹ energystar.gov/products/geothermal_heat_pumps

⁸² peco.com/WaystoSave/ForYourHome/Pages/HVACRebates.aspx

⁸³ [How to Set Up a Public Electric Vehicle Charging Station, the Fast Charging Edition \(treehugger.com\)](#)

⁸⁴ [How to Set Up a Public Electric Vehicle Charging Station, the Fast Charging Edition \(treehugger.com\)](#)

⁸⁵ afdc.energy.gov/vehicles/electric_fleets.html



Non-Profit & Congregation Renewable Energy

Action E-I: Procure renewable energy

Electricity is distributed through PECO's power lines, but in Pennsylvania you can purchase energy produced by a different company—many have the option of 100% renewable power.

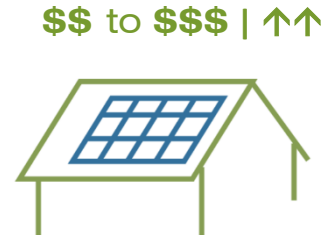
Electricity enters the grid from many different sources, ranging from nuclear and gas to wind and solar power. However, purchasing “renewable energy credits” represents electricity generated by renewable energy sources and delivered to the grid on your behalf.

- ✓ To buy green electricity, filter for “Renewable Energy, PA Wind, Renewable PA, or Solar” on papowerswitch.com

More on Renewable Energy Credits:
One REC is produced when a renewable energy source generates one megawatt-hour (MWh) of electricity. For example: if a wind power facility produces 5 MWh of electricity, they have 5 RECs to keep or sell. If you buy those RECs, you are buying the “renewable” aspect of the electricity from the wind farm, and you can say 5 MWh of your electricity came from a clean renewable source.

Action E-J: Install on-site renewable energy systems, solar panels

1. Prioritize areas like rooftops and parking lots
 - Site Considerations: [US EPA Renewable Site Considerations](#)⁸⁷
 - Virtual Meter Aggregation – Produce power at another site under the same PECO account and apply that electricity production to any site within two miles.
2. Aggregate installations with associated institutions to enhance economies of scale.
3. Financing options:
 - Direct Purchase or Conventional Loan
 - Power purchase agreements, or PPAs, are similar to leasing a solar panel system. Simply, a solar company or PPA financier covers the costs to buy solar equipment and install it, then sell the energy it produces to you like the utility. They own it and therefore provide any necessary maintenance. For more information: [Power Purchase Agreements: What You Need To Know | EnergySage](#)⁸⁸



Action E-K: Monetize “tax” credits for energy efficiency and renewable energy



Nonprofits now benefit from clean energy and energy efficiency tax credits; the IRA allows “direct monetization,” or payments, to nonprofits for on-site clean energy systems (such as solar PV and geothermal HVAC)—up to 70% of the cost of the system. Don't miss out! Read more here: [The Inflation Reduction Act | US EPA](#)⁸⁹

⁸⁶ fueleconomy.gov/feg/taxevb.shtml

⁸⁷ epa.gov/green-power-markets/site-considerations

⁸⁸ news.energysage.com/power-purchase-agreements-overview/

⁸⁹ [epa.gov/green-power-markets/inflation-reduction-](https://epa.gov/green-power-markets/inflation-reduction-act#:~:text=The%20Inflation%20Reduction%20Act%20of%202022%20%28IRA%29%20is,to%20invest%20in%20cle)

[act#:~:text=The%20Inflation%20Reduction%20Act%20of%202022%20%28IRA%29%20is,to%20invest%20in%20cle](https://epa.gov/green-power-markets/inflation-reduction-act#:~:text=The%20Inflation%20Reduction%20Act%20of%202022%20%28IRA%29%20is,to%20invest%20in%20cle)



Municipal Support Actions

Promote energy efficiency, electrification of buildings and vehicles and renewable electricity procurement among West Pikeland's non-profits and other local institutions.

- Promote the use of ENERGY STAR Portfolio Manager through a coordinated outreach program for building and business managers
- Coordinate with PECO regarding aggregated efforts for benchmarking
- Conduct a feasibility study for on-site electricity production and EV chargers on grounds and parking lots
- Encourage houses of worship to register for programs such as [Cool Congregations](#), [GreenFaith Stewardship Circles](#).⁹⁰

[an%20energy%20and%20reduce%20emissions.](#)

⁹⁰ coolcongregations.org/

A Clean Energy Future, for all.

Prioritizing the health, safety, livability, prosperity, independence, and security of the Township and its residents by setting a trajectory to a future of clean energy for electricity, heat, and transportation.