

2021

Energy Efficiency Toolkit

City of Grass Valley



This document was developed by Sierra Business Council's Sierra Nevada Energy Watch Team in partnership with City of Grass Valley staff and members of the City's Energy Action Plan Working Group.



Table of Contents

Introduction	2
Major Goals of the EAP	3
Why Is Energy Efficiency Important?	3
Renewable Energy Pyramid	4
Residential	6
Energy Analysis	6
Energy Conservation	7
Energy Efficiency	10
Time of Use Management	14
Renewable Energy	15
Renting	18
Non-Residential	19
Energy Analysis	19
Energy Conservation	20
Energy Efficiency	21
Time of Use Management	23
Renewable Energy	24
Larger Picture	26



Introduction

This year in California, more acres burned during a single week than during more than half of the last one hundred fire seasons. Each year, the fires get worse, drought lingers longer, average temperatures rise, and the Sierra snow-pack is diminished. These cumulatively threaten our homes, forests, communities, and water supply. The culprit? Greenhouse gas (GHG) emissions. Carbon is released into the atmosphere creating heat trapping greenhouse gases from our homes, cars, and businesses. Collectively, human carbon release is changing weather patterns, raising air and ocean temperatures, shifting rainfall patterns, and threatening agriculture and ecosystems. What can we do here in the City of Grass Valley to move our community toward zero greenhouse gas release?

In 2018, the City of Grass Valley adopted their Energy Action Plan (EAP), which provides an analysis of the energy use within the city limits by the community and City operated facilities, as well as a roadmap for accelerating energy efficiency, water efficiency, and renewable energy efforts already underway in the City of Grass Valley. It is designed to assist the City in implementing the energy and water-energy related goals and policies in the City's General Plan and Housing Element, as well as inform the community of cost-effective programs and best practices that will help them save energy and money. These steps can reduce greenhouse gas emissions, therefore helping to reduce the future devastation of climate change. Navigating energy efficiency can be overwhelming, so along with the EAP was a need for an easy-to-use guide or 'toolkit' to help residents and business owners navigate the complexities of energy efficiency action items. We are here to help!

By implementing the EAP and through actions taken by community members and the City, the community can potentially reduce energy use by 42,466,551 kWh of electricity (36% reduction) and 1,410,586 therms of natural gas (29% reduction). The exact therms and kilowatts are of less importance, what really matters is that this is serious reduction, and it can start with you. Using this toolkit, residents and businesses can find out ways to reduce their energy consumption and get the City of Grass Valley closer to becoming carbon neutral, but this goal extends beyond Grass Valley. By changing our daily habits, we all can play a role in creating an energy-efficient future that improves the health of people and the planet.



Major Goals of the EAP

The goal of the EAP is to reduce the projected annual electricity use in 2035 by 36%, annual natural gas use by 29%. This translates to annual savings of 42,466,551 kWh of electricity, and 1,410,586 therms from the projected business-as-usual (BAU) forecast.¹

Why Is Energy Efficiency Important?

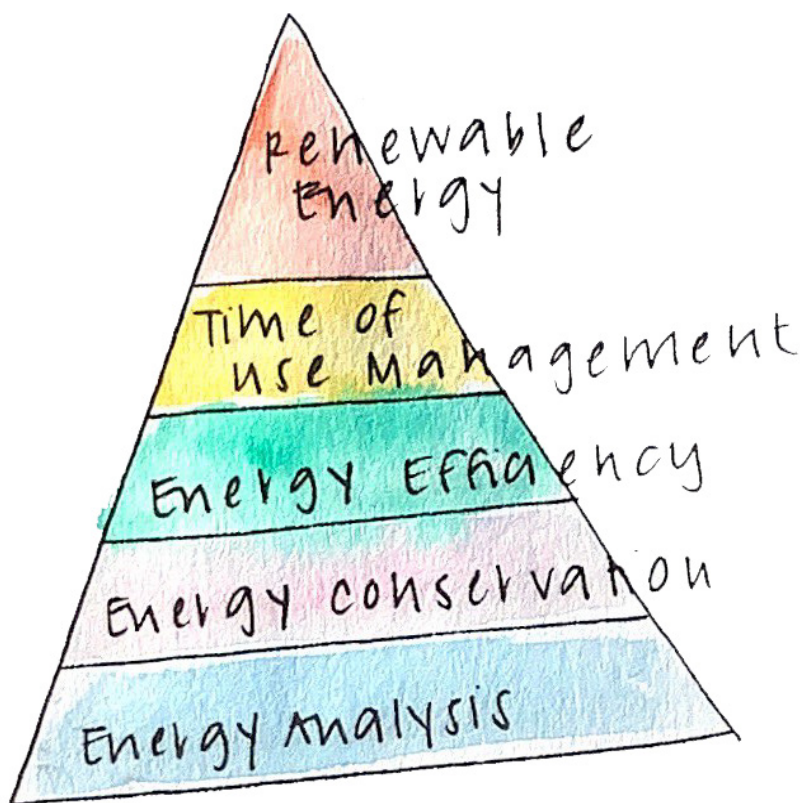
The three major benefits of increasing energy efficiency are **energy and money savings**, **community resilience**, and **local air quality improvements**. Communities can more readily and flexibly meet their energy needs and lessen the grid impacts (an over stressed grid often results in rolling blackouts and power outages) when efficiency is improved and local renewable energy systems are combined with energy storage. Retrofitting homes and businesses to be more efficient reduces energy costs, improves indoor and outdoor air quality, creates local jobs, and makes homes and businesses more comfortable.

In addition, hiring local contractors and spending money saved on energy bills at local businesses can significantly stimulate the local economy. Finally, prioritizing energy efficiency, local renewable energy, and water efficiency will enhance the City's ability to respond to the ever-changing external conditions related to energy supply and demand, and help community members become more self-sufficient and resilient to future changes in energy prices and weather.



Renewable Energy Pyramid

The Renewable Energy Pyramid is a visual guide to help understand the energy efficiency process. Following from the bottom up, the pyramid lays out the progression of energy-saving and GHG emissions-reducing actions for residents and businesses can take. Understanding what should be done first on the path to energy resiliency can make it easier to organize energy efficiency goals. Throughout this toolkit, we will use the Renewable Energy Pyramid to organize the steps of energy efficiency!



1. The first step on the energy pyramid is **Energy Analysis**. Energy audits review the current energy consumption of a building and recommend ways to save energy through more efficient behaviors and use of equipment. An energy audit is a valuable tool for making decisions about energy, because it determines the best energy choices, their cost, and the return on investment in years. The energy audit can range from a simple walk-through of the building to a detailed audit with onsite measurements, tests, and analysis of many, if not all, building systems. An [energy self-audit](#) can be a great place to start.

2. The second step on the pyramid is **Energy Conservation**. Simple behavioral changes can make a long lasting and immediate impact on the amount of fuel and electricity a building uses. Energy savings can be achieved simply by turning off lights, fans, and electronic devices when not in use, adjusting settings for the season and using a solar dryer clothesline. Energy conservation centers around human decision making and personal choices; becoming aware of use efficiencies and [time of use](#) is a great place to begin thinking of ways to change behavior and live more efficiently.
3. **Energy Efficiency** is the third step on the energy pyramid. This step uses equipment improvement to reduce a building's energy use by upgrading heating and cooling equipment and installing appliances that are energy efficient. It also centers on the building envelope, increasing air tightness and reducing energy loss. These upgrades can have significant cost reductions and tax deduction opportunities.
4. The fourth step in the pyramid is **Time-of-Use Management**. Utilities have a demand charge on their electric bill. This means they charge a higher rate to cover the cost of the utility having enough capacity to meet customer needs when that need is highest, often because natural gas generators must be activated when renewable sources are offline. Your energy bill can be reduced by changing the time you run your appliances or equipment, such as using the washer and dryer in off-peak hours, thus avoiding the demand charge.
5. At the top of the energy pyramid is **Renewable Energy**. Renewable energy is created from naturally replenishing sources, such as solar and wind power, geothermal, hydroelectricity, and biofuels. Conversion to renewable resources can have significant tax offsets, and positive financial returns over time while reducing home carbon emissions. Solar prices, for example, have lowered in many parts of the world making them an affordable source of energy.

Residential

For residents, energy efficiency can take the form of appliance upgrades, renewable energy retrofits, or even changes in everyday habits. Below are some different ways to become more energy efficient and learn more about the energy landscape.



Energy Analysis

Understanding Your Energy Bill

First thing's first, let's take a closer look at your PG&E energy bill.

The blue bubbles on the bill pictured represent different parts of your PG&E bill. Below is the specific section that is of interest when it comes to energy efficiency and tracking energy usage trends over time.

Monthly billing history: a chart of your monthly charges over the past year. This chart helps you visualize any trends in your monthly energy usage. You may observe changes in your total charges during different seasons, or after installing energy efficient appliances.

For more information or to examine a different PG&E bill, follow the link:

https://www.pge.com/en_US/small-medium-business/your-account/your-bill/understand-your-bill/energy-statement/gas-and-electric-statement-page-1.page

ENERGY STATEMENT
www.pge.com/MyEnergy

1 Account No: 1023456789-0
Statement Date: 05/09/2013
Due Date: 05/28/2013

2 Service For:
Commercial Customer
1234 Commercial Drive
Extra Address Line
Anytown, CA 00000

3 Your Account Summary

Amount Due on Previous Statement	\$4,329.22
Payment(s) Received Since Last Statement	-4,329.22
Previous Unpaid Balance	\$0.00
Current Electric Charges	\$5,156.08
Total Amount Due by 05/28/2013	\$5,156.08

4 Questions about your bill?
24 hours, 7 days/week 1-800-465-4743
Business Specialist available:
M-F 7am-7:30pm, Sat 7am-4:30pm
www.pge.com/MyEnergy

5 Local Office Address
24300 CLAWITER RD
HAYWARD, CA 94545

6 Electric Monthly Billing History

7 Daily Usage Comparison

8

9 99901234567890100000XXXXXX000000XXXXXX

Account Number: 1023456789-0 Due Date: 05/28/2013 Total Amount Due: \$5,156.08 Amount Enclosed: \$

COMMERCIAL CUSTOMER
1234 COMMERCIAL DRIVE
ANYTOWN, CA 00000
EXTRA ADDRESS LINE

PG&E
BOX 997300
SACRAMENTO, CA 95699-7300

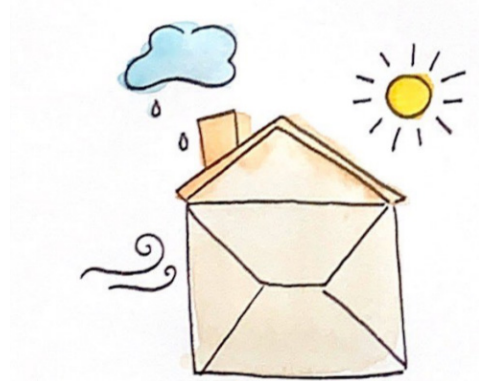
Page 1 of 3

Do It Yourself (DIY) Home Audit

A DIY Home Energy Audit helps identify how you can save money and energy around your home. A home that is energy efficient is less expensive to maintain and makes your home environment more comfortable.

It includes the following:

- Locate air leaks
- Consider and check ventilation
- Inspect heating and cooling systems
- Lighting
- Appliances and electronics
- Whole house plan



The HomeIntel Residential Energy Efficiency Program creates a customized energy reduction plan based on how energy is used in resident's homes using the resident's PG&E energy data. The customer is guided through an interactive tutorial on how energy is currently being used and how to plan to save energy and money while reducing GHG emissions.²

Energy Conservation

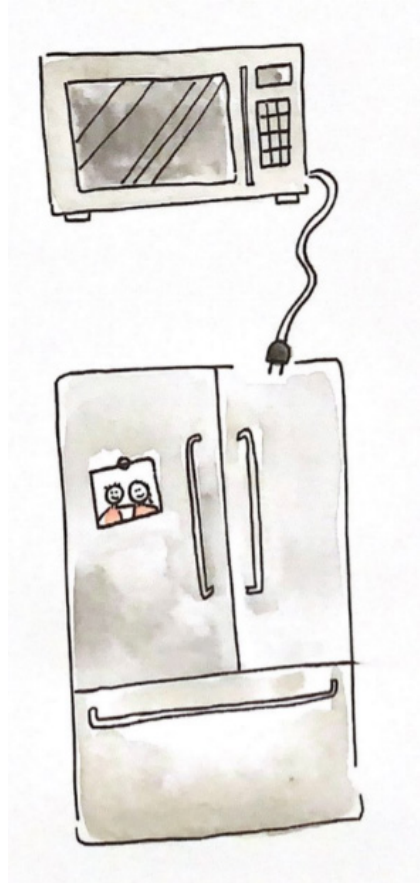
Simple and Easy Tips for Everyday Energy Efficiency

ENERGY

- Reduce energy use by unplugging appliances when they're not in use. These still suck lots of power, and can add an extra 10 percent to your monthly utility bill!³ You can also plug them in to a power strip that can be switched off for convenience.
- Appliances are normally about a quarter of your home energy usage. Make sure your fridge and freezer don't have any cracks or leakages to maintain their coldness. Consider upgrading to EnergyStar appliances because they use less energy and water than standard models. For your washer and dryer, consider

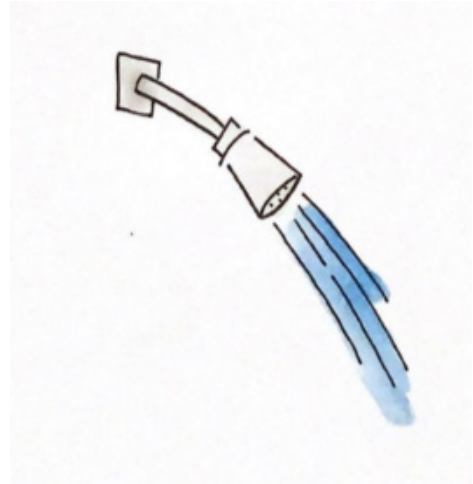
washing on cold and hang drying when possible. You can also use the high spin setting on the dryer to reduce dry time as well as using dryer balls, or the permanent press setting.

- For lighting, think about switching to LEDs because they're much more efficient. Switching to energy-efficient lighting is one of the fastest ways to cut your energy bills. By replacing your home's five most frequently used light fixtures or bulbs with models that have earned the ENERGY STAR rating, you can save \$45 each year.⁴
- Make sure your home is well insulated! Sealing cracks, gaps, and leaks and improving the insulation in your home can significantly reduce heating and cooling costs. Heating and cooling can account for a significant percent of home energy use and a properly insulated home will reduce this cost and keep your home cooler in the summer and warmer in the winter. For this you can also get a professional audit to know exactly what needs extra insulation. An easy DIY solution is to install weather stripping yourself in cracks where you can feel air or see light.
- Close curtains or blinds to keep sun and heat out on summer days. Consider insulating blinds or curtains to prevent heat loss in winter.
- Set furnace thermostats to not run during times of the day when no one is home. You can also set your threshold start temperature lower to save additional energy.



WATER

- Install faucet aerators to reduce water usage. Replacing old, inefficient faucets and aerators with WaterSense labeled models can save the average family 700 gallons of water per year, equal to the amount of water needed to take 45 showers!⁵
- Upgrade old, inefficient toilet (3.5 gallons per flush or more) to a high-efficiency (1.6 gallons per flush) or dual flush toilet.
- If the showerhead flows at more than 2.0 gallons per minute, replace it with the showerhead that uses less water. You can test this out by using a water flow rate bag, or a vessel that has measurements on it.
- Lastly, a few classics tips to save energy and water: Turn off the water faucet when you're brushing your teeth or shaving. Turn off the lights when you leave a room. Consider a warm sweater instead of a t-shirt with the heat up.
- Water might seem unrelated to energy usage but pumping from your well or getting treated water takes electricity. We use water to generate electricity and energy to move water in and out of our homes and buildings. Reducing water usage reduces energy consumption, it's a win-win!



Energy Efficiency

Income Qualifying EE programs

- PG&E Energy Savings Assistance Program (ESAP)⁶ -- PG&E's Energy Savings Assistance Program provides income-qualified customers with energy-saving improvements at no charge.
- PG&E's Multi-Family Program⁷ -- For property owners and managers of existing residential dwellings or mobile home parks with five or more units. The program encourages owners to install qualifying energy-efficient products in individual tenant units and common areas of residential apartments, mobile home parks and condominium complexes.
- Relief for Energy Assistance through Community Help (REACH)⁸ -- REACH provides solutions for projects that reduce energy vulnerability, such as PG&E's one-time emergency financial assistance. REACH provides an energy credit for up to \$300 to help low-income families keep their PG&E services turned on in times of hardship.



Retrofitting Your Home

While there are any number of different contractors that can work on a house in a manner that is related to its energy performance, they tend to fall into two basic camps: those that have something to do with the heating and cooling systems of the house (heating, ventilation and air conditioning, or "HVAC" contractors); and those affecting the building shell, or envelope, and thus the heating and cooling load of the house (envelope contractors). Common energy efficiency practices for existing buildings include retrofitting indoor and outdoor lighting, refrigeration and heating, ventilation, and air conditioning (HVAC) systems to more efficient technology. Other common practices include ensuring proper weatherization practices are in place, upgrading windows and insulation to maintain comfort without requiring significant energy use.

- Small retrofits can include updating furnaces, water heaters, shifting to electric from natural gas or propane, updating insulation, window retrofits, and more.
- Unless your home was specially constructed for energy efficiency, you can probably reduce your energy bills by adding [more insulation](#).⁹ Many older homes have less insulation than homes built today, but even adding insulation to a newer home can pay for itself within a few years.
- Install an [energy efficient induction-cooker](#)¹⁰, a powerful, high-frequency electromagnet, with the electromagnetism generated by sophisticated electronics in the "element" under the unit's ceramic surface.
- Install a [heat pump](#)!¹¹ Heat pumps do a lot more than just heating. In fact, they also provide air conditioning and humidity control. They work a lot like a refrigerator or air conditioner, using electricity and a refrigerant to pump or move heat from one location to another. Unlike furnaces, a heat pump does not generate heat, instead, it takes energy that can be found in the air, ground, or water sources surrounding your home.
- The U.S Environmental Protection Agency (EPA) calculates that a family of four will spend \$330 less on hot water every year by switching to a Heat-Pump Water Heater from a conventional electric unit. That's substantial, especially over the course of the heater's life. Learn more [here](#)!¹²
- Window coverings can reduce energy loss through the windows, lower heating and cooling bills, and improve home comfort.
- [PG&E Energy-Efficiency Products Home Appliances Rebate](#)¹³ -- PG&E offers rebates in order to save energy, costs, and time through several programs. The PG&E Marketplace allows customers to search for and compare the most energy efficient products on the market, and easily apply for product rebates.

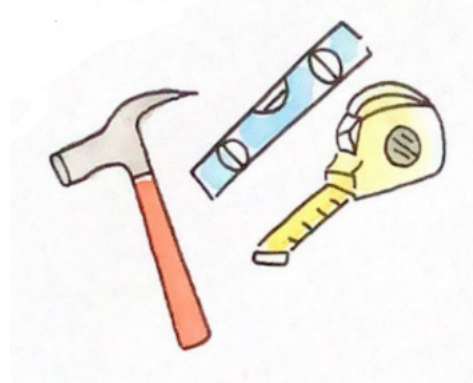
Building Your Own Home & New Construction

Building a new house from scratch involves a host of important decisions, some central considerations are energy and water efficiency.

- Compliance with **California Building Energy Efficiency Standards** (Title 24, Part 6). Title 24's Energy Efficiency standards are updated every 3 years, and it is important that designers, planners, building inspectors, and contractors maintain a current, working knowledge of the standards. The Nevada County [Building Department website](#)¹⁴ has additional resources that detail California building codes. Additionally, there are numerous opportunities in the design phase for new developments and renovation projects to achieve savings through holistic design.
- **Landscaping** is of considerable importance to both existing and proposed development in Grass Valley, contributing to the overall quality and character of our communities. Properly designed and maintained, landscaping provides visual interest and variety, complements structures, provides a transitional area between competing land uses, and aids in reducing air pollution, heat, and glare. You can increase efficient use of water for landscaping by establishing standards for the design and installation and choosing landscapes that avoid excessive water demand. Pumping water takes energy. Retention of on-site native vegetation where it does not pose a fire hazard is ideal. For example, where native oak trees are retained, plant materials within the dripline of the oaks shall be drought-tolerant to minimize the application of water at the base of oaks.
- California's Native Plant Society Redbud Chapter¹⁵
- NID's Demonstration Garden¹⁶ is a collaboration between Master Gardeners and the Nevada Irrigation District to demonstrate sustainable landscape techniques for the home gardening public. The guiding principles are to support regional biodiversity, conserve resources and minimize pollution and waste. The focus is on climate and soil adapted plants for the Sierra foothills. Take a trip to their garden to get some inspiration!



- **Home hardening** is another important consideration when building a new home. With increased frequency of wildfires, taking the necessary measures to harden (prepare) your home can help increase its chance of survival when wildfire strikes. An added bonus of home hardening is increased home energy efficiency, creating financial and energy savings while making your home more resilient. Learn more [here!](#)¹⁷



- A **fire-resistant landscape** isn't necessarily the same thing as a well-maintained yard. This type of landscape uses fire-resistant plants that are strategically planted to resist the spread of fire to your home. Fire resistant plants are great in California because they are often drought tolerant, too. The good news is, you don't need a lot of money to make your landscape fire resistant. And you will find that a fire-resistant landscape can increase your property value and conserve water while beautifying your home.



- Finding a **local contractor** can expand the definition of sustainability. Supporting your community by providing jobs, and finding an expert who understands the landscape and the local rules is a great way to go about sustainable construction.

[Nevada County Contractors Association](#)¹⁸

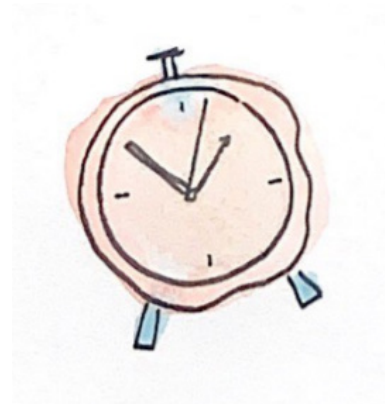
- **Contractor Directory:** It's also important to make sure your contractor is aware of energy standards and has energy efficiency in mind. There are different standards for contractors, such as the Building Performance Institute ([BPI](#))¹⁹ that represent energy and sustainability specific trainings. The Residential Energy Services Network ([RESNET](#))²⁰ is an industry non-profit membership corporation and the body that establishes national standards for building energy efficiency rating systems. RESNET also designates "EnergySmart" Builders and Contractors who meet certain minimum criteria, have undergone training and passed an exam. While not as robust as the BPI accreditation criteria for

contractors, the RESNET designation ensures some basic level of knowledge about building science and home performance. It is an extra step to find the right contractor but it's worth the effort, whether it's for a remodel, building a new home, or retrofitting.

- [California Advanced Homes Program](#)²¹ -- administered by PG&E and TRC Energy Services, highlights best practices in energy efficiency, green building and sustainability, and offers financial incentives to help builders and architects create environmentally friendly, energy-efficient communities for potential home buyers.

Time of Use Management

PG&E offers Time-of-Use rate plans, which helps support energy management and can reduce costs by incentivizing energy use during times of low demand when energy costs are low and discouraging energy use during times of high demand when costs are high. In the early afternoon and evening, energy demand is high, and less wind and solar power is available. By using less electricity during these hours, you can ensure that your energy is coming from cleaner sources. Here are some tips to use clean energy:



- Recharge your devices while you do the same, so when you wake up your devices are fully charged with cleaner energy
- Turn off, turn down, and unplug your devices during the early afternoon and evening to ensure you're using cleaner energy
- Wait to start your dishwasher and laundry until after the evening or the next morning so that you're cleaning with cleaner energy
- By setting your thermostat to 78° or higher during the early afternoon and evening in warmer months, you'll join fellow Californians in saving money and reducing your pollution, similarly turn your A/C on in the morning and turning it off by the afternoon

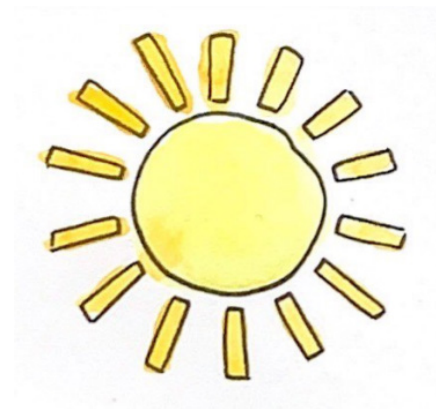
Time of Use Programs & Resources

- PG&E SmartACTM²² -- PG&E's SmartAC program offers the opportunity to help prevent summer energy supply emergencies from disrupting day to day activities. Upon joining, SmartAC will install their free SmartAC device on your air conditioner (AC). Once installed, the customer will receive a SmartAC reward check.
- PG&E SmartRateTM²³ -- The SmartRateTM Plan is a financial energy-saving incentive for customers to help offset peak energy consumption in California. PG&E customers who add the SmartRate program to their account will pay a reduced rate in exchange for minimizing their electricity usage for 9 to 15 SmartDayTM days a year.

Find out more about time of use programs [here!](#)²⁴

Renewable Energy

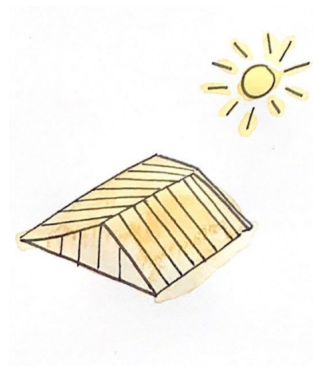
Renewable energy is the final step on the energy pyramid. It is crucial to start procuring renewable energy whenever possible to reduce reliance on fossil fuels and head in the direction of net-zero carbon emissions. The most common barriers to renewable energy include property ownership, site obstacles (i.e. shading and structural integrity), and financing. To address these barriers, the U.S. Department of Energy and State of California have launched initiatives to increase access to innovative financing mechanisms and ownership structures. These include the [Residential Energy Efficiency Loan \(REEL\) Program](#)²⁵ which provides subsidized loans for energy efficiency projects and other home improvement projects and [Property Assessed Clean Energy \(PACE\)](#)²⁶ programs which allow property owners to finance renewable energy projects.



Solar Panels

The California Energy Commission's (CEC) Local PV Ordinance Cost Effectiveness Study determined that incorporating a solar PV system in all single family and multifamily new construction is currently feasible and cost-effective in all climate zones in California. There are many options for solar. PV systems allow you to become more independent

from rising electricity costs and provide homeowners with a sustainable and decentralized energy supply without sacrificing comfort or convenience. [Community solar](#)²⁷ is another model, different from independent solar. Through community solar initiatives, renters and property owners can opt into a local community solar array and realize the benefits of solar on their electricity bill without having to install solar on their home or business.



Roof Tiles

Technically called building-integrated photovoltaics (BIPV), solar roof shingles present a unique and increasingly popular renewable energy solution. [Studies](#)²⁸ backed by the Department of Energy in recent years have shown that solar roofing features such as solar shingles can boost the value of your home by as much as \$15,000 or more.

Battery Storage

Home battery storage systems are typically connected to both the grid and your home's electric panel to perform two main functions, charging and discharging. Charging means you can store power generated by your home rooftop solar system — or from the grid when electricity prices are lower — to be used at a later time. If an outage is imminent due to a storm or shutoff event, some storage providers are able to send a signal to your battery to fully charge before the outage, in preparation to provide backup power. Discharging means you can use the energy stored by your battery to power your home when the price of electricity from the grid is more expensive, at night when your solar system isn't producing (if you have solar), or during an outage when you need backup power. To learn more click [here](#).²⁹



Residential Wind Turbines

Residential wind turbines generally require 1 acre of property or more to power a significant portion of the electricity needed by the average U.S. home. If there aren't restrictions on building heights and there is a sizable amount of wind, residential turbines can be a great option. To learn more click [here](#).³⁰

There are also other avenues to utilize wind if you have less than 1 acre of property. [Community wind](#)³¹ is a great option. The distinguishing feature of a community wind project is that one or more local community members receive the majority of the economic benefits of the project, beyond land lease payments. Historically, community wind projects have been utilized to supply local electricity for a variety of applications, like schools, hospitals, businesses, farms, ranches, or community facilities. Rural electric cooperatives or municipal utilities have also developed their own community wind projects to diversify electricity supplies. Community wind owners may also be local individuals who form independent power producer groups or limited liability corporations to sell the power the turbines produce to a local electricity supplier.

Renewable Energy Programs/Resources

- [Federal Renewable Energy Tax Credit](#)³² -- A taxpayer may claim a credit of 30% of qualified expenditures for a renewable energy system that serves a dwelling unit located in the United States that is owned and used as a residence by the taxpayer.
- PG&E Solar Water Heating³³ -- PG&E's Solar Water Heating program saves energy and money for customers by up to an 80% reduction in water-heating bill, and almost 75% savings for solar water heating systems with the PG&E rebate and tax credit.
- Go Solar California! Campaign Programs³⁴ -- Go Solar California! campaign provides consumers with information on solar programs, rebates, tax credits, and information on installing and interconnecting solar electric and solar thermal systems. The program funds solar on existing homes, existing or new commercial, agricultural, government, and non-profit buildings.
- Self-Generation Incentive Programs³⁵ - To promote equitable distribution of funds, the Self-Generation Incentive Program (SGIP) provides increased incentives to customers who need the equipment the most. Anyone can apply for SGIP incentives, and as a residential customer, you may receive increased incentives depending on your income status, location, medical/essential needs, and likelihood to be impacted by a Public Safety Power Shutoff (PSPS) event.

Renting

If you're renting your home it can seem difficult to participate in energy efficiency upgrades, but implementing EE retrofits and upgrades is totally possible. Improving your building envelope, weatherization, or other upgrades has direct cost savings. There are also things you can do that don't require a large investment in your home or input from your landlord. The previous section on [Small Tips for Energy Efficiency](#) can be a place to start. In terms of renewable energy, collaborative solar procurement and community solar programs have the opportunity to reduce costs and increase access to solar for property owners with site obstacles or renters who cannot install systems at their home or business. [TOU](#) is another great way to reduce your energy bill, it only requires behavior change and no additional action from a landlord or property manager.



PROGRAMS & RESOURCES FOR RENTERS

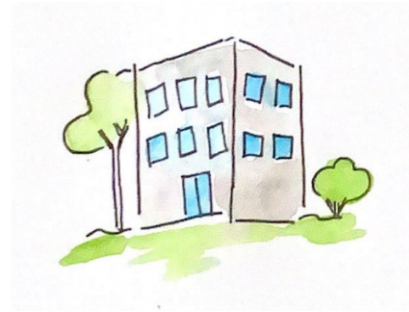
- [SmartACT™ Program for Renters](#)³⁶ - Whether you rent a house, townhome, condominium or apartment you can participate in PG&E's SmartAC program. It's easy, free, and you'll even earn a reward for participating.



Non-Residential

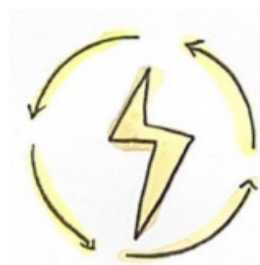
Dollars saved through energy efficiency can directly impact a business's bottom line and enable them to be more competitive in today's market. Many small businesses reside in commercial buildings smaller than 50,000 ft², which consume 44% of U.S. commercial building energy use.

Some of the previous resources are applicable for non-residential energy efficiency projects. The [small tips and tricks](#) for reducing energy and the [energy pyramid](#) apply to any building and any individual. However, there are some key differences between residential and non-residential energy efficiency projects. Office buildings, schools, hotels, hospitals, restaurants, and other commercial and



institutional facilities use a significant amount of water and energy in their daily operations. Owners and managers of these types of facilities are increasingly aware of the need to use water more efficiently to reduce their risk of water shortages and increasing costs. There is a strong business case to be made for both water and energy efficiency. Saving energy is a team sport – it is not just the responsibility of business owners. Employees should be informed on how they can save energy and be encouraged to share their own innovative ideas on how to cut down on energy costs. Fostering an open dialogue creates an energy efficient work culture at your business.

Energy Analysis



Businesses should conduct energy use benchmarking and perform building energy audits. Commercial building energy performance benchmarking is a foundational element of an organization's energy management strategy because you can't manage what you don't measure. This process is similar to residential energy analysis but is more tailored to business-specific needs. These can help determine your baseline energy use and offer a clear outline for ways for your business to save energy. Many electric utility companies offer free audits, including a professional assessment and a full inspection to check for air leaks, insulation issues, or opportunities to install energy-efficient lighting.



Energy Analysis Programs/Resources

[PG&E Retrocommissioning \(RCx\) Program](#)³⁷ is a systematic process for identifying less-than-optimal performance in your facility's equipment, lighting, and control systems, and making the necessary adjustments. While retrofitting involves replacing outdated equipment, RCx focuses on improving the efficiency of what's already in place. PG&E's RCx Program provides incentives and connects businesses with experts to make sure their facilities — and the equipment and systems within them — are running in peak condition for optimal energy savings.

[PG&E Advanced Pumping and Efficiency Program \(APEP\)](#)³⁸ is an educational and incentive program intended to improve overall pump and booster efficiency and encourage energy conservation. The program subsidizes pump tests and provides cash-back incentives for pump overhaul above 25/hp.

Energy Conservation

Small steps to reduce energy and water are similar for residents and businesses. There are things as simple as turning off lights that aren't in use, to more complicated measures like upgrading equipment and changing bulbs to LEDs, which is explained in more detail in the next section.

For small tips:

- Power down computers and other office equipment at the end of the day. Turning off and unplugging as many devices as possible at the end of the day is a simple way to reduce energy use.
- Prevent “phantom energy,” which is the energy that is still being used by equipment that remains plugged in but not in use. A great office energy-saving tip is to have your computer peripherals (printers, monitors, etc.) connected to power strips (aka “surge protectors”) so that the flip of a single switch can shut down several devices at a time.
- Start running fans. You can reduce your energy usage in the workplace simply and easily by running fans in offices, warehouses, showrooms and kitchens. Fans keep air flowing so your HVAC unit can run more efficiently.
- Take advantage of natural sunlight. If you're fortunate enough to have an office space where there's abundant natural light, use it! On a sunny day, you might



not need to turn on the lights at all in areas where windows can give all the illumination you need.

- Program your thermostats. This is one of those office energy saving tips that is especially relevant for a 9-5pm workplace, you don't need to heat or cool a workplace after everyone has gone home for the night.

Energy Efficiency

There are different routes to make a building more energy efficient. Upgrading to equipment that is energy efficient is a great way to increase EE efforts (i.e. using blower tests for tight and well-insulated enclosures, replacing incandescent lights with LEDs, and installing heat pumps that are 3-5 times more efficient than an electric or gas furnace and water heater).



- Purchase energy-efficient office equipment. Before you buy or lease office electronics, check to see if they are ENERGYSTAR-rated. ENERGYSTAR-rated appliances have been evaluated and deemed energy-efficient, which can save you money and help you manage your small business energy costs, especially in the long run.
- Trees, shade structures, and cool (high albedo) paving and roofing materials reduce the amount of solar energy absorbed as well as the temperature of rooftops and parking lots. By increasing the use of these materials it is possible to reduce heat gain in residential buildings and commercial centers during warm summer months.

Programs & Resources for Energy Efficiency

- PG&E Rebates and Incentives for Businesses³⁹ - PG&E offers non-residential customers rebates and incentives for power management software, occupancy sensors on lights, steam traps, HVAC motors and pumps, electric water heaters, process cooling, data center airflow management, boiler economizers, refrigeration, boiler heat recovery, refrigeration control, VSD pumps, boilers and fans. A full list of current rebates can be found using the PG&E money back tool.
- PG&E Lighting Rebates⁴⁰ - PG&E offers rebates for efficient replacement lights as well as rebates to help cover the costs of qualifying fixtures and retrofit kits.

- PG&E Savings by Design (SBD) Program⁴¹ is a program offered by PG&E to encourage high-performance new building design and construction for non-residential (commercial, school, facility, etc.) buildings. The program offers building owners and their design teams a wide range of services, such as design assistance, incentives, business solutions, and educational resources. SBD can help exceed California's Title 24 energy-efficiency standards, and engineers can analyze your building's energy design to help it rise above the standard, potentially earning financial incentives for doing so.
- [PG&E and Ecology Action Hospitality Program](#)⁴² - The Hospitality Program provides energy efficiency recommendations, project oversight, and rebates at no cost to customers in PG&E territory including hotels and motels, dining and restaurants, casinos, health clubs, and more. Free services provided include: facility audit, project proposal, installation oversight, and rebate fulfillment. Projects include upgrading old inefficient lighting to LEDs and replacing old refrigeration motors.
- PG&E K-12 Schools Programs and Rebate Catalog⁴³ - The Solar Energy Efficiency (SEE) Program helps public school districts identify, evaluate, and process incentives on energy efficiency retrofit measures and CLEAResult analytics enabled RCs for school facilities. The rebates, discounts, and expert advice can help make it easier for K-12 schools to save energy and money.
- [The Bright Schools Program](#)⁴⁴ - The BSP offers services to help identify the most cost-effective energy saving opportunities for your facilities. Eligible applicants include: K-12 Public School Districts, Charter Schools, State Special Schools, County Offices of Education, and Community Colleges. The Program provides technical assistance to schools for improving building energy efficiency and clean energy generation.
- [Energy Partnership Program](#)⁴⁵ - The Energy Partnership Program offers services to help identify the most cost-effective energy saving opportunities for facilities. The California Energy Commission (CEC) provides technical assistance to public agencies, which includes cities, counties, special districts, public hospitals, and public care facilities, in identifying the most cost-effective energy efficiency upgrades. The program targets existing facilities with energy audits, and new construction with energy efficient design reviews.

- Energy Efficiency Financing⁴⁶ - The CEC provides 0-1% interest loans to public entities for projects with proven energy and/or demand cost savings.
- PG&E Food Service Technology Center⁴⁷ - The PG&E Food Service Technology Center (FSTC) provides nationally-recognized energy efficiency consulting services to the commercial food service industry. The program includes kitchen equipment testing, design consultation, on-site facility surveys for energy efficiency, educational seminars for energy performance in commercial kitchens, and equipment testing services to determine the energy and performance of food service equipment.

Resources and Information for Water Efficiency:

People don't naturally realize the connection between water and energy. They are intertwined – saving water saves energy. Water efficiency is the smart use of our water resources through water-saving technologies and simple steps we can all take. Using water efficiently will help ensure reliable water supplies today and for future generations. For specific sector information, click the links below.



- Commercial and Institutional Sector⁴⁸
- Office Buildings⁴⁹
- Hospitals⁵⁰
- Hotels⁵¹
- Restaurants⁵²
- Educational Facilities⁵³
- Industrial⁵⁴

For businesses, almost all energy efficiency measures with significant private costs result in a return on investment in energy cost savings that will add up over time, reducing the initial investment. Additionally, there are funding sources and financing mechanisms available to offset the upfront cost that often make projects cash flow positive from day one.

Time of Use Management

One of the best ways to save electricity in a non-residential space is to reduce your peak demand. The phrase “peak demand” refers to the hours in a day when energy usage is at its highest. Peak demand times are typically normal office hours (9-5pm).

You can reduce your demand during this time by staggering work hours/start times, running heavy equipment and factory equipment during the evening and early morning hours, and conserving energy throughout the day.

- Participating in PG&E's Demand Response Program⁵⁵ is a great way to reduce energy use during peak demand, leading to a more sustainable energy grid.

Renewable Energy

The cost of renewable energy has dramatically fallen over the last few years. Renewable energy is becoming more and more affordable for businesses, making it the best solution for entrepreneurs for saving money on energy and becoming energy efficient.



Solar

Rooftops, parking lots, and under-utilized open spaces provide excellent opportunities for solar energy generation. In particular, non-residential and government facilities tend to have large, flat roofs that are well suited for solar equipment. To learn more about solar for your business, click [here](#).⁵⁶

- PG&E Solar Water Heating⁵⁷ - PG&E's Solar Water Heating program saves energy and money for customers by up to an 80% reduction in water-heating bill, and almost 75% savings for solar water heating systems with the PG&E rebate and tax credit.
- [Federal Business Energy Investment Tax Credit \(ITC\)](#)⁵⁸ - A taxpayer may claim an investment tax credit of 30% of qualified expenditures for solar, fuel cells, small wind systems; or 10% of qualified expenditures for geothermal, micro-turbines, and combined heat and power systems (CHP), aka cogeneration systems. Expenditures include labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system.

Wind

Small wind energy systems provide an economical source of energy if in an area with fairly steady strong winds and at least one acre of open land. For more information click [here](#).⁵⁹

Geothermal

Geothermal heat pumps (GHPs), also known as ground-source heat pumps, can heat, cool, and even supply hot water to a home by transferring heat to or from the ground. This technology has been keeping consumers comfortable for more than 50 years and can cut energy bills by up to 65% compared to traditional HVAC units. GHPs are a long-term investment, they're built to last and have extremely long life spans. Expect to get around 25 years out of GHP indoor components (i.e. the heat pump) and 50-plus years for ground loops.

Although installation costs can be up to several times more expensive, GHPs are up to 65% more efficient than traditional HVAC units and pay themselves back over time in energy savings-typically within 10 years. For more information, click [here](#).⁶⁰

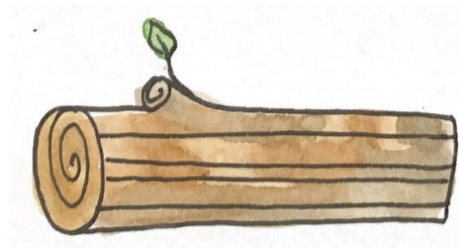


Hydropower

The Smart Hydro Power turbine was developed to produce a maximum amount of electrical power with the kinetic energy of flowing waters. Because it is powered by kinetic energy instead of potential energy, it is known as a so-called "zero-head" or "in-stream" turbine. As such, no dams and/or head differential are necessary for the operation of this device; the course of a river remains in its natural state and no high investments in infrastructure are required. Because the amount of kinetic energy (velocity) varies from river to river, a greater amount of energy is generated with a higher velocity of water flow. Learn more about the technology [here](#).⁶¹

Biomass

Biomass is one of the most plentiful and well-utilized sources of renewable energy in the world, and specifically in the Sierra Nevada. Broadly speaking, the term biomass refers to organic material. Green waste from forestry that would avoid open pile



burning or from rural parcel maintenance can be used in a small biomass plant to produce electricity. Sustainably managing forests can provide the City and community with significant biomass resources that can be used to generate electricity, increase wildfire resilience, and used for heating.

Larger Picture

Opportunities to improve energy and water efficiency are seemingly endless, but when it's broken down using the Energy Efficiency Pyramid and tailored for specific purposes, it becomes clearer. On November 13, 2018, the City of Grass Valley City Council approved the Energy Action Plan (EAP) as the City's roadmap for expanding energy efficiency, water efficiency, and renewable energy.



Nevada City and Nevada County have adopted similar plans and the Town of Truckee is in the process of developing its own Climate Action Plan. With each jurisdiction focused on their respective goals and action to reduce emissions, Grass Valley is assisting the State of California to achieve reduced greenhouse gas emissions and the goal of carbon neutrality by 2045.

Stepping outside of the City of Grass Valley, energy and water efficiency measures are on the horizon for the entire world. We live on a finite planet and saving resources is becoming increasingly important. Using water-saving techniques can save you money and diverts less water from our rivers, bays, and estuaries, which helps keep the environment healthy. It can also reduce water and wastewater treatment costs and the amount of energy used to treat, pump, and heat water. This lowers energy demand, which helps prevent air pollution by reducing greenhouse gas emissions. Saving energy also reduces greenhouse gas emissions, and lowers our costs on a household and economy-wide level. Investing in renewables can create jobs and reduces environmental impacts from mining and pollution. All of these things are connected and they can start with you. Simple steps in your home or business can make a big difference. If this is a topic that you're passionate about, join the City of Grass Valley's EAP Working Group, a group of engaged community members invested in energy efficiency. For more information on joining the effort to implement the City's EAP and increase climate resiliency in the region, contact the Sierra Business Council's Climate & Energy team at climate.energy@sierrabusiness.org.



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