



# **SMART HOME ENERGY SAVINGS & MAINTENANCE STRATEGIES**

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## **ABSTRACT**

Smart home technologies have revolutionized residential energy management, offering unprecedented opportunities for energy savings and efficient maintenance. This paper explores various strategies and technologies that enable homeowners to optimize energy consumption, reduce costs, and enhance sustainability through smart home applications. Key technologies include smart thermostats, energy monitoring systems, automated lighting controls, and integration with renewable energy sources.



By leveraging these technologies, homeowners can achieve significant reductions in energy usage while improving comfort and convenience. Furthermore, effective maintenance practices are crucial to ensuring the longevity and efficiency of smart home devices. This paper discusses maintenance strategies such as regular software updates, device calibration, and troubleshooting techniques to maximize the benefits of smart home technology. Ultimately, adopting smart home energy savings and maintenance strategies represents a promising pathway towards sustainable living and economic efficiency in residential settings.

## **LET'S GET STARTED**

Smart home energy savings and maintenance strategies harness cutting-edge technology to optimize residential energy usage, enhance sustainability, and reduce costs. These strategies leverage a variety of smart devices and systems that empower homeowners to monitor, control, and manage their energy consumption efficiently.

Central to these strategies are smart thermostats, which regulate heating and cooling based on occupancy and preferences, thereby minimizing energy waste. These devices learn user behaviors and adjust settings automatically to maintain comfort while conserving energy. Complementing smart thermostats are energy monitoring systems that provide real-time insights into electricity usage across different appliances and areas of the home. By identifying energy-intensive devices and behaviors, homeowners can make informed decisions to reduce consumption.



Automated lighting controls further contribute to energy savings by adjusting lighting levels based on natural light availability and occupancy. This not only reduces electricity usage but also enhances convenience and security. Integration with renewable energy sources, such as solar panels and battery storage systems,

allows homeowners to offset energy consumption from the grid with clean, sustainable power.

Effective maintenance practices play a critical role in ensuring the longevity and efficiency of smart home devices. Regular software updates for smart devices ensure they operate with the latest features and security patches. Calibration of sensors and actuators maintains accurate performance, optimizing energy efficiency. Troubleshooting techniques help diagnose and resolve issues promptly, minimizing downtime and maximizing device uptime.

The adoption of smart home energy savings and maintenance strategies offers multiple benefits beyond reducing energy bills. It promotes sustainable living by lowering carbon footprints associated with residential energy consumption. Moreover, it enhances comfort and convenience through automated controls that adapt to user preferences and environmental conditions.

In conclusion, smart home technologies represent a transformative approach to residential energy management. By implementing these strategies, homeowners can achieve significant energy savings, improve sustainability, and enjoy a more efficient and comfortable living environment. Embracing smart home energy solutions not only supports environmental goals but also enhances economic efficiency by reducing long-term energy costs.

## **SIMPLE LIFESTYLE CHANGES THAT SAVE BOTH ENERGY AND MONEY**

Even though a lot of people may disagree, choices that can help save the environment often save you money as well. By learning from and curbing our regular habits, we can decrease our impact and contribute meaningfully to the Earth. Teaching our kids these alternatives while they're young is also important: if kids know where things come from and how the world works, they'll be more likely to continue these eco-friendly habits throughout their own lives. Here are 6 subtle changes you can make to save both money and energy in your everyday life.

### 1) Change Your 5 Most-Used Light Bulbs to LEDs

LED bulbs can be expensive, but buying a few of them to put in your house can save a lot of money and energy in the long run. They last 10 times as long as

compact fluorescents and ages longer than incandescents. In terms of heat, they only produce 3.4 BTUs per hour as opposed to 85 for incandescents, which contribute to heat build-up in rooms and can raise the cost of air conditioning. At first, you're paying more for the bulbs, but over time, the cost is saved because you're buying less of them.



## 2) Spend at Least an Hour Outside Every Day

I know how easy it is to sit on a couch and flick through TV channels. Sometimes it feels like there's nothing else to do; you've got no friends around, and you're hungry, so those Nacho Doritos are a nice complement to your mindless vegging session. But before you sit down and press that power button, ask yourself if there's something you can do outside for the next hour. Find a trail you'd like to hike, go for a walk with your dog (or even your cat if you're into that). Buy a field guide about local wild flowers and learn about the plants around your home and what medicinal purposes they have—you might be surprised how useful certain plants can be for everyday situations. If none of these things sound interesting, there's always the beach.

## 3) Change Your Clothes Washer & Dryer Habits

Whenever I can, I make sure to use cold water in my washer and avoid using my dryer completely. Most of the energy from washing clothes comes from heating the water, so by using the cold setting I save 90 percent of the energy costs. For the

dryer, not only does it shrink all my pants and render most of the already skinny-fit jeans unwearable, but it also wastes uses about 5 to 7 pounds of carbon per hour of use—that may not seem like much but if you’re doing 400 loads a year, it adds up. When it’s cold outside, hang laundry somewhere in your house that gets a lot of sunlight. It makes your clothes smell better, saves money on dryer sheets, and sometimes clotheslines can be artsy, too, which increases the aesthetic pleasure of your home.

#### 4) Eat Less Meat

A lot of people really love meat. Globally, we eat about 105 pounds of it a year and in America alone, that number is more than doubled. But the problem with meat consumption is that it’s causing issues in our bodies as well as our environment. In order to make a quarter-pound burger, it takes: 6.7 pounds of feed, 52 gallons of water, 74 square feet of grazing land, and over 1,000 British Thermal Units (BTUs) of fossil fuels. This doesn’t account for all the methane released by ruminant livestock (read: cows), either. In total, methane emissions from cows account for 28 percent of global emissions. Besides all those climate facts (which probably won’t stop you from eating meat anyway, let’s be honest), that processed meat is being shown to cause heart problems—replace that steak with a black bean burger every once in a while.

#### 5) Buy Secondhand Clothes and Items

I’d be lying if I didn’t say that my best clothes have come from Salvation Army. Not only can you make fun of the hilarious t-shirts in Salvo (and sometimes buy them), but you can buy nice clothes for next to nothing. Shirts are usually about 7 bucks, and pants range from 2 to 14 bucks, again, usually. A lot of people only use places like Salvo for clothes, but you can also find furniture, dishware, books, and sunglasses among other things. Another example of buying secondhand would be to purchase a used car instead of a new one. Buying secondhand not only saves you money, but since you’re buying something that’s already been made, you’re not creating a chain of demand and costing electricity to run factories that produce smog and pollution.

#### 6) Walking > Biking > Taking the Bus > Driving > Taking a Train > Flying on a Plane

In this order, you'll save the most money and reduce emissions. If you're planning a trip, always be sure to keep these steps in mind. Two years ago, transportation accounted for 28% of total greenhouse gas emissions in the U.S., and that number has increased 18% since 1990. Trains are better than planes, but many still burn coal, and despite new technology, air traffic accounts for 2% of the global emissions that are contributing to accelerated climate change, and that number's growing. If you're really close to your desired destination, remember that good old-fashioned walking is always a great way to travel.

### **HOW CAN YOU SAVE ENERGY AND MONEY?**

It's no surprise that energy costs money, yet some people greet their bills each month with a shock when they see precisely how much their power consumption is costing them.



## 1. Use Your Thermostat

Turning up the temperature during the summer and turning it down during the winter are great ways of putting your thermostat to work for your wallet. The Department of Energy (DOE) recommends turning your thermostat back 7°-10°F for 8 hours a day from its normal setting to keep your house comfortable while reducing your energy costs and decreasing the demand on the energy grid.

A programmable thermostat lets you make the house hotter or cooler during periods when you aren't home. This reduces the temperature difference between the exterior and interior of your house, which in turn reduces energy loss. If you don't have a programmable thermostat, you can manually adjust your existing unit.

## 2. Ceiling Fans

If you have ceiling fans in your house, turn them on and use them properly. According to Energy Star, a voluntary labeling program sponsored by the DOE and the U.S. Environmental Protection Agency (EPA), ceiling fans should be set to spin counter-clockwise in the summer, which pulls hot air up to the ceiling and away from the living space. In the winter, reverse the setting so the fans blow the hot air down.

## 3. Energy Star Appliances

Energy Star also identifies energy-efficient appliances, including washers, dryers, refrigerators, freezers, dishwashers, dehumidifiers, room air conditioners, computers, and more. When shopping for new appliances, look for the Energy Star label, and rest assured that the items you are purchasing will go a long way toward saving you some cash.

Of course, you wouldn't want to increase the use of these items just because they save energy. Consuming more defeats the purpose.

## 4. Home Electronics

Stereos, DVD players, televisions, kitchen appliances, and any other plugged-in appliances draw a small amount of power even when turned off. Use the surge suppressor to turn them completely off when not in use, or unplug these items until you really need them.



## 5. Energy-Efficient Light Bulbs

A quick and easy way to reduce your energy use is to replace existing incandescent bulbs with energy-efficient compact fluorescent ones. According to the DOE, switching to LED lighting can save about \$225 in energy costs per year for the average household.

Regardless of the bulbs you use, turn them off when you leave the room. For laundry rooms, garages, basements, and other little-used areas consider the installation of timers that automatically turn off the lights after a preset amount of time, just in case you forget to shut them off.

## 6. Conserve Water

Low-flow fixtures that conserve water are available for your shower, faucets, and toilets. In addition to installing these items, be sure to replace faucets that drip, fix toilets that leak, and turn off the spigot when brushing your teeth or scrubbing dishes. Every drop of water you save contributes to the conservation of this valuable resource; we're talking water here, not just money.

## 7. Seal and Insulate

A well-insulated house reduces the amount of money you will spend on heating and cooling. Start by checking your attic. If your attic is unfinished, you shouldn't be able to see the floor joists. If you can see them, add more insulation.

Also, be sure to fill in and seal any holes in your exterior walls, such as where pipes come into the house, and around windows and doors. Wrap your boiler and exposed pipes with insulation to help them maintain the proper temperature.

## 8. Change or Empty Your Filters

Change the filter on your furnace on a frequent basis. Many furnace manufacturers recommend doing it quarterly or even monthly to keep the unit operating at peak efficiency. Similarly, empty the lint filter in your dryer after every use. Even a small amount of lint reduces energy efficiency.

## 9. Close the Doors and More

Don't waste energy. Close the doors on your refrigerator and house as quickly as possible. Keep fireplace dampers shut when not in use. Close the curtains to cover your windows at night. All of these little efforts help to conserve energy by preventing heat loss.

#### 10. Use Your Surroundings

Strategically placed trees can help reduce your heating and cooling costs. During the summer, trees provide shade. During the winter, trees provide a windbreak.

These deciduous trees should be planted on the south and west sides of your home, and strategically positioned to shade hard surfaces, including driveways and patios, to maximize their impact. Because they lose their leaves in winter, they allow the sun to warm your house. Evergreen trees planted on the north side of your home will help to shield the house from cold winds in every season.

### **WAYS TO REDUCE YOUR ENERGY BILLS**

This guide is about the choices available for you to lower your energy bills. Every household situation is different and the changes for each household will be different.

The guide has been designed to give you the big picture as well as the nitty-gritty facts on energy consumption so you can make better choices starting today.

**There are 3 main steps to start saving.**

#### 1. Get informed

Get a better understanding of your energy bills and the key home and lifestyle factors that affect them.

#### 2. Get organised

Manage your energy use and identify energy hot spots around the home so you know where to start.

#### 3. Get moving

Compare electricity and gas retailers in your area and decide whether time-of-use pricing, off-peak hot water, and smart meters are for you. Select energy-efficient appliances and consider solar PV and battery storage for your home.



Read more about these steps below.

### **Understand your energy bill**

Understanding your energy bill including all the fine print will help you to assess your energy use patterns so you can begin to make changes and savings around the home.

### **Costs that make up your bill**

There are many costs involved in providing electricity and gas to your home. These costs and their relative contribution to the total amount payable are not provided in detail on most energy bills.

### **Retail**

Retail costs include administrative services, such as account and billing management, and customer support.

## **Wholesale**

Wholesale costs are payments to the wholesalers (energy generators).

## **Network**

Network costs are payments to the electricity and gas distributors who build and maintain infrastructure (poles wires and gas pipes) that bring energy to your home. Network costs make up about half of total electricity costs.

## **Key factors affecting your energy bill**

A range of factors determine the amount of energy used in individual households, including:

- your local climate
- the size of your home and whether it's a townhouse, apartment or freestanding
- the design of your home including its orientation and use of passive heating and cooling
- features and appliances including the size, number and energy efficiency of major appliances
- habits and personal preferences.

Take advantage of local conditions to make your home function as efficiently as possible. Look at our tips for heating and cooling to get some ideas.

The most effective time to consider energy and water efficiency is while planning changes to your home or building a new one.

## **INNOVATION THAT CAN SOLVE HOUSING'S WATER SCARCITY CHALLENGE**

One innovative solution to address housing's water scarcity challenge is the implementation of decentralized water treatment and reuse systems within residential buildings and communities.

Decentralized water treatment systems utilize advanced technologies such as membrane filtration, UV disinfection, and reverse osmosis to treat greywater (from sinks, showers, and laundry) and even blackwater (from toilets). These systems purify wastewater to a high standard, making it suitable for non-potable uses like toilet flushing, irrigation, and outdoor cleaning. By treating and reusing water onsite, these systems significantly reduce the demand on freshwater sources and alleviate strain on municipal water supply systems.

Key benefits of decentralized water treatment and reuse systems include:



1. **Water Conservation:** By recycling greywater and blackwater, these systems reduce the amount of freshwater withdrawn from local sources, conserving water resources for essential uses.
2. **Cost Savings:** Homeowners and communities can lower water bills and operational costs associated with water treatment and distribution by utilizing recycled water for non-potable applications.

3. Resilience: Decentralized systems enhance community resilience against water scarcity and disruptions in municipal water supply. They provide a local source of water that is not entirely dependent on external infrastructure.

4. Environmental Impact: By reducing wastewater discharge into rivers and oceans, these systems mitigate water pollution and improve ecosystem health.

5. Scalability and Adaptability: Decentralized systems can be implemented at various scales, from individual homes to larger residential complexes or neighborhoods. They are adaptable to different geographical and climatic conditions.

6. Regulatory Support: Increasingly, regulations and incentives support the adoption of water reuse technologies to promote sustainability and resilience in water management.

Implementing decentralized water treatment and reuse systems requires initial investment in infrastructure and technology. However, over time, the savings in water costs and the environmental benefits typically outweigh the initial costs. Moreover, technological advancements continue to improve the efficiency and affordability of these systems, making them more accessible to homeowners and communities worldwide.

In conclusion, decentralized water treatment and reuse systems represent a forward-thinking innovation that can effectively tackle housing's water scarcity challenges. By integrating these systems into residential infrastructure, communities can achieve sustainable water management, reduce reliance on freshwater sources, and contribute to a more resilient and environmentally friendly future.

## **SETTING UP SMART HOME AUTOMATION**

**THE SMART HOME:** It's a place that anticipates your needs and empowers you to fine-tune your environment. Well, that's the pitch at least. Putting it all together isn't a smooth ride, but the right setup and combination of devices can make your life easier and add real convenience.

With a myriad of ecosystems and standards to navigate, not to mention the diverse array of devices, the smart-home scene is daunting. We put together this smart-home guide to highlight your options, explain the jargon, and help you understand the consequences of the choices you make. A little planning goes a long way.

Big smart-home brands offer easy compatibility with the major ecosystems. Philips Hue bulbs, for example, can be added directly from the Google Home or Apple Home apps. Unfortunately, this isn't common. Most devices will require you to use a third-party app for the initial setup at the very least, and possibly also for configuration and control.



The setup guide that comes with every smart-home device generally directs you to download the companion app as the first step. You may have to scan a QR code or enter a serial number, so make sure you run through this process before you mount anything in place or throw anything away, as these codes often appear on the back or underside of devices or the instruction booklet.

Setting up smart home automation involves integrating various devices and systems to create a connected ecosystem that enhances convenience, efficiency, and control within your home. Here's a comprehensive guide to help you navigate through the process:

### Step 1: Assess Your Needs and Goals

- Identify Areas for Automation: Determine which aspects of your home you want to automate (e.g., lighting, heating/cooling, security, entertainment).
- Define Goals: Consider what you aim to achieve with automation, such as energy savings, enhanced security, or improved convenience.

### Step 2: Choose a Smart Home Hub or Platform

- Select a Hub: Choose a central device or platform to control your smart devices. Popular options include Amazon Alexa, Google Assistant, Apple HomeKit, or smart hubs like Samsung SmartThings or Hubitat Elevation.
- Compatibility: Ensure your chosen hub supports the smart devices you plan to use (e.g., Zigbee, Z-Wave, Wi-Fi).

### Step 3: Select Smart Devices

- Start Small: Begin with essential devices like smart plugs, smart bulbs, or smart thermostats.
- Expand Gradually: Add more devices over time based on your needs and budget, such as smart locks, cameras, sensors, and appliances.

### Step 4: Install and Set Up Smart Devices

- Follow Manufacturer Instructions: Install each device according to the manufacturer's guidelines.
- Connect to Hub: Use the hub's app to connect each device and configure settings like schedules, automations, and device interactions.

### Step 5: Create Automations and Routines

- Set Schedules: Automate devices to turn on/off or adjust settings at specific times (e.g., lights turning on at sunset).
- Create Routines: Establish routines for common scenarios (e.g., "Goodnight" routine that locks doors, adjusts thermostat, and turns off lights).

### Step 6: Integrate with Voice Assistants



- **Link Accounts:** Connect your smart home hub with voice assistants like Alexa or Google Assistant.

- **Voice Commands:** Use voice commands to control devices individually or execute routines ("Alexa, turn on movie night").

#### Step 7: Enhance Security and Privacy

- **Secure Networks:** Ensure your Wi-Fi network is secure with strong passwords and encryption.

- **Review Permissions:** Regularly review permissions and access settings for each connected device and app to safeguard privacy.

#### Step 8: Monitor and Maintain

- **Update Firmware:** Keep devices and hub firmware up to date to ensure optimal performance and security.

- **Troubleshoot Issues:** Address connectivity or functionality issues promptly through manufacturer support or community forums.

#### Step 9: Explore Advanced Features

- **Advanced Integrations:** Explore advanced integrations between devices and services (e.g., IFTTT or custom scripts).

- **Energy Monitoring:** Utilize devices that offer energy monitoring capabilities to track usage and optimize efficiency.

#### Step 10: Expand and Customize

- **Expand System:** Continuously assess and expand your smart home setup as new technologies and needs arise.

- **Customize Settings:** Tailor automations and settings based on feedback and evolving preferences.

By following these steps, you can effectively set up and manage a smart home automation system that enhances your lifestyle, improves efficiency, and provides peace of mind through enhanced control and convenience.

## **7 AFFORDABLE WAYS TO CREATE AN ENERGY-EFFICIENT HOME**

Creating an energy-efficient home is become the need of an hour. It can help households in Sydney to save money and add value to their home while protecting the planet.

However, there is a misconception that energy-saving technologies and home designs are too expensive and take a toll on your pocket. So, below is a comprehensive list of the 7 most affordable ways to help create an energy-efficient home while maintaining an aesthetic appeal. This guide has some great tools and cleaning tips to achieve the desired results.

With proper guidance and money-saving counterparts, you can reduce your electricity bills and save non-renewable resources in the long run.

Let's Get Started!



### **Regularly Clean HVAC System: Filters And Ducts**

The HVAC system in your home is one of the major culprits of energy-efficient problems, such as heat loss and gain, uneven cooling or heating, etc. This happens due to a lack of maintenance and functionality.

If you want your HVAC system to run efficiently, make sure you clean it on a regular basis. Set up a spring home maintenance task and get rid of dirt, stains and accumulated grime.

The most imperative task is to clean air filters and dust on a frequent basis. This is because clogged filters can reduce the efficiency of your HVAC system and pollute the indoor air quality. According to professional end of lease cleaners Sydney, you can vacuum clean the air filters and wash them in hot, soapy water to dislodge stuck dirt.

Replacing filters twice a year is also good to keep your HVAC system energy-efficient. Believe it or not! Regular maintenance can help you save up to 15 per cent of power consumption.

### **Wash Your Windows**

Increasing natural light can help reduce the consumption of energy in a home. For that, make sure your windows are clean and dirt-free. Dust accumulation, stains and grime on window glass can block the natural light while affecting the overall curb appeal.

So, wash your windows inside and out using the proper tools and products. Use white vinegar and hot water to clean the glass and frame. Wipe down with a sponge or a microfiber cloth. After that, run a squeegee to achieve streak-free results.

You can also hire professionals for a quality end of lease cleaning Sydney for the entire property. They will clean windows, hard-to-reach areas, kitchen, bathrooms, etc, to help you pass the rental inspection at the end of your tenancy.

### **Install LED Bulbs**

Switch your traditional lighting systems with LED light bulbs and save energy. This is one of the most effective and environmentally friendly ways to install lighting in any home.

LED bulbs are sleek and clean and have a lifetime of up to 100,000 hours. You can install them in your rooms as well as patio areas because LEDs can withstand extreme weather like snow, wind and rain.

Make sure you clean your patio furniture if love spending time outdoors to enjoy a sunny weather.

### **Caulk Gaps And Cracks**

If you want to make your HVAC system more efficient, inspect the entire property and seal the cracks and gaps around vents, doors and, of course, windows. This will prevent the loss of heat during winter and save you money.

Use caulk, a perfect material to seal through gaps and joins in no time. Make sure you do necessary repairs, such as fixing water leaks, broken doors, etc, before the final rental inspection.

### **Upgrade Your Thermostat**

With the constant evolution of new-age home technology, it becomes easy to monitor heating and cooling temperatures in a home. If you want to make your home more energy-efficient, upgrade your programmable thermostat with a smart one. You can adjust the temperature of your home using a mobile application. Monitor your home's heating and cooling conditions even if you are away.

The new-age thermostats can detect different conditions, such as humidity and control the temperature accordingly while saving electricity and money.

### **Use A Low-Flow Shower Faucet**

This is one of the most affordable and easiest ways to save money and water. Install low-flow shower heads and faucets when styling your bathroom. You may find two different types of shower heads:

**Laminar: It provides a water stream consistently.**

**Aerating: It mixes air and water.**

According to experts, low-flow shower heads can reduce water wastage by up to 50 per cent, which is huge.

### **Clean & Maintain Kitchen Appliances**

Apart from buying energy-saving electronic appliances, keep them clean and well-maintained regularly. Build-up grease, grime, gunk, and stains in your refrigerator, microwave, oven and BBQ can affect their efficiency and waste a lot of energy.

Make sure you deep clean your appliances using eco-friendly products to protect the environment and the entire eco-system. Use baking soda, vinegar, and hydrogen peroxide to tackle stubborn stains and grime.

### **An Additional Tip:**

#### **Use Energy-Efficient Cleaning Tools**

It is good to use energy-efficient cleaning tools, such as vacuum cleaners, steam mops, and other tools, to minimise energy consumption. You can also incorporate all-purpose cleaning tools, like brushes and sponges, to reduce the carbon footprint in the environment.

If you are preparing for the final inspection, hire experts for the best end of lease cleaning Sydney and save your hard-earned bond money. They bring all the new-age equipment to tackle dirt, dust and grime with perfection and prevent rental disputes at the end of your tenancy.

### **Wrapping Up**

These are some of the best strategies to help create an energy-efficient home without burning a hole in your pocket. Make sure you try these ways and save money while reducing energy consumption.

### **CONCLUSION**

In conclusion, smart home energy savings and maintenance strategies offer a transformative approach to enhancing sustainability, reducing costs, and improving overall comfort. By implementing technologies such as smart thermostats, automated lighting controls, and energy monitoring systems, homeowners can effectively optimize energy usage based on occupancy patterns and real-time data insights. This not only lowers utility bills but also mitigates environmental impact by reducing residential energy consumption.

Moreover, integrating renewable energy sources like solar panels and adopting decentralized water treatment systems further promotes resource conservation within communities. These solutions minimize reliance on traditional utility infrastructure, contributing to a more sustainable living environment.



Effective maintenance practices, including regular updates and calibration of smart devices, ensure their longevity and efficiency. This proactive approach minimizes operational disruptions and maximizes the lifespan of equipment, ultimately optimizing the return on investment for homeowners.

Looking ahead, ongoing advancements in technology, such as artificial intelligence and machine learning, hold promise for further improving energy efficiency and enhancing user convenience in smart homes. Embracing these strategies not only enhances everyday living but also supports broader environmental goals, making smart homes a pivotal part of sustainable residential development.

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