

Renewable Energy for Homes

In a Nutshell

Many individuals are familiar with renewable energy as part of large-scale public policy discussions about electricity in the United States. But renewable energy can be a very local solution too - including for your very own home. Simply, your home relies on the power you buy from your electric utility, however, you can tap into many sustainable, naturally renewable solutions such as solar energy and wind power yourself. Not only do these solutions save you money off your power bill they also reduce pollution and negative impacts on human health.

The “How To”

The [U.S. Department of Energy](#) outlines three technologies for use in home-based renewable energy: [solar](#), [wind](#), and [hydro](#). It is important to consider your prioritization of home energy efficiency - if you have already addressed items like performing a home energy audit, updating thermostats, and sealing air leaks, then considering renewable energy investments makes more sense. But [building a brand new home](#) is also a great opportunity to address energy efficiency using the [whole-house design approach](#).

For existing residences, property owners should begin the renewable energy process by evaluating the property and structure for maximum benefit as well as to build an investment strategy. The output of this process is a [Home Renewable Energy Systems Plan](#). There are many factors to consider, including what your local municipal and/or county codes and regulations may permit. Further, there are key decisions about power-generating strategies versus energy consumption forecasts. Finally, an important decision will be whether to [connect to the power grid](#) or operating as a [stand-alone system](#).

Ultimately this broader systems plan will yield more detailed individual plans for [solar](#), [wind](#), and [hydro](#). Finally, working with your contractors, you will develop a strategy for installing and maintaining [solar](#), [wind](#), and [hydro](#) renewable systems at your home.

Planning & Zoning

There is a lot of variety in how local governments treat all three of these renewable energy sources - they are addressed below:

Solar

Many communities already acknowledge homeowner interest in solar panels. Some municipalities have fully embraced the technology, while others feature codes that do not even reference them as a building or zoning code item. In those cases one of the largest barriers to the local use of solar power is difficult and challenging municipal regulations, more than purchase cost or the amount of sunlight. The [American Planning Association](#) offers [information on addressing solar panels](#) in your city, as well as the arguments for going further and developing programs to incentivize their use. The APA has released a Planning Advisory Service (PAS) report on [planning and zoning policies for solar power installations](#), which includes dozens of case studies, model ordinances, and best practices from cities across the United States.

Wind

Although many cities and counties have been addressing wind turbines and even fielding applications to develop wind farms in their areas, it is less common for a municipality to have thoroughly addressed [distributed wind](#), or small wind turbines for homeowner use. The APA also has a [PAS report on regulating distributed wind installations](#) in your community. That report also includes information on wind farms, the use of wind turbines on public facilities, and also integrating wind energy planning into the community comprehensive planning process.

Micro-Hydroelectric

Homeowner-installed small-scale hydroelectric energy generation is the least common of these three options. However, if a property and structure siting allows for access to a flowing natural waterway, then it could be an excellent opportunity for local homeowners. While there will be municipal and/or county permitting processes and other regulations, typically any electrical generation from natural waterways is primarily managed by the [Federal Energy Regulation Commission](#). The FERC provides information on the [application and approval process](#). Further, although similar resources do not currently exist for Missouri or Illinois, the [Energy Trust of Oregon](#) produced a handbook that explains from step one to completion the process for [permitting small hydroelectric systems](#) in their state - the process and many of the steps will be very similar in the St. Louis region.

Dollars & Cents

The technology surrounding solar, wind, and hydro power renewable energy resources is rapidly evolving. The cost of installation is decreasing, the efficiency and productivity of renewable infrastructure is improving, and more and more incentives are being created to transition power generation to renewable technologies. As a result, the cost-benefit analysis of many of these technologies is consistently improving - in some cases the cost analysis models are lagging behind the cost-saving realities being experienced on the ground. However, resources for each renewable technology is presented below:

Solar

Ultimately solar energy investments [pay for themselves](#). The U.S. Department of Energy offers a [Homebuilder's Guide to Going Solar](#) that comprehensively reviews the initial expense, maintenance, and long-term cost savings of using solar power. The [state of Missouri](#) also has resources on state incentives as well as cost benefits. Also [Ameren](#) offers a wealth of solar energy resources to assist in making the decision on the benefits of adding solar power to your home energy use. An [online tool](#) can assist in estimating cost savings.

Small Wind

Analyzing the cost-saving benefits of a small wind turbine at a residential building is highly dependent on a series of factors, such as the size, height, and type of the turbine, as well as how much wind it receives. One of the limitations in the St. Louis region is the amount of energy-generating wind, and those opportunities are reviewed by the [Missouri Department of Natural Resources](#). The U.S. Department of Energy provides a comprehensive [Consumer's Guide to Small Wind Electric Systems](#) that assesses the long-term cost-savings potential of a wind turbine for your home. An [online tool](#) offers cost savings estimates for small wind turbines.

Micro-Hydroelectric

The cost-benefits associated with operating and maintaining a micro hydroelectric system varies considerably based on the local specifications of the system and natural body of water. The state of Oregon provides a [website](#) dedicated to micro-hydro including links to various reports and studies that evaluate the cost impacts of such systems, including a [detailed cost-breakdown](#) presented by Canadian Natural Resources department.

Cost Impact on Local Government

All three technologies are similar in that the main impact is on staff time. Staff will have to evaluate existing codes and draft new ordinance language that permits and regulates the use of renewable energy technologies in residential areas. Depending on the approach and the complexity it could be a relatively simple or more detailed project. However the only potential for out-of-pocket costs would be the creation of any programs.

Measuring Success

There are many various ways to measure the success of a [home-based renewable electricity system](#). Most of the success metrics will be for the homeowner.

For the Homeowner

The simplest is to track your new power bills against the same month from the previous year - you should be able to note the cost savings (factoring in weather changes, rate increases, etc). Another more detailed approach is to perform an additional [home energy audit](#) that measures post-installation performance against the expectations developed during your [planning stages](#). Finally, you can either approach a more system-specific performance metric review yourself, or work with your original contractor to routinely monitor system performance, for each of your [solar](#), [wind](#), and [microhyrdo](#) power systems. By tracking maintenance costs and long-term savings you can ultimately predict your payback rate and date.

For Local Government

The success of these projects will largely be the homeowner's. However, a unit of local government can track how many such installations are conducted in your community, using the building permit database. If

homeowners are willing to volunteer the information, a community-wide total of renewable energy produced could be calculated. Tracking city or county promotional programs encouraging and informing the public on renewable energy could be evaluated for activity and interest. Highlighting local success stories and featuring "green homes" as community models is also an effective way to gauge success.

Discover More

Many of the other tabs within this tool provide a wealth of links to various websites that either offer or link to resources. Please exhaust those resources in your research. Further, the U.S. Department of Energy offers a website dedicated to [all things home renewable energy](#). There are also various non-profits, retailers, and other entities geared towards the homeowner. Many local contractors can also assist in these evaluations. Finally, and more geared to the municipal official audience, the American Planning Association offers a [Policy Guide on Energy](#) as well as resources on [Planning & Zoning for Renewable Home Energy](#).

Case Studies

Knoxville - Solar Cities America Award Winner

Contact

Susanna Sutherland
Director, Policy & Redevelopment Department
865-215-2029
ssutherland@cityofknoxville.org

Address

City County Building, Room 655 - 400 Main Street - Knoxville, TN 37902

Description

The [Knoxville City Hall's program](#) to streamline local regulations, encourage solar power use, and to comprehensively plan to adopt sustainable solar energy practices within their agency received national recognition from the U.S. Department of Energy's Solar Cities America program, part of the [SunShot Initiative](#).

Milwaukee - Solar Cities America Award Winner

Contact

Amy Heart
Solar Program Manager (City of Milwaukee)
414-286-5593
solar@milwaukee.gov

Address

200 E Wells Street, Room 603 - Milwaukee, WI 53202

Description

The [Milwaukee City Hall's program](#) to streamline local regulations, encourage solar power use, and to comprehensively plan to adopt sustainable solar energy practices within their agency received national recognition from the U.S. Department of Energy's Solar Cities America program, part of the [SunShot Initiative](#).

Model Small Wind Energy System Ordinance

Contact

Sherrie Gruder
Sustainable Design Specialist, LEED Accredited Professional, Energy Program Coordinator
608-262-0398
gruder@engr.wisc.edu

Address

610 Langdon Street, Room 322 - Madison, WI 53703

Description

The [Solid and Hazardous Waste Education Center \(SHWEC\)](#), working as part of the University of Wisconsin - Extension in Milwaukee has produced a [model ordinance](#) for permitting small wind turbines and energy systems in local communities.

State & Local Small-Wind Turbine Regulation

Contact

Jonathan Bartlett
Wind Powering America National Technical Director, U.S. Department of Energy
202-586-7334

Description

The U.S. Department of Energy provides a [comprehensive database](#) of local and state government agencies that permit small wind turbines within their community. There are non-St. Louis area examples from both rural Missouri and Illinois listed.