

LINE EXTENSION ALTERNATIVES

This document is published by the Public Utility Commission of Texas. Its purpose is to create an awareness of renewable energy technologies that may be viable alternatives to line extensions. Your utility company is required to distribute this document in accordance with the Commission's Substantive Rule 23.44(c)(3). Please note that the information provided here is to be used as a starting point only. You need to seriously evaluate available options before deciding which energy source is best suited for your particular situation.

SHOULD YOU CONSIDER RENEWABLE RESOURCES?

The economic decision to choose either a power line extension, solar power, or wind power requires careful analysis, just like any other investment. A line extension may include a one-time major expense, plus monthly bills. A solar or wind system will include a one-time major expense and will require a replacement of storage batteries every three to ten years, plus maintenance during the life of the system. Depending on your electricity needs, there may be additional costs for a backup generator, which include fuel and maintenance.

Stand-alone solar or wind systems are not normally used for water heating, space heating, refrigerated air conditioning, or electric cook stoves or ovens. These heating and cooling applications require more energy than what a stand-alone renewable system can economically provide. If your use of electricity includes such applications, the renewable system will need supplemental power from conventional energy sources.

Description of Solar and Wind Systems

Small-scale solar systems use photovoltaic (PV) cells to convert energy from sunlight. The basic principle of the energy conversion is the same as what takes place in a solar-powered calculator. A PV system can furnish electricity for communication systems, lights,

Customer Cost Considerations

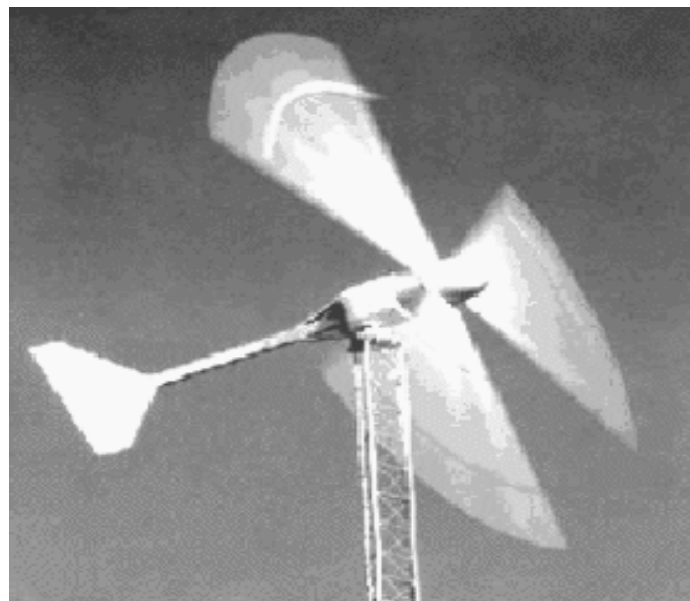
Line Extension

line installation
utility bills

Solar or Wind

initial system
battery*
maintenance
backup generator*
generator fuel*

*May be required.



*Small Wind Turbine in Operation
(Courtesy of National Renewable Energy Laboratory)*

Some Common Applications of Solar and Wind Power

water pumping
microwave repeater
beacons
obstruction lighting
remote residence

billboard lighting
traffic control devices
recreational/security lighting
gate openers
control and monitors

irrigation, and many other electric appliances. In the picture to the left, an outdoor light is powered by a PV system that is supplemented by a battery. During the daytime, when the light is not needed, energy from sunlight is used to charge the battery. At night, the light draws power from the battery.

Unlike the water-pumping "windmills" that are a common sight on Texas farms and ranches, modern wind energy generators -- or wind turbines -- produce electricity from the wind. As shown in the picture above, the wind pushes the turbine blades and turns the electric generator. The electricity that is produced when the wind is blowing can, as with PV, be used for a variety of purposes.

SYSTEM DESIGN

Designing a reliable, safe, cost-effective stand-alone renewable system requires knowledge of electrical usage characteristics, system components and system characteristics, local ambient temperature, sunlight intensity or wind speed data, electrical wiring practices, and electric codes. For example, sensitive electronic equipment such as personal computers may require a power conditioner to prevent damage to the equipment from an unsteady power supply. If you are inexperienced in these areas, you should get assistance from an expert who can advise you or provide you with the design and installation of



*PV-Powered Outdoor Light
(Courtesy of National Renewable Energy Laboratory)*

your system.

A computer program is often used in the system design process to size components, predict system performance, and produce cost estimates. Some Texas companies provide design services at little or no cost. The following steps briefly explain the design process and will help prepare you for discussing with prospective suppliers.

Step 1. Identify Electrical Loads

What equipment do you want to power with electricity? The answer to this question will determine the load that must be serviced by your PV or wind system. It may be a single-purpose system or you may be planning to operate a variety of appliances. This question must be answered completely to properly design your system.

The more power the equipment needs, the higher the system costs. Energy conservation and efficient equipment are essential to keep the system costs down.

Step 2. Identify Load Wattage

Once you have identified the individual electrical loads, you can determine the wattage¹ of each item. The wattage of a device is usually stamped or printed on a nameplate or identification plate on the unit.

Step 3. Estimate Electricity Use

You should estimate the number of hours you plan to use the equipment as precisely as possible. The number of hours of operation each day times the wattage determines the number of watt-hours your system will need to produce daily. If you plan to power more than one piece of equipment, you will need to know whether you will be using more than one at the same time.

Step 4. Estimate System Cost

A PV or wind dealer can estimate the cost of a system to meet your needs. In some instances, packaged systems for remote uses may be available from home improvement stores, hardware stores, or catalogs.

Availability of Electricity

A renewable system can produce electric power only when there is adequate wind or sunlight. Therefore, it is possible that electricity will not always be available at the moment when you need it. If uninterrupted power is important, you should consider a backup generator or a battery that can provide needed power when the renewable power is not available.

Safety Issues

General Guidelines for safe installation and maintenance include:

- compliance with the National Electrical Code and other applicable local code
- proper size of electrical conductors or wires
- appropriate fuses, circuit-breakers, and circuit disconnects
- proper grounding techniques
- elimination of exposed wires and connections
- adequate ventilation for battery gas
- safe disposal of batteries.

A properly designed and installed renewable system should be

able to provide many years of safe and reliable service.

More information about the PV design process can be found in the *Stand-Alone System Design Handbook*, available from Sandia National Laboratories, (505) 844-3698.

COMPANIES THAT PROVIDE PRODUCTS AND SERVICES

PV and wind systems are available from contractors and dealers. These contractors can assist you in deciding whether a PV or wind system is the best option for you. Your electric utility may offer this service.

This is potentially a big investment. Be sure to consult with more than one contractor. When you talk to your contractor, be sure to ask about the reliability of the system being proposed and the percent of time the system will provide the power you need. Get any warranties or guarantees in writing.

You may want to use the following questions as a starting point for talking with the contractors and dealers:

- Will a licensed electrician install the system?
- Is the contractor a member of any trade associations?
- Is there a written contract agreement and written system specifications?
- How long has the contractor been in business?
- What are the warranties on the system?
- Is the equipment UL-approved² or equivalent?
- Does the contractor provide service and maintenance for the system?

Use your judgment when dealing with contractors. Be sure to ask for references and check with your Better Business Bureau and the Texas Renewable Energy Industries Association for additional information on a particular contractor.

For your convenience, the Commission maintains a list of companies in Texas that provide renewable systems and services. To obtain a copy of the list please call the Commission's Central Records at (512) 936-7176 or download it from the Commission's web site at www.puc.state.tx.us.

This document is distributed in accordance with the requirement in Substantive Rule 23.44(c)(3) of the Public Utility Commission of Texas which states: "...the utility shall provide the customer with information about on-site renewable energy technology alternatives."

The information provided here is for educational purpose only and does not represent an endorsement of any particular option. The economic feasibility of alternatives has to be evaluated on a case by case basis. You need to conduct an additional investigation before making any decision on your investment

¹ While mechanical power is measured in horsepower, the electrical power is measured in watt (w). Another familiar term for electrical power is kilowatt, which is equal to 1,000 w. One horsepower is equivalent to 746 watts.

² UL stands for Underwriters Laboratories, an independent entity that conducts tests on devices, systems, and materials for their safety.