

# Renewable... Priorities

## Ordering RE Possibilities

by Ian Woofenden

*Derivation: From Latin prior, meaning "former" or "prior."*

The perennial question, "Which renewable energy resource is best?" has a perennial answer: It depends. First of all, it depends on what resources you have at your site. There's no sense pining after hydro-electricity if you have no falling water on your property. But you also shouldn't throw up your hands in despair if you don't have as much sun as your cousin in Arizona. You should make the best of the renewable resources available at your site.

The answer also depends on what scale you are considering. Prioritizing renewable energy (RE) technologies is different for homes and ranches than it is for municipal or utility-scale projects. Different people might prioritize the existing renewable energy technologies in different orders. From my knowledge, research, and experience, here are the

rankings I'd make for small- and large-scale projects, based on the performance of typical systems. Of course, this ranking will vary, based on design and resource specifics of your individual situation.

On the large scale—municipal to national—the ranking is different. Larger-scale renewables are generally more mature technologies. They have higher reliability and lower cost per delivered kilowatt-hour than their small-scale counterparts.

Note that I'm only considering existing, proven technologies. While new technologies may look promising, my history in the RE industry leads me to wait for a price tag, warranty, and track record before putting time, energy, and money into something new. Meanwhile, the technologies on the market are making energy *today* using natural, abundant, and renewable resources.

### On the home-to-ranch scale, I would order the technologies in this way:



**Energy efficiency.** The first choice on both lists is the most cost-effective and environmentally friendly energy available—the energy you don't have to generate. Conservation (using less) and efficiency (doing more with what you have) should be your first investment, whether you're powering a small cabin, a multinational corporation, a city, or the world.



**Solar pool heating** is a slam-dunk if you have a pool and sunshine. These systems are low cost, simple to implement, and can significantly reduce nonrenewable energy use.



**Microhydro-electric systems** take a very concentrated resource—water under pressure—and make a lot of electricity using a modest amount of infrastructure.



**Solar hot water systems**, for domestic hot water (and where appropriate, space heating), are the most cost-effective RE technologies for the typical home.



**Photovoltaic (solar-electric) systems** are still relatively expensive up front, but many homeowners choose this technology over solar hot water because of its very high reliability and simplicity to maintain.



**Wind electricity** looks very attractive to the uninitiated, and when it works well, it can produce electricity very inexpensively. But it often doesn't work well on the home scale, and when you factor in the cost of downtime, repair, and replacement, this technology ends up at the bottom of my list for typical home-scale systems.

**At the utility scale, after energy efficiency, my simplified ranking looks like this:**



**Hydro-electricity** on a large scale can produce some of the least costly electricity available. Of course, it is not without its impacts, with dammed rivers flooding landscapes and communities, and affecting fish and other animals.



**Wind electricity**, on farms or with single utility-scale units for large businesses and institutions, is one of the fastest-growing RE technologies, and doesn't suffer from the lack of reliability of its small-scale cousins.



**Biomass** for electricity generation includes waste from agriculture, forestry, and municipalities, as well as dedicated energy crops. Behind hydro-electricity, biomass is the single largest source of renewable electricity in the United States today.



**Geothermal energy**—tapping the heat in the earth—is not as widely available as some of the other resources, but can make sense when it is. Steam turbines running on the earth's heat energy are used in many regions around the world.



**Concentrating solar** thermal plants use large reflective troughs, dishes, or tracked mirrors that concentrate the sun's heat and make steam to generate electricity. Plants in California and Nevada cover hundreds of acres of desert, with generating capacities of several hundred megawatts.



**Photovoltaics** are very reliable, but so far, the economics don't improve dramatically when scaled up, though this could change as the industry develops. Business incentives in some areas make the financial case for PV very inviting.

So what are your priorities? My prioritized lists are big-picture rankings, assuming equal resources. But in the real world, each region and property has more or less of each resource. In my book, your top priority should be to implement energy conservation and efficiency strategies, whether it is in your home, business, region, country, or world. Then move toward using your local renewable resources, and choose them over nonrenewables, which in the long run are expensive and unsustainable.

**Access**

Ian Woofenden's (ian.woofenden@homepower.com) home in Washington's San Juan Islands has no uranium, coal, or oil deposits, nor access to falling water or free hydrogen. But it does have reasonable sun and wind resources, so that's what his family uses to heat water and make electricity.



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