

5 Feasible Renewable Energy Sources

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Wind power is one of the more feasible renewable energy sources. Image credit: Kichigai Mentat

(PhysOrg.com) -- President Barack Obama has made no secret of his desire to develop a "green economy" that includes renewable energy projects meant to [benefit the environment](#). He has said that part of the economic recovery in the U.S. will come from money for, and jobs created by, renewable energy projects. Around the world, politicians, businesses and scientists are developing the technology that could improve the cost-efficiency of renewable energy.

One would expect that -- over time -- the costs associated with renewable energy would go down. With fossil fuels, costs can only go up as the un-renewable sources dwindle and become more scarce even as demand rises. Here are 5 feasible renewable energy sources that could be

developed to help meet world energy needs:

1. Solar: This is perhaps the most recognized renewable [energy](#) source. Energy from the sun is captured using cells made from special materials (silicon is quite popular right now) and then converted into electricity. The biggest factor in solar cell production is cost. However, with technological advancements solar is becoming more cost efficient, and high efficiency solar cells are being developed. This is important, since high efficiency cells are hard to come by. New materials are providing solar cells that are easier to transport and install. Flexible [solar cells](#) can be used for residential use, and building [solar arrays](#) is becoming popular. One of the main factors in efficiency is the fact that solar panels only generate electricity during daylight hours, and can be hampered by cloudy conditions or pollution. Some sort of storage is needed in order to make full use of solar power.

However, there are environmental impacts associated with building arrays, since they take up a great deal of room (which is why deserts are being considered -- but still ecological impacts are a reality). In some areas, power companies are toying with the idea of [renting rooftops and installing solar panels](#). This way companies could generate renewable energy that would be theirs, customers could see their costs decrease, and homeowners would not have to pay for installation. Warehouses would be targeted in larger areas. These types of projects could help overcoming the cost-efficiency hurdle, while reducing the environmental impact of large solar installations.

2. Wind: Wind power is growing rapidly, and is becoming a well-recognized renewable energy resource. Using wind power to turn turbines that generate electricity can provide a cheap source of energy. Building and maintaining equipment could provide thousands of jobs and cost-efficient and clean electricity. Wind farms, however, are not particularly popular. They can impact local environment and wildlife,

and even provide noise pollution. Additionally, many people feel that the equipment used obstructs scenic views.

It is possible, however, to construct wind turbines in various sizes. They can be made for single residential use, and they can be constructed on a large scale as well. Wind power could be used in areas where there is a great deal of wind, and a lot of open spaces. Technology is making this mode of renewable energy more efficient and less intrusive, but many still feel that there is a long way to go with wind power.

3. Geothermal: Geothermal energy is extracted from the natural processes of the earth. A great deal of heat is created below Earth's surface, and efforts are being made to extract and use this power. While the ancient Romans knew about and used geothermal heating, now Earth's processes are being used to generate electricity -- going beyond space heating. Geothermal power does not put off greenhouse gases (although some harmful gases from deep in the earth would be released -- and need to be contained), and it is reliable. However, it can only be used in areas where there is tectonic activity.

Unfortunately, drilling is involved with geothermal extraction. Additionally, exploration is rather expensive. The costs of starting a geothermal plant are quite high at the outset, including the piping that would need to be laid and all the other costs, although a geothermal operation takes up less surface space than a power plant that uses coal or oil. Fuel is not necessary for a geothermal plant at all. However, once a successful geothermal plant is established, the long-term cost-efficiency usually makes up for the initial cost outlay.

4. Water: We have been studying water-based renewable energy for quite some time. Hydroelectricity has been a source of energy for years. However, even though the energy production process does not put off pollution, there are other environmental concerns associated with the

damming of rivers and ecological impacts stemming from this practice. But hydroelectric power remains one of the more cost-efficient means of generating renewable energy.

Other water sources are being considered as well. Tidal power is being developed right now as an energy alternative. Tidal generators placed underwater work in a similar fashion to wind turbines, only they are turned by currents. While considered environmentally friendly, tidal power will be difficult and expensive to develop, since it involves placing generators at the bottom of the ocean. These "underwater wind farms" are also likely to have impacts on sea life.

5. Nuclear: Perhaps the most controversial form of renewable energy is nuclear energy. Electricity is produced from the energy released by nuclear reactions. While fission (splitting) is the main source used today, interest continues in developing [cold fusion](#). Currently, though, power plants generating power using nuclear fission are among the safest plants. They also generate power without emitting pollution. In Europe, France benefits greatly as its nuclear energy produces the cheapest electricity (according to 60 Minutes).

The biggest drawback that many see with nuclear energy is the waste. Radioactive waste is a concern, since it is a health hazard and if stored improperly can leach into soil and groundwater. However, with the right kind of processes, it is possible to recover the waste from the reactions, reclaiming it for further power generation. With technological advancements, it could be theoretically possible to reclaim up to 95% of the waste from initial reactions. Right now, though, France leads in nuclear waste recycling with only 28%. Another issue is fear of sabotage that could result in large-scale contamination. However, nuclear energy is the probably the fastest method that could be put into practice for energy independence from fossil fuels.

Implementing Renewable Energy

All of these processes would require expense up front. Research and technological developments to advance the efficiency of renewable energy is expense. Producing the equipment would require a large initial capital outlay. Additionally, there are some environmental concerns beyond [air pollution and global warming](#) with any of these processes. However, it is thought that the environmental impacts long-term would still be less than those of continuing to use fossil fuels. Additionally, cost-efficiency would increase, and overall energy costs would be expected to fall long-term

No one of these [renewable energy](#) sources could effect a change, however. It would require coordinated implementation of a variety of alternative strategies to replace the energy we get from fossil fuels. Assessments of which types of energy would work best in different locales would be required, and a great deal of planning would be needed for a successful implementation.

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