

## RENEWABLE RESOURCES AS ENERGY-EFFICIENT SOURCES

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### Annotation

This article provides the information about the concept of renewable resources as energy-efficient sources, its classification, methods of using, including the most innovative which are realized nowadays. The study offers a comprehensive description of all types of renewable energetic resources, exciting at this moment.

Key words: renewable resource; biomass; wind and solar energy; drilling; reinjection; potable water; irrigation.

Nowadays, people generally use nonrenewable sources of energy because it has been already developed and aspects of this area are studied. Some of them are being under research now. However, it is not effective because we cannot renew them. Therefore scientists try to find the most energy-efficient sources from the renewable ones.

The main purpose of this study is to show that the area of producing energy from renewable resources is actively developing now as well as to have a look at scientists' inventions and future projects.

The term "renewable" is generally applied to those energy resources and technologies whose common characteristic is that they are non-depletable or naturally replenishable.

A.J. Armstrong explains that renewable energy technologies produce power, heat or mechanical energy by converting those resources either to electricity or to motive power. The policy maker concerned with development of the national grid system will focus on those resources that have established themselves commercially and are cost effective for on-grid applications. Such commercial technologies include hydroelectric power, solar energy, fuels derived from biomass, wind energy and geothermal energy. Wave, ocean current, ocean thermal and other technologies that are in the research or early commercial stage, as well as non-electric renewable energy technologies, such as solar water heaters and geothermal heat pumps, are also based on renewable resources. [1]

As concerns resources, they are fundamentally different. At present, the major commercial grid-connected renewable resources are hydroelectric, geothermal, biomass, wind energy and solar. In the majority of legal regimes, hydroelectric and geothermal resources are identified as owned in common by the people of the country and developed by the government for their benefit.

Dr. J. Hamrin suggests the following classification of renewable resources:

- Geothermal resources require extraction (and reinjection). Drilling for geothermal resources involves many of the same discrete considerations involved with drilling for petroleum (hydrocarbons) and individual treatment is prudent.

- Hydroelectric resources are inextricably linked with surface water rights, including potable water, navigation, irrigation, navigation and recreational rights. The historical complexities of sorting out these juxtaposed rights usually dictate individual treatment of hydroelectric resource issues.

- Wind energy and solar draw on resources - wind and sun energy - generally thought of as being free for the taking. The principal resource issue with both of these renewables is surface land. Therefore there is no general technical requirement for individual treatment.

- Biomass is a broadly inclusive term, often encompassing wood and wood waste, agricultural waste and residue, energy crops, and - sometimes - landfill gas resources. Resource availability and cost can be highly variable, and resources may require management of a type not frequently required for other renewables. [1]

According to the recent study presented in the Journal of Environmental Studies, renewable energy technologies are a cost-effective way to provide power. If climate change costs and health impacts are included in the price analysis, wind and solar energy is cheaper than coal-fired power plants. This is in addition to their well-documented effects on carbon pollution. Coal-fired power plants account for 40 percent of the national carbon footprint, according to the study's authors. Switching power generation to clean energy would cut down on this output, which could help slow the effects of global warming.

Large energy companies have traditionally maintained certain renewable energy technologies, such as small-scale solar installations, were too expensive and unwieldy to implement. This has been a persistent excuse for continuing to use coal-fired plants and other methods of energy production that are harmful to the environment and human health. However, more major utilities are learning that distributed generation can save them money. Distributed generation is the practice of using small-scale energy generators, like rooftop solar panels and mini wind-turbines, to produce electricity in close proximity to where it is used. [2]

At the same time, the report states that the cost of gas- and coal-fired plants is increasing because of lower utilization of thermal plants, the higher capital costs of some new thermal plants and the increasing cost of fuel.

Development of renewable energy technologies provides new researching. For example, Rice University scientists have unveiled a revolutionary new technology that uses nanoparticles to convert solar energy directly into steam. The new "solar steam" method from Rice's Laboratory for Nanophotonics is so effective it can even produce steam from icy cold water. The technology's inventors said they expect it will first be used in sanitation and water-purification applications in the developing world.

The technology has an overall energy efficiency of 24 percent. Photovoltaic solar panels, by comparison, typically have overall energy efficiency around 15 percent. However, the inventors of solar steam say that they expect the first uses of the new technology will not be for electricity generation but rather for sanitation and water purification in developing countries.

Moreover, Fitlow J. in his article explains that the efficiency of solar steam is due to the light-capturing nanoparticles that convert sunlight into heat. When submerged in water and exposed to sunlight, the particles heat up so quickly they instantly vaporize water and create steam. The solar steam's overall

energy efficiency can probably be increased as the technology is refined.

Scientists are going from heating water on the macro scale to heating it at the nanoscale. Their particles are very small -- even smaller than a wavelength of light -- which means they have an extremely small surface area to dissipate heat. This intense heating allows them to generate steam locally, right at the surface of the particle, and the idea of generating steam locally is really counterintuitive. [3]

Another potential use could be in powering hybrid air-conditioning and heating systems that run off of sunlight during the day and electricity at night.

Last year, for example, Saudi Arabia's plans to launch a massive renewable energy program were the big news coming out of the Middle East – but internal wranglings have resulted in uncertainty about the future of the project. Looking elsewhere in the region, it appears that Jordan may wind up upstaging its neighbors by pursuing steps to reduce its dependence on imported energy, which currently stands at 97 percent. The plan, which involves the initial procurement of 200 megawatts (MW) of solar energy and 200 MW of wind power, is intended to increase the kingdom's share of renewable energy contributions from one percent to 10 percent by 2020. Round one is primarily being deployed in the southern region of Ma'an. Later stages may prove riskier, as Jordan plans to switch focus to the northern and eastern parts of the country, close to the border with Syria.

Jordan's efforts notwithstanding, Font V. sees Dubai as a key market to watch in 2014. «There are plans to tender the second phase of the Dubai Solar Park in 2014», he says, and «which will be a 100 MW PV independent power project. That's arguably the most important solar project for next year in the Middle East». [4]

One of the biggest challenges facing the future of the solar industry is the ability to provide cost-effective storage. Solar energy's intermittent nature is a fact that many say could prevent more widespread adoption of the technology as a viable replacement for traditional energy generation.

Consequently, countries worldwide try to make solar energy more cost-effective. For example, Latin America could very well someday soon blossom into a world leader in solar energy. By most accounts, industry growth in 2013 was not explosive – but the region did experience significant added.

«There are quite a few countries in South America that have projects and developments in various stages», Font V. claims. «Chile is obviously very important. There's a lot of preliminary project activity going on down there, but also some major projects that plan to be installed during the coming year». Coming in a close second behind Chile as one of the countries most likely to make significant inroads in solar in 2014 is Mexico, which Font V. says has several large scale projects underway. «The third major Latin American market to watch is Brazil», Font V. adds. «That growth is being driven in large part by localities within Brazil, cities and states that are trying to incentivize solar rather than having it take place at the federal level». [4]

Most are of the shared opinion that 2014 will be a year of consolidation. Font V. believes 2014 will draw a «deep line of demarcation between the haves and the have-nots» in that downstream installers who are unable to provide low cost systems will find themselves out of business. «I think the days of subsidizing

high-cost installers will come to an abrupt end next year», he says, tempering this prediction by adding that few employees will experience long term unemployment as a result: «They'll be hired into other companies. That's good news for employees and it is good news for all of us – including governments that are paying subsidies. It's also good for the solar industry at large, because you're going to have much more professional business people running the companies. Ultimately that's also great news for consumers». [4]

In conclusion, it should be stated that renewable energy resources are becoming more cost-effective and energy-efficient now. Worldwide scientists invent modern technologies and try to update the exciting ones. It is believed that renewable resources will be used in future as energy-effective sources.

## REFERENCES

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