



SunTalk # 2: From the New Mexico Solar Energy Association

Renewable Energy

Renewable energy, and sustainable energy and green energy are all hot topics these days. Most people can list several sources of renewable or sustainable energy. The most common list will include solar, wind, hydro, biomass, geothermal and nuclear energy. Nuclear is included because Congress said so – nuclear was declared renewable by a federal government edict! So are these 6 renewable energy sources really separate and unrelated? Not really.

Everybody knows that solar energy comes from the sun, and almost everyone has seen solar thermal air collectors, solar thermal water panels, and solar photovoltaic modules. There's no doubt that these systems run on pure sunshine, and there's no doubt that the sun will still be shining tomorrow – and the day after that. In terms of the sheer amount of energy that's available for the taking, pure sunshine wins hands down.

The fact that the wind is full of energy will come as no surprise to anyone who has ever been in a hurricane or a tornado. These days, wind turbines are even more popular with utility companies than solar PV systems, because at least for now, wind turbines can generate electricity more cheaply. There's a lot of kinetic energy in wind, but because air is so light, you have to capture lots of wind in order to generate significant amounts of electrical energy. A typical commercial wind turbine is 200 ft high, and has three 100ft long blades. Even bigger ones are on the way.

But where does the wind get all that energy? Why does the wind blow? Your TV weather person mentions that almost every night – it has to do with localized areas of high and low air pressure. And what causes those air pressure differences? Unequal heating on the surface of the earth. And what energy source is responsible for heating the surface of the earth? El Sol. So wind energy, when you get right down to it, is actually solar energy in disguise.

Hydroelectric turbines can be huge, but their blades are much smaller than wind turbine blades because water is much heavier than air. Relatively speaking, a little moving water goes a long way when it comes to kinetic energy content. And a lot of fast moving water is virtually unstoppable – think tsunamis. It's possible to harness the energy in tides and flowing rivers, but most hydroelectric power plants depend on large lakes created behind dams.

Hydroelectric turbines are spun by the kinetic energy contained in falling water. Where does all that water come from? Water flows into the lake or reservoir from “upstream”, that is, from water sources that are higher than the dam. And how does all that upstream water get upstream? Rain. OK, but water is very heavy, so how exactly does all that weighty water work its way up into the clouds? Evaporation. But it takes a lot of energy to evaporate water and drive it up into the atmosphere. Where does all that energy come from? El Sol. So hydro energy, when you get right down to it, is really solar energy in disguise.

Biomass – the name says it all. Biomass includes food, wood, biodiesel and ethanol, and even the methane generated from manure. Manure comes out the rear end of animals, but what goes into the front end of those animals is plants. Bottom line - biomass is really all about plants. And every 4th grader knows where plants get the energy to do the work of putting together all that biomass and storing all that energy. El Sol. And every 4th grader also knows what that process is called – photosynthesis. So biomass, when you get right down to it, is also solar energy in disguise.

Looks like there aren't really 6 different & unrelated sources of renewable energy after all – only three: solar, geothermal, and nuclear. Geothermal is all about tapping into the heat found deep in the earth – think volcanoes. We won't run out of that any time soon, but it's notoriously difficult to tame. And of course, nuclear is about harnessing the energy locked up in the structure of the atom. That may be promising, but there are still major problems to solve. You'll be greatly relieved to hear that neither geothermal nor nuclear energy is actually solar energy in disguise.

This sun-talk came to you from the New Mexico Solar Energy Association.

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