

RENEWABLES

T. Balli

Faculty of Chemical Technology,

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”

Over the last 300 years, most of the energy used by the mankind has been generated from fossil fuels like oil, gas, and coal. These non-renewable sources will eventually reduce, and using them causes air pollution and carbon dioxide emissions being the main factor of a “greenhouse effect” and subsequent global warming.

Due to the above mentioned the demand for more sustainable, cleaner, ecologically friendly resources has increased dramatically over the recent decades. In fact, we face today the unique transition towards renewable energy with its share increasing every year reaching up to 20 % of the world’s energy. It is within last few years that the costs of renewables production have fallen down and its power capacity has increased moving us into the era of commercial use of renewables.

The renewables can be classified according to the source of energy used. Their commercial use is subject to the advantages and drawbacks of each type of energy.

Solar energy seems to be the most promising renewable technology nowadays. Solar panels capture sunlight in photovoltaic (PV) panels and transform it into electricity. This technology has really changed the energy market today. Even in Ukraine there have been installed 98 solar stations with total capacity 819 MW by 2015. It should be mentioned that the half of global solar consumption falls on China whereas 60 per cent of solar panels are manufactured in China as well.

Wind energy is being converted to electricity with the help of wind turbines. Originally windmills could not reach large capacities of energy production, and more powerful wind stations were rather expensive. However, within last few years, we

have faced substantial enhancement in the wind power technology which made this type of energy much more competitive.

Another source of renewable energy is **ocean** providing people with the energy of tides and waves. It has a strong potential, especially for the island countries like the UK or New Zealand. On the other hand, it is limited to a few sites all over the world where one can find powerful ocean tides and efficient ocean currents. Moreover, the construction of a tidal barrage was rather expensive until the latest improvements in turbines efficiency. So, it is considered that this renewable resource might be more applicable and much more competitive in the nearest future.

Geothermal power is another alternative source of energy using the inner heat of the Earth. It has one substantial drawback that it can be used only in the places with high volcanic activity and availability of hot springs. Still, geothermal power is successfully used in such countries as Iceland or the Philippines.

Hydroelectric power uses the energy of water currents in the rivers and lakes via creating artificial dams. This renewable resource has been widely used in the 20th century and proved to have major ecological impacts on the environment. Ukraine has suffered severely from the use of this energy source. Construction of the huge Dnipro and Dniester cascades of hydro electro stations in the last century caused flooding of vast spaces of agricultural lands with subsequent irreversible changes in local ecosystems. With all the devastating changes in environmental settings, the share of hydro energy does not exceed 10 % of total energy generation in Ukraine. Still, according to some experts, it is considered reasonable to use hydro energy on the small mountain rivers.

To give the full outlook of the renewables we should mention **biomass** (meaning all kind of organic waste) and **wood** which have been burnt to generate heat, light and energy for centuries. In fact, these resources are not infinite and should be regularly replanted to be considered fully renewable. Nowadays, there are new ways of using biomass, namely producing various types of biofuels like bioethanol and biodiesel. However, these types of fuels are not universal and require the new design of the vehicles and new transport infrastructure.

The last energy source to be mentioned in this paper is **hydrogen**. Most experts consider it to be the energy source of the future. Its advantages include the following: the simplest element in the universe consisting of one proton and one electron), the most abundant element on the Earth, really endless, very high in energy, clean energy source, non-toxic after burning. However, at the moment the disadvantages overbalance since there are many problems to be overcome before industrial and commercial use of hydrogen. First, it doesn't occur naturally as a gas and is always combined with other elements, mainly in hydrocarbons like gasoline or natural gas and water (combined with oxygen). In fact, the full chain of its use is still disputable and requires huge investments, starting from its production to transportation and storage.

To conclude, I would like to stress again that we have already entered the era of renewables. The latest enhancements in the production of solar panels, wind turbines and other technologies have demonstrated the fast movement towards cheap and efficient alternative energy. Governments all over the world have implemented policies to increase renewables share significantly. However, we should not forget that renewable energy sources so far have not influenced heavy industries like steel, chemical and cement production, typical of Ukraine. These areas are still huge consumers of natural gas, coal and other hydrocarbons. Thus, despite good potential, there is still a long way ahead.

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