Sustainable Energy Transition through Green Hydrogen

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Abstract: Transition to sustainable energy faces several challenges. Hydrogen has the potential to help this transition in the near future.

Hydrogen is an element that is plentifully available in the universe, but it is a part of some other substances like Water (H_2O) or Methane Gas (CH_4). These two substances are available in the world in great quantities.

Today, there are several technologies to produce hydrogen from water and gas. To produce hydrogen, these technologies require energy in the form of heat or electricity, so from an environmental point of view, these hydrogen-production processes are different.

Today, up to 95% of all hydrogen-producing industry uses fossil fuel energy, which has a significant impact on the environment. However, if this energy comes from renewable energy sources for supplying electricity for electrolysis process, the hydrogen produced this way is called "Green Hydrogen" (Combining Electricity from Renewable Sources with Water Electrolysis System). This process has very limited environmental impacts. As the price of renewable energy sources is going down, so it is expected that the unit price of green hydrogen ($/kg$H_2$) will also go down making the green hydrogen more attractive.

The objectives of this talk are to present details of a model developed for producing green hydrogen. The components in this model are i) a solar PV plant, ii) an electrolysis unit, and iii) a battery storage system. Furthermore, the model suggests a) the suitable size of each system's components to produce a certain amount of hydrogen, b) the performance prediction of the entire system, and c) the pricing of green hydrogen produced in $/kg$H_2$. Also, the model demonstrates its capacity to be applied to any location around the world.

About the speaker: Dr Zahedi, Ahmad

Current Position: Principal Research Fellow, Associate Professor, James Cook University, Queensland, Australia. Educated in Iran and Germany, Ahmad has over 30-year experience in teaching Renewable Energy and Power Engineering technologies' at the university level in Australia, Japan, and Europe, produced more than 200 publications, including 4 books, trained 21 successfully completed PhD candidates, examined more than 50 PhD, and completed 15 industry-funded projects.