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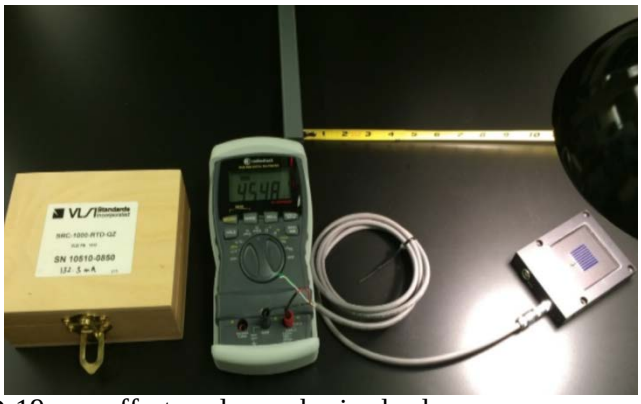
Final Assessment: Renewable Energy – Windand Solar and Water, oh my!

Driving through the Midwest en route to my internship last summer, I peeked in my rearview mirror only to see a semi-truck towing what seemed to be largest piece of cargo ever. Long, bright white, partly cylindrical yet somewhat angular – ah, the blade of a wind turbine. Shortly thereafter, I drove by a slew of wind farms near Rock Port on the Nebraska-Iowa border and marveled at the mere magnitude of these machines. Rotating effortlessly in uniform motion, it was an odd and foreign sight to see after spending my last year in the concrete jungle of New York City. Yet in Iowa, wind farms are commonplace; in fact, wind energy accounts for more than 30% of their electricity needs.[1]



Renewable energy is definitely a trendy topic that has garnered widespread attention and speculation. Some even go as far to say that the sole future of power generation is via renewable energy. It's a bold statement, but given its strengths, it is more than feasible. Sources of renewable energy are available in various facets, such as wind, solar, and hydroelectric, and are contingent on locational factors like proximity to cities or water sources. Wind energy boasts no greenhouse gas emissions and also is readily available, like solar and hydroelectric power. Solar power has many applications and minimal maintenance, and hydroelectric power generation is easy to control and store in reservoirs. The experiment for our lab course aimed to explore the efficiency of solar and wind power varieties, but due to COVID-19, our efforts only emphasized solar energy.

Given all these benefits, the future of renewable energy looks promising. However, it is important to note some factors that weaken the allure of these sustainable energy sources. For instance, hydroelectric power is really only applicable if there is a large water supply, and dam construction disrupts the mobility of fish and the natural transport of silt downstream. A large land usage is needed for wind energy, and its maximum efficiency can only reach the Betz limit at 59%. Both wind and solar energy have expensive installation fees, and solar power is only limited to certain times of the day. With respect to solar efficiency, it is difficult to ascertain based on our own experimental results given the challenging nature of measuring gaseous volumes. However, calculated findings indicate that most efficiencies involving any combination of photovoltaic cells with DC power are above 85%. Using more precise measurement techniques for gaseous volumes and increasing the area of solar panels will improve efficiency in future experiments. It is clear that despite these inherent shortcomings associated with renewable energy, the ultimate reduction in environmental implications auspiciously paves the way toward a future with a diminished carbon footprint.

[1]Jossi, F. (2017, April 19). Industry report: Midwest and Great Plains lead wind energy expansion. Retrieved May 2, 2020, from https://energynews.us/2017/04/19/midwest/industry-report-midwest-and-great-plains-lead-wind-energy-expansion/.