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The Future of Renewable Energy

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The arguments surrounding the near-term viability of renewable energy take many shapes. There are discussions about environmental impact, transmission and delivery infrastructure, storage capacity and the current political outlook. However, the focus always turns to cost in the end. While by most measures, the unsubsidized cost of renewable energy is still higher than that of traditional forms of power generation, the gap is closing rapidly. According to a recent report from the International Renewable Energy Agency (IRENA), current trends indicate that renewable energy will be cost-competitive by 2020.

According to the report, onshore wind power now costs an average of \$0.06 per kilowatt-hour (kWh) globally, while solar (photovoltaic) power comes in at \$0.10 per kWh. Wind and solar rates have decreased by 23 percent and 73 percent, respectively, since 2010. In contrast, fossil-fuel power costs in the range of \$0.05 to \$0.17 per kWh. Even with a conservative trend assumption, we will soon see cost-efficient renewable energy.

Another concern is the ramp-up of infrastructure to meet the demands of renewable energy users. The prime example of this is the need for widespread charging stations for electric cars. In much of the intermountain western United States, the distances between charging stations are currently very large, causing anxiety for drivers of electric vehicles on interstate highways. In response to this, the governors of several western states joined together in 2017 to develop a regional electric vehicle plan called the REV West Plan. This plan will generate new economic development along interstate corridors, and states have already begun to implement it. Some states, such as Nevada, have state-level plans. Nevada has almost completed an electric highway from Reno to Las Vegas. Also, Nevada is committed to completing an electric highway system serving the entire state by 2020. Recently both ExxonMobil and BP significantly

revised their estimates of electric car usage upward. ExxonMobil expects 100 million electric cars on the road by 2040, and BP expects that many by 2035.

A primary component of renewable power infrastructure is the distribution and storage of wind, tidal and solar power. Water releases can control renewable power generated by hydroelectric facilities. However, wind, tidal and solar power do not have the same controllability. Peak demand that does not match up with renewable generation must be met by grid storage, demand-side management or traditional power generation. Grid storage technology consists of batteries in electric vehicles, storage heaters, district heating systems or ice storage. Demand-side management mainly consists of instantaneously adjusting the cost of electricity based on the cost of supply to encourage efficient usage. Finally, peak needs that are not met by solar or wind power can be met by hydroelectric plants, which can adjust quickly. Coal and nuclear power plants take longer to adjust. The conclusion is that large-scale use of renewable energy is possible using current technology, and future technology will only speed up the adoption of renewable energy.

At first there will be some resistance to replacing heavily embedded nonrenewable technology such as natural gas home heating. However, as the costs of solar technology continue to plunge, legacy sources such as natural gas will become more expensive due to their reduced scale. At some point in the near future, it will become economically infeasible to continue to use natural gas, and gas heating will be as rare as horses on the freeway.

There is much debate as to whether or not human-made global warming is a real phenomenon. In any case, renewable energy is without a doubt more environmentally friendly than fossil-fuel usage. There is no question that air pollution is responsible for many health problems around the world. The bottom-line costs of environmental damage and cleanup to humanity are enormous. The United Nations estimates the annual cost of environmental damage to be \$6.6 trillion globally, which works out to about 11 percent of the world's gross domestic product (GDP). This amount is expected to grow to \$28 trillion by 2050 (18 percent of GDP). The main culprits are oil and gas production and mining.

One factor that could slow down the adoption of renewable energy is the entrenched interests of oil, gas and coal producers and the politicians who support them. The political situation is always in flux. In other words, just wait a few years, and the political climate always changes. You can bet that when the cost of renewables reaches a critically low point, the opposition will crumble.



We are part of a global community now. Countries around the world have invested heavily in renewable energy. According to IRENA, China has more than 2.5 million people working in the solar energy sector, compared to 260,000 in the United States. “Even in China where coal is—or was—king, the government still recognizes that the economic opportunities of the future are going to be in clean energy,” according to Alvin Lin, head of the Natural Resources Defense Council. China’s National Energy Administration recently created a mandatory target for reducing coal usage. The country also set a goal for renewable energy to provide 20 percent of China’s energy needs by the year 2030. According to a United Nations report, China invested a whopping \$102.9 billion into wind, solar and other renewable projects in 2015. Prime Minister Modi of India has targeted bringing 100 gigawatts of solar power online by 2020, as part of a goal to bring reliable power to all Indians.

Several leading-edge companies based in the United States have made renewable energy a priority. Apple has made several moves into renewable energy operations in China, where it manufactures many of its products. These include a solar project in the

Sichuan mountains, where the panels are designed to allow the local yak population to graze around them. Facebook and Google are pushing to reach 100 percent renewable energy, and Microsoft has been at 100 percent renewable since 2017. Even the traditional energy companies are getting in on the action. In 2017, Shell Oil purchased the electric car charging company NewMotion.

Historically new, cost-effective technologies have replaced obsolete practices in varying amounts of time. It took about 40 years for the automobile and tractor to replace the horse and mule entirely. In today’s fast-paced world, change happens much more quickly. It is not overly optimistic to expect renewable energy to predominate in our lifetime. ■



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