RENEWABLE ENERGY DEVELOPMENT

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Abstract: Climate change, pollution, and energy insecurity are significant problems, and addressing them requires major changes to energy infrastructures. Renewable energy technologies are essential contributors to the energy supply portfolio, as they contribute to world energy security, reduce dependency on fossil fuels, and provide opportunities for mitigating greenhouse gases. Most developing countries have abundant renewable energy resources, including solar energy, wind power, geothermal energy, and biomass, as well as the ability to manufacture the relatively labor-intensive systems that harness these. By developing such energy sources developing countries can reduce their dependence on oil and natural gas, creating energy portfolios that are less vulnerable to price rises. In many circumstances, these investments can be less expensive than fossil fuel energy systems.

Key words: energy; delvelopment; renewable energy; clear; electricity.

1. INTRODUCTION

All forms of electricity generation have positive and negative aspects. Technology will probably eventually declare the most preferred forms, but in a market economy, the options with less overall costs generally will be chosen above other sources.

It is not clear yet which form can best meet the necessary energy demands or which process can best solve the demand for electricity.

There are indications that renewable energy and distributed generation are becoming more viable in economic terms. A diverse mix of generation sources reduces the risks of electricity price spikes.

2. ENERGY DEVELOPMENT

Although electricity had been known to be produced as a result of the chemical reactions that take place in an electrolytic cell since Alessandro Volta developed the voltaic pile in 1800, its production by this means was, and still is, expensive.

In 1831, Michael Faraday devised a machine that generated electricity from rotary motion, but it took almost 50 years for the technology to reach a commercially viable stage. In 1878, in the US, Thomas Edison developed and sold a commercially viable replacement for gas lighting and heating using locally generated and distributed direct current electricity.

The world's first public electricity supply was provided in late 1881, when the streets of the Surrey town of Godalming in the UK were lit with electric light. This system was powered from a water wheel on the River Wey, which drove a Siemens alternator that supplied a number of arc lamps within the town. This supply scheme also provided electricity to a number of shops and premises to light 34 incandescent Swan light bulbs.

Additionally, Robert Hammond, in December 1881, demonstrated the new electric light in the Sussex town of Brighton in the UK for a trial period. The ensuing success of this installation enabled Hammond to put this venture on both a commercial and legal footing, as a number of shop owners wanted to use the new electric light.

Thus the Hammond Electricity Supply Co. was launched. Whilst the Godalming and Holborn Viaduct Schemes closed after a few years the Brighton Scheme continued on, and

supply was in 1887 made available for 24 hours per day.

In early 1882, Edison opened the world's first steam-powered electricity generating station at Holborn Viaduct in London, where he had entered into an agreement with the City Corporation for a period of three months to provide street lighting. In time he had supplied a number of local consumers with electric light. The method of supply was direct current (DC).

It was later on in the year in September 1882 that Edison opened the Pearl Street Power Station in New York City and again it was a DC supply. It was for this reason that the generation was close to or on the consumer's premises as Edison had no means of voltage conversion.

The voltage chosen for any electrical system is a compromise. Increasing the voltage reduces the current and therefore reduces the required wire thickness. Unfortunately it also increases the danger from direct contact and increases the required insulation thickness.

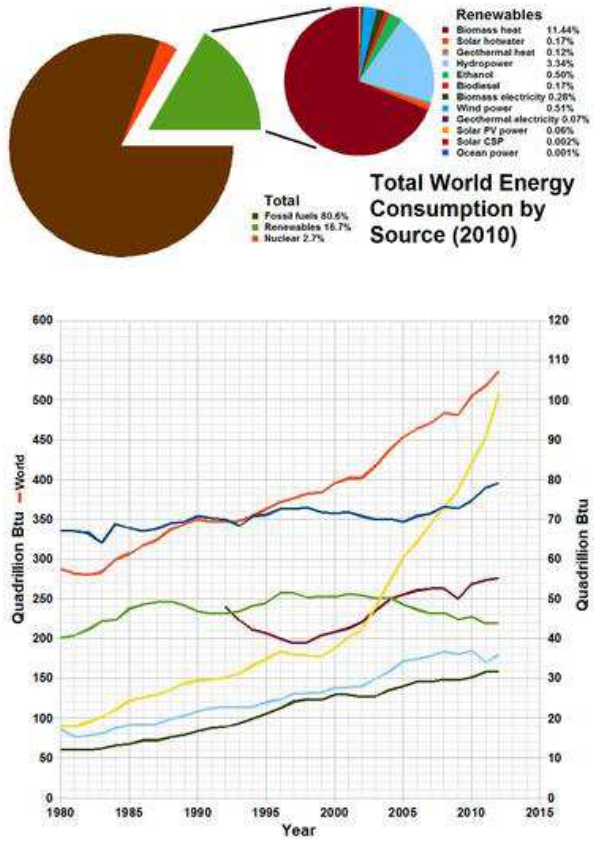
Furthermore, some load types were difficult or impossible to make work with higher voltages. The overall effect was that Edison's system required power stations to be within a mile of the consumers.

While this could work in city centres, it would be unable to economically supply suburbs with power.

The mid to late 1880's saw the introduction of alternating current (AC) systems in Europe and the U.S. AC power had an advantage in that transformers, installed at power stations, could be used to raise the voltage from the generators, and transformers at local substations could reduce voltage to supply loads.

Increasing the voltage reduced the current in the transmission and distribution lines and hence the size of conductors and distribution losses. This made it more economical to distribute power over long distances.

Generators (such as hydroelectric sites) could be located far from the loads. AC and DC competed for a while, during a period called the War of Currents. The DC system was able to claim slightly greater safety, but this difference was not great enough to overwhelm the enormous technical and economic advantages of alternating current which eventually won out.



World total primary energy production (Wikipedia)

Energy development is a field of endeavor focused on making available sufficient primary energy sources and secondary energy forms to meet the needs of society. These endeavors encompass those which provide for the production of conventional, alternative and renewable sources of energy, and for the recovery and reuse of energy that would otherwise be wasted.

Energy conservation and efficiency measures reduce the effect of energy development, and can have benefits to society with changes in economic cost and with changes in the environmental effects.

Classified according to the energy reserves of the energy source used and the regeneration capacity with:

- renewable: When the energy source used is freely regenerated in a short

period and there are practically limitless reserves; An example is the solar energy that is the source of energy from the sun, or the wind[note 13] used as an energy resource.

Renewable energies are:

- original solar
- natural wind (atmospheric flows)
- natural geothermal
- oceanic tidal
- natural waterfall (hydraulic flows)
- natural plant: paper, wood
- natural animal: wax, grease,[note 14] pack animals and sources of mechanical energy

- nonrenewable: They are coming from energy limited sources on Earth in quantity and, therefore, are exhaustible. The non-renewable energy sources include, non-exclusively:
  - fossil source: petroleum, natural gas, coal
  - original mineral/chemical: uranium, shale gas

So, for example, shale gas is secondary non-renewable. Wind is a primary renewable.

The principle stated by Antoine Lavoisier on the conservation of matter applies to energy development: "nothing is created." Thus any energy "production" is actually a recovery transformation of the forms of energy whose origin is that of the universe.

For example, a bicycle dynamo turns in part from the kinetic energy (speed energy) of the movement of the cyclist and converting it into electrical energy will transfer in particular to its lights producing light, that is to say light energy, via the heating of the filament of the bulb and therefore heat (thermal energy). But the kinetic energy of the rider is itself biochemical energy (the ATP muscle cells) derived from the chemical energy of sugars synthesized by plants who use light energy from the sun, which runs from the nuclear energy produced by fusion of atoms of hydrogen. This material itself constitutes a form of energy, called "mass energy."

Since the beginning of the 2000s, the development of renewable energy has been quite impressive. Energy production from renewable sources like sun power and wind power grew worldwide as investments increased yearly. Renewable energy types like solar and wind power have gained considerable momentum both in the developed and in the developing world. Much of this forward movement happened in Western and Northern Europe and in the United States. Spain, Germany, and Denmark are among the leading European countries that have increased renewable energy grants for both research and development. As a result, German scientists from the University of Kassel predict that it is very probable that

Germany can produce electricity solely from renewable energy in the near future. In the United States, the surge in the global warming movement has also brought more attention from the government and the business community to the potential of renewable energy development.

Considering the current economic conditions, these numbers show that this sector is becoming a target of venture capitalists, which means that high returns on these investments will result an increase in the development of clean sustainable energies. Renewable energy business development brings the promise of cost efficient clean energy not only in developed countries, but also in developing countries. The examples of

Mexico, India and Brazil point out how solar systems and renewable energy in general has the potential to build micro scale energy efficiency and improve the living conditions of the developing world.

3. CONCLUSIONS

Today the use of renewable energy technologies to provide electricity, heating and cooling, and transportation is now spread across the globe, and recent trends suggest sustained growth worldwide. A decade ago, renewable energy technologies predominately occupied an environmental niche, having a strong appeal to those who were interested in moving away from conventional fuels for environmental reasons.

Today renewables demonstrate that, in addition to their environmental benefits, they are also an economic driver, creating jobs, helping to diversify revenue streams, and stimulating new technological developments.

The idea of achieving high shares of renewable energy was radical ten years ago; today it is considered feasible by many experts. The commitment to 100% renewable energy in various sectors by local, regional, and national governments around the world is witness to this. However, the renewable energy sector still faces numerous challenges.

Subsidies for fossil fuels and nuclear power persist, and continue to vastly outweigh financial incentives for renewables.

Further advances and investment in renewable energy, as well as improvements in energy efficiency, must continue if the increase in global temperature is to be limited to two degrees Celsius above pre-industrial levels. A rapid de-carbonisation of the energy sector with renewable energy technologies is required to implement the climate targets.

The past decade has set the wheels in motion for this transition, but a concerted and sustained effort will be required to fully achieve it. With increasingly ambitious targets, innovative policies, and technological advances, renewables will continue to surpass expectations and foster a cleaner energy future. The clean energy technologies highlighted here are transforming how our nation produces and uses energy. While challenges and uncertainty exist for these technologies, it is clear that they are not some far away opportunity, but are now a significant part of the energy landscape. We can and should plan on using them to clean our air, reduce our reliance on unstable oil markets, and help build an economy that is more competitive and more efficient, while reducing carbon pollution.

There are even more technologies that are just on the horizon. These will increase the efficiency of the vehicles we depend on for travel and move goods, and the systems we use to manufacture new products and control our buildings. Although not as visible to the public eye, these technologies are every bit as important to the future clean energy economy, holding the potential for significant energy savings.

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