



RENEWABLE ENERGY: HUGE UPSIDES WITH THEIR CHALLENGES

Sadhna M. Singh¹, Aarti Malhosia² and Nitu Singh^{3*}

¹Department of Chemistry, Lucknow university, Lucknow, U.P. 226025

²Department of Home Science, Govt. Girls P.G. College, Vidisha, M.P. 464001

³Department of Physics, Maulana Azad National Institute of Technology, Bhopal, M.P.462003

Email: nituyana@gmail.com



Date of Received

2 November, 2021



Date of Revised

18 November, 2021



Date of Acceptance

10 December, 2021



Date of Publication

31 December, 2021

DOI : <https://doi.org/10.51514/JSTR.3.4.2021.37-40>



"together we can and we will make a difference"

RENEWABLE ENERGY: HUGE UPSIDES WITH THEIR CHALLENGES

Sadhna M. Singh¹, Aarti Malhosia² and Nitu Singh^{3*}

¹Department of Chemistry, Lucknow university, Lucknow, U.P. 226025

²Department of Home Science, Govt. Girls P.G. College, Vidisha, M.P. 464001

³Department of Physics, Maulana Azad National Institute of Technology, Bhopal, M.P.462003

Email: nituyana@gmail.com

ABSTRACT

Renewable energy comes from a source that will not deplete. Two familiar examples of this type of energy are solar power and wind power. Hydropower, Geothermal power, biomass, and tidal power are other forms of renewable energy which generate power for our requirements.

Renewable energies are still not the chief energy resource in the energy sector, though in certain developed countries their contribution is significant in electricity generation. Renewable energy sources come out as an additional source of energy in the conventional form of electro-industry. The main cause of the increasing investment and development of renewable is definitely environment conservation and environmental phase of sustainability [1]

The aim of this review paper is to conclude the advantages and disadvantages of renewable energy sources consumption in general, without taking into account the individual type of renewable energy, such as wind or solar energy [2]. In this manner, the paper presents plentiful advantages of using renewable energy in the electricity generation, such as environment conservation in terms of reduced greenhouse gas emissions or development of innovations and technical or technological development [3]. Here are also presented certain disadvantages of renewable energy in the production of electricity, such as its dependence on weather conditions, low energy competence and low availability to generate electricity [4].

This effort presents different opinions and believes of different scientists, sociologists and politics related to the most discussing topic now days i.e. renewable sources of energy.

Keywords: Renewable energy, limitations, emissions, greenhouse gases, environmental phase.

INTRODUCTION

Discussion

Fossil fuels are the chief sources of non-renewable energy collection while wind, water, solar power etc is renewable energy sources, since they are unlimited and can be easily recycled. Major distress in the world is that fossil fuel consumption spectacularly produce massive emission of green house gases or other pollutants [5].

President of the United States claimed in his speech to United Nations that “We’re investing billions to capture carbon pollution so that we can clean up our coal plants” (President Obama, 2010).

Many debates have occurred since people started to see their future and became threatened that these fossil fuels will just collapse one day. As an alternate of fossil fuels, innovations such as wind miles, solar power panels were presented in front of the world. And hence, the solution of problem of pollution and destroying environment due to the incredible industrial consumption of energy also came into existence [6-7].

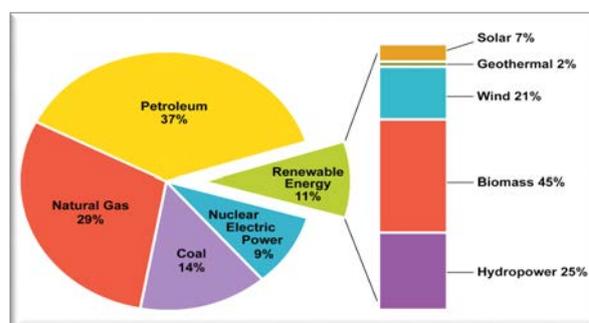


Fig. 1 Graph showing Distribution of different types of energies worldwide [8]

Renewable energy has multiple advantages over fossil fuels. So first of all, we are focusing on their benefits. Here are some of the top listed benefits of going green.

1. Won't run out

Renewable energy technologies are functioning on the resources which are directly obtained from the nature like sunshine, wind, water, biomass. Therefore, energies obtained from these natural resources will never replenish and hence will be available full time [9].

2. It is a technology not of a fuel.

Coal is first mined, refined and then used. Similarly, natural gas is first released and then transported for use [10]. A fossil fuel is obtained from natural resources, while renewable energies are shaped for the use, by the use of respective technologies. Hence, there is always chance of improvement which will ultimately lead to the low pricing of renewable energies.

3. Low maintenance requirement

In most of the cases, renewable energy technologies need less maintenance comparing to those generators used in traditional fuel sources [11]. For instance, solar panels and wind mills once equipped properly do not need much maintenance as they either have few or no moving parts for care, also they don't use any kind of flammable or combustible fuel sources to operate. Thus more time and more money is saved.

4. Saves money

More money can be saved by using renewable energy technologies. Not only they are on low maintenance costs but also on less operating systems costs. With this we need not have to re-fuel them time to time [12].

5. Exist in various forms.

lots of diversity is available in the form renewable energy [13]. For example,

- a. marine energy from tides,
- b. solar energy from sun shine,
- c. Geothermal energy from depth of earth,
- d. biomass energy from biomass. etc.

There is greater diversity in this sector when compared to fossil fuel resources.

6. Leads to cleaner air and water

As we all know that, renewable energy technologies produce little or no greenhouse gases or pollutants into air. Renewable energy usage leads to cleaner air and water [14]. Means to say that, it has positive impact on our environment.

On contrary, fossil fuels produces large amount of toxic gases which ultimately raises the global temperature. For example, coal power stations release high volumes of Carbon dioxide and nitrous oxide as well as harmful toxins like mercury, lead and sulphur dioxide [15].

7. Numerous environmental and health benefits

The use of fossil fuels not only emits green house gases as discussed above but also they produce other harmful pollutants that led to various types of respiratory and cardiac health issues [16] By the use of renewable energies we can decrease the prevalence of these harmful gases or pollutants contributing to an overall healthier environment and society.

8. Can help in solving waste problems

Renewable energy usages sometimes also help in solving the waste composting issues. For instance,

biomass energy shows a big advantage in this way. Biomass generators consume used organic wastes like soya bean byproducts, vegetable oil, corn and even algae to produce energy. Because of this, using biomass energy can reduce the amount of waste which can be used as landfills [17].

9. Creates new jobs

With the above such mentioned benefits, nowadays, use of various types of renewable energies is increasing day by day. This number is expected to raise in upcoming years and as a result these jobs tend to pay average wages, ultimately making it a very attractive career option and overall economic fulfillments [18]

Disadvantages of Renewable Energy

Though renewable has many advantages but it's always not sunny. With its huge benefits, it also has some disadvantages or challenges to overcome. Here are some important disadvantages of renewable energies over traditional energies.

1. Higher upfront costs

This is correct that we save money by using renewable energies but this is also very true that these technologies are comparatively very costly equipped. Means to say that installment of these technologies are typically more expensive than traditional ones. The installation of wind turbines, solar panels, and hydroelectricity plants is relatively expensive. These plants require upfront investments to build, have high maintenance expenses and require careful planning and implementation [19].

Also, the electricity generated from these technologies need to be delivered to towns and cities, which means additional cost of installing power lines [20].

To increase the use of such renewable energies, the govt., and the companies are giving offers like easy available loan, rebate in taxes etc. to equip the upfront at particular place.

2. Not every form of renewable energy is commercially workable.

Many forms of renewable energy can be collected at their specific location, and then for its reach to towns or cities, distribution networks is to be setup. These networks require a enormous fossil fuel outlay that can supply the production of renewable technologies.

From tidal power to geothermal, the commercial feasibility of many renewable energy resources is not available right now due to network issues of supply [21].

3. Intermittency

Though renewable energy sources are available around the world, but still they are not available 24x 7 year around. Some day's sun is not too hot or hidden behind the cloud; also its availability is only during day time it doesn't shine at night. The same can be with wind or any other energy. Sometimes rain or

drought occurs for long periods [22].

Over all it can be said that the benefits of renewable energies are weather dependent. If atmospheric conditions are not good enough, renewable energy technologies would lack the ability to generate any electricity.

- Hydro generators require enough rain to fill dams for their supply of flowing water.
- Wind turbines require wind blowing, at least with minimum wind speed, to move their blades.
- Solar panels need clear skies and sunshine to get the heat required to generate electricity, and at night it isn't collected.

On contrary, fossil fuels are not intermittent and can be turned on or off depending on the need or requirements.

3. geographic limitations

Renewable energies are geographically dependent. For example, a large farm with open space is required for wind turbine or a solar energy system set up while a home in city covered in shade either from tall buildings or by tall trees wouldn't be able to garner the benefits of these useful renewable technologies [23].

A nuclear power plant of average size generates about 1,000 megawatts of energy on 259 hectares, while a solar energy facility would generate less than 200 megawatts given at the same amount of space.

4. Not 100% Pollution free

The manufacturing, setting up of equipment or installation, transportation etc. sometimes create footprints of Carbon. Hence can be said, that use of renewable energies is not 100% Carbon free.

Nitrogen tri fluoride (NF₃) and sulphur hexa fluoride (SF₆) are released out from solar panels. These gases have thousand times high impact on global warming compared to carbon di oxide (CO₂) [24].

Still not every renewable resource is clean such as biomass that burns organic matter directly into the atmosphere.

5. Expensive Storage Costs

Its more challenging to store renewably produced energies. For example, when using coal for electricity generation, the coal or any kind of fossil fuel can be stored in pile until its requirement. But it does not suit when functioning with renewable energy technologies [25]. We can't rely on the source of energy generation being there when we need it. So for the backup, we need significant batteries to store excess energy or else we will lose it [27]. And very

Often we overlook the storage cost of renewable energy. The overall storage cost for the energy is about 9 cents per kilowatt-hour; however, the cost of the battery is upfront. That means we had spent a lot upon installation just for the battery [28].

Some types of batteries also wear out very quickly, especially if they are being used with their full capacity on a regular basis.

CONCLUSION

Renewable energies have more benefits than its drawbacks. Of course the positive outweighs the negatives.

Regardless of some existing limitations and challenges, it's clear that renewable will one-day supply all of our homes, businesses, and vehicles with emission-free energy and while it's not likely that a single energy source will ever meet all of our needs, the combination of solar, wind, biomass, geothermal, hydro, and battery storage has the potential to power our entire world without emitting any pollutants or greenhouse gasses.

If you're looking to make the switch to renewable energy we must look on following points-

- If we have a large property, we can plant a wind turbine or solar panel on our vacant land
- Solar panels can also be terraced if we have open area at top keeping in mind that there should be proper reach of sun shine.
- Proper installment for storage of energy.

But most prominently, we should remember that regardless of the many advantages of renewable energy, the best way to lower our carbon emissions is to reduce our electricity and gas consumption in the first place.

As individuals, as communities, and as a country, we should aim to improve our energy use, forms of transport, and consumer choices – and then use clean energy to meet our remaining needs. If we successfully combine renewable with sustainable lifestyles, it will be much faster – not to mention far cheaper – to create an emission-free world [29].

Conflict of Interest

None

REFERENCES

- [1]. David Pimentel, C. Harvey, P. Resosudarmo, K. Sinclair, D. Kurz, M. McNair, S. Crist, L. Shpritz, L. Fitton, R. Saffouri, R. Blair, 1995. *Science*, 267 (5201) 1117-1123.
- [2]. Environmental Protection Agency. 2017. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015*.
- [3]. Energy Information Agency (EIA). 2017, *How much of the U.S. carbon dioxide emissions are associated with electricity generation?*
- [4]. M. P. Moore, "The Union of Concerned Scientists on the uncertainty of climate change: A study of synecdochic form" *Environmental Communication* 3, no. 2, 2009, 191-205.
- [5]. X. Yuan, Xujiang Wang, and Jian Zuo. "Renewable energy in buildings in China—a review." *Renewable and Sustainable Energy Reviews* 24 (2013): 1-8.

- [6]. C. Augustine, R. Bain, J. Chapman, P. Denholm, E. Drury, Douglas G. Hall, Eric Lantz et al. Renewable Electricity Futures Study. Volume 2. Renewable Electricity Generation and Storage Technologies. No. NREL/TP-6A20-52409-2. National Renewable Energy Lab.(NREL), Golden, CO (United States), 2012.
- [7]. T. Mai, D. Sandor, R. Wiser, and T. Schneider, Renewable electricity futures study. executive summary. No. NREL/TP-6A20-52409-ES. National Renewable Energy Lab.(NREL), Golden, CO (United States), 2012.
- [8]. Renewable-Energy-Sources: <http://www.renewable-energy-sources.com/>
- [9]. D. Mooney, B. Kroposki, and W. Kramer "Renewable and efficiency systems integration at the National Renewable Energy Laboratory" In 2011 IEEE Power and Energy Society General Meeting, pp. 1-1. IEEE, 2011.
- [10]. A. Brown, P. Beiter, D. Heimiller, C. Davidson, P. Denholm, J. Melius, A. Lopez, D. Hetteringer, D. Mulcahy, and G. Porro, Estimating renewable energy economic potential in the United States. Methodology and initial results. No. NREL/TP-6A20-64503. National Renewable Energy Lab.(NREL), Golden, CO (United States), 2016.
- [11]. P.R. Epstein, J. J. Buonocore, K. Eckerle, M. Hendryx, B. M. Stout III, R. Heinberg, R. W. Clapp, B. May, N. L. Reinhart, M. M. Ahern, S. K. Doshi, and L. Glustrom. 2011. Full cost accounting for the life cycle of coal in "Ecological Economics Reviews." Ann. N.Y. Acad. Sci. 1219: 73–98.
- [12]. T. Mai, D. Sandor, R. Wiser, and T. Schneider, Renewable electricity futures study. executive summary. No. NREL/TP-6A20-52409-ES. National Renewable Energy Lab.(NREL), Golden, CO (United States), 2012.
- [13]. American Wind Energy Association (AWEA). 2017. AWEA U.S. Wind Industry Annual Market Report: Year Ending 2016. Washington, D.C.: American Wind Energy Association.
- [14]. D. Tilman, R. Socolow, Jonathan A. Foley, J. Hill, E. Larson, L. Lynd, Stephen Pacala et al. "Beneficial biofuels—the food, energy, and environment trilemma" Science 325, no. 5938 (2009): 270-271.
- [15]. Plumer, Brad. "There are now twice as many solar jobs as coal jobs in the US." Vox. Vox Media 7 (2017).
- [16]. F. Lisa "Job Creation Opportunities in Hydropower" In National Hydropower Association Annual Conference. 2010.
- [17]. S. Huang, "Geothermal energy in China" Nature Climate Change 2, no. 8 (2012): 557-560.
- [18]. O. Claudio, M. Melgosa, and R. Huertas, "Euclidean color-difference formula for small-medium color differences in log-compressed OSA-UCS space" JOSA A 26, no. 1 (2009): 121-134.
- [19]. I. Ferrer, Jerry A. Zweigenbaum, and E. M. Thurman "Analysis of 70 Environmental Protection Agency priority pharmaceuticals in water by EPA Method 1694" Journal of Chromatography A 1217, no. 36 (2010): 5674-5686.
- [20]. J. Deyette, and Barbara Freese. Burning coal, burning cash: Ranking the states that import the most coal. Union of Concerned Scientists, 2010.
- [21]. AWEA. 2017. AWEA U.S. Wind Industry Annual Market Report: Year Ending 2016. Washington, D.C.: American Wind Energy Association.
- [22]. Malhosia, Aarti, Nitu Singh, Sadhna M. Singh, and Ravindra Kumar, Elements Influencing the Human Immune System During Any Pandemic, Journal of Science and Technological Researches 3, no. 1 (March 31, 2021): 9-13. doi:10.51514/jstr.3.1.2021.9-13.
- [23]. Upadhyay, Sunita, and Megha Jaiswal, Chemical Constituents and Biological Activity of Swertia Species Growing In Uttarakhand, Journal of Science and Technological Researches 3, no. 1 (March 31, 2021): 20-24. doi:10.51514/jstr.3.1.2021.20-24.
- [24]. L. A. Sandham, A. J. Van Heerden, C. E. Jones, F. P. Retief, and A. N. Morrison-Saunders. "Does enhanced regulation improve EIA report quality? Lessons from South Africa" Environmental Impact Assessment Review 38 (2013): 155-162.
- [25]. Advantages and Disadvantages of Renewable Energy Resources, Published: 10th Aug 2021 in Environmental Sciences
- [26]. D. J. Feldman, Jack Hoskins, and Robert M. Margolis. Q2/Q3 2017 Solar Industry Update. No. NREL/PR-6A20-70406. National Renewable Energy Lab.(NREL), Golden, CO (United States), 2017.
- [27]. Verma, Mudrika, Vandita Srivastava, Sanjeev Kumar, Karan Singh, and Alok Sagar Gautam, Impact of Covid - 19 Lockdown on the Water Quality of Roorkee Ganga in Rishikesh-Haridwar-Roorkee Stretch Uttarakhand, India, Journal of Science and Technological Researches 3, no. 3 (September 30, 2021): 51-61 doi:10.51514/jstr.3.3.2021.51-61.
- [28]. D. J. Unger, "Linear elastic solutions for slotted plates." Journal of Elasticity 108, no. 1 (2012): 67-82.
- [29]. Malhosia, Aarti, Nitu Singh, and Sadhna M. Singh, Carbonated Cold Drinks And Their Influence On College Going Students With Special Reference To Bhopal, Madhya Pradesh, Journal of Science and Technological Researches 2, no. 1 (March 31, 2020): 1-3 doi:10.51514/jstr.2.1.2020.1-3.

