



**Review Article**

# A Review Report: Supplying Energy from Renewable Energy Around the World

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**To cite this article:**

Bahrampour Hamid, Bahrampour Mohammad Reza, Askari Mohammad Bagher, Beheshti Marnani Amir Khosro. A Review Report: Supplying Energy from Renewable Energy Around the World. *American Journal of Modern Energy*. Vol. 2, No. 6, 2016, pp. 54-57.

doi: 10.11648/j.ajme.20160206.14

**Received:** September 11, 2016; **Accepted:** December 20, 2016; **Published:** January 14, 2017

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**Abstract:** Population growth, technological advances and increased demand for energy, has been made the world faced with a major crisis which called energy crisis. Using renewable energy as a permanent and proper solution is to deal with this crisis issue. The Environmental sustainable availability, diurnal fossil fuel reducing and increasing emissions from fossil fuels, has been actuated world to use renewable energy sources. Economic growth, innovation in technology and public health undoubtedly is dependent on the manner and extent of energy consumption of countries. In this article we will briefly review the amount of produced energy from renewable energy sources in the world and finally the use of these energy sources as a major step forward for community health and energy crisis and shortage of fossil fuels will be introduced.

**Keywords:** Renewable Energy, Fossil Fuel, Wind Energy, Solar Energy, Geothermal Energy, Hydropower Energy

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## 1. Introduction

Noted to the different types of clean energy and fossil fuel, many countries has been based their planning on long-term schedule. On the other hand, increasing crisis which has been caused by fossil fuel emissions, according to environmental factors by organizations and international institutions And also managers are more serious to use renewable energy to solve this issues today.[1] [2]

According to the statistics recorded in the last 30 years the world's energy requirements has considerably increased. In 1960, world energy consumption is equivalent to 3 / 3Gtoe. In 1990 this number has increased to 8 / 8Gtoe, which has an average annual growth of 3.3% and In total 166 per cent increase has shown and now the world's energy consumption is about 10Gtoe / Year, and it's anticipated that in 2010 and

2020 to it could be increased by 12 and 14 Gtoe / Year. These numbers show that world energy consumption will be much more than now in the next century, therefore fossil energy sources in future centuries does not dispel the world's energy needs for development and survival thus it's vital to use new energy sources instead of fossil resources. Anticipations suggest that the share of renewable energy in new policies in 2035 is about to 18 percent While this share in 2014 was less than 11 percent. This energy is required in most aspect of human's requirements as well as the production of electricity, heat and transport fuel suppliers [3]. Figure 1 shows Estimated Renewable Energy Share of Global Final Energy Consumption.

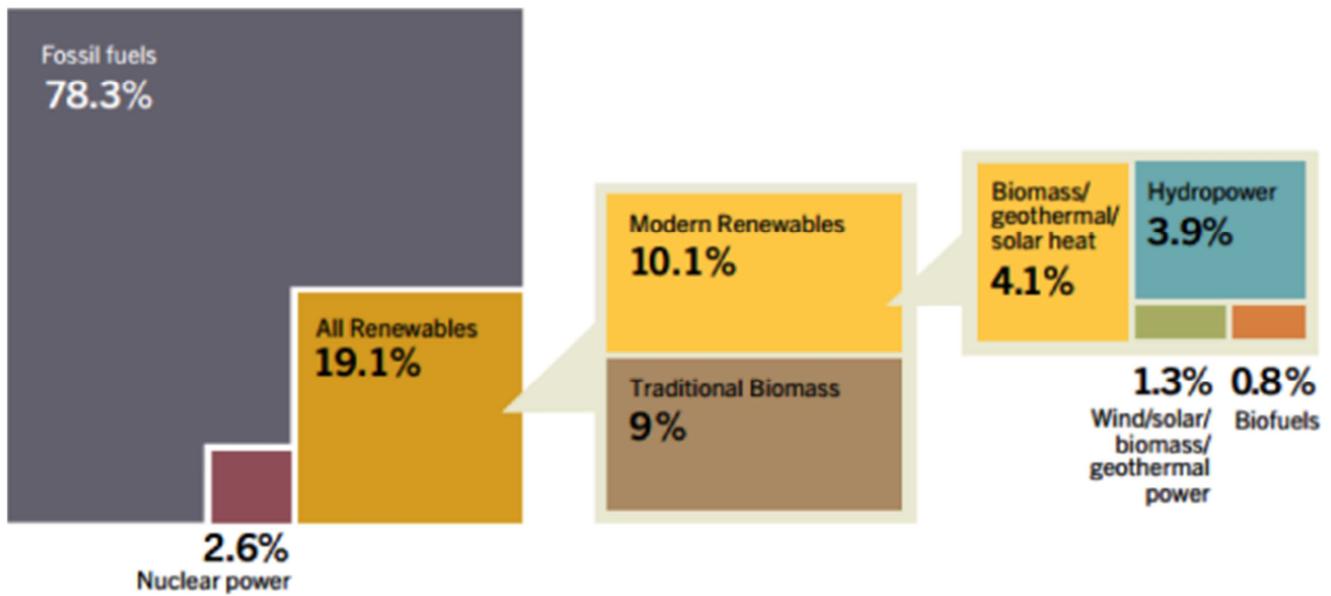


Figure 1. Estimated Renewable Energy Share of Global Final Energy Consumption [4].

In the power production sector, renewable energies have grown significantly till 2014. Statistics indicate that with growth of 8.5% compared to 2013, The production capacity has increased to 1712 Gigawatts of electricity through renewable sources. Hydropower (GW 1055) and Ocean Energy (GW 0.5) respectively has the largest and the lowest share and among the renewable resources. The calculation of hydroelectric power, wind energy's share of electricity generation among other factors includes over 50 percent of total [5]. Table 1 shows global renewable power generation.

Table 1. Global renewable power generation 2014 [4].

POWER GENERATION (GW)	EXISTING AT END-2014	ADDED DURING 2014
Bio-power	93	5
Geothermal power	12.8	0.6
Hydropower	1,055	37
Ocean power	0.5	~0
Solar PV	177	40
Concentrating solar thermal power (CSP)	4.4	0.9
Wind power	370	51

## 2. Wind Energy

Using of wind energy technology has been available in many countries nowadays which is detected as a cheapest way to produce electricity from solar energy derivatives. The price of the energy produced, depends on type of machines, practical and environmental factors. With various studies that have been conducted in the field of wind energy prices, shows that although the estimation cost of wind machines can be increased by aggrandizing their size and capacity, but the cost per kilowatt of energy will be reduced. In 2014, the total investment in clean energy exceeded 310 billion US \$. The

share of wind field in this regard is about 99.5 billion \$ which shows a grow rate of 11%. [6] While China have the largest share of wind power generation in the world in 2014, the most new electrical generating capacity is also allocated to china. Germany also strongly follow the policies of the Europe Union with new investment with adding 5279 megawatts of electricity capacity, has become second-largest investor and in general the third largest producer of electricity in this year. [5] [7].

## 3. Solar Energy

Sun is a huge natural nuclear reactor. always some mass of sun converted into energy by nuclear fusion which every day about 350 billion tons of its mass is converting to radiation, the internal temperature of sun is about 15 million Celsius, when this energy which is about 1 kW per square meter reaches us, converts to form of visible light, infrared and ultraviolet light [8]. In terms of solar energy in photovoltaic cells in 2014 Asian competitors have the maximum investment in this sector, China and Japan, have total of more than 20 gigawatts of power capacity added to their lines. However, it should indicate that the right policies of other Asian countries such as South Korea, India and Thailand are in this context. [5] Outside of Asia, the United States has grew up to 30 percent the power capacity in 2013 to 18.3 GW's. [9, 5]

Although In the case of power generation through solar thermal energy it's so less than photovoltaic cells, But it looks interesting for countries to invest about this industry. Spain has allocated more than half of the electricity produced in the world in this field [10]. However, in 2014, no investment has been made in this field in this country. But the amazing part refers to Statistics of two Arabic countries among the top five list of this field. UAE Arabic countries and Algeria with a capacity of 100 and 25 megawatts are located respectively in fourth and fifth places in the world. [5].

## 4. Geothermal Energy

Geothermal energy, is available energy in the deep of earth which has been stored by solar energy over thousands of years As well as the decay or radioactive decay of uranium, thorium and potassium during far years in deep of earth has been originated which are mainly focused in most areas prone to earthquakes and young volcanic and Earth's tectonic plates. Earth is a huge source of energy as heat in its core reaches over 5,000 Celsius, Heat from the earth in different ways such as a volcanic eruption, hot springs and geyser due to effect of reducing the density of the Earth And conductivity in parts of Earth to its surface directed. the earth's temperature increases nonlinearly (Linear approximation 3°C per 100 m) thermal energy stored in 11 km of the earth's upper crust is equal to fifty thousand of energy derived from known oil and gas reserves of today world. Unlike other renewable energies, geothermal energy is not limited to specific season, time and conditions which is always useable without any interruption. The overall cost of electricity production in geothermal power plants is competitive with other conventional (fossil) power plants and even is less expensive than other forms of renewable energy. [11]

In 2014, about 21 new power generation plant with a capacity of 610 megawatts of power generation in this field has been added to the fleet of electricity production which this amount of capacity is the most in one year since 1997. [12] Kenya in East Africa with 59% of all new electricity generating capacity this year, has increased the capacity more than 510 megawatts and has growth to eighth place in the world. Several countries, including Armenia, Chile, Djibouti, Dominica, Indonesia, Kenya, Mexico, Nicaragua, Saint Lucia and Turkey as well as Ethiopia, with support of World Bank are developing projects in this field. The United States is located on top of the countries that are producing electricity from geothermal energy. [5] [13]

In subject of thermal gaining and direct use of geothermal energy in 2014, China has ranked first. In the year that the world has achieved 73 terra watt hours of heat energy from geothermal energy, the share of China was 20.6 Terra Watt hour. This country, along with Turkey, Iceland, Japan, Hungary, United States and New Zealand has allocated 70 percent of total heat energy. [5]

## 5. Hydroelectric Power

Hydroelectric or electrical power generation via gravitational potential energy of water, a process which the water behind a dam kept in aim of increasing its potential energy; this potential energy is used to generate electrical energy. In this process, water turbines used for transfer water energy to the generators. This method is used in the electrical network as a kind of balancer that reduces costs of generated electricity. In this method during the low consumption of night hours, energy of power plants uses to pump water into high reservoirs, in fact by this method, electrical energy is converted to potential energy of water. During peak demand hours, the stored water is released through turbines to produce electrical energy and makes network balanced. [14] [15]

Although hydroelectric energy has the largest share of clean energy in electricity production but in the future of renewable energy, this contribution will be less and less because the use of this method have already been used in many areas. While referring to statistics and comparing of countries in this field implies the involvement of many countries in the energy except areas in the north and north-east Africa and the Persian Gulf countries such as Saudi Arabic that particular geography of these regions is the main reason. Most power generation capacity in this field is in China, Brazil and the United States which the most important reasons is because of width and high water capacity lands of this countries. [9] Table 2 shows Renewable Electric Power Global Capacity

*Table 2. Renewable electric power global capacity (mw), top countries and rest of world (2014).*

 Geothermal	 Hydropower	 Solar PV	 CSP	 Wind
United States (3,450)	China (280,000)	Germany (38,200)	Spain (2,300)	China (114,763)
Philippines (1,870)	Brazil (89,306)	China (28,200)	United States (1,634)	United States (65,879)
Indonesia (1,340)	United States (79,270)	Japan (23,200)	India (225)	Germany (39,165)
Mexico (1,017)	Canada (77,558)	Italy (18,500)	U A E (100)	Spain (22,987)
New Zealand (1,005)	Russia (49,108)	United States (18,305)	Algeria (25)	India (22,465)
Rest of World (4,118)	Rest of World (460,758)	Rest of World (50,595)	Rest of World (67)	Rest of World (104,300)

## 6. Results and Discussion

The current cost of renewable energy is higher than conventional fossil fuels and this is due to new technology of renewable energies with high initial investment cost. In addition to the novelty of the technology for renewable energies, these energies are in need of basic infrastructure. Most renewable energies are dependent on weather conditions. Renewable energy requires equipment that in some cases this equipment are made of toxic and hazardous substances, such

as photovoltaic panels. Along with all these disadvantages it's not true to state that the use of renewable energy is not useful and economical. Stability is the main benefits of renewable energy. This energy never ends and as the most benefits of renewable energy is to produce no pollution or produce very little pollutions like carbon dioxide or other chemical pollutants, so environmental effects are highly considered in renewable energies.

Approximately 1.2 billion people (constituting 17% of the global population) live without electricity, with the vast majority in the Asia-Pacific region and sub-Saharan Africa.

Distributed renewable energy (DRE) systems continue to play an increasing role in providing energy services to these populations. Advances in technology, increased awareness of deforestation and enhanced government support enabled the expansion of DRE in the cooking and heating sector in 2015. By year's end, approximately 28 million households worldwide were using clean cook stoves. Renewables are now established around the world as mainstream sources of energy. Rapid growth, particularly in the power sector, is driven by several factors, including the improving cost-competitiveness of renewable technologies, dedicated policy initiatives, better access to financing, energy security and environmental concerns, growing demand for energy in developing and emerging economies, and the need for access to modern energy. Consequently, new markets for both centralised and distributed renewable energy are emerging in all regions.

By the end of 2015, at least 146 countries had enacted some kind of energy efficiency policy, and at least 128 countries had one or more energy efficiency targets (not considering INDCs). Some policies attempt to harness the synergy between energy efficiency and renewable energy, as efficiency measures have the potential to enable a more rapid increase in renewable energy's share of global energy consumption. Driven by structural changes and energy efficiency improvements among other factors, global primary energy intensity declined between 1990 and 2014 at an average annual rate of 1.5%, falling by more than 30% overall during this period. However, the global economy has expanded even more, and energy demand has risen steadily. The year 2015 was an extraordinary one for renewable energy, with the largest global capacity additions seen to date, although challenges remain, particularly beyond the power sector. In 2015 several developments that all have a bearing on renewable energy, including a dramatic decline in global fossil fuel prices; a series of announcements regarding the lowest-ever prices for renewable power long-term contracts; a significant increase in attention to energy storage. Emphasis on activities to improve energy efficiency in all sectors increased during 2015 at all levels of government, as well as in the private sector. There is growing recognition worldwide that energy efficiency can play a key role in reducing energy-related emissions and that it can provide multiple economy-wide benefits such as enhanced energy security, reduced fuel poverty and improved public health.

Renewable energy projects always bring economic benefits. Renewable projects are generally located outside urban areas. These projects also have a tourist aspect which attract investment and create jobs. In this study it was tried to report the process of renewable energy producing using statistics data in the world And due to end of fossil fuels, relying on two very important factors in public health and energy crisis warning, Renewable energy as an alternative solution has been introduced to replace it with fossil fuels therefore every governments around the world depending on the climatic conditions and different cultures, should attract more investments to replace and use renewable energies Instead of

fossil fuels.

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## References

- [1] Bahrapour, Mohammad Reza, et al. "The consideration of Lut desert potential in the production of electric energy from solar energy." *World Journal of Engineering* 13.3 (2016): 275-280.
- [2] Hamid, Bahrapour, et al. "Review of sustainable energy sources in Kerman." *World Journal of Engineering* 13.2 (2016): 109-119.
- [3] IEA. International Energy Agency (IEA). World energy outlook 2013. November 2013. Available from <<http://www.worldenergyoutlook.org/weo2013>>.
- [4] Ren21. Renewables 2016 Global Status Report. Jun 2016. Available from <http://www.ren21.net/status-of-renewables/global-status-report>.
- [5] Ren 21. Renewables 2015 Global Status Report. Jun 2015.
- [6] GWEC. Global Wind Report 2014 – Annual market update. March 2015. Available from <<http://www.gwec.net/publications/global-wind-report-2/global-wind-report-2014-annual-market-update>>.
- [7] GWEC. Global Wind Statistics 2014. Feb 2015.
- [8] Bagher, Askari Mohammad, Mirzaei Mahmoud Abadi Vahid, and Mirhabibi Mohsen. "Types of Solar Cells and Application." *American Journal of Optics and Photonics* 3.5 (2015): 94-113.
- [9] U. S. Department of Energy. 2014 Renewable Energy Data Book. November 2015. Available from <<http://energy.gov/eere/analysis/downloads/renewable-energy-data-book>>.
- [10] Nasti, Manuel, and Morten Rask. "How can solar photovoltaic emerge in the Danish energy market?." *available online at: pure.au. Dk/portal-asb-student/files/51440857/Photovoltaic\_and\_Danish\_energy\_market\_M.\_Nasti\_Master\_Thesis.pdf (accessed June 4, 2014)* (2012).
- [11] Bagher, Askari Mohammad, Mirzaei Vahid, and Mirhabibi Mohsen. "Geothermal Energy." *Journal of Engineering and Technology Research* 6.8 (2014): 146-150.
- [12] 2015 Annual U. S. & Global Geothermal Power Production Report. Feb 2015. Available from <<http://geo-energy.org/reports.aspx>>.
- [13] Steenblik, Ronald. "Liberalisation of Trade in Renewable Energy and Associated Technologies." (2006).
- [14] Bagher Mohammad, Vahid Mirzaei, Mohsen Mirhabibi, Parvin Dehghani "Hydroelectric Energy Advantages and Disadvantages". *American Journal of Energy Science*. 2015: 17-20.
- [15] Dincer, Ibrahim, and Yunus A. Cengel. "Energy, entropy and exergy concepts and their roles in thermal engineering." *Entropy* 3.3 (2001): 116-149.