Environmental friendly renewable energy sources of 2019

With the daily increasing requirements of power, trends are beginning to rise, concentrating more on environmental-friendly sources of power. As a result of global warming, this has become vital and more and more countries around the world are looking for reliable power sources rather than power generated using conventional, non-renewable power sources such as fossil fuels (coal, natural gas, and petroleum) and nuclear energy.

Renewable energy sources

Renewable energy types are:

1. Biofuel
2. Biomass
3. Biogas
4. Geothermal
5. Hydropower
6. Solar energy
7. Tidal power
8. Wave power
9. Wind power

It is the energy collected from renewable resources, which are naturally renewed constantly on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

Renewable energy often provides energy in four important areas:

- Electricity generation
- Air and water heating/cooling
- Transportation
- Rural (off-grid) energy services [1]

Solar energy

Compared to the power generated using conventional fossil fuels and nuclear energy, solar energy is identified as cost effective and efficient. The technologies are being evolved in favor of improving the cost effectiveness and efficiency as well as the less impact on the environment combined with economic benefits.

History of solar power

Although the simple concept of sunlight converted into energy, solar power was begun in 19th century, its usage has not been plausible due to the cost of solar panels. But at present, with the introduction of improvements in technology and decreased costs in generating solar energy, it is believed to be more competitive in near future and will climb up to the top of the power sources in the future energy requirements.[2]

Solar power at present

Although the usage of renewable power sources are less at present, trends are being set to move it from being an acceptable energy source to the most preferred energy source. Several projects are launched around the globe using the advancing technologies of solar power such as solar panels fixed roads and solar powered aircrafts.

[1] https://en.wikipedia.org/wiki/Renewable_energy

[2] https://www.solarunitedneighbors.org/news/brief-history-solar-energy-2/

Solar panel fixed roads

This method is about converting sunlight on the road surface into electricity. The following are few of the roads already built in the world.[3]

Figure 1: Solar Roadways - Sandpoint, Idaho

Scott and Julie Brusaw launched Solar Roadways in 2016 as the first public installation in their hometown of Sandpoint, Idaho.

Figure 2: One-kilometer solar road with 2,880 solar panels - France

France opened the first solar road in the world in late 2016, a one-kilometer stretch in Tourouvre-au-Perche, built with technology from Colas' Wattway. It consists of 2880 panels fixed on the road that generates enough power to light up street lights in the 3,400-person village, Tourouvre-au-Perche.

Figure 3: A test stretch of Wattway's solar roads - Rural Georgia, USA

Shortly after France introduced solar roads, the Ray C. Anderson Foundation installed 538 sqft of the solar road near the Alabama and Georgia border - the first Wattway pilot in America.

Figure 4: Solar panel expressway in Jinan, China

During the first quarter of 2018, a one-kilometer solar road has been developed by Qilu Transportation Development Group and opened in Jinan, China. The solar panels cover around 63,238 sqft in two lanes along with an emergency lane, and can generate one million KWh of renewable energy every year.

[3] https://inhabitat.com/6-solar-roads-shaking-up-infrastructure-around-the-world/

Figure 5: Solar powered bike path in Krommenie, Netherlands

The SolaRoad solar-paneled bike path generated 70 kilowatt-hours per square meter, enough power for around three houses - and even more than the designers expected.

Figure 6: Solar sidewalk helps charge electric cars - Budapest

Sidewalks built with solar panels has been installed to help charge electric cars. Platio recently installed a 720-watt peak capacity system, 50 sqft solar sidewalk, made using recycled plastic offering double duty, as a sidewalk and to charge electric vehicles.

What is the importance of solar energy?

- Solar energy - a clean source
- No greenhouse gas emissions are released into the atmosphere
- The sun provides more energy than we'll ever need [4]

Advantages of solar power

1. Pollution free and causes no greenhouse gases to be emitted after installation
2. Reduced dependency on foreign oil and fossil fuels
3. Renewable clean power that is available every day of the year, even cloudy days produce some power
4. Return-on-investment unlike paying for utility bills
5. Virtually no maintenance as solar panels last over 30 years
6. Excess power can be sold back to the power company if grid intertied
7. Creates jobs by employing solar panel manufacturers, solar installers, etc. and in turn helps the economy
8. Ability to live grid free if all power generated provides enough for the home / building
9. Can be installed virtually anywhere; in a field to on a building
10. Use batteries to store extra power for use at night
11. Solar can be used to heat water, power homes and building, even power cars
12. Safer than traditional electric current
13. Efficiency is always improving so the same size solar that is available today will become more efficient tomorrow

[4] https://www.fortum.com/about-us/our-company/our-energy-production/solar-power-unlimited-source-energy

14. Aesthetics are improving making the solar more versatile compared to older models; i.e. printing, flexible, solar shingles, etc.
15. Federal grants, tax incentives, and rebate programs are available to help with initial costs

Disadvantages of solar power

1. High initial costs for material and installation and long ROI
2. Needs lots of space as efficiency is not 100% yet
3. No solar power at night so there is a need for a large battery bank
4. Some people think they are ugly (I am definitely not one of those!)
5. Devices that run on DC power directly are more expensive
6. Depending on geographical location the size of the solar panels vary for the same power generation
7. Cloudy days do not produce much energy
8. Solar panels are not being massed produced due to lack of material and technology to lower the cost enough to be more affordable
9. Solar powered cars do not have the same speeds and power as typical gas powered cars
10. Lower production in the winter months[5]

Why is it important for Sri Lanka?

Being a tropical country that has the benefit of having sunlight for more than 12 hours per day, the usage of solar systems to generate electricity will be highly beneficial by reducing the dependency on the costly and non-environmental friendly conventional methods of electricity generation, reducing the burden of huge usage bills for the consumers.[6] Also it will be much beneficial for the electric car users because investors will be encouraged to invest on establishing charging points around the country.

Future of solar power

Solar energy will be much useful if used with energy storage methods since volume of sunlight is not available during dark hours as well as it changes with the weather & seasons as well as with geography.[7]

Also if the cost of production of solar energy capturing methods can be decreased, this freely available power source will be the major power source around the globe in the near future.

[5] https://www.sepco-solarlighting.com/blog/bid/115086/Solar-Power-Advantages-and-Disadvantages

[6] http://www.dailynews.lk/2018/01/31/features/141431/solar-power-electricity-sri-lanka

[7] https://corporate.vattenfall.com/about-energy/renewable-energy-sources/solar-energy/future-of-solar-energy/

References

1. https://en.wikipedia.org/wiki/Renewable_energy
2. https://www.solarunitedneighbors.org/news/brief-history-solar-energy-2/
3. https://inhabitat.com/6-solar-roads-shaking-up-infrastructure-around-the-world/
4. https://www.fortum.com/about-us/our-company/our-energy-production/solar-power-unlimited-source-energy
5. https://www.sepco-solarlighting.com/blog/bid/115086/Solar-Power-Advantages-and-Disadvantages
6. http://www.dailynews.lk/2018/01/31/features/141431/solar-power-electricity-sri-lanka
7. https://corporate.vattenfall.com/about-energy/renewable-energy-sources/solar-energy/future-of-solar-energy/