

The Making of America's Solar Energy Revolution

WHITEPAPER



Bell Laboratories built the first silicon solar cell in 1954. The solar cell was the precursor of all solar-powered devices. In the 26th April 1954 edition of its edition, The New York Times noted that the invention was, "the beginning of a new era, leading eventually to the realization of one of mankind's most cherished dreams -- the harnessing of the almost limitless energy of the sun for the uses of civilization."

173,000 terawatts (TW) of solar energy strikes the earth continuously. This is more than 10,000 times the world's cumulative energy use. The energy is renewable and as finite as our solar system. Solar photovoltaic (PV) panels on just 0.6% of USA's total land area will be sufficient to generate electricity for the entire country. The key to its optimum utilization is ensuring that the energy is converted, channelized and stored effectively and efficiently.

Solar Energy in USA (2019)



Contribution to the utility-scale electricity generation
2.5%



Electric capacity added to grid
40%



Energy produced
62.5 GW



Average per GW cost
USD 2.40 - USD 3.22



Solar installations
> 2 million



Investments generated
USD 18.7 billion



Employment opportunities created
250,000



USA is amid a solar energy revolution

At the beginning of the 21st century, solar energy systems in USA were expensive and hence, out of the reach of most consumers.

The number of photovoltaic installations across USA has increased 35-fold over the last decade. The country surpassed 2.3 million rooftop solar installations in 2020 - just four years after it completed the first millionth milestone. Reaching the first million took over four decades (see Graph I: Historical and projected rooftop solar installation in the USA). A study by the Solar Energy Industries Association (SEIA) and Bloomberg New Energy Finance predicts that the number of installation will increase from ~500,000 per year to 2-4 million per year by 2024. This means that we will be adding more solar rooftops in 2024 alone than we have in the entire history of our country leading up to that point.

This large-scale adaption has been made possible due to a combination of factors. Rising popularity and progressive innovation have significantly decreased solar adoption costs across the country. In the early 2000s an average solar system in the USA costed around USD 10 per watt. Today, the price ranges between USD 2.40 and USD 3.22 per watt. Currently, our country produces 62.5 million gigawatts (GW) of solar energy - which is enough to power 12.5 million average American homes. In 2019, 40% of all new electric capacity added to the grid came from solar, the largest such share in history. Solar energy is also an important employment-generating sector. Over the last five years, the solar sector has added jobs five times higher than the national average.

What is the potential of the solar sector in USA's transition to zero-carbon power?

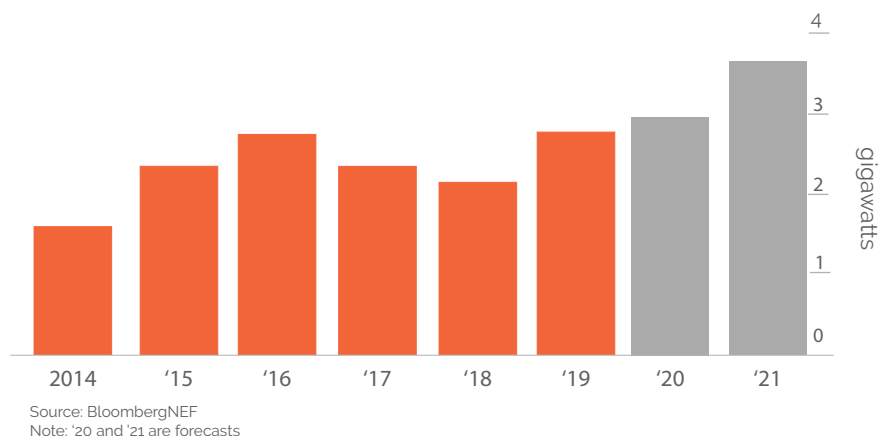
In 2019, USA generated about 4,118 billion kilowatthours (kWh) of utility-scale electricity.

About 63% of this electricity was from fossil fuels such as coal, natural gas, petroleum, etc. About 20% was from nuclear energy while the remaining ~18% was from renewable energy sources. Evidently, as a nation, we are heavily dependent on traditional sources for our energy needs.

However, the numbers can change very soon. 2020 marks the onset of the Solar+ decade in USA. With the right policies, infrastructure and talent, we aspire to generate 50% of our energy requirements through renewable sources by 2050. 20% of this would be from solar. Recognizing the economic, environmental and employment opportunities fostered by the solar sector, 90% of Americans support its expansion.

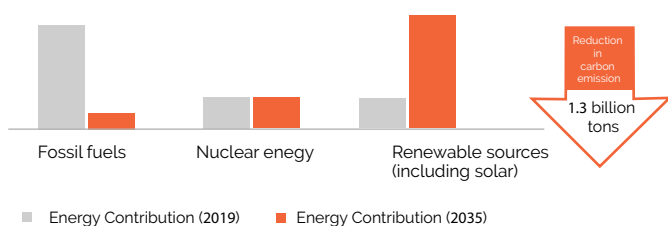
An analysis by UC Berkley indicates that our country can transit to 90% zero-carbon power by as early as 2035. The report says that all coal powered plants can retire by the year and no fossil fuel plants are built. A grid system powered by renewable energy can meet the country's electricity demand dependably.

Graph I: Historical and projected rooftop solar installations in the USA



Notably, the analysis says that 70% of this renewable energy will be sourced from solar and wind. Hydropower and nuclear are expected to contribute to 20% of the energy requirements, while natural gas will provide just 10%. The transition (refer Graph II: Transition in Utility-scale Generation) has the potential to cut carbon emissions by 1.3 billion tons in 2035. The shift will affect all aspects of our community, environment and economy. And if the numbers over the past few months are anything to go by, a transition could well be a possibility in the near future.

Graph II: Transition in Utility-scale Generation



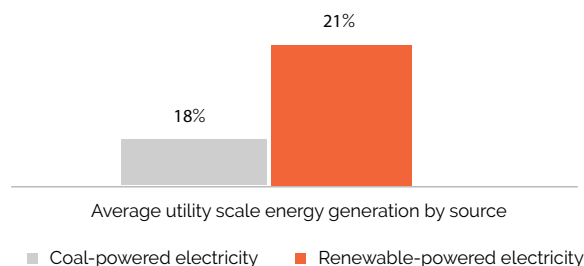
COVID-19: The onset of America's solar energy revolution

The COVID-19 pandemic is said to be the tipping point for coal-fuelled power plants. According to the Institute for Energy Economics and Financial Analysis (IEEFA), in the United States, more electricity has been produced from renewables than from coal-powered generation during the last few months.

Between March 2020 and June 2020, utility-scale solar, wind and hydropower collectively produced more electricity than coal-fired generation (refer Graph III: Sources of Utility-scale Generation). During this period, solar energy contributed an average 2% of the renewable energy fraction.

The IEEFA attributes the accelerated dependence on renewable sourced electricity to a number of factors. These include particularly low gas prices, warmer weather, a significant amount of new renewable capacity connecting to the grid late last year, and lower power demand from the economic slowdown during the period. The matrix is reverting to a coal-dominated narrative as businesses reopen but the direction of change is evident. Now, as we set out to rebuild our world in the post-COVID era, let us make collective, conscious choices to make a solar powered future a reality.

Graph III: Sources of Utility-scale Generation (March 2020-June 2020)



A solar-powered route to rebuilding America's economy in the post-pandemic world

The solar sector was one of the fastest growing industries before COVID-19 hit the US economy. In the last decade alone, the sector witnessed an average annual growth of 49%. From just 0.1% in 2010, the solar sector contributes to more than 2.5% of the total electricity generation in the USA today. The growth can be attributed to factors such as strong federal policies like the Solar Investment Tax Credit, rapid demand arising out of increased awareness and proportionately declining costs.

In the post-pandemic world, it continues to be among the most attractive sectors for investments and growth. If we target the industry to generate 20% of the electricity generation by 2030, it offers efficient strategies for America to recover from the pandemic. Here's how :



Powering a clean future:

Investing in the sector will help in the construction of a resilient, reliable and renewable future for our homes, industries and communities.



Generating sustainable employment:

The solar sector holds the potential to employ 400,000 personnel by 2030.



Addressing climate change:

The target can enable USA to achieve one-fifth of its Paris Climate Accord of reducing carbon emission by 925 million metric tons.



Empowering consumers:

Utility-scale and distributed solar power is not just environment-friendly but also a cost-effective option.

Conclusion

Solar technology is among the most transformative advents of our times. Exponential advances in the industry have enabled energy generated by solar systems to be cheaper than their fossil fuel equivalent. In fact, the option is more economical than maintaining coal-fuelled units. These advances have revolutionized the solar landscape and its potential contributions to the American economy. Indeed, a solar-powered future for America will not just guarantee a cleaner environment but also form the basis for a sustainable economy in the post-COVID-19 era. It is time for policymakers, industries and consumers to come together and turn this aspiration into a reality.

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