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POWERING A SOLAR FUTURE

The Future is Distributed Solar

WHITEPAPER

The attractiveness of solar energy has witnessed a sharp rise over the last decade. Since 2010, the sector has witnessed an annual growth of over 49%. Today, there are more than **81 gigawatts (GW)** of solar capacity installed across USA. This can power **15.7 million homes.**

Any why not? Across the states of Maryland, Virginia and Washington DC alone, switching to solar energy can lead to an average net profits of USD 50,943 with a payback time of 6 years 5 months. (refer table I: Solar Power Facts).

Table I: Solar Power Facts

Solar Power Facts (August 2020)		
	Net Profits*	Average Payback Time
Maryland	USD 45,718 – USD 55,877	5.8 years-7.1 years
Virginia	USD 43,307- USD 52,931	5.5 years – 6.7 years
Washington DC	USD 48,522 - USD 59,305	6.1 years -7.5 years

**Saving less systems costs*

In 2019, USA saw record-setting residential solar capacity added, with more than 2.8 GW installed. During the year, 40% of all new electric generation across the USA came from solar power - more than any other source of energy

Installed in Washington DC in 2018

What is distributed solar?

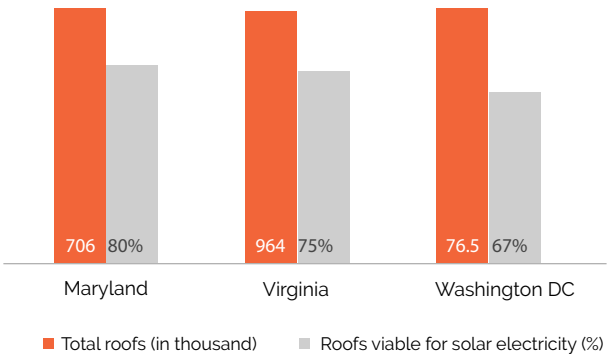
Solar energy produced at or near the point of consumption is called distributed solar.

It is typically located on rooftops or is ground mounted. This contrasts with centralized generation where solar electricity is produced by a large plant and then distributed to consumers through a power distribution grid.

In distributed solar applications, small photovoltaic (PV) systems (5–25 kilowatts [kW]) generate electricity for on-site consumption and interconnect with low-voltage transformers on the electric utility system.

While distributed solar is normally produced by individual owners for their own use, any excess power may be sold to the power company. This system, net energy metering, enables solar panel owners to earn fair compensation for the benefits they provide to other users of the electricity grid, and makes "going solar" an affordable option for more people.

Graph I: Distributed Solar Viability

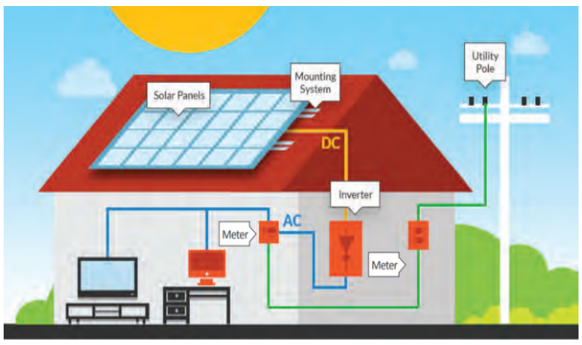


How does a distributed solar model work?

Solar energy models convert sunlight into electricity with the use of PVs.

In the distributed model, sunlight strikes the solar panels, usually placed on roof tops or ground mounted and frees electrons, creating electricity. The electricity thus produced is direct current (DC). However, alternating current (AC) is usually required for generic and residential purposes. The distributed solar system changes the DC into AC through the use of an inverter. The output of the inverter is then connected to the home's electrical system so that the electricity produced by the distributed solar system can power the home (see image I: The Working of a Distributed Solar System).

Image I: The Working of a Distributed Solar System



According to Google's Project Sunroof, an average of 74% of the roofs across the states of Maryland, Virginia and Washington DC are viable for solar panel installation (refer Graph I: Distributed Solar Viability). Currently, more than 2 million distributed solar projects are currently operating across the USA.

Advantages of the distributed solar model

Distributed solar model facilitates greater efficiency

Long-distance electricity transmission and distribution (T&D) costs American ratepayers USD 21 billion annually. Additionally, the model is inefficient. The U.S. Energy Information Administration (EIA) estimates that electricity transmission and distribution (T&D) losses average at about 5% annually.

By producing electricity near the point of consumption, distributed solar significantly reduces transmission-related energy losses and generation & distribution costs. A National Renewable Energy Laboratory (NREL) study estimates that rooftop PV systems alone can host ~1,118 GW of energy.

This amount is sufficient to cover the annual electricity needs of more than 130 million American homes . Further, large-scale adaption of distributed solar will help taxpayers avoid the cost of investing in new power plants, grids and other form of electricity infrastructure.

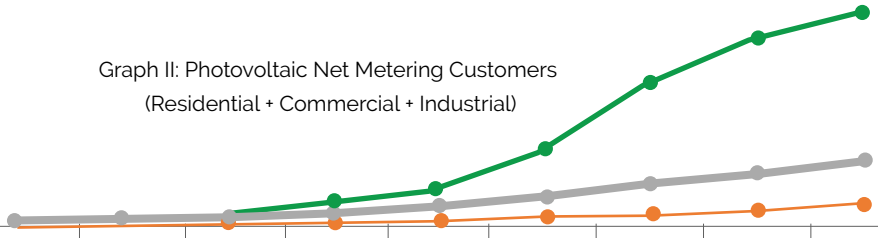
The economic benefits of a distributed solar model

In 2018, distributed solar prices before any incentives, were USD 3.70 per Watt for residential projects, USD 3.00 per Watt for small non-residential purposes and USD 2.40 per Watt for large non-residential systems. Further, the federal government provides an income tax credit to help residents and businesses with the cost of buying solar systems. The solar investment tax credit (ITC) provides 26% tax credit for solar systems on residential and commercial properties. The law also allows for commercial credit to be applied to both customer-sited commercial solar systems and large-scale utility solar farms. Solar users can claim the credit when filing their income tax return.

In addition, the net metering model makes solar energy more economically viable for all types of customers across all income categories. As the graph demonstrates, there has been a significant uptick in the net metering customers in the three states of Maryland, Washington DC and Virginia over the last decade (refer Graph II: Photovoltaic Net Metering Customers).

Between 2010 and 2018, Virginia has registered a 10X growth in the number of net metering customers, while Washington DC witnessed a 20X increase. At 60X, Maryland has the highest growth among the three states during this period.

Graph II: Photovoltaic Net Metering Customers
(Residential + Commercial + Industrial)



	2010	2011	2012	2013	2014	2015	2016	2017	2018
Maryland	1,155	2.456	4,416	6,596	11,277	22,879	44,414	58,181	66,105
Virginia	702	992	1,305	1610	2,147	2,170	4,041	5,143	7,578
Washington DC	1,673	2,150	3,222	4,751	6,607	9,832	13,678	16,482	20,986

Distributed solar PV systems significantly increase the resilience of electricity systems

Weather-related power disruptions have witnessed a significant increase over the last decade. According to an estimate, USA suffers 147 big blackouts every year. And the number is rising. As our dependency on electricity is increasing progressively, these disruptions can endanger life, security and health.

Distributed power generation is an effective way to counter this challenge. With proper equipment and calibration, distributed PV systems provide reliable standby capacity during outages. When combined with other technologies, such as auxiliary generation sources, smart meters and energy storage options (such as inverter-integrated batteries), distributed solar PV systems can minimize the response time to restore electricity and mitigate the negative consequences of power disruptions.

Distributed solar model is better for our environment

The electricity sector is the largest source of greenhouse emissions in USA – contributing to ~30% of the total air pollution in the country. This polluted air is bad not just for the environment but also for our health.

If all the viable solar installations (refer Graph I: Distributed Solar Viability) were implemented in Maryland, Virginia and Washington DC, CO_2 emissions from the electricity sector would reduce by ~25 million metric tons. This would have the same impact as removing 5.3 million passenger cars from the road for over a year. Undoubtedly, even a partial accomplishment of this figure will have a significant positive impact on the environment.

Distributed solar is prompting more Americans to go solar

The value generated by distributed solar models is leading the industry to expand into new markets and deploy thousands of systems nationwide. In 2018, California's grid operator cancelled 20 transmission projects and revised 21 others. The project savings from this decision was approximately USD 2.6 billion. The decision was a result of large-scale adaption of distributed electricity generation. These figures can provide impetus for other states to adapt the distributed solar model.

The trend of the distributed solar model has a significant impact on the installation prices. Consequently, the cost to install solar has dropped by more than 70% over the last decade. In fact, the average prices in the first quarter of 2020 are at their lowest levels in history across all market segments. Further, according to a recent Rocky Mountain Institute (RMI) report, battery energy costs are less than a fifth of what they were a decade ago.

Distributed solar model is better not just for the users but also for the economy and the environment. And hence, stakeholders across the ecosystem, including consumers, policymakers and service providers, should join hands towards large-scale adoption of the model. Such a collaborative effort is vital to the achievement of our goal of producing 100% energy through renewable energy by 2050.

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