

# U.S. PV Installations Remain on Record Pace in July

October 2020

## U.S. PV-WIND CAPACITY July 2020 PV-Wind Capacities and Forecasts

- July PV capacity additions total 789 MW.
- July wind capacity additions total 221 MW.

## U.S. ELECTRICITY GENERATION July 2020 PV-Wind Electricity Generation

- PV-wind electricity production is 9.0% of total electricity generation
- Of total U.S. electricity generation, PV is 3.8% and wind is 8.5%

## TRADE – U.S. PV IMPORTS/EXPORTS Asian PV Imports Supplement U.S. PV Supply

- U.S. imports of PV panels remain on record annual pace
- Malaysia and Vietnam are the largest sources of U.S. PV panel imports

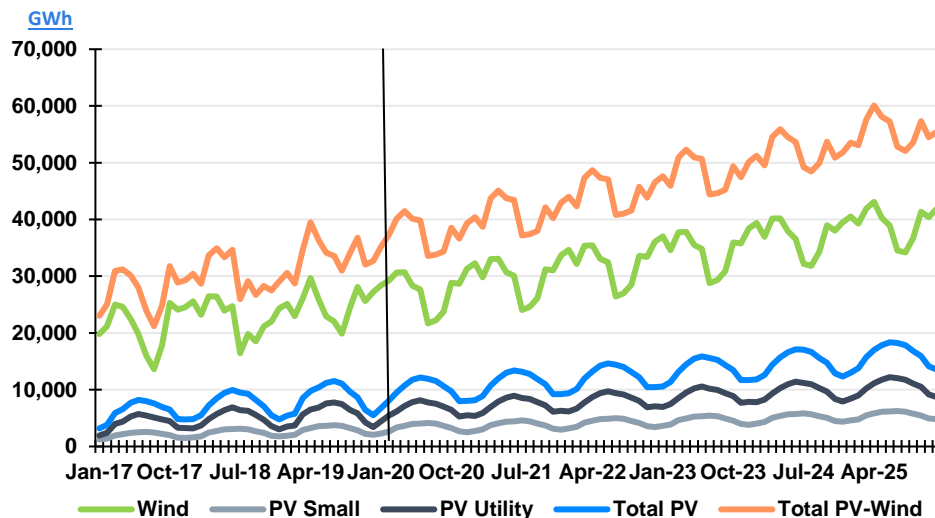
## WORLD PV-WIND CAPACITY PV and Wind Growth Forecasts Revised Down

- World PV installations are expected to be 105 GW in 2020 (Pandemic Adj)
- World wind installations are expected to be 50 GW in 2020 (Pandemic Adj)

## PV-WIND COMPANY FINANCIAL PERFORMANCE Stock Performance Robust

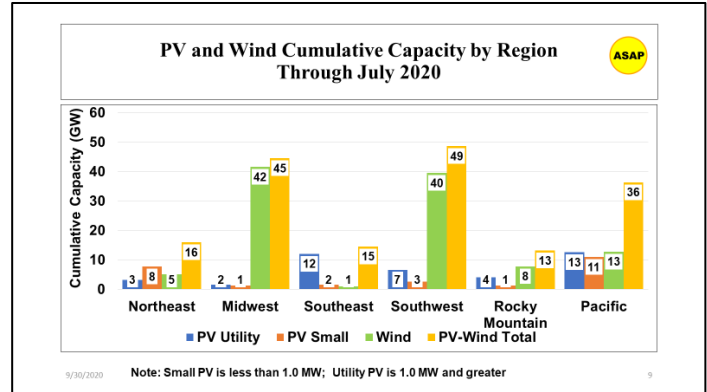
- For 2020, TAN up 110%, and FAN up 21%
- Increases in TAN and FAN prices are outperforming the SPY index

**PV-Wind Electricity Generation: Actual to July-20; Forecast to Dec-25**



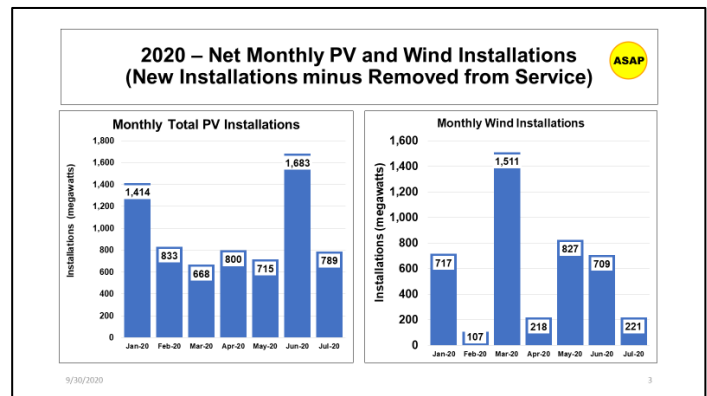
## PV and Wind Capacity

At the end of July, the cumulative capacity of U.S. PV and wind installations is 174 GW and will approach 190 GW by year-end. The regional distribution of PV and wind operating assets are shown in the graph. As expected, the Midwest, Southwest and Pacific regions with their abundant wind and solar resources account for 75% of total U.S. installed PV and wind capacity.



ASAP lowers 2020 U.S. PV installation forecast to 14 GW

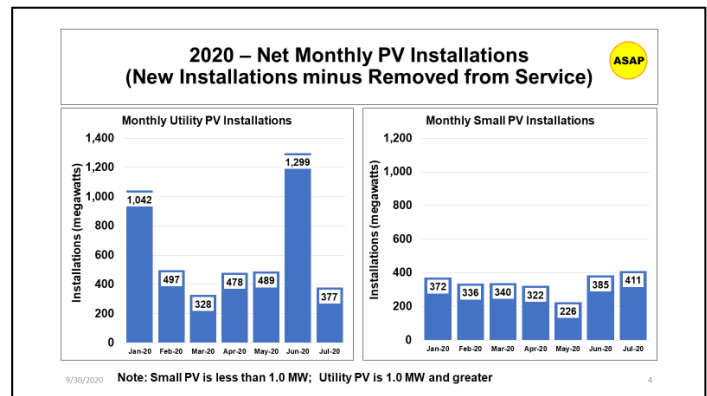
In July, net monthly U.S. PV installations was 789 MW. Year-to-date (YTD) PV installations are 6.9 GW. The annualized installation rate is 11.8 GW, which is behind pace to reach ASAP's 2020 forecast of 14.0 GW. Utility PV capacity grew 377 MW, while small PV capacity growth is 411 MW. Wind installations expanded 221



MW in July bringing YTD wind capacity additions to 4.3 GW, which is far below pace to reach the 2020 forecast for 21 GW of new wind capacity.

Southwest region leads in new PV installations in July

ASAP has lowered its 2020 forecast for PV installations from 18 GW to 14 GW due to effects of pandemic (-20%). The utility PV installation forecast has been lowered from 14 GW to 11 GW (-21%). Utility PV installations YTD are 4.5 GW, which is an annualized pace of 7.7 GW. The small PV installation forecast has been lowered from 4.0 GW to 3.0 GW (-25%). Cumulative 2020 small PV installations through July is 2.4 GW, which is an annualized pace of 4.1 GW. The 2020 annualized pace of 11.8 GW of PV capacity additions is on track to surpass the record of 11.0 GW of PV installations in 2015.



On a regional basis, the Southwest added 236 MW of new capacity and accounted for 30% of total PV installations in July. Texas and California led in state installations with 205 MW and 114 MW respectively. Wind installations in July were only in the Midwest and Southwest regions. The only states with wind capacity additions are Illinois reporting 201 MW of new capacity and Texas reporting 20 MW of new capacity.

## PV-Wind Electricity Generation Update

July PV and wind electricity generation falls to 9% of total generation

Month-on-month, PV electricity generation increased 7.0%

Month-on-month, wind electricity generation declined 25%

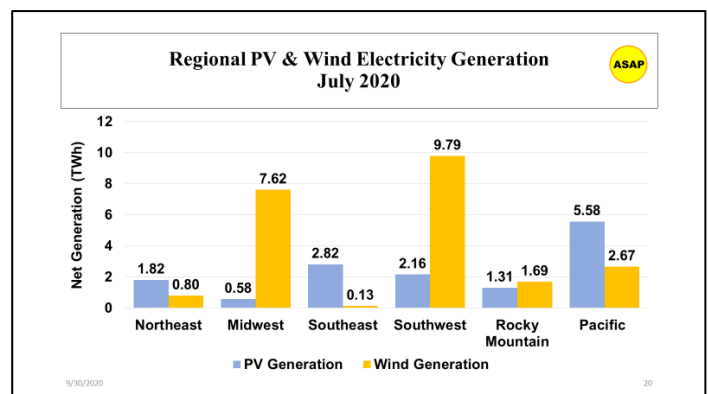
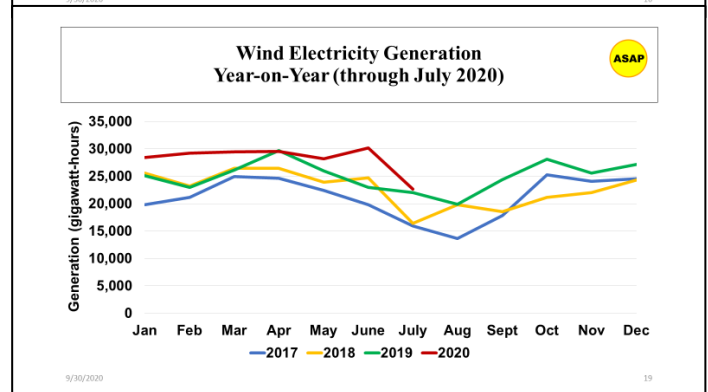
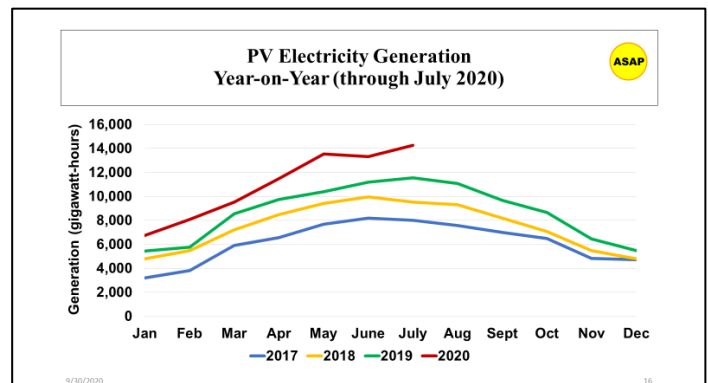
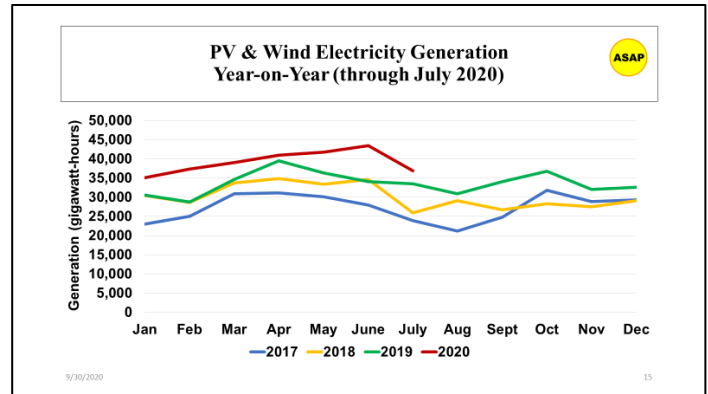
Year-on-year, PV and wind electricity generation up 10%

PV and wind electricity generation totaled 36.9 TWh in July, which is the lowest since January. PV produced 14.2 TWh and wind 22.7 TWh. Wind electricity was down 25% from June due to seasonality. The combined PV and wind electricity generation is 9.0% of total U.S. electricity generation. The PV and wind contribution to total electricity generation is off the 14.9% record set in April, which again is due to seasonality.

Month-on-month, June-July, PV electricity generation increased +0.9 TWh (+7.0%). Both utility and small PV electricity generation increased with utility PV +0.78 TWh and small PV +0.15 TWh. In contrast, month-on-month wind electricity generation declined -25.0%.

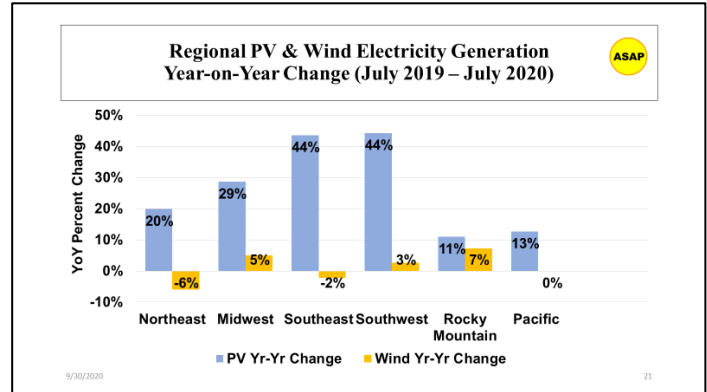
On a regional basis, the Pacific region set the pace in July with 5.58 TWh of PV electricity generation and was followed by the Southeast with 2.82 TWh and the Southwest with 2.16 TWh. For wind electricity generation in July, the Southwest region produced 9.79 TWh (43.1% of total) and the Midwest region generated 7.62 TWh (33.6% of total).

Month-on-month (MoM), PV electricity production increased 309 GWh (+5.9%) in the Pacific region and 263 GWh (+7.9%) in the Southwest. On the other hand, MoM wind electricity generation declined in all regions. The largest declines were in the Southeast (-31.6%) and the Midwest (-31.3%). As shown in the wind generation graph, there is large wind resource seasonality with summer months at the low end.



Turning attention to year-on-year (July-19 to July-20) comparisons, YoY growth in combined PV and wind electricity production is +10%. Total PV electricity production grew +23% YoY, with small PV growing +17% and utility PV growing +27%. On the other hand, YoY growth in wind electricity generation is +3%.

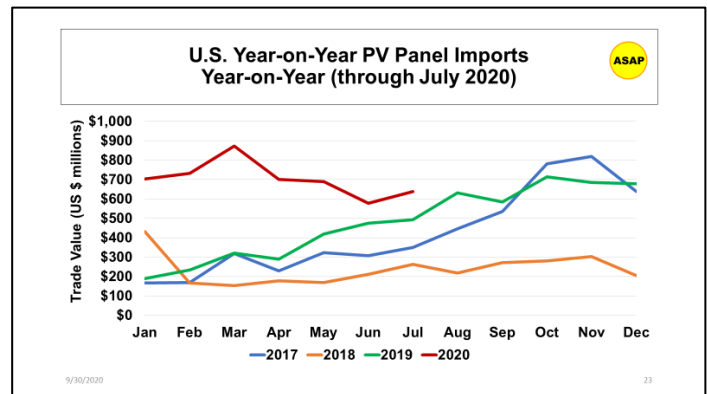
On a regional basis, YoY growth in PV electricity generation is greatest in the Southeast (+44%), Southwest (+44%) and Midwest (+29) as shown in the regional graph. Regional YoY change in wind electricity generation is a mixed bag. The Rocky Mountain (+7%), Midwest (+5%) and Southwest (+3%) regions have the highest YoY wind electricity generation growth. Once again, it should be noted that the effects of seasonality in solar and wind conditions create fluctuations in YoY totals in the monthly PV and wind electricity generation reports.



PV Trade

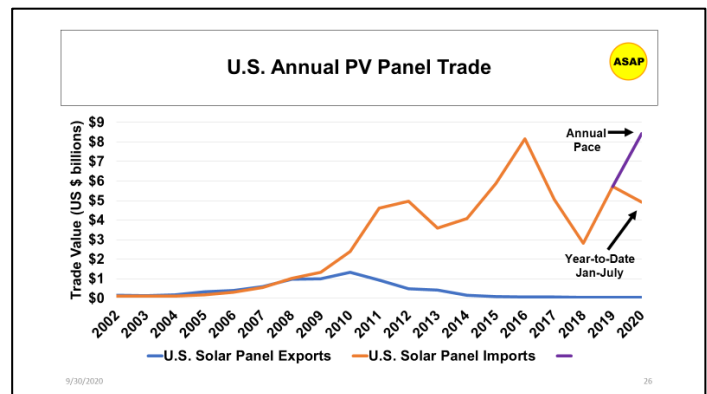
U.S. PV panel imports remain at record level

In July, the value of U.S. PV panel imports increased to \$638 million, which is 10% greater than June as shown in the graph. The major sources of U.S. PV panel imports in July were Vietnam, Malaysia, Thailand, South Korea and Cambodia. These five countries accounted for over 90% of total U.S. PV panel imports.



Malaysia, Vietnam and Thailand are the top sources of U.S. PV panel imports

The year-to-date (Jan.-July) total value of U.S. PV panel imports is \$4.9 billion. On an annual basis, the U.S. is on pace to import PV panels with a value over \$8.4 billion in 2020, which would be a new annual record for PV panel imports. The U.S. relies on foreign PV panels to balance U.S. demand. Domestic U.S. PV panel demand of ~14 GW is greater than the ~10 GW of U.S. PV panel production.



The value of U.S. PV panel imports in 2019 was \$5.7 billion. U.S. imports of PV panels peaked in 2016 at \$8.2 billion and then declined to \$2.8 billion in 2018 as shown in the graph. In terms of exports, U.S. exports of PV panels in 2019 was \$360 million, which is a ten-year low. The downward trend in U.S. PV exports is continuing in 2020.

U.S. PV panel manufacturing capacity is growing

The U.S. PV panel manufacturing base is about 10 GW. The U.S. PV manufacturing base is healthy and poised to expand as needed to supply U.S. PV demand growth. The established U.S. PV manufacturers First Solar and Tesla Solar have each expanded their U.S. manufacturing capacity to 2 GW in 2020. Over the past couple of years global heavy hitters such as JinkoSolar, LG Solar, Hanwha Q CELLS, Seraphim Solar, Silfab Solar and Sunenergy America (CSUN USA) have invested in 3.8 GW of advanced PV panel manufacturing capacity in the U.S. The current uptick in PV panel imports is due to the large increase in the installation of small PV systems as customers take advantage of investment tax credits before they completely expire in 2021 for small PV systems. The question is whether utility PV demand will compensate the expected decline in small PV.

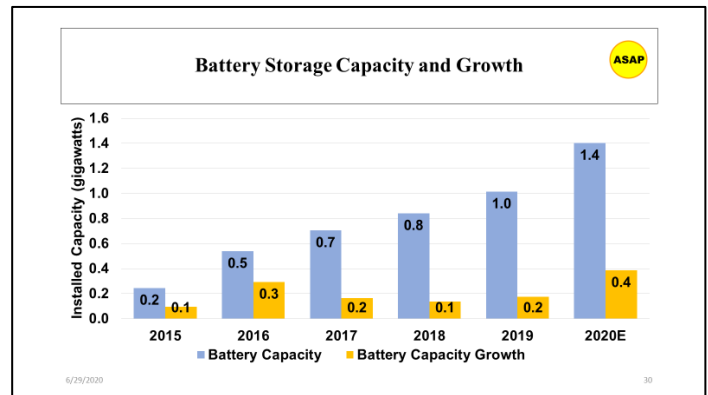
Turning attention to U.S. imports of PV cells, the total value of July U.S. PV cell imports was \$28 million, which is 65% greater than the June value. South Korea dominates the supply chain with a 79% trade share in July. The relatively low value of U.S. PV cell imports indicates that the U.S. PV cell manufacturing covers PV panel assembly demand.

The U.S. held a positive trade balance in PV cells until 2016 when PV cell imports topped exports. In recent years, the U.S. has turned significantly to South Korea for PV cells, which in 2019 provided over 50% of total U.S. imported PV cells and to date 63% of PV cell imports in 2020. In conclusion, the U.S. PV panel and cell manufacturing base appears sound and poised for adoption of advanced vertically integrated, 5 GW-scale, c-SI panel manufacturing plants to position the U.S. in the global PV market.

### Utility Battery Storage

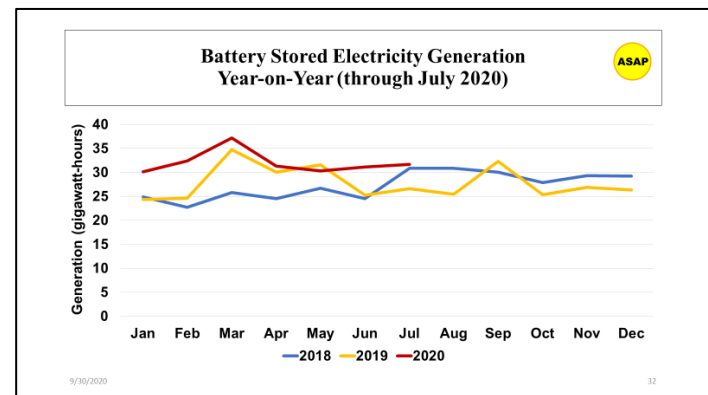
Cumulative U.S. battery storage tops 1.0 GW

The capacity of U.S. utility battery storage facilities reached the 1.0 GW mark in late 2019. The utility battery storage forecast for 2020 calls for the installation of a hefty 387 MW. In July, 236 MW of utility battery storage was brought online. The 2020 YTD total is 301 MW, which is above the installation rate needed to reach the annual forecast of 387 MW.



Battery storage is effective for peak load shaving

Cumulative utility battery capacity through July is 1.3 GW. The reported July average monthly battery utilization factor is 4.0% with a battery electricity supply of 31.7 GWh. For the first seven months of 2020, battery electricity supply is averaging 32.1 GWh/mo with an average utilization factor of 4.2%. Battery electricity generation will increase in coming months due to the new capacity coming online.





Obviously, variability in PV and wind electricity production requires electricity storage to convert PV and wind into a dependable supply of on-demand electricity. At present, the large-scale storage options are pumped hydro, batteries, molten salt for thermal solar and underground compressed air energy storage. Currently, pumped hydro is the largest storage technology with over 22 GW of installed capacity. However, battery storage technology is gaining traction for utility storage.

While battery storage is in the early adoption phase, battery storage is attracting attention. This is particularly true for peak load shaving, which stores 2-4 hours of low-price, off-peak electricity and then releases the battery stored electricity during the premium priced peak load period. In a recent development, the U.S. Department of Energy (DOE) announced on May 11 that final approval for construction of a 690 MW PV plant that is coupled to a 380 MW battery system in Nevada. The Nevada PV+battery project is slated for completion in 2022. This is the largest battery storage project to date.

### World PV and Wind

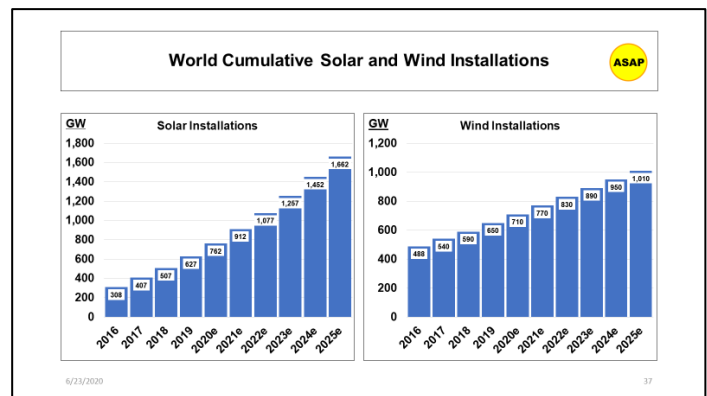
The trajectory of global cumulative PV installations is a doubling in cumulative capacity every five years. In 2020, the cumulative world PV installations will surpass 700 GW, which is more than double the 308 GW of cumulative capacity in 2016. The global COVID-19 pandemic is having an impact on global PV installations in 2020, which may result in a decrease by as much as 25%. ASAP's original 2020 forecast was 135 GW of global PV installations, but a 25% reduction decreases the total to 100 GW of new capacity. Even at this reduced rate, global PV capacity will surpass 700 GW by the end of 2020.

World PV installations doubling every 5 years

Looking ahead to 2025, global cumulative PV installations are expected to more than double to over 1,600 GW at a 9.2% annualized growth rate. It follows that the global annual installation rate is expected to approach 200 GW in 2025.

China is the world leader in PV manufacturing and annual PV installations. China's PV

manufacturing base has a 70+% global market share. In terms of domestic installations, China has installed on average about 40 GW per annum since 2017. In March 2020, China's NEA set a target of 30 GW of new PV installations in 2020. Combine this with the 15 GW of uncompleted 2019 projects, the total of new 2020 PV capacity is 35-45 GW. Over the next five years, China's annual PV installation rate is expected reach 60 GW (+50%).



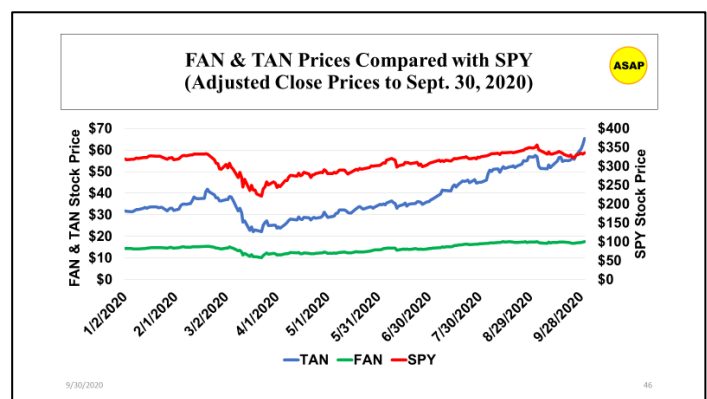
ASAP U.S. PV projection: 30 GW/year by 2030

The U.S. is the second largest installer of PV systems and is expected to increase the annual installation rate to 20 GW by 2025 and to 30 GW by 2030. ASAP's long-term deployment schedule for PV installations is 30 GW per annum by 2030. This is a doubling of the current capacity installations. Hence, a U.S. commitment to 30 GW per annum of new PV installations by 2030 appears to be a reasonable goal. ASAP's 2030 forecast calls for wind installations of 30 GW per annum and PV/wind storage capacity additions of 10 GW per annum.

Climate change analysts state that the world needs to install at least 400 GW/annum of zero emissions energy systems over the next twenty years to meet the international goal of limiting global temperature increase to below 2.0 degrees Celsius. To achieve this goal will require the U.S. to approach 100 GW of annual PV and wind installations with storage. The last decade was a demonstration period for PV, and it has met the challenges in terms of cost (\$0.90/W installed) and performance (20% efficiency), but there remains the imposing issue of storage. Fossil fuel energy is dirty energy, while PV-wind energy is clean. The public understands that clean energy with storage comes at a price. It needs to be reinforced in the public mind that a clean energy system provides a higher quality of life (better climate and air quality) and that the price is affordable.

## PV and Wind Industry Financial Performance

Entering 2020, optimism about the financial outlook on the global and U.S. PV and wind industries was strong with record annual production and installation guidance across the board. For the first seven weeks of 2020, PV and wind company stock prices in general increased. TAN, a solar focused ETF, peaked at \$41.86 on February 20, while FAN, a wind focused



For 2020, TAN Up 110% and FAN Up 21%

ETF, peaked at \$15.52 on February 19. Then, the pandemic hit, with sharp declines in TAN and FAN prices from late February through March mirroring the broader market, as shown in the graph. Then the market began a recovery lasting through August.

TAN and FAN followed suit and began to rebound in April and have continued to increase to the present. For 2020 through September 30<sup>th</sup>, TAN prices have increased a whopping 110.4%, and FAN prices have increased 21.1%. These increases are greater than the 5.5% increase in the SPY index. In September, SPY has declined, while TAN has soared after an early September correction. TAN's strong September resurgence is the market response to the expected strong U.S. and global PV installation rates going forward into 2021.

ASAP is tracking the economic performance of 46 PV and wind companies. In the November Monthly Market Update issue, the third quarter financial performance of the 46 companies will be analyzed. To date, the average stock performance of these companies is tracking the performance of TAN and FAN as expected.

## ASAP Methodology

ASAP benchmarks U.S. historical electricity generation and capacity to the Energy Information Administration (EIA) of the U.S. Department of Energy. ASAP benchmarks historical U.S. trade to U.S. Census Bureau trade data. Global data sources include the International Energy Agency (IEA), European Wind and Solar Industry Associations, China's NEA, as well as company reports. All ASAP forecasts are ASAP generated.