

U.S. PV and Wind Installations Pickup Pace in June

September 2020

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

- June PV capacity additions total 1,683 MW.
- June wind capacity additions total 709 MW.

U.S. ELECTRICITY GENERATION June 2020 PV-Wind Electricity Generation

- PV-wind electricity production is 12.3% 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

- In June 2020, U.S. imports of PV panels remain on record annual pace
- Vietnam is single largest source of U.S. PV panel imports in June 2020

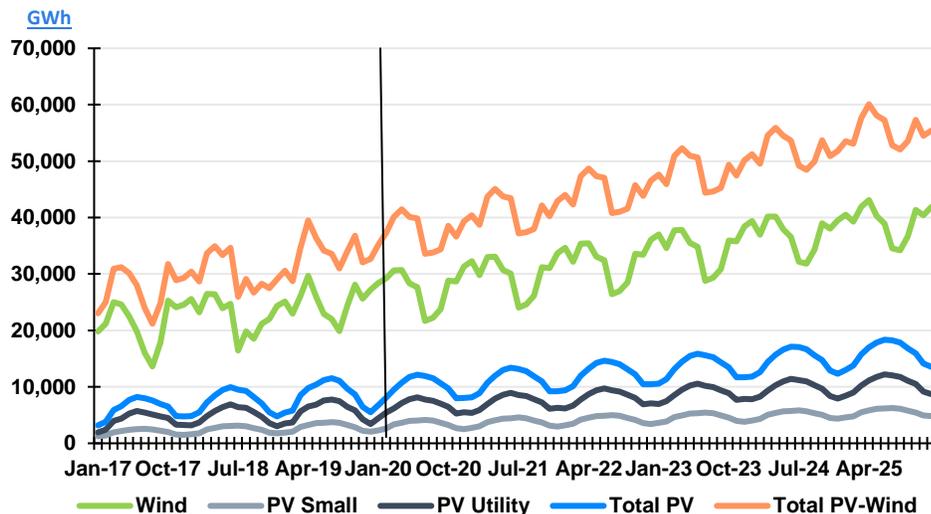
WORLD PV-WIND CAPACITY PV and Wind Growth Forecasts Revised Down

- 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

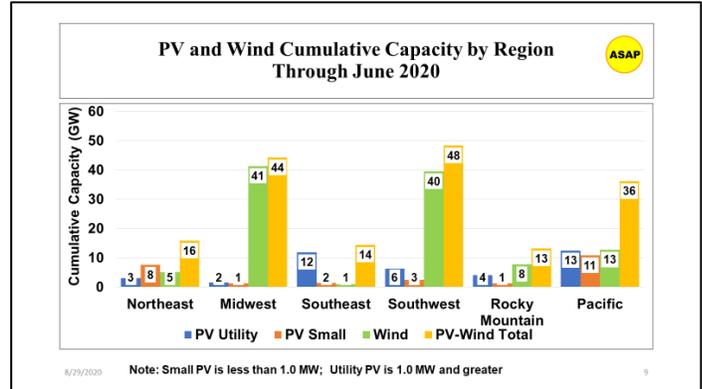
- For 2020, TAN up 79%, and FAN up 20%
- Of forty-six PV-wind industry companies reviewed, 81% have positive stock prices

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



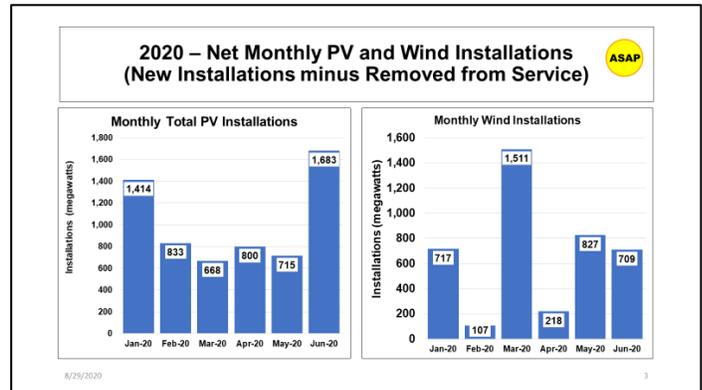
PV and Wind Capacity

At the end of June, the cumulative capacity of U.S. PV and wind installations is 172 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 are leading the way and account for 75% of total U.S. installed PV and wind capacity.



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

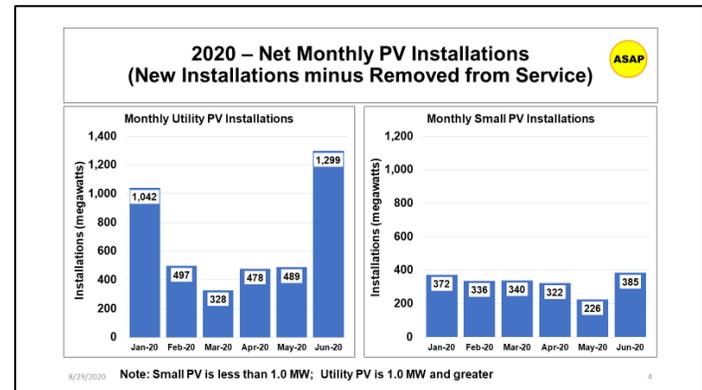
In June, net monthly U.S. PV installations was 1,683 MW. Total PV installations year-to-date (YTD) is 6.2 GW. The 2020 YTD installation rate is behind pace to reach ASAP's 2020 forecast of 14 GW. Utility PV capacity grew 1,299 MW, while small PV capacity growth is 385 MW. Wind installations expanded 709 MW in June



bringing the YTD total of wind capacity additions to 4.1 GW, which is far below pace to reach the 2020 forecast for 21 GW of new wind capacity.

Southeast region leads in new PV installations in June

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 in 2020 through June is 4.1 GW, which is an annualized pace of 8.2 GW. The small PV installation forecast has been lowered from 4.0 GW to 3.0 GW (-25%). Cumulative 2020 small PV installations through June is 2.0 GW, which is on an annualized pace of 4.0 GW. The annualized pace of total 2020 PV installations is 12.2 GW, which implies that the record of 11 GW set in 2015 will likely be surpassed in 2020.



On a regional basis, the Southwest accounted for 56% of total PV installations in June. Texas dominated state level PV installations with 866 MW of new additions. Wind installations in June were relatively evenly distributed in the Midwest, Southwest and Pacific regions. Nebraska (+230 MW), Wyoming (+226 MW) and Texas (+219 MW) led states in June wind capacity additions.

PV-Wind Electricity Generation Update

June PV and wind electricity generation is 12.3% of total generation

June PV electricity declines 1.6% due to decline in utility PV

Wind electricity generation increases 7% in June

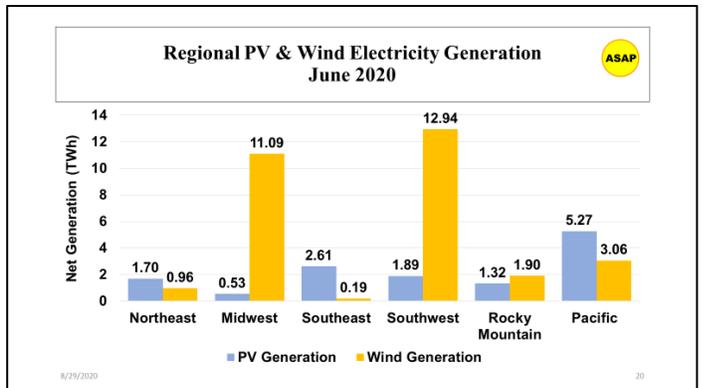
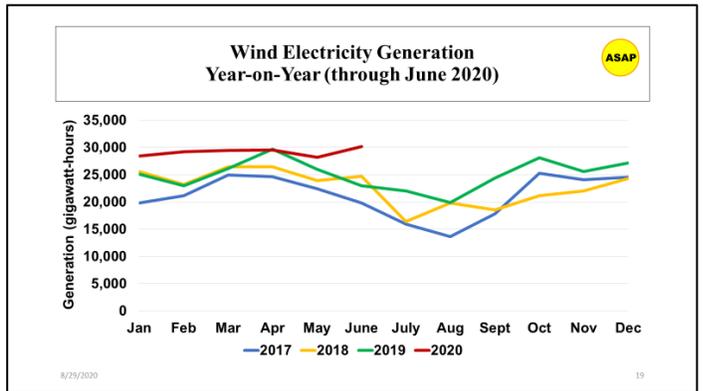
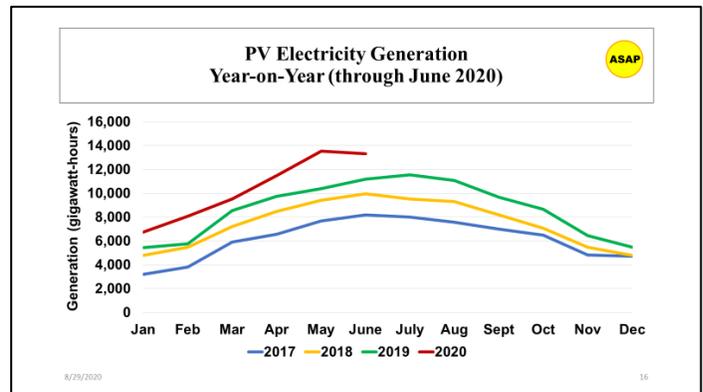
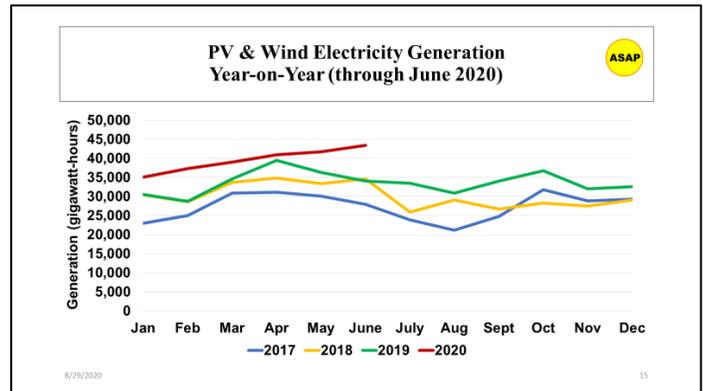
Year-on-year PV and wind electricity generation up 30%

PV and wind electricity generation totaled 43.5 TWh in June. PV produced 13.3 TWh and wind 30.2 TWh. The combined PV and wind electricity generation is 12.3% of total U.S. electricity generation. The PV and wind contribution to total electricity generation is off the 14.9% record set in April.

Month-on-month, May-June, PV electricity generation declined -0.2 TWh (-1.6%). The decline in utility PV generation caused the MoM decline total PV electricity generation. Utility PV declined -0.23 TWh, while small PV grew +0.01 TWh. June wind electricity generation increased +1.97 TWh in June compared with May.

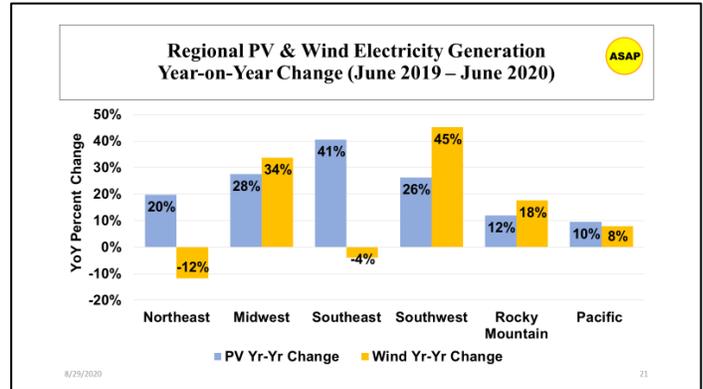
On a regional basis, the Pacific region set the pace in June with 5.27 TWh of PV electricity generation and was followed by the Southeast with 2.61 TWh of PV electricity generation as shown in the graph. For wind electricity generation in June, the Southwest region produced 12.94 TWh and the Midwest region generated 11.09 TWh.

Month-on-month (MoM), PV electricity production increased 871 GWh (+19.8%) in the Pacific region and 413 GWh (+17.3%) in the Southeast. On the other hand, MoM wind electricity generation increased 160 GWh (+8.5%) in the Rocky Mountain region but declined 1.2 TWh (-10.5%) in the Midwest region. The Southwest region had a 49 GWh (+0.4%) MoM increase in wind electricity generation.



Turning attention to year-on-year (June-19 to June-20) comparisons, YoY growth in combined PV and wind electricity production is +15%. Total PV electricity production grew +30% YoY, with small PV growing +19% and utility PV growing +36%. In contrast, YoY growth in wind electricity generation is +8%.

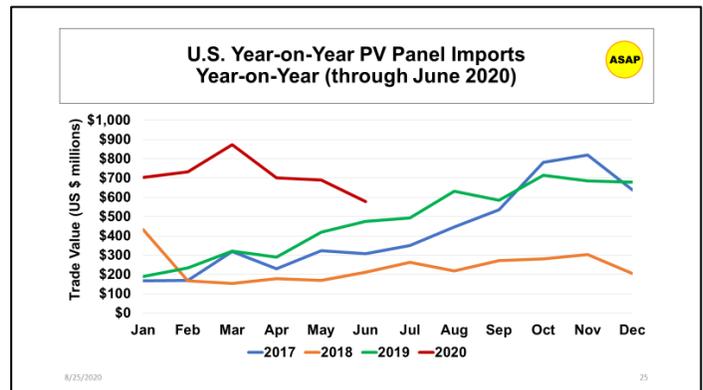
On a regional basis, YoY growth in PV electricity generation is greatest in the Southeast (+41%), Southwest (+26%) and Midwest (+28) as shown in the region graph. Regional YoY change in wind electricity generation is a mixed bag. The Southwest (+45), Midwest (+34%) and Rocky Mountain (+18) have the highest YoY wind electricity generation growth. 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

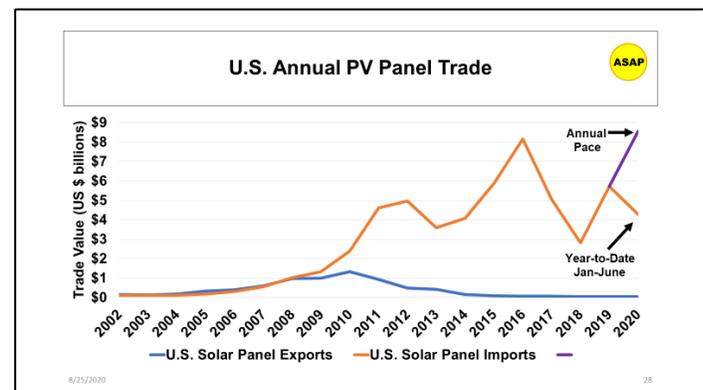
In June, the value of U.S. PV panel imports declined to \$578 million, which is the lowest total of the year. PV panel imports in June are \$111 million lower than the May imports of \$689 million (-16%), as shown in the graph. The year-to-date (Jan.-June) total value of U.S. PV panel imports is \$4.3 billion.

U.S. PV panel imports remain at record level



On an annual basis, the U.S. is on pace to import PV panels with a value over \$8.6 billion in 2020, which would be a new annual record for PV panel imports, easily passing the previous high of \$8.2 billion in 2016. The major sources of U.S. PV panel imports in June were Vietnam, Malaysia, Thailand, South Korea and China. These five countries accounted for over 90% of total U.S. PV panel imports.

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



The U.S. relies on foreign PV panels to balance U.S. demand. 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.

U.S. PV
Manufacturing
Capacity Is 10
GW

Domestic U.S. PV panel demand (14 GW) is greater than PV panel manufacture (10 GW), which explains the anemic U.S. PV panel export market.

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 June U.S. PV cell imports fell to \$17 million, which is half the May value. South Korea dominates the supply chain with 77% trade share in June. The relatively low value of U.S. PV cell imports indicates that the U.S. PV cell manufacturing is inline with 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

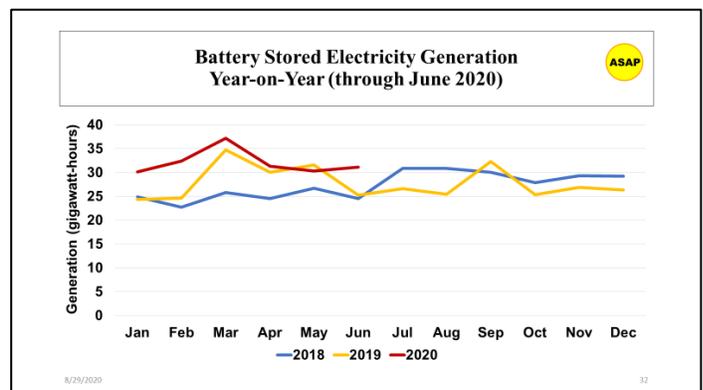
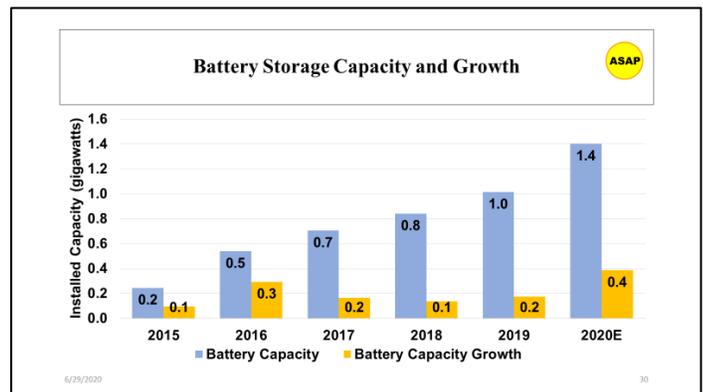
Cumulative
U.S. battery
storage tops
1.0 GW

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 June, 10 MW of utility battery storage was brought online. The 2020 YTD total is 44 MW, which is far below 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 June is 1.059 GW. The reported June average monthly battery utilization factor is 4.1% with a battery electricity supply in June of 31.2 GWh. For the first half of 2020, battery electricity supply is averaging 32.1 GWh/mo with an average utilization factor of 4.3%.



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

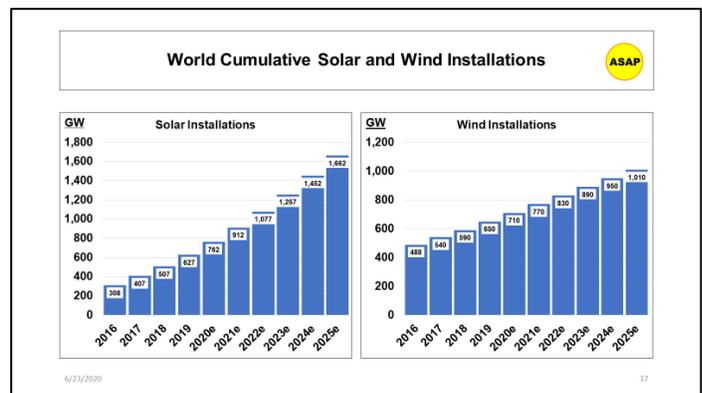
The trajectory of global cumulative PV installations is a doubling in cumulative capacity every five years. In 2020, the cumulative world PV installations will surpass 700 GW, which is more than double the 308 GW of cumulative capacity in 2016. The global COVID-19 pandemic is having an impact on global 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

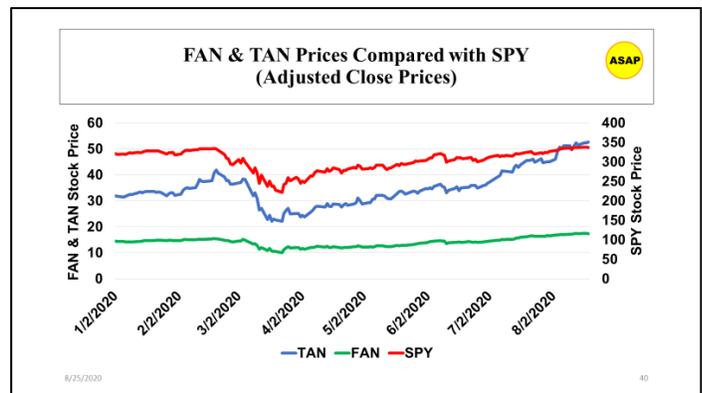
The U.S. is the second largest installer of PV systems and is expected to increase the annual installation rate to 20 GW by 2025 and to 30 GW by 2030. ASAP's long-term deployment schedule for PV installations is 30 GW per annum by 2030. This is a doubling of the current capacity installations. Hence, 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 within 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 ultimately affordable.

PV and Wind Industry Financial Performance

PV and Wind Company Stock Prices Are Robust

The above listed positive trends are embedded in the stellar stock performance of the global PV-wind industry in 2020. ASAP monitors the financial performance of forty-six publicly traded PV and wind manufacturing and installation companies (global). Thirty-seven of the forty-six companies (80%) have positive stock price returns over the period Jan. 1, 2020 through Aug. 25, 2020, while nine of the companies (20%) have negative returns. Interestingly, thirty-two of the companies (70%) have stock increases of 20% or greater in 2020.



Entering 2020, optimism about the financial outlook on the global and U.S. PV and wind industries was strong with record annual 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 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, as shown in the graph. However, TAN and FAN began to rebound in April and have increased significantly to the present. For 2020, TAN prices have increased 79%, and FAN prices have increased 20%. These increases are greater than the 8% increase in SPY index, Jan. 2 – Aug. 25.

For 2020, TAN Up 79% and FAN Up 20%

ASAP’s PV-wind company database excludes multi-product conglomerates such as Tesla, GE, LG, Sharp, Panasonic, Shanghai Electric, Iberdrola, Siemens, NextEra, Xcel, etc. The financial performance evaluation of battery storage and electric vehicle companies is confounded by the multi-product nature of these firms.

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.