**Tariffs. Trade Wars. And domestic content requirements. How are international trade tensions reshaping the solar energy industry?**

The past decade has seen a significant rise in international trade tensions. Long before the headline-grabbing trade war between China and the United States broke out in 2017, the two countries spatted over solar PV modules trade. In 2012, the U.S. imposed the first round of tariffs on solar modules imported from China. Since then, the two countries traded more solar tariffs and retaliation. Shortly after President Trump took office in 2017, he broadened the solar trade war by imposing an industry-wide tariff, which affects imports from all major solar module producing countries.

While the U.S.-China trade tension over solar persists, some other solar tariffs had come and gone. The E.U. imposed trade restrictions on wafer, cells, and modules made in China in 2013 and removed them in late 2018. Currently, India has safeguard measures against foreign solar module imports. Brazil’s development bank gives preferential treatments to solar projects using domestic content. Just to name a few.

While protectionism may fit certain economics and political agenda, it puts a toll on some segments of the solar energy industry while propelling positive changes in others. This research began by asking three questions:

1. How has the global solar PV supply chain evolved with trade tensions?
2. How did solar PV manufacturers adapt to trade frictions?
3. Who are the winners and losers of the trade protectionism over solar PV?

Initial investigation showed that protective trade practices have profoundly reshaped the solar PV industry. Significant changes had happened to the supply chain. Chinese polysilicon manufacturers have dominated the global landscape, not only outcompeting long-time Western giants but also forcing some of them to retire their production capacity. Although Chinese solar module manufacturers saw similar success in capturing global market share, they were compelled to relocate some capacity overseas, particularly to Southeast Asia, in response to tariffs imposed by the U.S. This move, inadvertently, made Southeast Asia a winner of the solar trade war between the U.S. and China.

In addition to capacity relocation, many Chinese solar PV manufacturers also see exploring the demand in emerging markets as crucial to managing the downside risk of solar trade wars with the West. This strategy pivot happens to coincide with the rising global interest in solar, driven by both the rapidly falling solar PV cost and countries’ commitment to reducing CO2 emissions. As a result, major Chinese solar module manufacturers’ reliance on business from Western Europe and the U.S. declined year over year since 2017 while their global footprints grew.

The solar trade wars had created a few winners -- Southeast Asia countries in the realm of module manufacturing and European consumers in terms of the low module prices in recent years. However, countries that are directly involved in the trade wars, namely China and the U.S., are not among the winners’ list. Chinese manufacturers are shut off from directly accessing the high-margin American market while American consumers are paying a 45% price premium for solar modules.

Evidence has shown that trade tensions do not bring direct benefits to countries involved in them. However, like it or not, they are reshaping the global solar PV supply chain and creating downstream impacts that have an uneven distribution amongst global solar markets.