Open Trade Saves Countries Billions in Solar Panel Production

New study published in Nature is the first to quantify the historical and future cost savings to the solar industry from globalized supply chains

By Christine Clark, Ioana Patringenaru, Cate Douglass | UC San Diego Today

A globalized, open trade supply chain saved countries an estimated $67 billion in solar panel production costs, reveals a new study published in the Oct. 26 issues of the journal Nature. The savings alone for the United States amounted to $24 billion.

Solar energy has the potential to provide a sustainable, low-carbon energy future if the price of production continues to decline, as it has over the last 40 years. But the study, coauthored by University of California San Diego researcher Michael Davidson, found that if strong nationalistic policies are implemented—limiting the free flow of goods, talent and capital going forward—solar panel costs will be much higher by approximately 20-25% by 2030.

The study—the first to quantify the cost savings of a globalized value chain for the solar industry—comes at a time when many countries have introduced policies
that would nationalize renewable energy supply chains in a bid to benefit local manufacturers. Policies such as imposing import tariffs could complicate efforts to accelerate deployment of renewables like solar by raising the cost of production, the study’s researchers said.

“What this study tells us is if we’re serious about fighting climate change, policymakers need to implement policies that promote collaboration across global value chains with regard to scaling up low-carbon energy technologies,” said John Helveston, lead author of the study and assistant professor of engineering management and systems engineering at the George Washington University. “While this study focuses on one industry—solar—the effects we describe here are applicable to other renewable energy industries, such as wind energy and electric vehicles.”

The study looked at historically installed capacities as well as input material and sales price data for solar panel modules in the United States, Germany and China—the three largest solar-deploying countries—between 2006 and 2020. The research team estimated that a globalized solar supply chain saved the countries a combined $67 billion—$24 billion in savings for the United States, $7 billion in savings for Germany and $36 billion in savings for China. Had each of the three countries adopted strong nationalistic trade policies that limited cross-border learning over the same time period, solar panel prices in 2020 would have been significantly higher—107% higher in the United States, 83% higher in Germany and 54% higher in China.

“Our research shows international collaboration is key to addressing global climate change,” said Gang He, assistant professor of energy policy at Stony Brook University and the paper’s corresponding author. “Nationalistic policies hurt every country and risk missing pressing climate targets.”

The research team also looked at the cost implications of more protectionist trade policies going forward. They estimate that if strong nationalistic policies are implemented, solar panel prices will be approximately 20-25% higher in each country by 2030, compared to a future with globalized supply chains.
Michael Davidson, assistant professor with UC San Diego’s School of Global Policy and Strategy and the UC San Diego Jacobs School of Engineering.

“Policies that cut off global value chains and restrict flows of people and capital will disrupt the global learning processes that have contributed precisely to solar’s success story,” said Davidson, a study coauthor, and assistant professor with UC San Diego’s School of Global Policy and Strategy and the UC San Diego Jacobs School of Engineering. “Models demonstrating the feasibility of meeting ambitious clean energy targets rely upon continued cost declines which may not materialize if countries choose to go it alone.”

The study builds on a 2019 paper published by Helveston in the journal Science, which argued for more collaboration with strong manufacturing partners like those in China in order to rapidly decrease the cost of solar and accelerate the deployment of low-carbon energy technologies.

“The new Inflation Reduction Act contains many important policies that support the development of low-carbon energy technologies in the United States, which is critical to addressing climate change and would introduce more innovation and capacity in the marketplace,” Helveston said. “What our study contributes to this conversation is a reminder not to implement these policies in a protectionist manner. Supporting the United States’ manufacturing base can and should be done in a way that encourages firms to trade with foreign partners to continue to accelerate cost reductions.”

The paper, “Quantifying the cost savings of global solar photovoltaic supply chains” was published by Nature and is available at this link.