Testimony before the U.S. International Trade Commission
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Good afternoon. My name is Amy Grace and I manage the North America research group at Bloomberg New Energy Finance, a division of the financial information provider Bloomberg LP. We provide major investors, utilities, policy-makers, and others with data and insights on the energy sector, including natural gas; renewables, such as wind and solar; and other technologies. My team covers the U.S. and Canadian markets.

I am here today in my role as an analyst for Bloomberg New Energy Finance. My remarks today represent my views alone, not the corporate position of Bloomberg LP. And of course, they do not represent specific investment advice.

I have been asked today to testify on the competitive dynamics in the U.S. electricity system, which is, ultimately, the final market for the crystalline silicon photovoltaic ("CSPV") products at issue in this case. I will focus my comments on how utility-scale solar competes in wholesale power markets and in regulated utility resource planning. I recognize that solar also competes at the retail level – on residential and commercial rooftops across the country – but for my comments, I will focus on the utility-scale sector, which represents approximately 60% of the total photovoltaic solar market over the last five years. I look forward to answering any questions on the residential and commercial sector during the Q&A.

In some places in the U.S., there is demand for new generation, either because of growth in the demand for electricity, or because of retirements of aging coal and nuclear fleets. In these few places, utility-scale solar will compete against *new* natural gas and wind build. (Gas and wind are typically the cheapest forms of new power in much of the U.S.) However, in most

regions today, utility-scale solar competes against *existing* generation in both wholesale power markets and in utility planning decisions.

Why does utility-scale solar compete mostly against *existing* generation? For the last decade, electricity sales in the U.S. have been flat. As visible in this first slide, growth in demand for electricity, which in the past rose in tandem with GDP growth, has decoupled from this partnership due to energy efficiency and the U.S.'s transition away from manufacturing and towards a service-based economy. There is limited need for new capacity to meet electricity demand, and with a few exceptions, a new utility-scale solar project will only be built if it is cheaper than the cost of running an existing power plant.

Over the last decade, wholesale power prices have declined by roughly two-thirds due primarily to a collapse in the price of natural gas, which has become the primary fuel for electricity generation in the U.S. As a result, natural gas-fired generators typically set power prices throughout the country. This means utility-scale solar must be competitive with the operating cost of an efficient natural gas plant (roughly $20-30/MWh), or it will not be built.

So, why did the U.S. add over 14 gigawatts of solar last year (75% of which was utility-scale)? And why does Bloomberg New Energy Finance forecast the U.S. to add 52 gigawatts, as visible in this second slide, between 2018 and 2021?

First, policy still matters. The federal Investment Tax Credit remains instrumental in bolstering solar project economics. State policies mandating solar have played an equal – if not more important – role historically. However, these state policies have become less important over the last couple years as a driver for new solar build.

Less than 10% of our forecasted U.S. solar build is effectively 'locked in' by solar-specific state policy mandates, seen here in slide three. Most of these solar-specific targets have

already been met. Another 13% we expect will be driven by technology-agnostic renewable mandates where solar competes head-to-head against wind and other forms of renewable energy generation. Similarly, most of these technology-agnostic renewable energy targets have also already been met.

Outside of policy, utilities are building or buying solar because (with the federal subsidy) it is cheaper than the operating cost of their existing generation or it is useful as a hedge against future fuel price volatility. In addition, corporations and large energy users – from the Fortune 500 to the U.S. military – are signing contracts with utility-scale projects to offset their electricity consumption and cost-effectively meet internal sustainability targets.

Corporations generally do not consume the electricity generated by solar projects directly; it is sold into the wholesale market. Rather, the corporation is merely providing a financial hedge to the solar project – guaranteeing a fixed price for the power it produces and accepting the risk that the wholesale power price will, over time, roughly equate to or exceed this fixed price. As such, outside of solar mandates, the competiveness of utility-scale solar with the wholesale power price is critical.

It is worth emphasizing the significant cost declines achieved by U.S. solar developers – and their equipment suppliers – over the last decade, as seen in slide 4. In 2006, the average price for a long-term utility-scale solar contract was $224 per megawatt-hour; in 2016, it was between $30-40 per megawatt-hour. This is why utility-scale solar is able to compete with other forms of electricity generation. It is now price-competitive with wind and wholesale power in several parts of the country – but just barely.

So, what would happen if the petitioners' requested tariffs were to take effect?

All else equal, any increase in equipment cost for utility-scale developers – whether the result of lower domestic subsidies or increased import tariffs – would increase the price of solar electricity developers can offer. And any increase in the price of solar offered to electricity purchasers – whether a utility, a financial intermediary or a corporation – would result in fewer contracts being signed and lower solar deployment.

Fundamentally, demand for solar energy is elastic. Its output, electricity, is fungible with all other forms of power generation except where policy dictates otherwise, for example through mandates for specifically solar or renewable energy. As mentioned previously, these mandates have mostly been fulfilled, and are a small percentage of forecasted future build. Without a policy mandate, utilities will normally build the cheapest form of power regardless of its source. Corporations with sustainability goals will sign long-term contracts with the cheapest form of renewable resource.

This is not hypothetical. New contracting activity for utility-scale solar projects has essentially ground to a halt since June. Developers cannot reasonably guarantee competitive contract terms with their counterparties when they don't know how much they will have to pay for modules – the most expensive line-item of a project's cost.

This brings me to my final point. Regardless of the ultimate impact on costs, political and legal uncertainty alone can result in less willingness to invest and a higher cost of financing.

In closing, I would like to reemphasize the competitive nature of the U.S. power market. The days of solar build being driven by solar-specific policy requirements have essentially passed. The majority of solar build in recent years has been as a result of solar power's cost competitiveness with other forms of new and existing bulk generation, and rooftop solar's cost competitiveness with retail energy prices. Any increase in price in the future will negatively

impact how much solar is installed in the United States, as well as the companies and people that rely on access to competitively priced solar equipment for their livelihood.