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To: Washington State Solar Energy Industries Association

From: Richard McCann, Partner

RE: Potential Solar Rooftop & Parking Lot Capacity for Washington State

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We present results from previous studies that estimate the potential solar capacity that could be installed on residential, commercial and industrial rooftop and parking lots in Washington. **Total estimated potential installed capacity is 30,700 to 43,900 megawatts (MW).** For comparison, Washington has [30,853 MW](#) of installed grid-scale generating capacity of all technologies.

Category	Low	High
Small buildings (NREL 2016)	15,700	15,700
Medium & large buildings (NREL 2016)	7,100	
Manufacturing (Namin et al 2023)		9,500
Warehouses (Env. America 2023)		2,900
Parking Lots (Rudge 2021)	7,900	15,800
<b>Total Potential MW</b>	<b>30,700</b>	<b>43,900</b>

### Rooftop Solar Potential Capacity

Three studies have estimated the potential installed capacity for rooftop solar in Washington. These studies use a combination of building structure databases and satellite mapping to estimate available rooftop space across the U.S. (These estimates exclude potential capacity installed in parking lots.) The total potential installed capacity for the state ranges from **22,800 to 28,025 megawatts (MW).**

The Pacific Northwest is transitioning from a winter peaking electric system driven by electric resistance heating to a summer peaking one driven by rising air conditioning loads. Further, with a relatively small amount of installed solar plant capacity, that summer peak occurs during mid-afternoon.<sup>1</sup> California saw a 93% relationship between reduced summer peak loads and increased rooftop solar capacity beginning in 2006. Washington should expect a similar relationship.

### Study Results

The National Renewable Energy Laboratory ([NREL](#)) did a state by state study in 2016 using data down to the Census Tract level.<sup>2</sup> This table summarizes the potential for Washington.

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<sup>1</sup> The Northwest is yet to experience the notable “duck curve” that California has seen with much higher solar capacities, both on rooftops and large-scale.

<sup>2</sup> There are approximately two Census Tracts on average in each Zip Code.

Building Type	Installed Capacity
Small buildings (residential)	15,700
Medium & large buildings	7,100
<b>Total</b>	<b>22,800</b>

A [2023 study](#) published in *Environmental Research: Infrastructure and Sustainability* estimated the potential on the rooftops of manufacturing plants across the U.S.. That study found a potential of **9,470 MW** on 85% of manufacturing facilities in the state. That would meet about half of all industrial electric sales in the state. This estimate is 33% more than the combined commercial and industrial total from the NREL study.

A third study prepared by [Environment America](#) in 2023 study found the potential on warehouse roofs is **2,854 MW** in the state.

	Installed Capacity
Manufacturing	9,471
Warehouses	2,854
<b>Total</b>	<b>12,325</b>

Replacing the capacity estimated for medium and large buildings in the NREL study with the projections from the two 2023 studies (which are only a partial count of all commercial and industrial buildings), **the potential installed capacity rises to 28,025 MW.**

### Potential Parking Lots Solar Capacity

Solar car park canopies offer a win-win solution for Washington's transition to a renewable power supply. Since parking lots are highly degraded land with minimal environmental benefits, placing solar panels above this land has little ecological consequences. About [84% of solar is placed on valuable open space](#), harming environmental resources. Instead, solar can be developed above much of Washington's [276 sq miles](#) of parking lots.

Using the methods of [Rudge \(2021\)](#), **Washington can produce 15,800 MW by adding solar above parking lots with 100 spots or more** or about two-thirds of an acre.<sup>3</sup> For example, placing solar car canopies above just 10% of large parking lots will generate 1,580 MW, or about three times Washington's current solar capacity.

Producing sustainable energy and incentivizing electric vehicle adoption will reduce air pollution. Since large parking lots are correlated with lower-income neighborhoods, solar car parks will have an [outsized beneficial impact in disadvantaged communities](#). Car parks will benefit communities that historically have lower levels of solar adoption, EV adoption, and higher levels of air pollution.

Motorists benefit from the structure's protection from the elements. Having a cover over a parking spot will reduce the amount of sun, rain, and snow hitting a parked vehicle. Additionally, electric vehicle chargers can easily be integrated into the canopy, creating a closed loop where sustainable electricity is stored for use directly where it is generated. Instead of importing energy from distant power plants,

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<sup>3</sup> An average Walmart parking lot is 5 acres. A football field is 1.32 acres.

canopies can help power business operations, charge electric vehicles, and sell clean electricity back to the grid. This localized energy can be made into a microgrid, creating a more resilient power supply.

Recognizing the benefits of solar car parks, France has implemented a law requiring parking lots with 80 spaces or more to cover at least 50% of all of their lots in solar canopies. This law is expected to generate between 6.75 and 11.25 GW of solar power. (Paris is slightly north of Seattle.)