



# COMBINING WIND AND SOLAR

**In windy places, Flower Turbines are more efficient than solar, so you should first allocate space for wind.**

## SLANTED ROOFTOP

This is usually a residential case. This is easy. We have created a mount that will safely secure the turbines and solar panels, all without needing to be bolted into the structure.

## LARGE FLAT ROOFTOP OR GROUND INSTALLATION

This is usually a corporate, commercial, or government building or property. Here it is a little more complicated.

First, let's understand that Flower Turbines, thanks to its efficiency and cluster effect, produces more energy for you per square meter than solar, so it should get the priority.

Let's do a calculation using the Port of Rotterdam as an example.

Using [pvwatts.nrel.gov/pvwatts.php](http://pvwatts.nrel.gov/pvwatts.php)

A 20-kilowatt solar system will take up 125 m<sup>2</sup>. It will produce 18000 kWh/year. Flower Turbines has 1 large turbine for each 9 m<sup>2</sup>. In 125 m<sup>2</sup>, Flower Turbines could put 14 turbines, each of which would produce, depending on location in the port, 8000 plus or minus 2000 kilowatt-hours per year. 8000 times 14 is 112,00 kWh/year from the same space.

**Here is how you take advantage of the Flower Turbines cluster effect and make a joint project:**

**1. Identify the direction of prevailing wind.**

**2. Line up a row of turbines,** using the instructions for each size as to how to separate them, perpendicular to the prevailing wind.

**3. Identify the average wind speed.** If it is 5.5 meters per second or greater, you will likely benefit from two rows of turbines. Place them "catty corner"—like checker squares—in a second row at the same distance between the turbines.

**4. Use solar for the rest of the property** or repeat the process with wind at the other side of the roof if the other side is at least 5 times the turbine diameter distant. The reason for this is that the turbines extract energy from the wind so the wind speed is lower behind them. Usually the wind speed of the total environment equalizes as the higher speed wind above fills in the gap.

Flower Turbines is different from solar in that the cluster effect enhances the performance of nearby turbines, but this advantage leads to a disadvantage that each pass through a turbine reduces the wind's capacity to produce electricity downstream from that turbine. This is one of many reasons why wind and solar make a good combination in getting the most energy out of your property.