

Geographical variation in renewable energy output on the SWIS

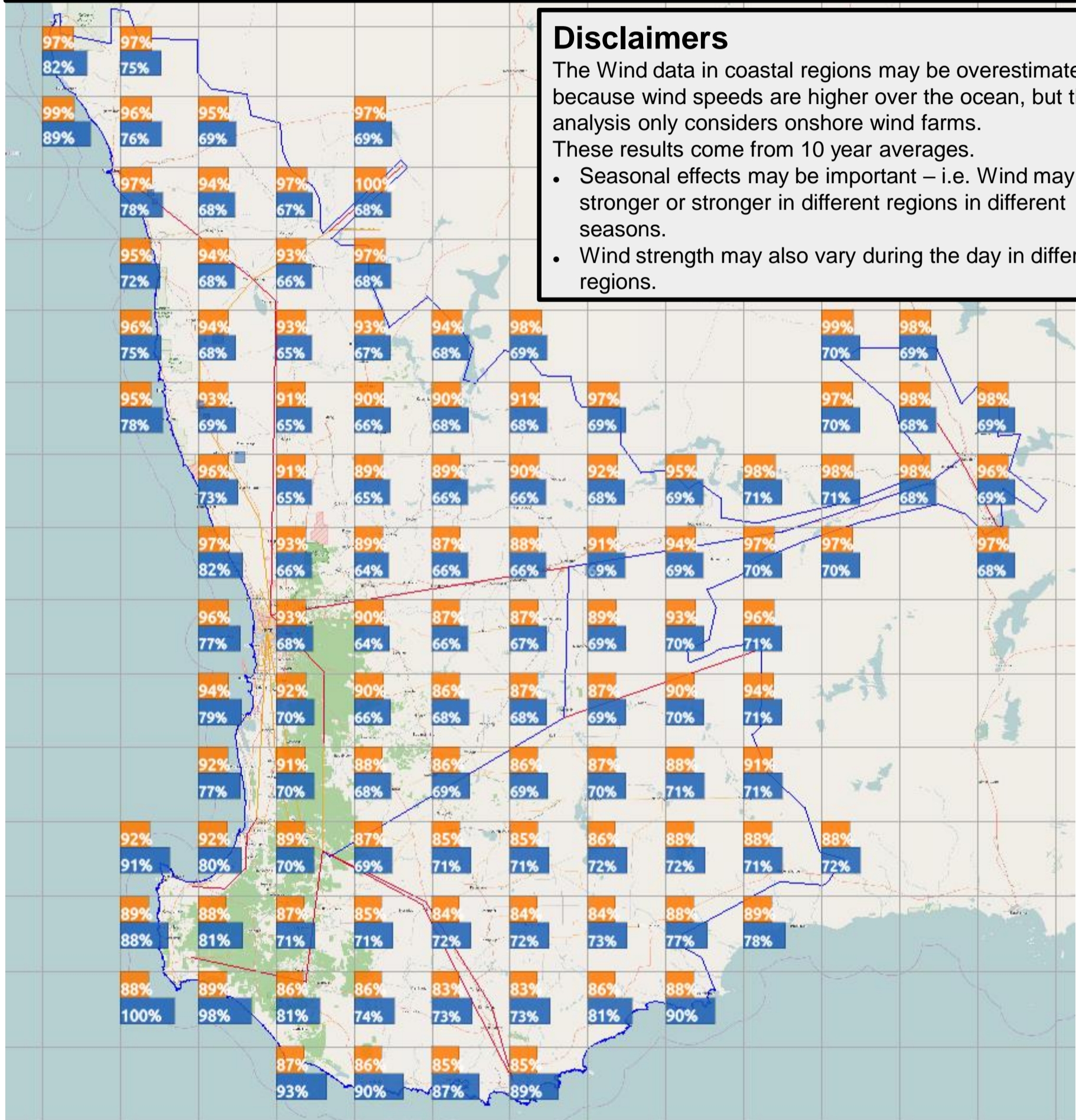
This graphic shows the geographical variations in Wind and Solar PV generation capacity across the WA South West Interconnected System (SWIS) network.

Findings

- Wind output is greater than PV output, because Wind can generate throughout the day.
- The lowest Wind generation cell is 64% of the maximum, implying that Wind farms need to be located carefully.
- The strongest Wind generation cells tend to be near the coast.
- The lowest PV generation cell is 83% of the maximum.
- PV generation is generally higher in the north and east.

Disclaimers

- The Wind data in coastal regions may be overestimated because wind speeds are higher over the ocean, but this analysis only considers onshore wind farms. These results come from 10 year averages.
- Seasonal effects may be important – i.e. Wind may be stronger or stronger in different regions in different seasons.
 - Wind strength may also vary during the day in different regions.



• How the graph was calculated

The SWIS is divided into a grid where each cell is about 60 km west to east and 55 km north to south. Each cell corresponds to a data point for NASA's global MERRA-2 climate data.

- A 100 MW onshore wind farm and 100 MW single axis PV station were positioned at the centre of each cell.
- Models were run for each cell for a 10 year period for each year from 2012 to 2021. The 10 year average generation was then taken as the input to the charts.

- A chart of the same scale was then produced for each of the cells, with two bars (blue - Wind and orange - PV). The width of each bar corresponds to the generation output in that cell. The number in each bar corresponds to the percentage of the maximum generation for that technology, identifiable by a value of 100%.
- The Wind cell with maximum output is at Cape Leeuwin (494,026 MWh). Solar in this cell is only 88% of the maximum.