

User guide for visualisations of renewable energy resources and energy infrastructure in Chile

Andrea Oyarzún

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This guide provides a quick and easy way to understand the key elements of the visualisations of the energy landscape in Chile. The examples in this guide are drawn from the “*Advanced user*” visualisation. We describe key aspects of the energy landscape in the different macro-zones of Chile, running from north to south, to emphasize the geographical differences and facilitate an understanding of the challenges imposed by the mountainous geography of Chile. The data used for these examples is from 2018.



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1 Visualisation controls

Figure 1 shows the basic visualisation controls. It is recommended to select the background first, then the projection and finally the data layers.

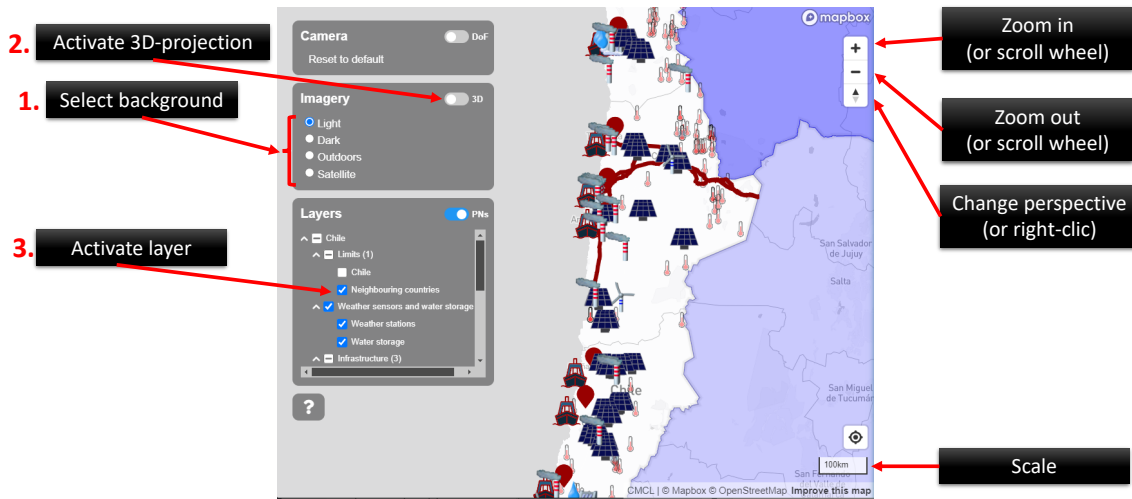


Figure 1: Basic visualisation controls.

Figure 2 shows some additional visualisation controls. You can click “Chile” at the top of the layer tree to toggle the selection of all data layers in one go. On the bottom right there are tabs to view general information about the visualisation, a legend and references.

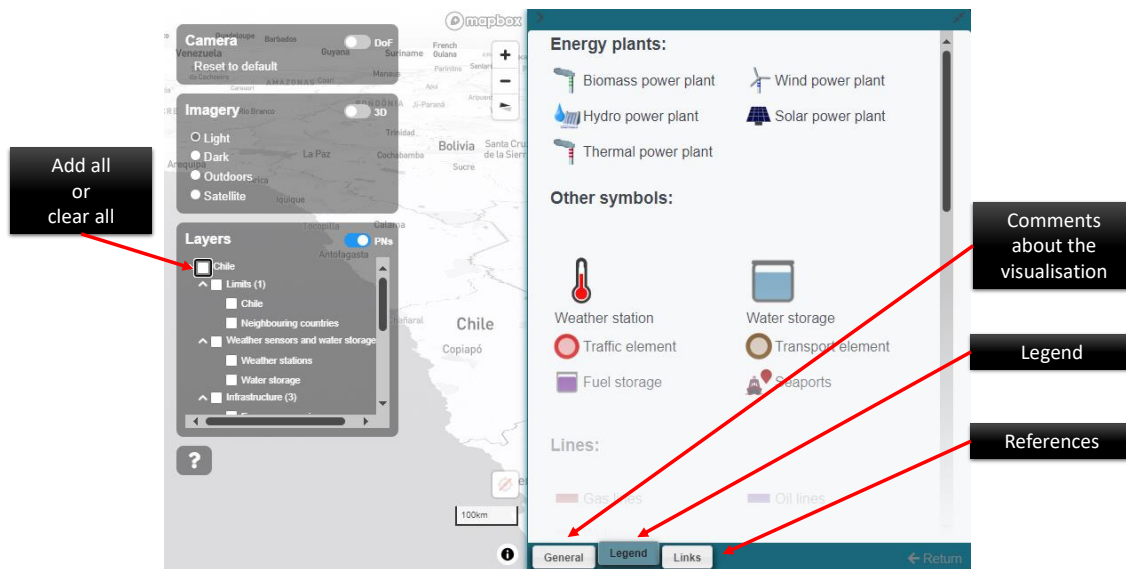


Figure 2: Additional visualisation controls.

Figure 3 shows the size and location of solar energy plants in Chile. The “Chile” node at the top of the layer tree was first used to unselect all data layers. Single layers were then selected one after the other. The size of the power plants is indicated using yellow and red cards.

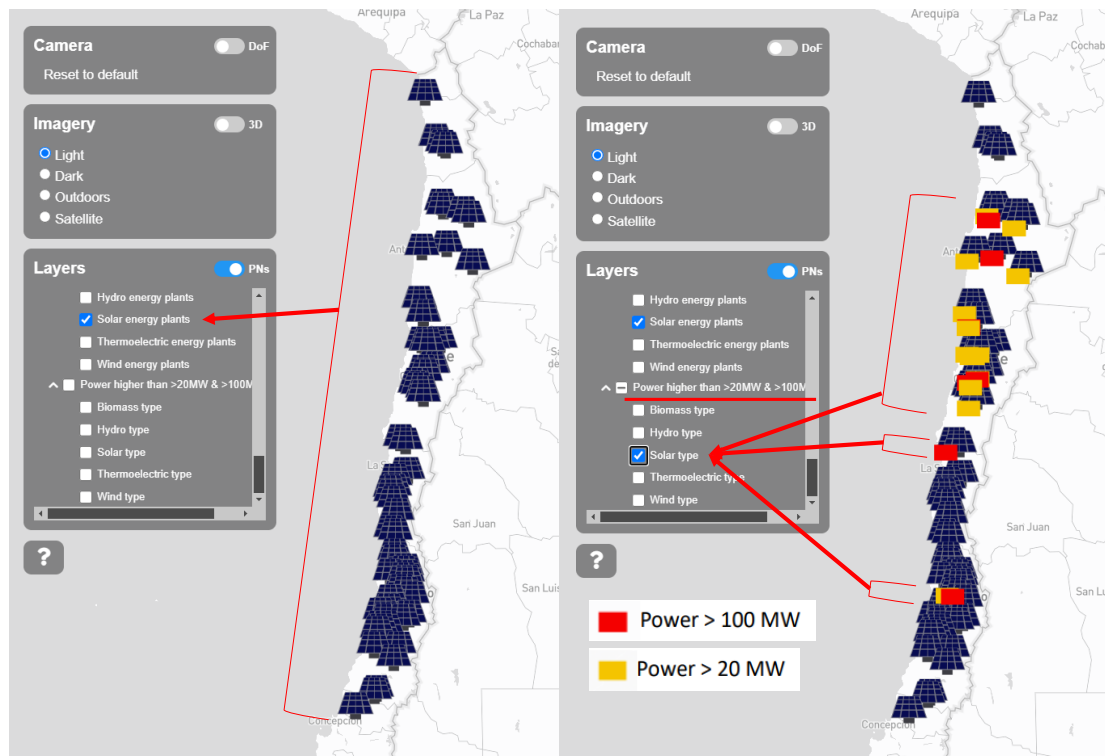


Figure 3: Size and location of solar energy plants.

2 *Norte Grande and Norte Chico* macro-zones

It is well known that the north of Chile has abundant solar energy. Figure 4 shows that the distribution of solar infrastructure can be visualised by activating “Solar energy plants” layer and zooming out to see the whole of Chile.



Figure 4: Solar energy plants are predominantly located in the north of Chile.

Figure 5 shows the same solar plants with the “Solar type” layer of the “Plants with power > 20 & > 100 MW” layer group activated to highlight large and small plants. The solar energy plants of significant size are located in the *Antofagasta* and *Atacama* regions, except for two plants located near the capital, Santiago.

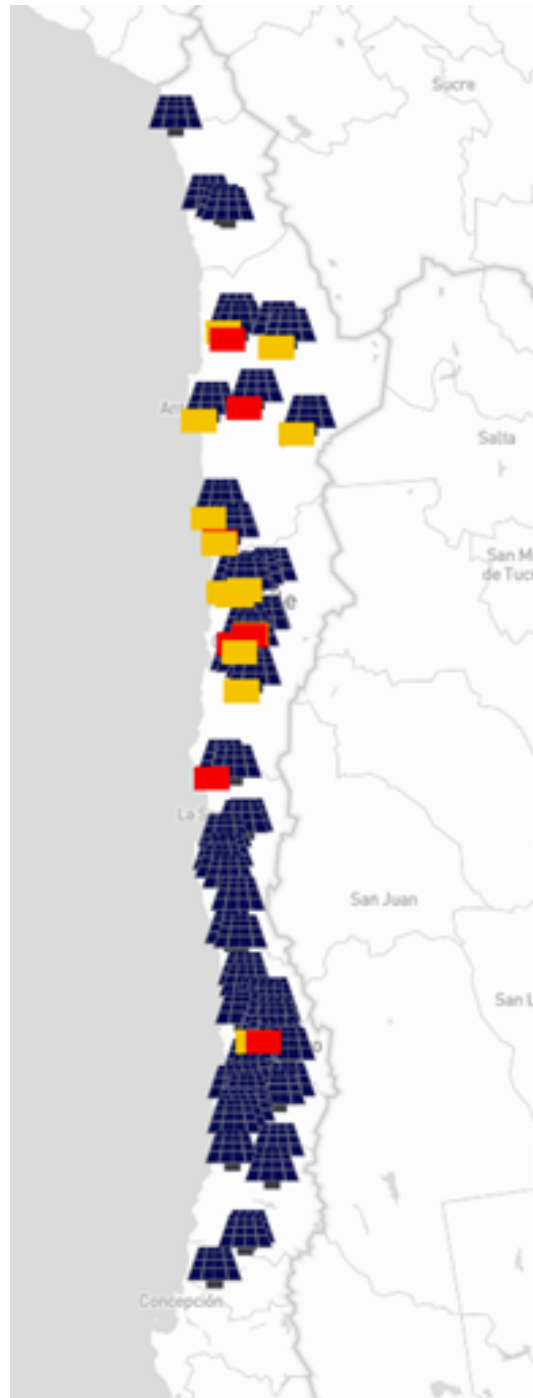


Figure 5: The largest solar plants are mainly located in Antofagasta and Atacama.

Figure 6 shows the same data overlaid by the “*Direct normal radiation (DNI)*” layer.

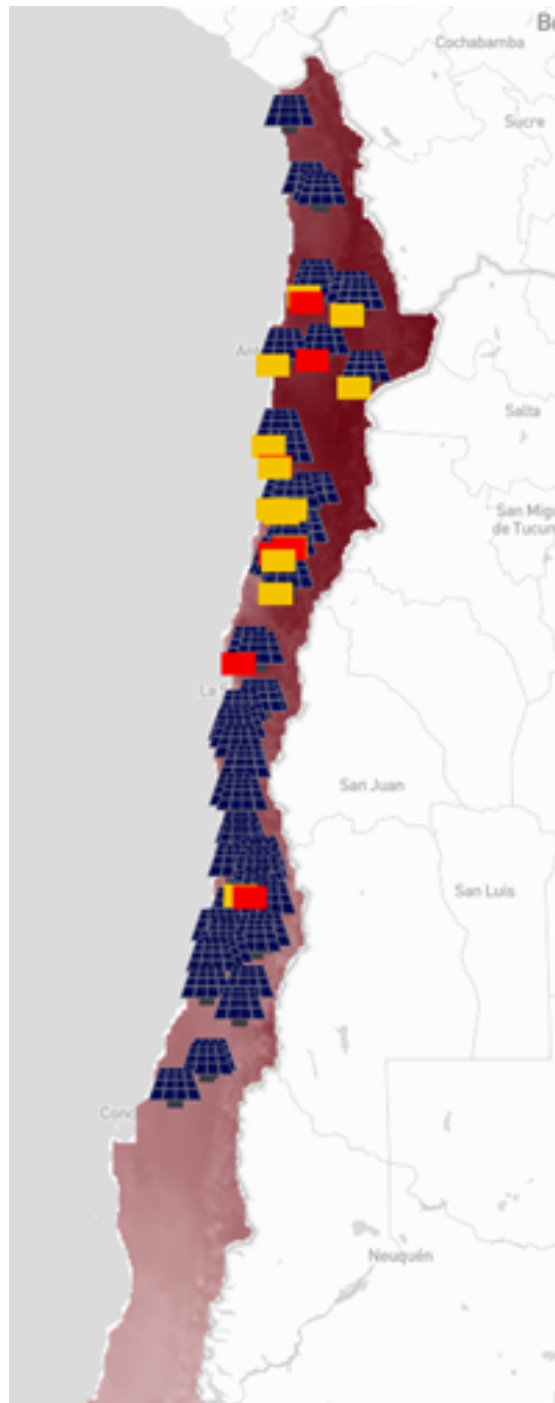


Figure 6: *Solar energy plants overlaid by DNI.*

By activating the satellite view you can get an impression of the actual size of these plants. Figure 7 shows the *Solar Llano de Llampos* in Atacama with 101 MW power capacity on the left and *Generadora del Pacífico* in Atacama with 9 MW power capacity on the right.



Figure 7: *Satellite views give an impression of the physical size of solar energy plants.*

Figure 8 shows the same data as Fig 5 overlaid by the “*Thermoelectric energy plants*” layer and the “*Thermoelectric type*” layer of the “*Plants with power > 20 & > 100 MW*” layer group. It can be seen that there are more large thermal than large solar energy plants in the north of Chile (left), especially in the industrial area of the *Mejillones* industrial park (right).



Figure 8: *Size and location of thermal power plants in the north of Chile.*

3 *Centro Sur* macro-zone

Figure 9 shows the power plants in the *Centro Sur* macro-zone of Chile. We observe a combination of all types of energy, which is reasonable for the most populated areas of Chile.

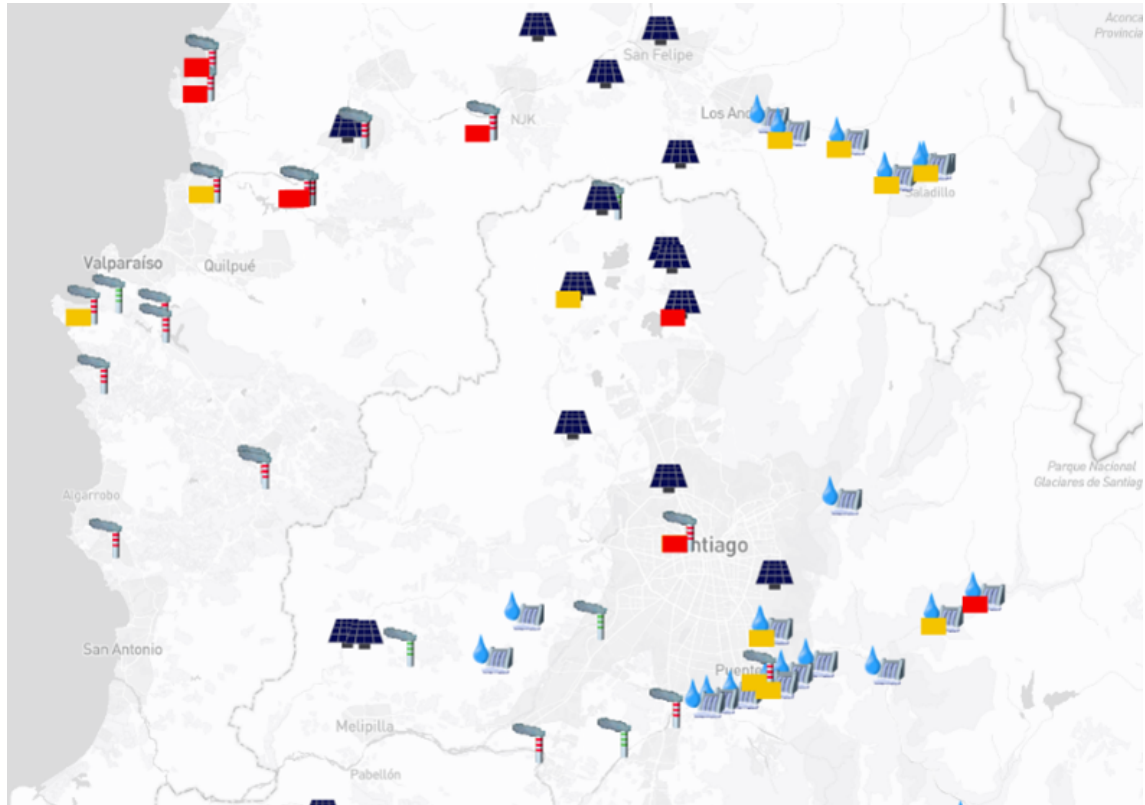


Figure 9: Power plants in the *Centro Sur* macro-zone.

Figure 10 shows that the capital, Santiago, benefits from a series of hydroelectric power plants distributed along the *Colorado* and *Maipo* rivers (left). A similar situation is seen along the *Aconcagua* river (right).

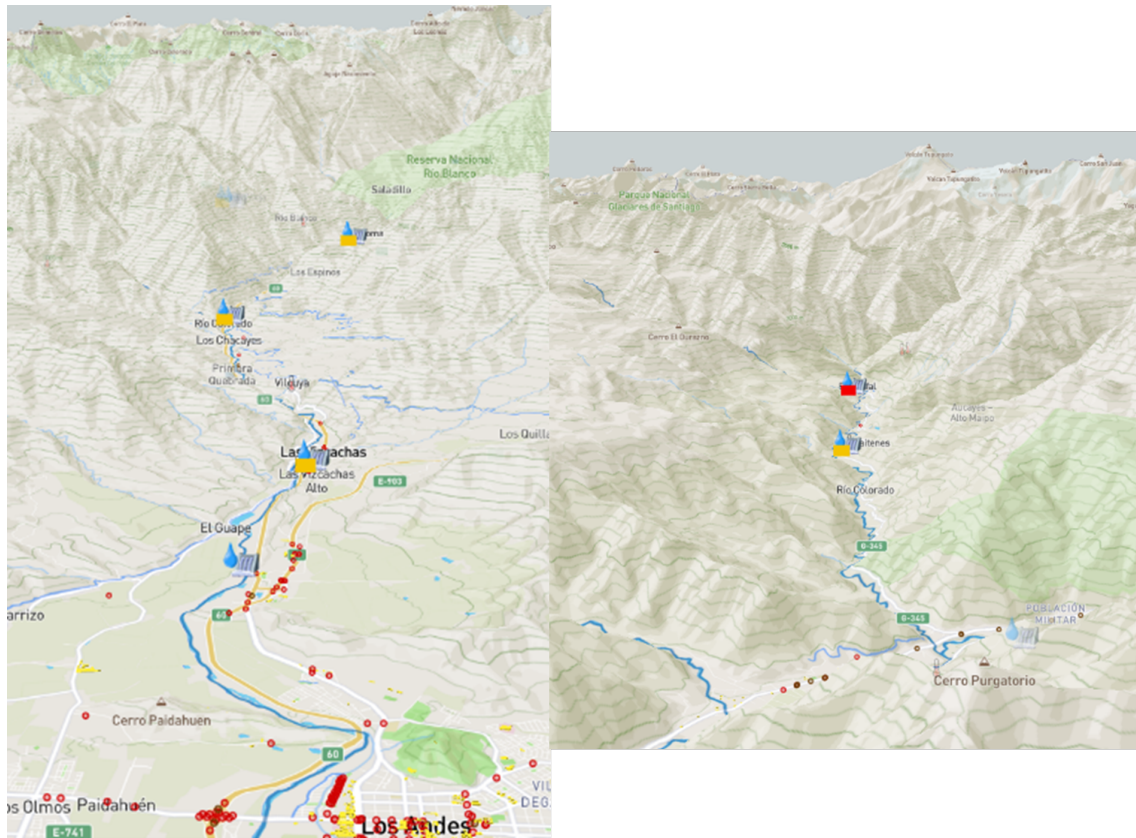


Figure 10: *Hydroelectric power along the the Colorado and Maipo rivers (left) and Aconcagua river (right).*

Figure 11 shows the differences in the locations of thermal and wind power plants.

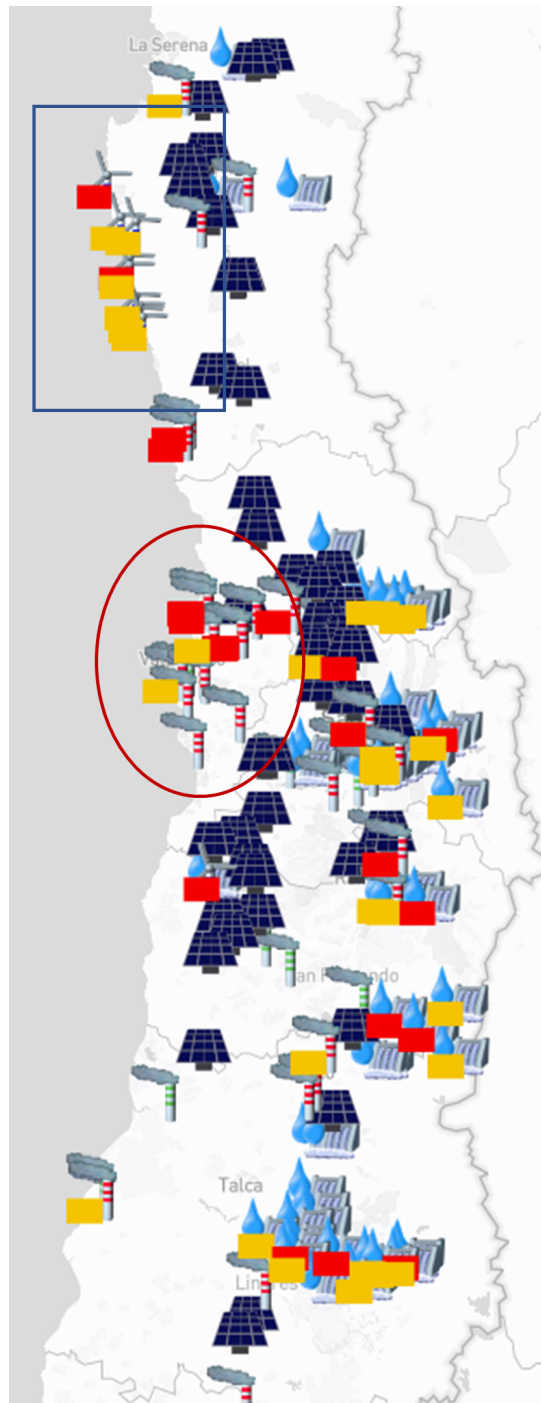


Figure 11: *Thermal power plants on the coast in the Metropolitana region (oval), wind power plants in the Coquimbo region (rectangle).*

Figure 12 shows the contribution of renewable energies in the *Metropolitana* region.

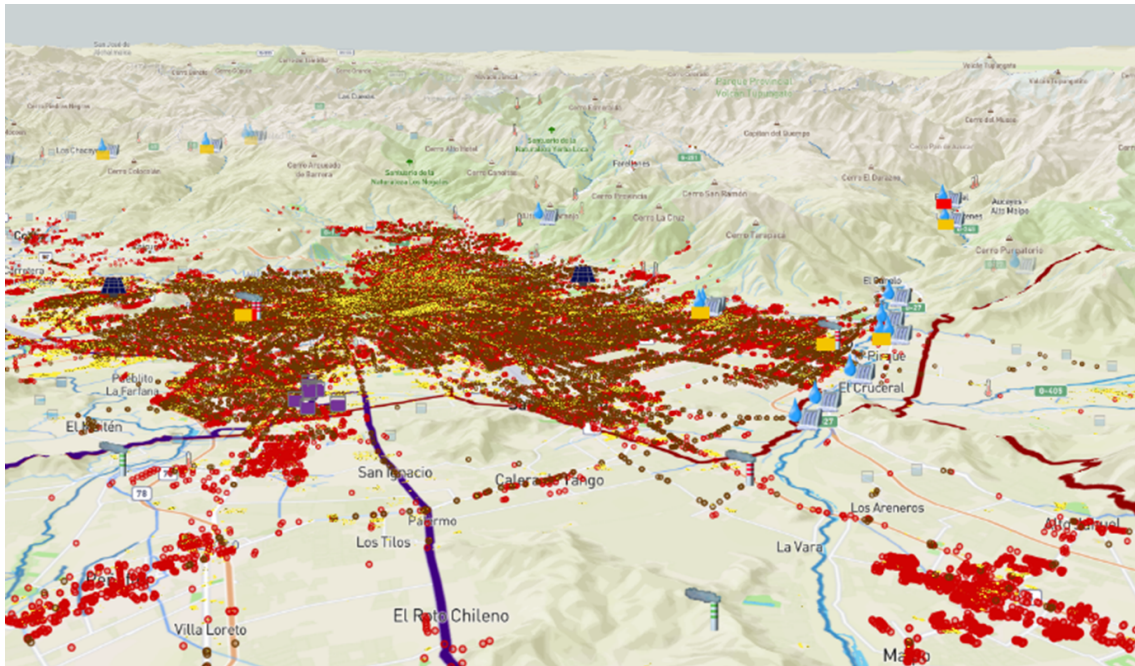


Figure 12: Renewable power plants in the *Metropolitana* region (see right of image).

In *Quinteros* and *Ventanas* there is a large industrial complex, which is connected by oil and gas lines to *Villa Alemana* and the capital. Figure 13 shows the industrial park at *Quinteros*.



Figure 13: Industrial park at *Quinteros*.

Figure 14 shows that further south, the largest contributions are from hydroelectric power plants in the proximity of the Andes and thermal power plants on the coast, especially in the industrial park at *Concepción* and *Lota*.

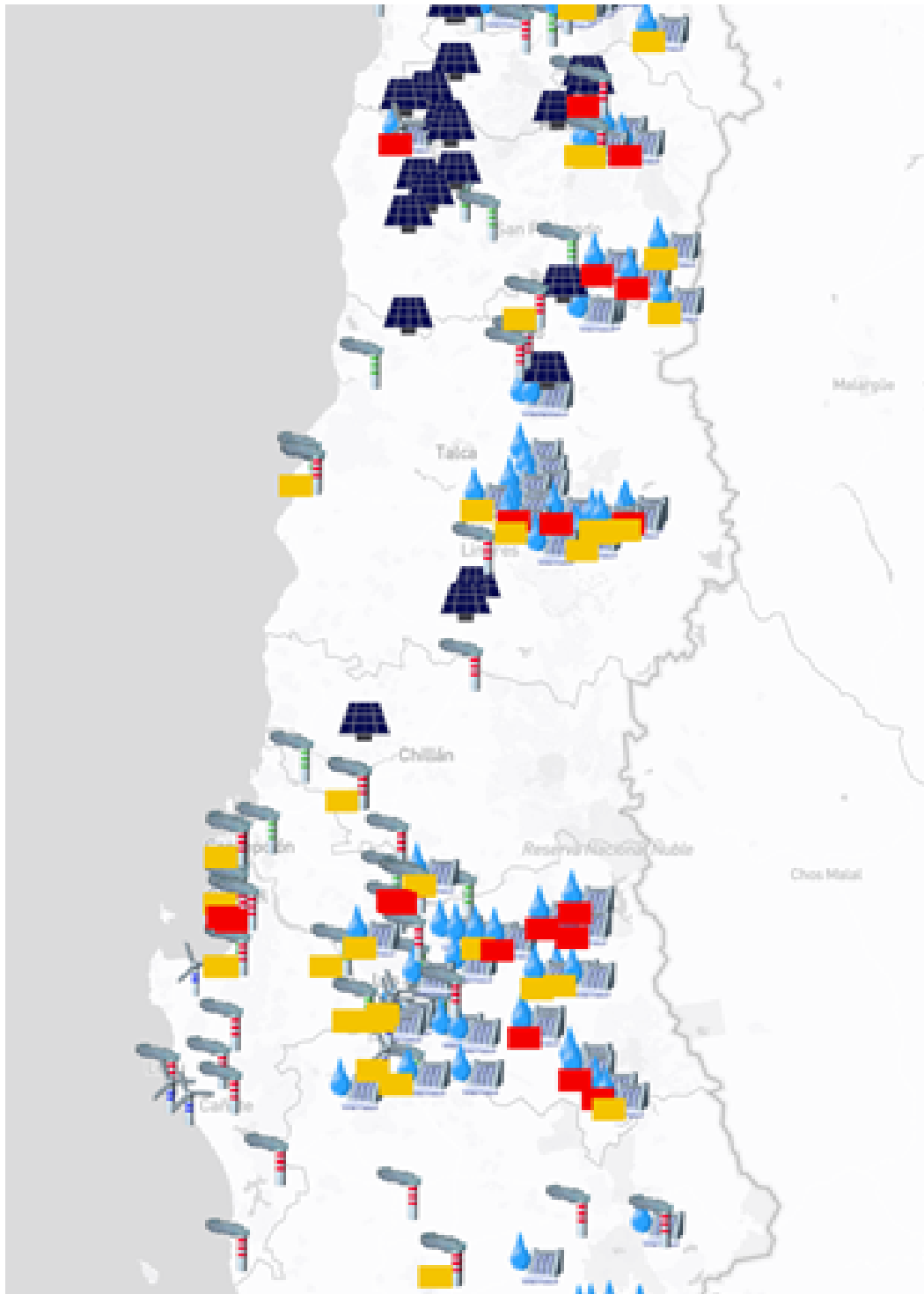


Figure 14: *Hydroelectric power plants near the Andes and thermal power plants on the coast.*

Figure 15 shows the distribution of hydroelectric power in the *Maule* river area. Figure 16 shows the *Talcahuano* and *San Pedro* industrial parks.

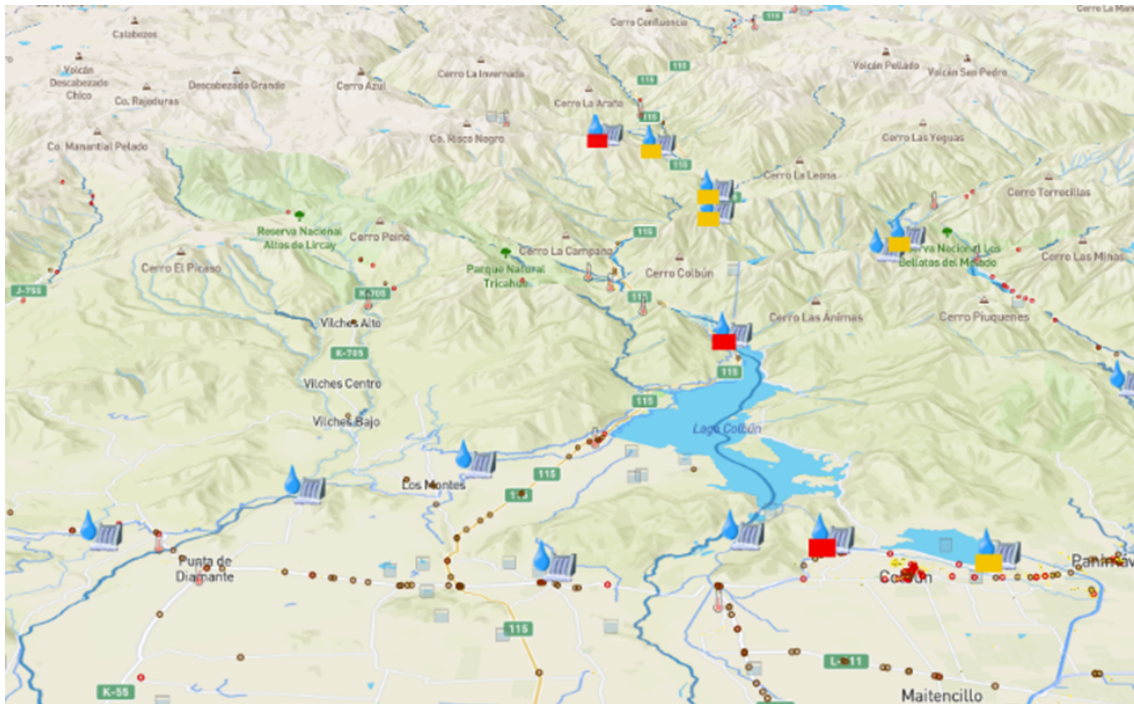


Figure 15: *Hydroelectric power near the Maule river.*

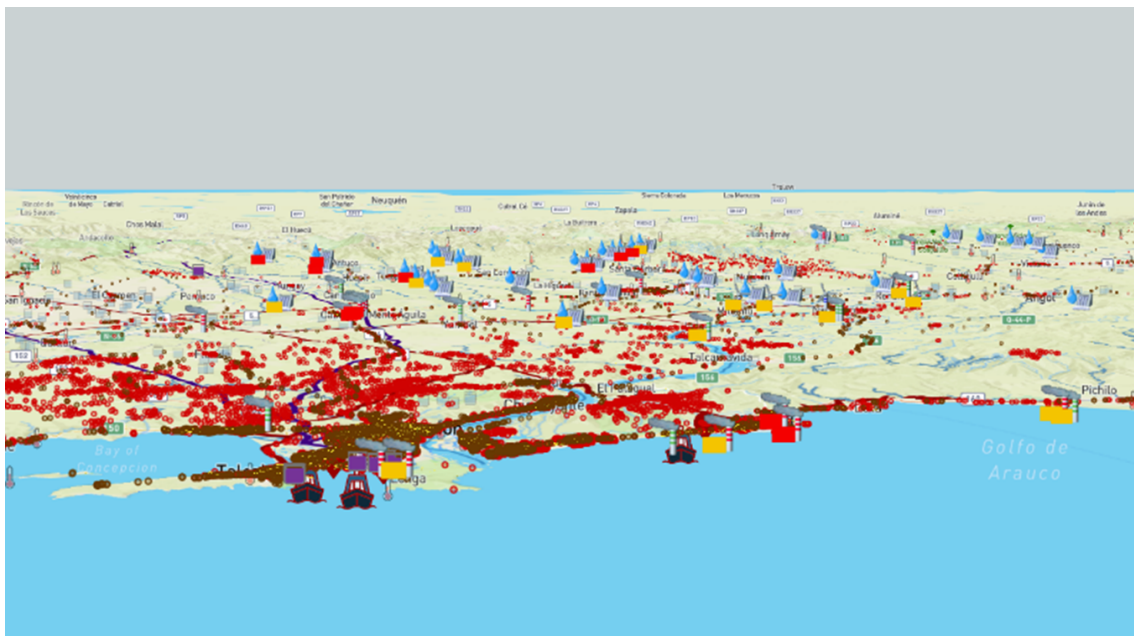


Figure 16: *Talcahuano and San Pedro industrial parks.*

4 *Sur* macro-zone

Figure 17 shows the power plants in the *Sur* macro-zone. There are mainly hydroelectric power plants, and again thermal power plants towards the coast.

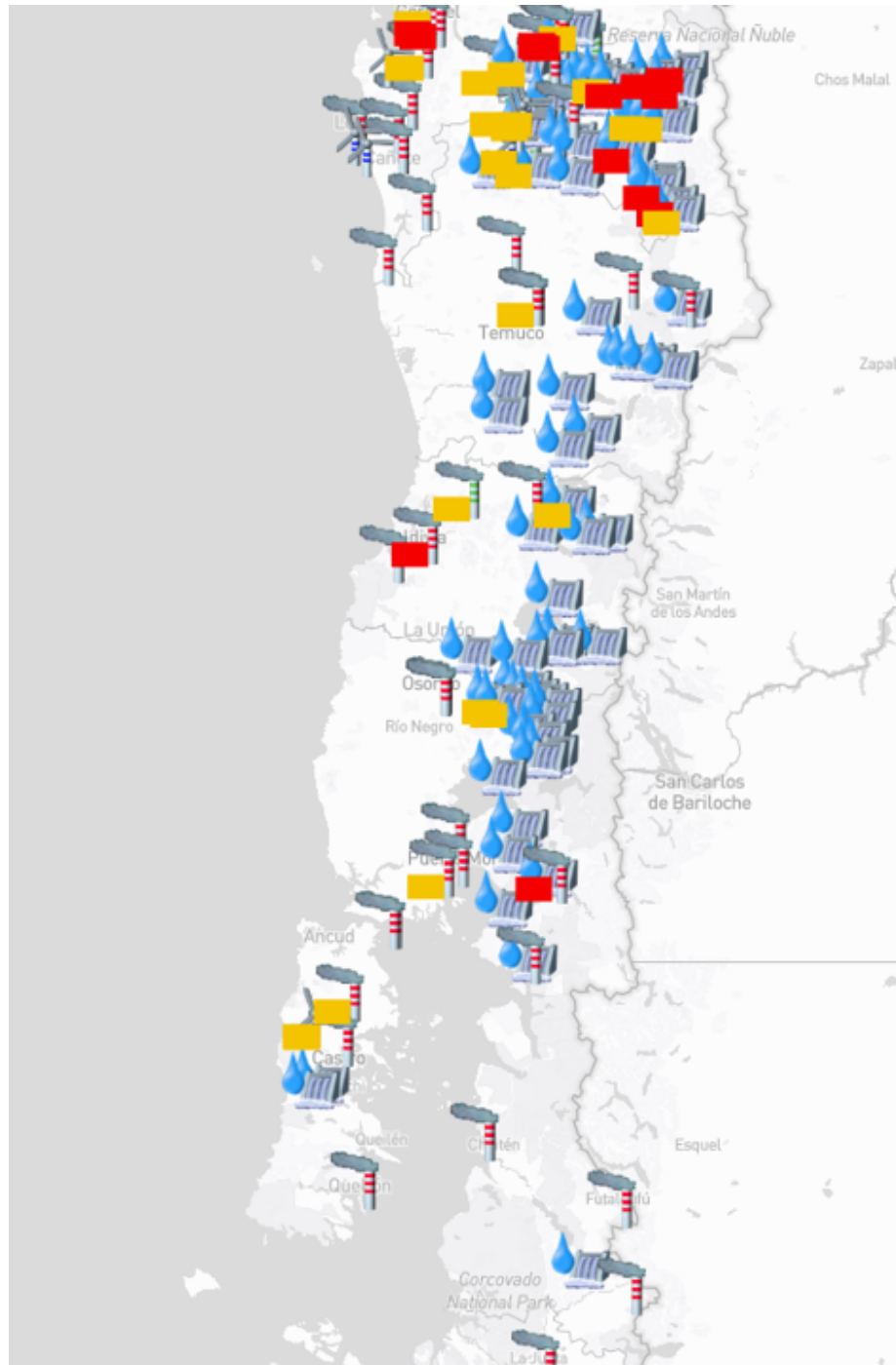


Figure 17: *Power plants in the Sur macro-zone.*

Figure 18 shows a more detailed view of the area. The traffic elements and population density are much lower than in the central areas, with correspondingly fewer large power plants. Interestingly, the island of *Chiloé* has two medium-sized wind power plants and only one thermal power plant in the same size range.

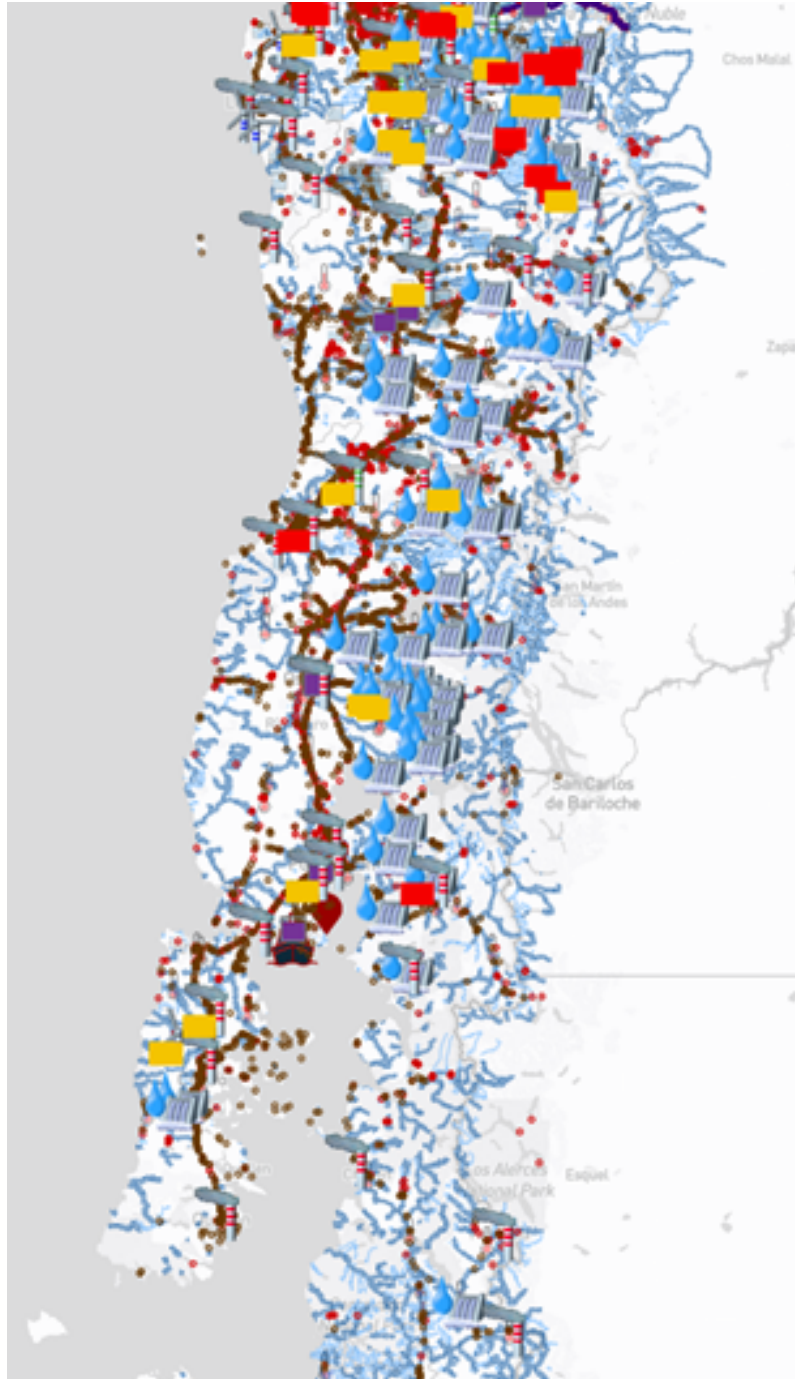


Figure 18: Power plants overlaid by additional infrastructure elements in the Sur macro-zone.

5 *Austral* macro-zone

Figure 19 shows there is only one medium-sized thermal power plant in the *Austral* macro-zone. This is due to the small population and small energy needs, but contrasts with the fact that the area has the highest wind energy potential in the country. The wind energy potential is shown by activating the “Wind speed at 50 m height” layer.

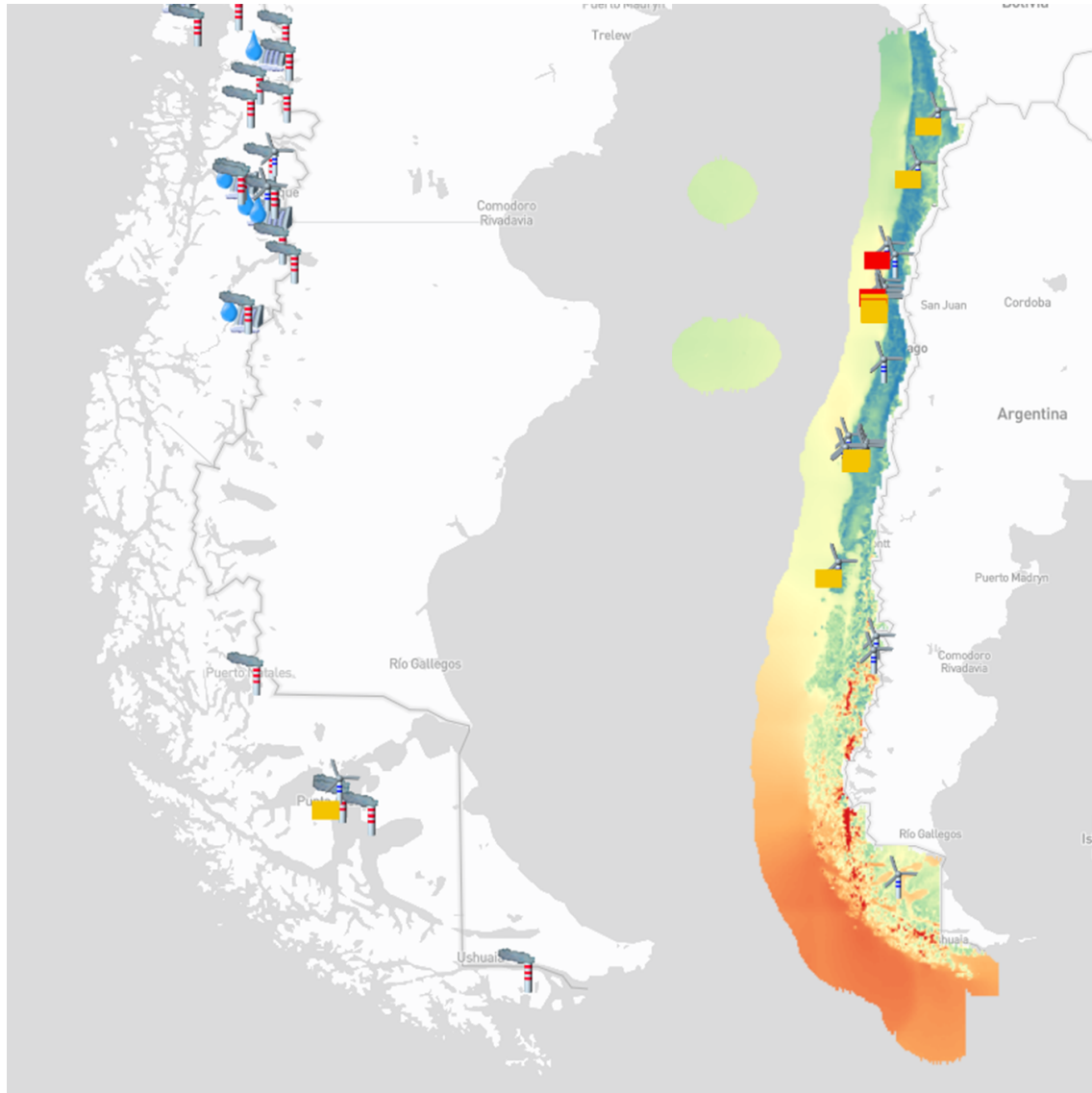


Figure 19: Power plants (left) and wind energy potential (right) in the *Austral* macro-zone.

A comparison can be made of the size of wind farms in different regions. Figure 20 shows the *Magallanes* wind farm in the *Austral* macro-zone of Chile (left) is much smaller than the 193 MW *Eólica San Juan* wind farm in *Atacama* (right).

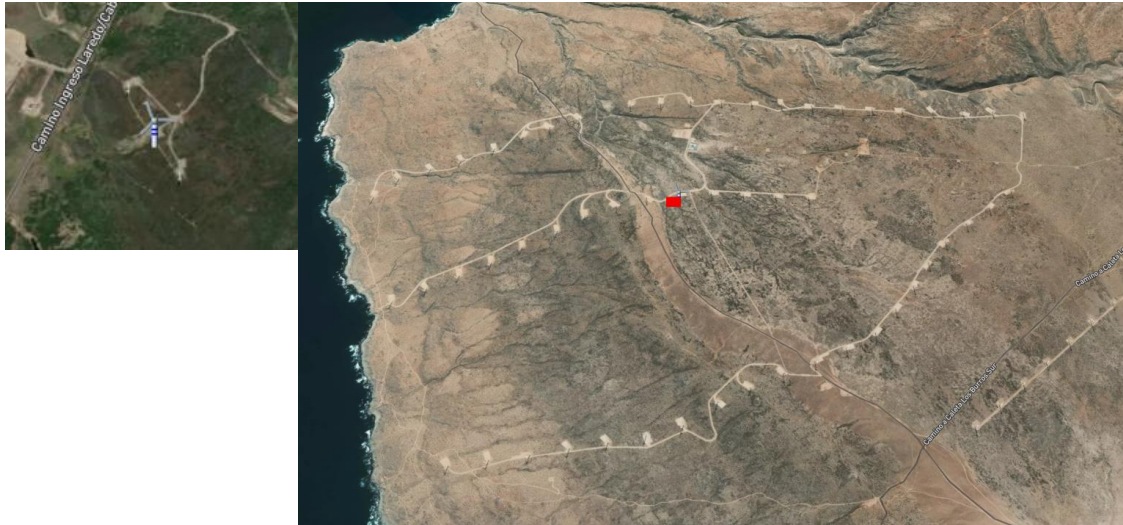


Figure 20: *Satellite images of the Magallanes (left) and Eólica San Juan (right) wind farms.*

Edited by

Computational Modelling Group
Department of Chemical Engineering and Biotechnology
University of Cambridge
Philippa Fawcett Drive
Cambridge, CB3 0AS
United Kingdom

E-Mail: mk306@cam.ac.uk
World Wide Web: <https://como.ceb.cam.ac.uk/>

