SIMULATION OF URBAN GROWTH NEAR THE GREEN AREA OF "AVENIDA BRASIL" IN ANTOFAGASTA MIDTOWN, CHILE

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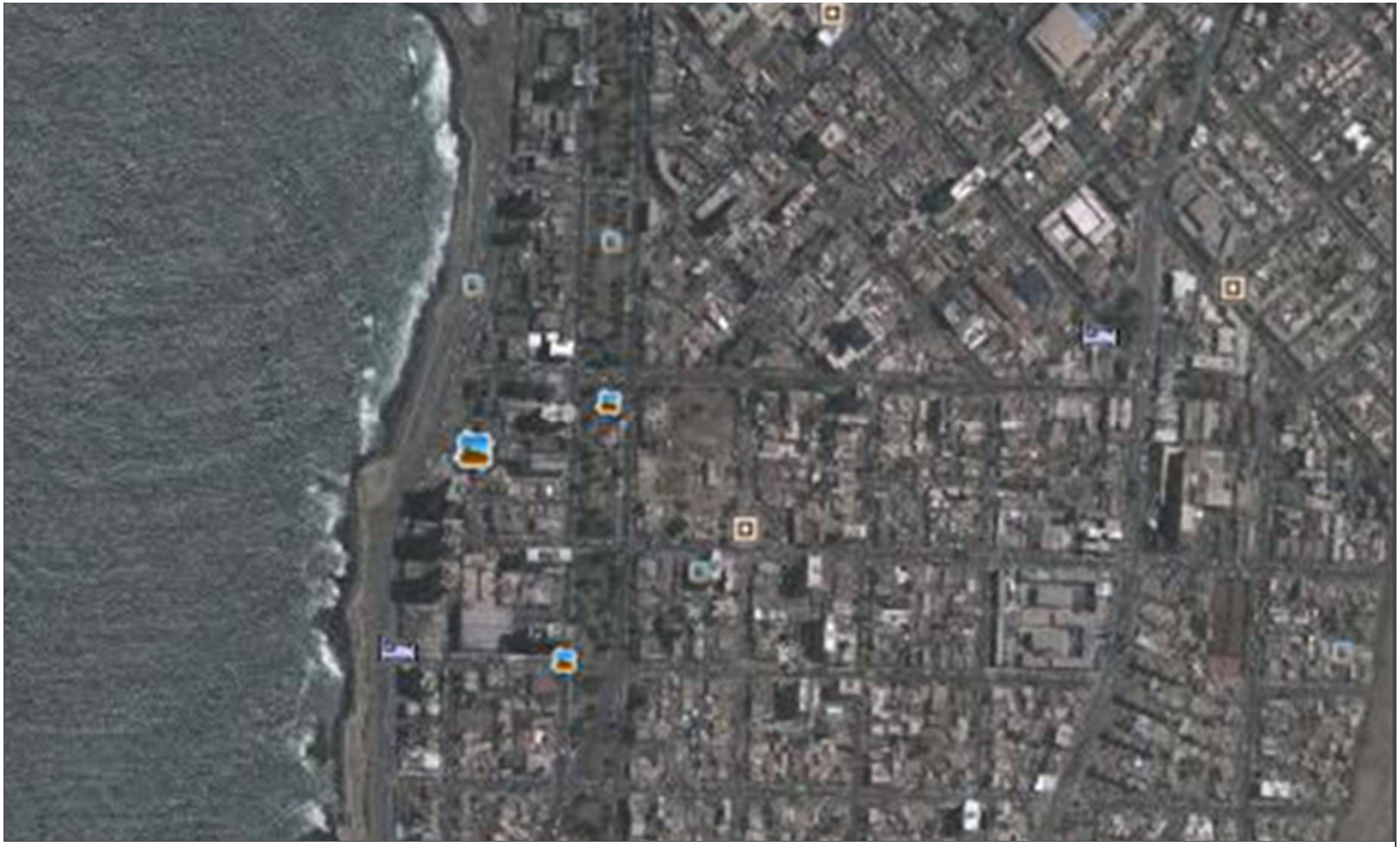
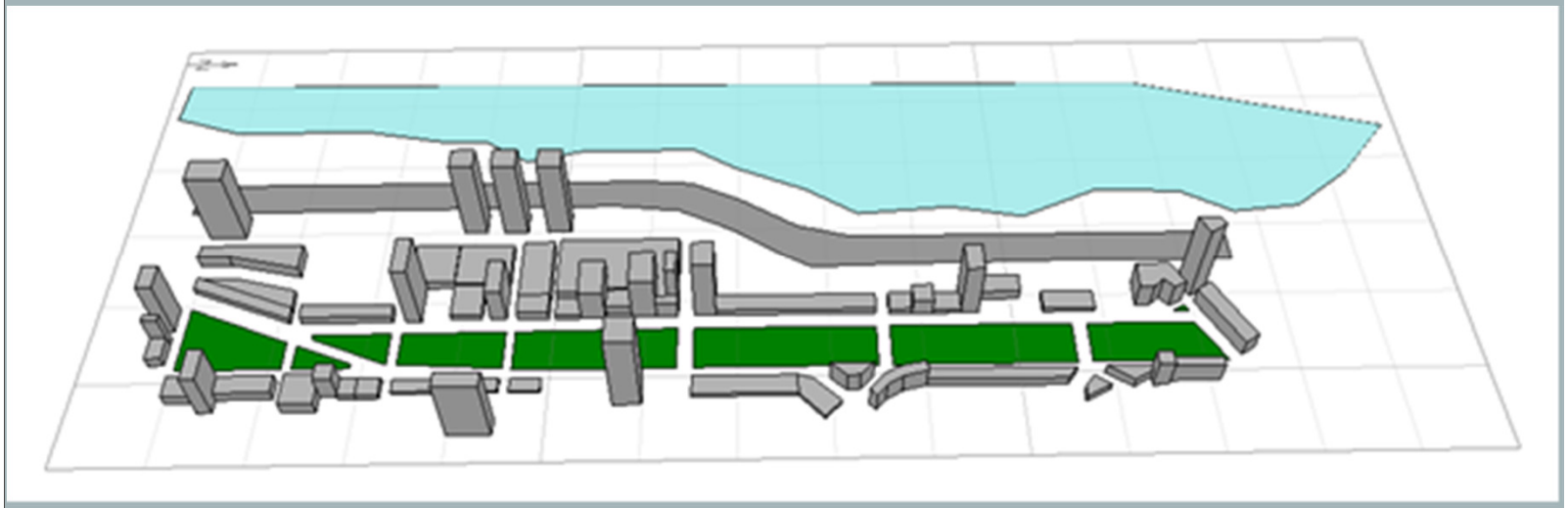
Antofagasta emplacement in north of Chile

Antofagasta city, in the Atacama Desert, locates close to the Pacific Ocean. Climate is typical of desert coast, with high solar radiation levels, no precipitation, average temperatures between 15 and 25 degrees Celsius during the whole year.



Park area of “Avenida Brasil” in downtown

In the city center the green park of Avenida Brasil is one of the icons of Antofagasta. Figure 2 shows the park form, S-N oriented, surrounded by the city, but quite close to the sea. Building growth near this site has been uncontrolled during years

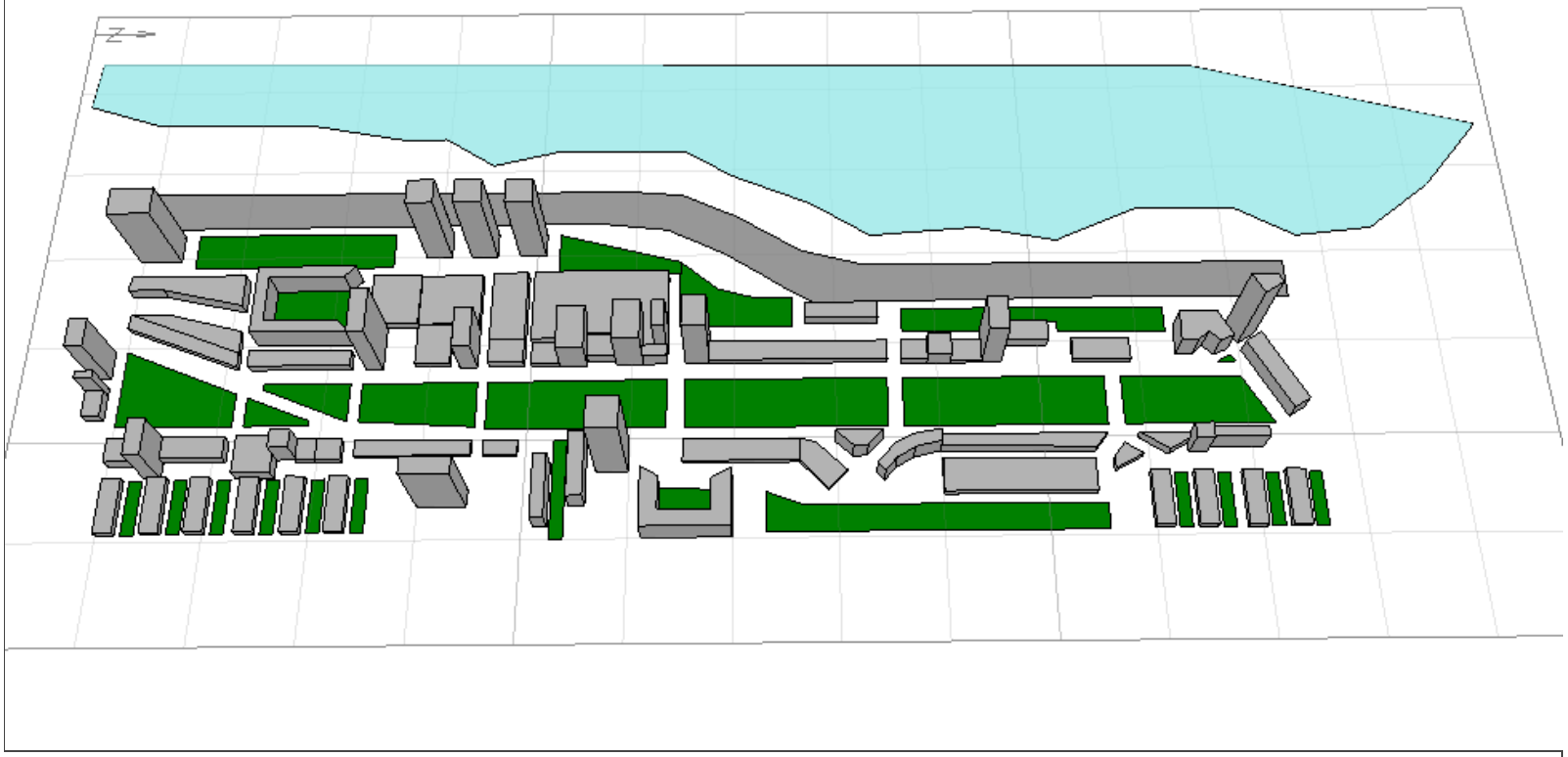


Ecotect model for actual situation

At the School of Architecture of the local University, UCN, we focused a laboratory to understand the possible future scenarios of the city and started investigations using different simulation tools to obtain some microclimatic data of different areas potentially affected.

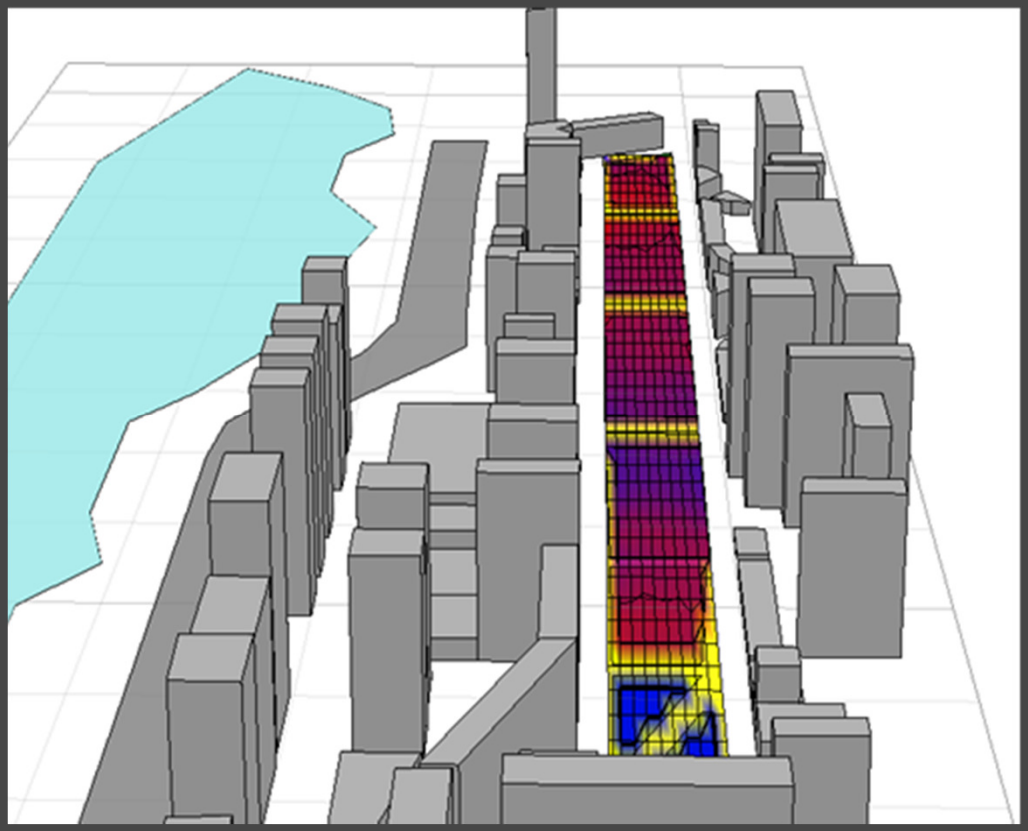
Ecotect model for future prediction (actual trend)

Economical growth of Antafagasta signified an important population growth and the center area has been transformed in order to attend the new needs of the residents. However, uncontrolled built area improvement is dangerous for the sustainability of the site, especially considering the low presence of vegetation in the city



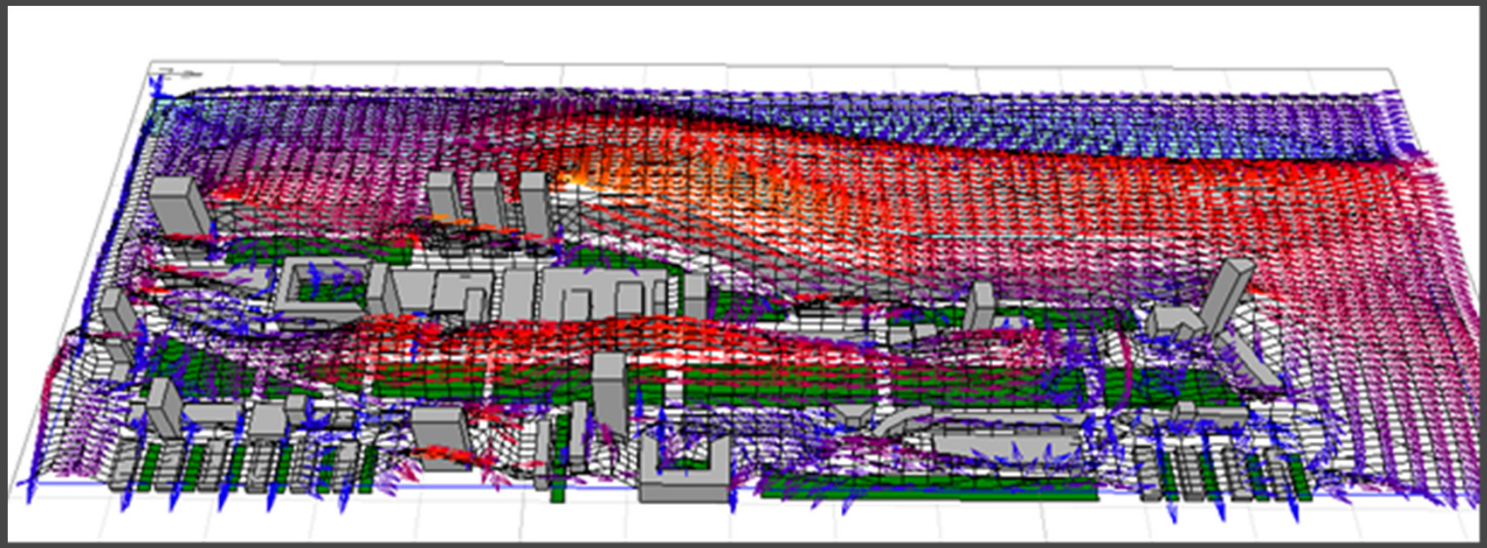
Ecotect model for sustainable development

Avenida Brasil was an area with delicate relations between houses, plants, sky and sea. To modify the environment could cause for example an excessive increase in the shadow zone, or a wind deviation from natural movement.



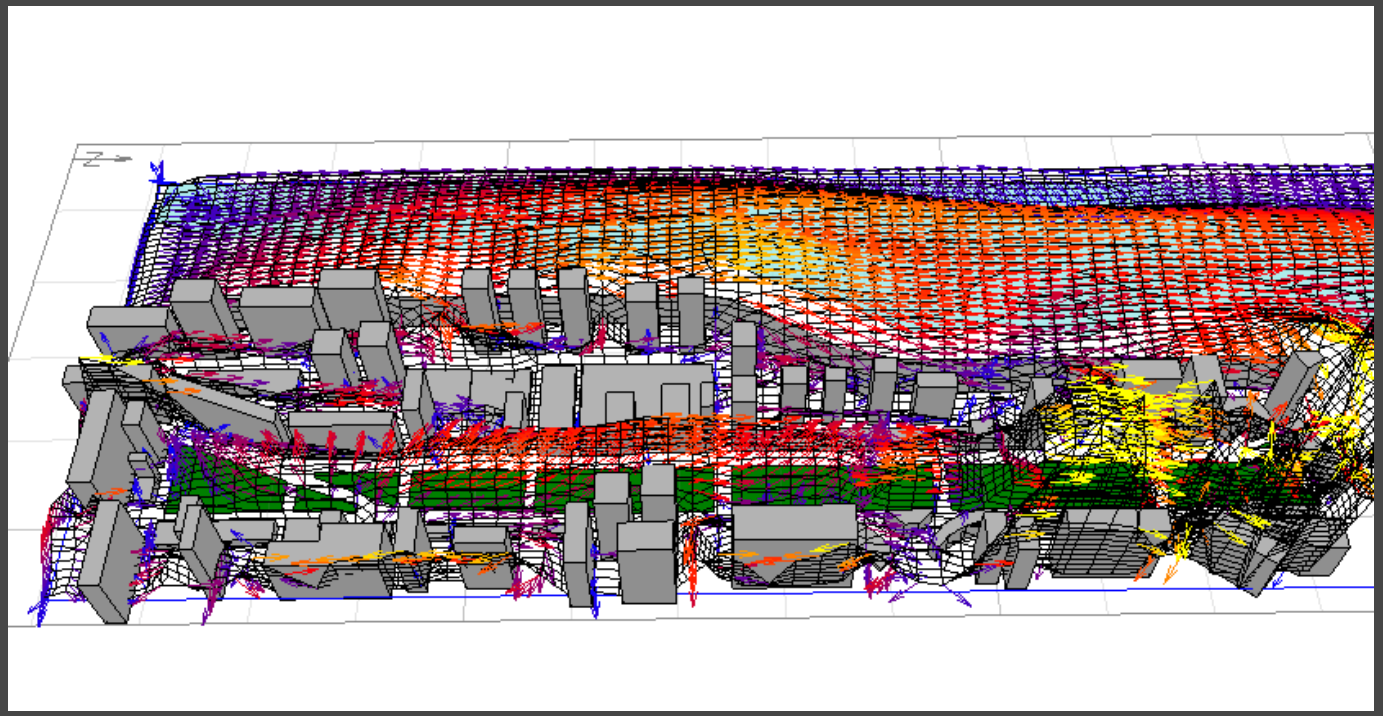
Mean radiant temperature and radiation

Radiant temperature depends strongly by the soil, as detailed in the picture, where asphalt road has a temperature of about 30 ℃ and the green area almost 22 ℃. Building presence affects the green area radiant temperature that is perceived at 1.8 m high in the range of 24-28 degrees, with ambient temperature of 24.



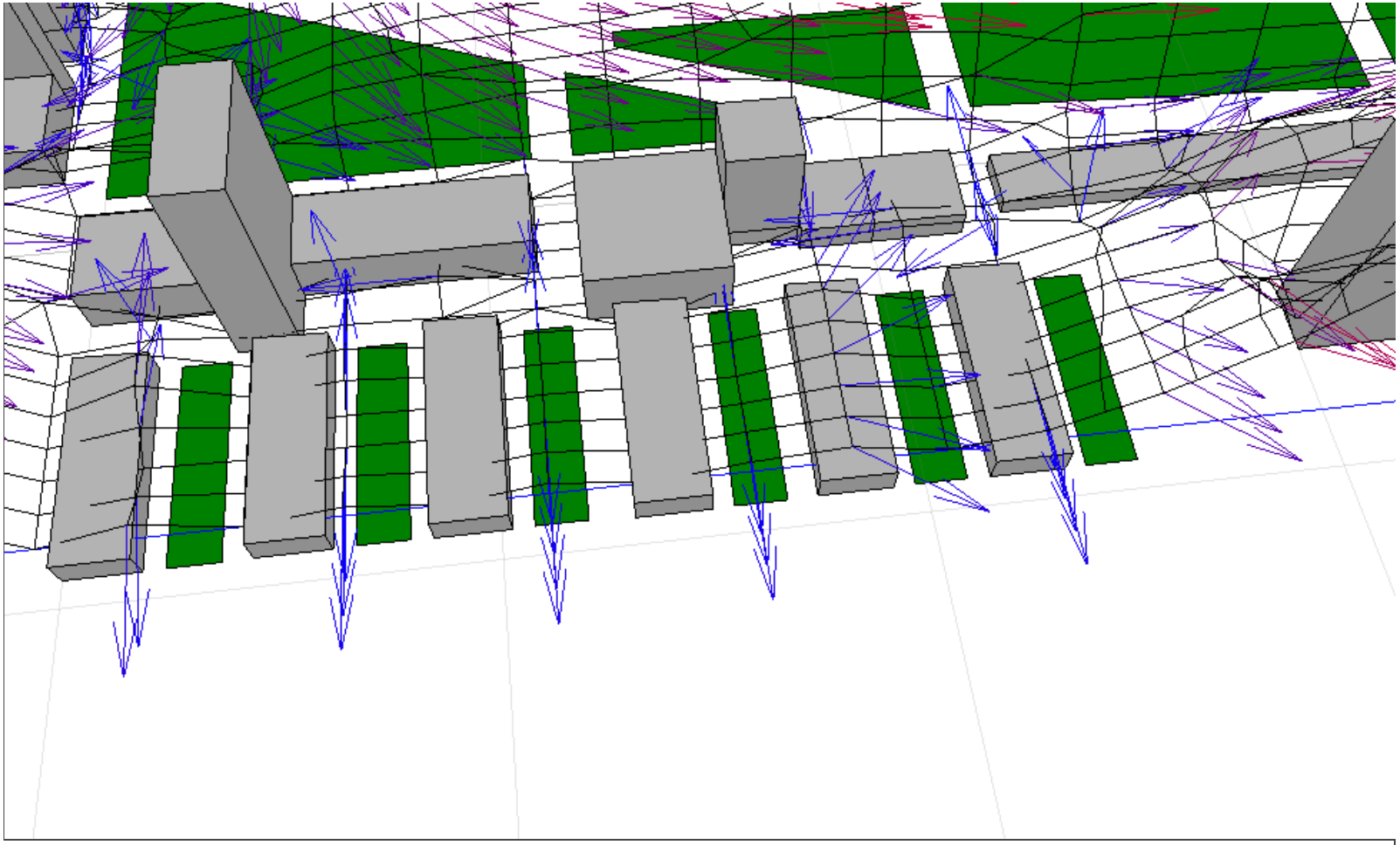
Ventilation – sustainable development

Sustainable construction have to consider the overheating effect caused by the sun radiation in this location, and ventilate appropriately the façades and the roofs. Figure shows air flows in the area, with controlled transversal flows in the new built areas.



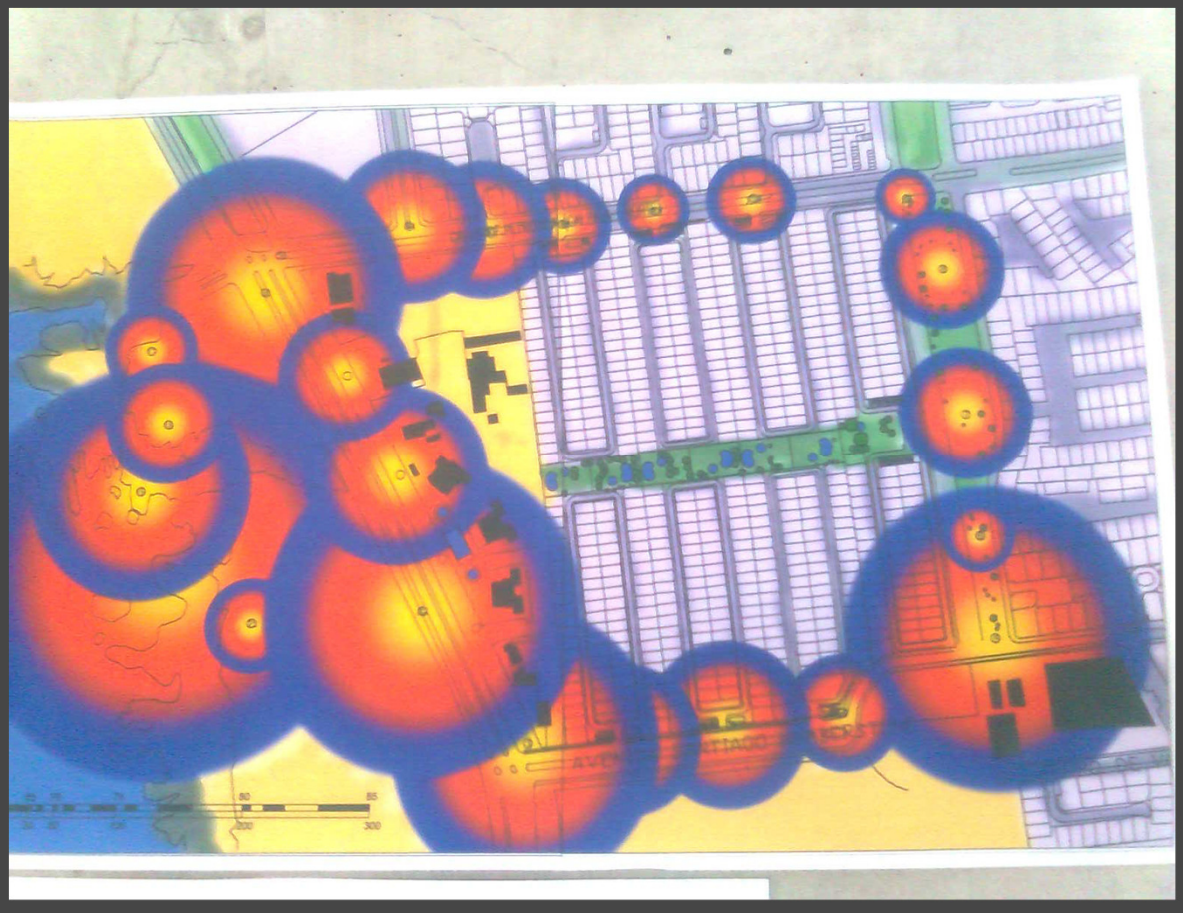
Ventilation – uncontrolled construction

Figure shows the complicate situation of urban environment in the case of following the actual trend without sustainable considerations. In the north part of the area wind is generating turbulences and air velocity is increased by some tunnel effects. East part of the area presents buildings that can be not correctly ventilated.



Ventilation in new proposed urban area

Figure shows a detail of the natural ventilation strategy in the east side of the park area. New constructions have been designed considering maximum 6 floors of vertical growth and orientation S-N of the principal facades. Green areas are alternatively inserted between residential blocks. Results is a good ventilation, controlled and used to evacuate overheating in summer.



Acoustics – diagram of urban noise

Figure shows a student interpretation of urban noise distribution in the entire neighbor. Strategy of analyzing first the existing environmental stimulation is absolutely needed in order to decide how to use it or how to protect better from it.

Avenida modification due to construction

In conclusion, we can assume that it appears very dangerous the actual trend in the Antofagasta urban development. Buildings are expanding on the entire city, without any consideration about history, sky line integration, environmental sustainability, acoustics, etc. The only parameter taken in to account is the economic growth.

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