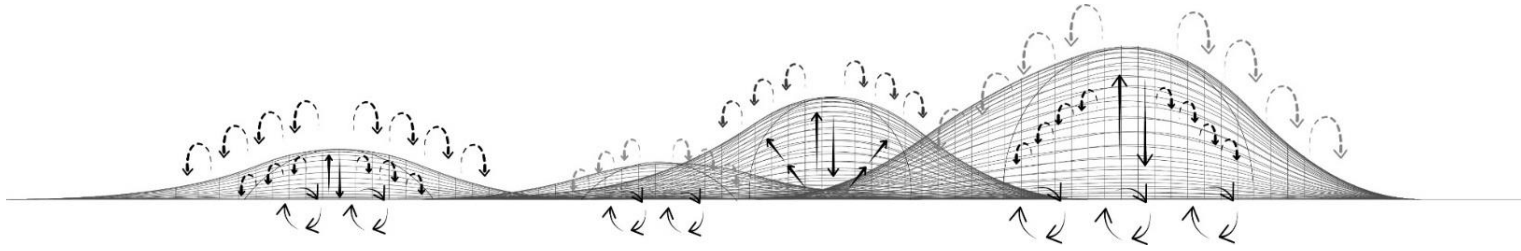
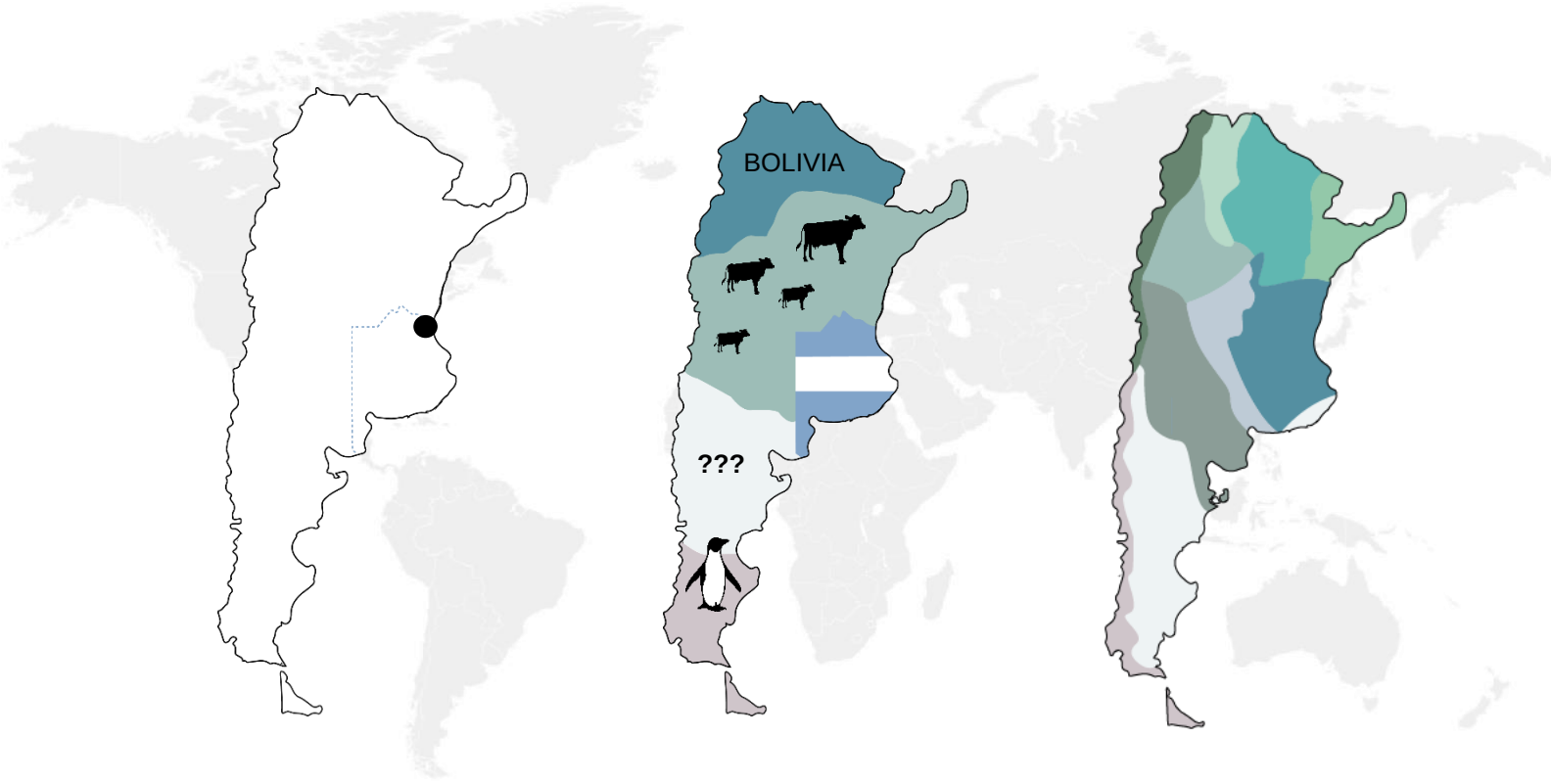
Climaxion Park



Proposal for a climatic park in Argentina

Prepared by:
Julia Hajnal

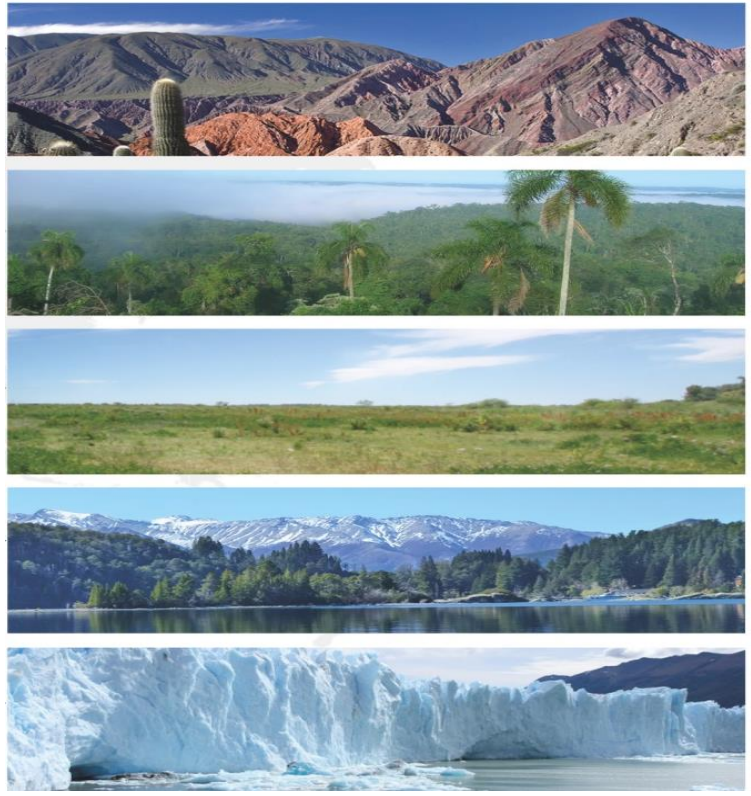
With the help of:
Wolfgang Kessling,
Alexander Greising,
Tommaso Bitossi,
Vu Hoang

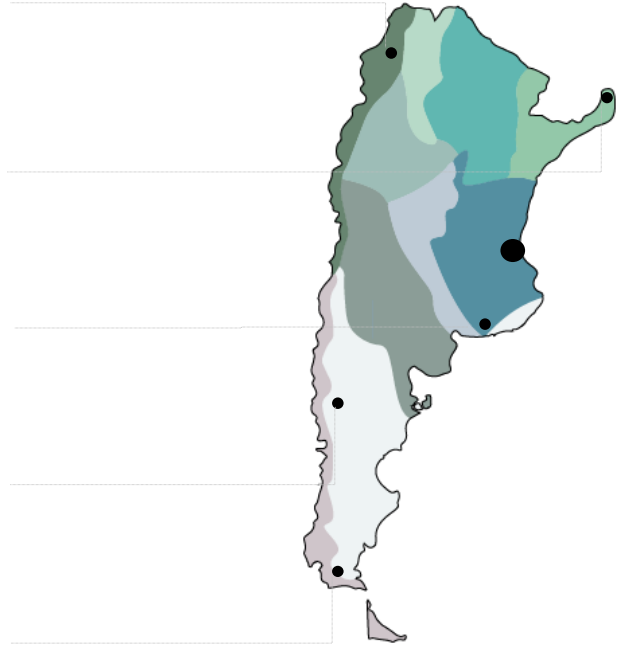


Distribution **Perception** **Climate Zones**

Argentina's 42 million inhabitants are not equally distributed throughout the territory. 90% of the population is concentrated in urban areas out of which 40% are settled in the capital city. People living in this area have a far perception of the country when compared to the biodiversity it hosts (more than half of the world's climate zones according to the Köppen classification system).

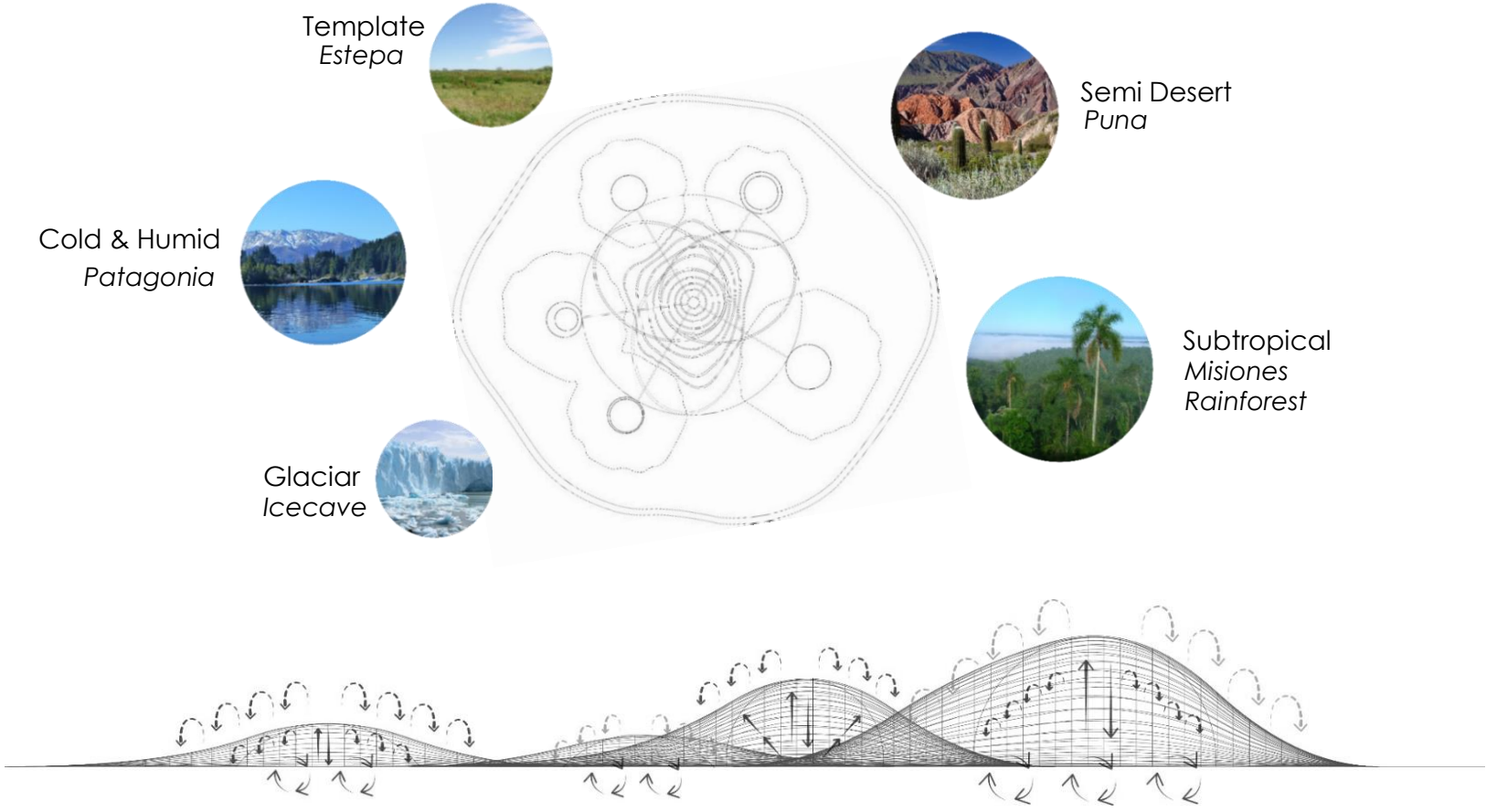
Figure Source_*Perception*:
redrawn from
https://kn3.net/30B5E66A08EJPG.html
Figure Source_*Climate zones*:
redrawn from
https://en.wikipedia.org/wiki/Climate_of_Argentina





The design proposal intends to celebrate this diversity by bringing together different climates and landscapes from Argentina, to coexist in a new a park which will host the various environments.

Figure Source_*Climate zones*: redrawn from *https://en.wikipedia.org/wiki/Climate_of_Argentina*



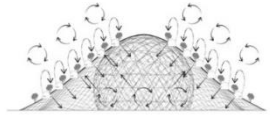
The approach aims to question the centralised and hierarchical logic under which the country operates today by proposing a multiclimatic park and evaluating if the different enclosed biomes can coexist and interact to achieve a thermodynamically balanced, efficient and distributed system.

The selected site is an 18 hectares park in the center of the city, which used to host the old city Zoo; one of the first metropolitan infrastructures of Buenos Aires which has been recently closed.

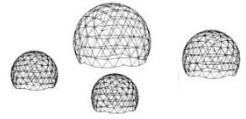
Figure Source:
http://buenavibra.es

Proposed informed topography with embedded biomes

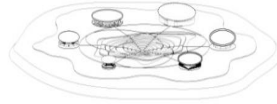
Figure Source:
redrawn from:
http://buenavibra.es



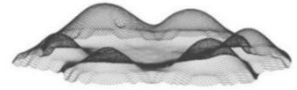
Climate Targets



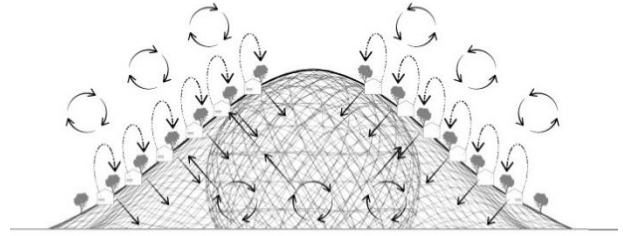
Boundary Conditions



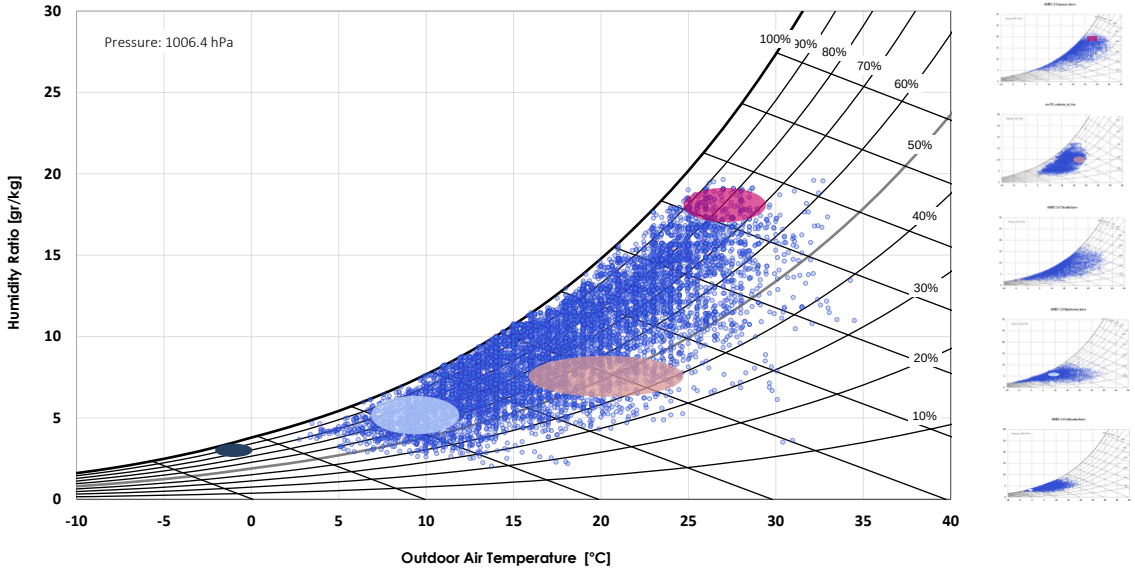
Synergies



Informed Landscape



CLIMATE TARGETS
& STRATEGIES



Subtropical.

Semi Desert.

Temperate.

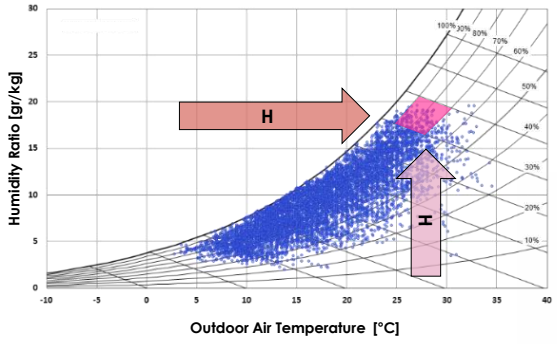
Cold Forest.

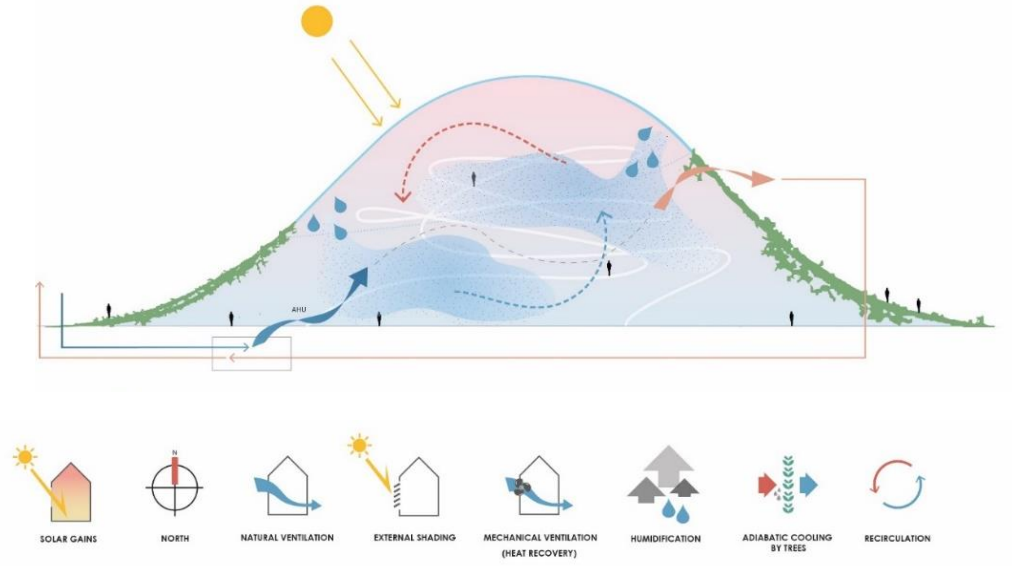
Glacier.

Buenos Aires Psychrometric chart with selected targets for the 4 Biomes to be introduced, embedded in an outdoor temperate climate.

T°: **25-30°C**

Rel. H: **70-90%**



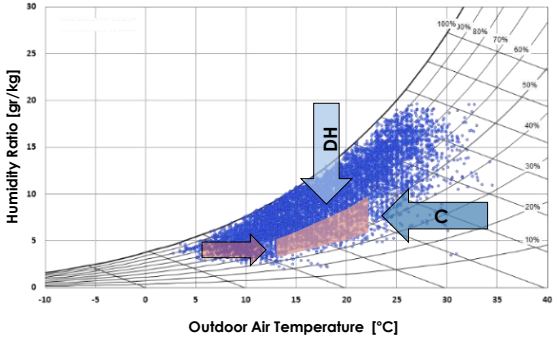


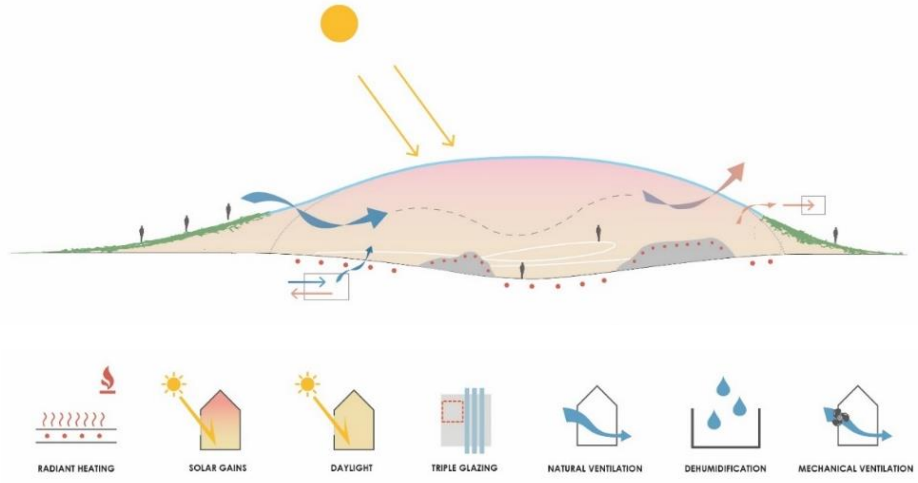
Subtropical Biome.

Achieving a subtropical biome in Buenos Aires requires heating and humidification all year round. The heating driven biome maximizes solar gains (by orientation and glazing selection), and naturally ventilates when possible. Adiabatic cooling effect by the plants covers most of the latent heating –humidification demand needed.

T°: **12-22°C**

Rel. H: **35-60%**



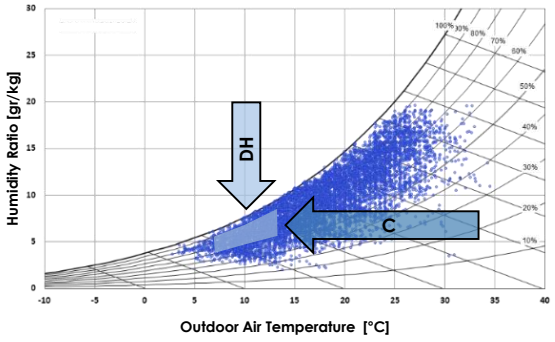


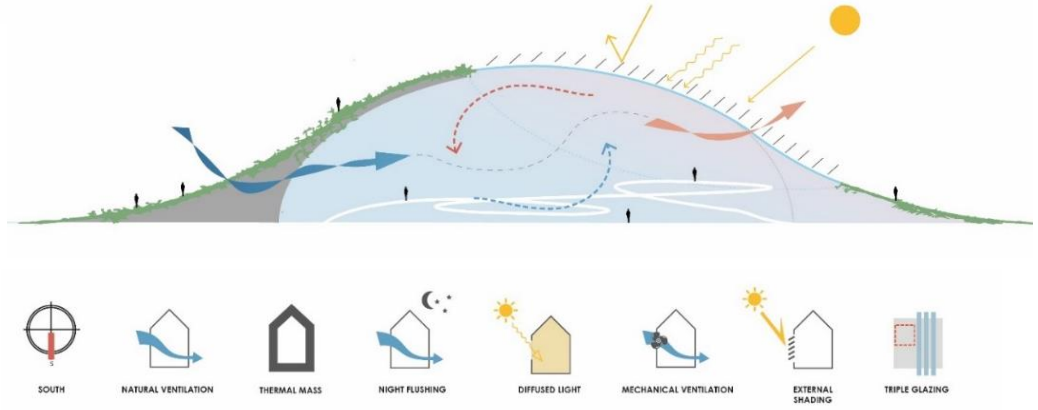
Semi desert Biome.

Introducing a semi desert from the high Puna mountains, located close to the Cordillera de los Andes where insolation levels are extremely high (aprox. 1400 kWh/m²); instigates a strategy that aims for an Operative Temperature. Radiative heating surfaces compensate for the lack of solar radiation in Buenos Aires, compared to the original climate levels. However, it is driven by cooling and yearly dehumidification demands.

T°: **7-12°C**

Rel. H: **60-90%**



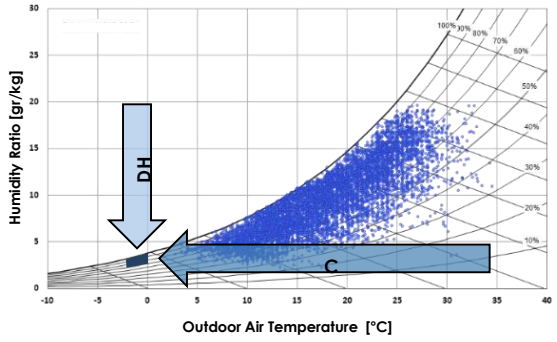


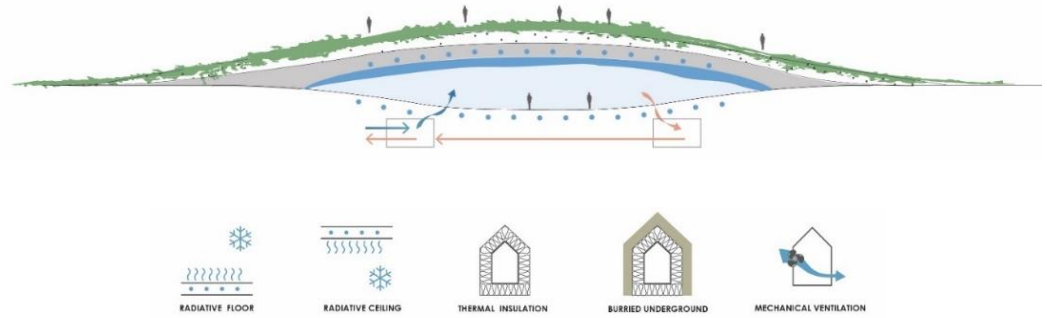
Cold Forest Biome.

This biome introduces a cold & humid forest from the western Patagonia region. It aims to minimize solar gains, while maximising daylight for plant requirements. The design proposes the enhancement of diffused light, working with thermal mass and night flushing to keep the cool temperature targets.

T°: **-2°C**

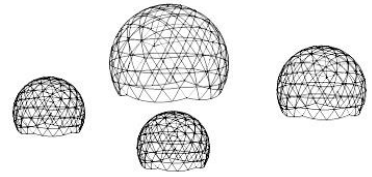
Rel. H: **70-100%**





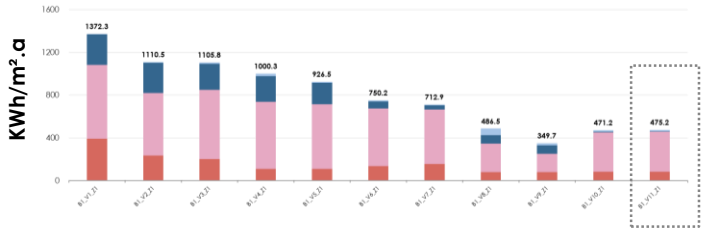
Icecave Biome.

Buried underground, with a 2% WWR in its horizontal surface, this biome requires 24/7 mechanical systems, mainly activated through radiative cooling surfaces –using glycol as a fluid.

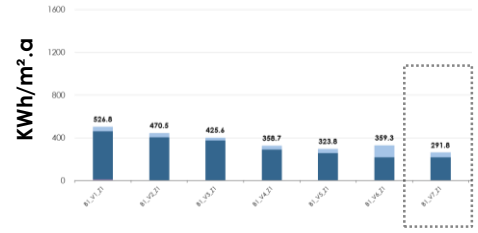


BOUNDARY CONDITIONS
(THERMAL EVALUATION)

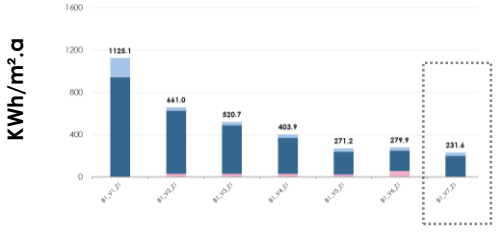
Subtropical Biome



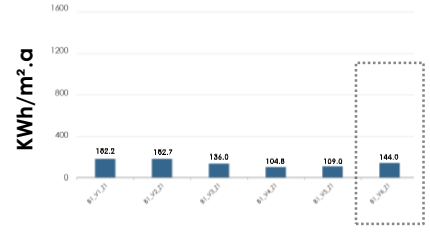
Semi Desert Biome



Cold Forest Biome

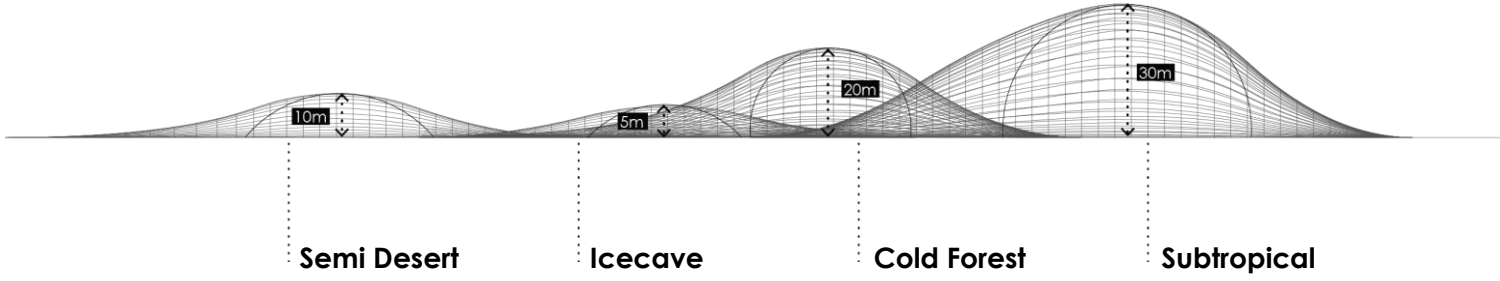


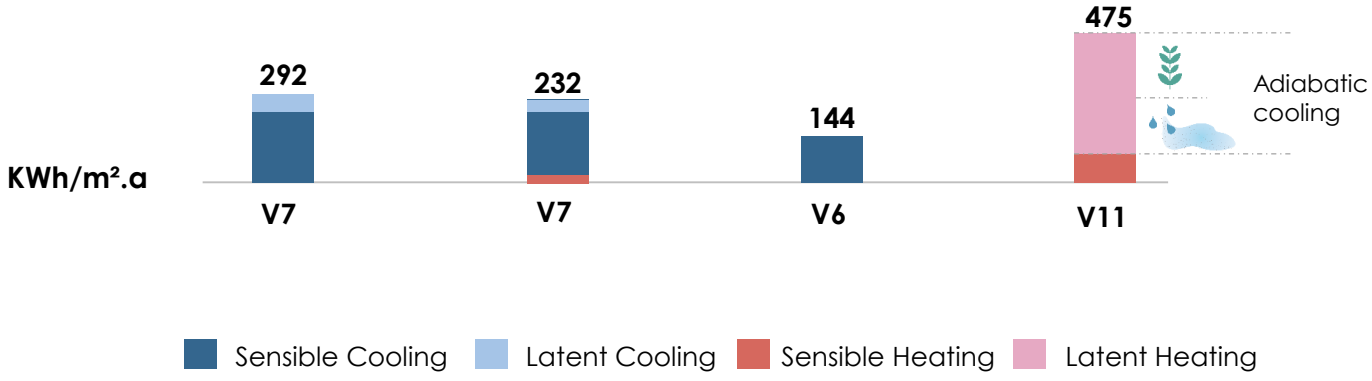
Icecave Biome



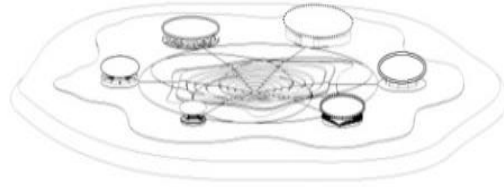
Sensible Cooling | Latent Cooling | Sensible Heating | Latent Heating

The definition of the boundary conditions and the evaluation of the proposed strategies was done through thermal simulation analysis (Trnsys 18) This allowed for the selection of the most convenient variant in each case, which was not always the least energy demanding but the variant that better fit the system as a whole, considering that the total demands need to be equally balanced.

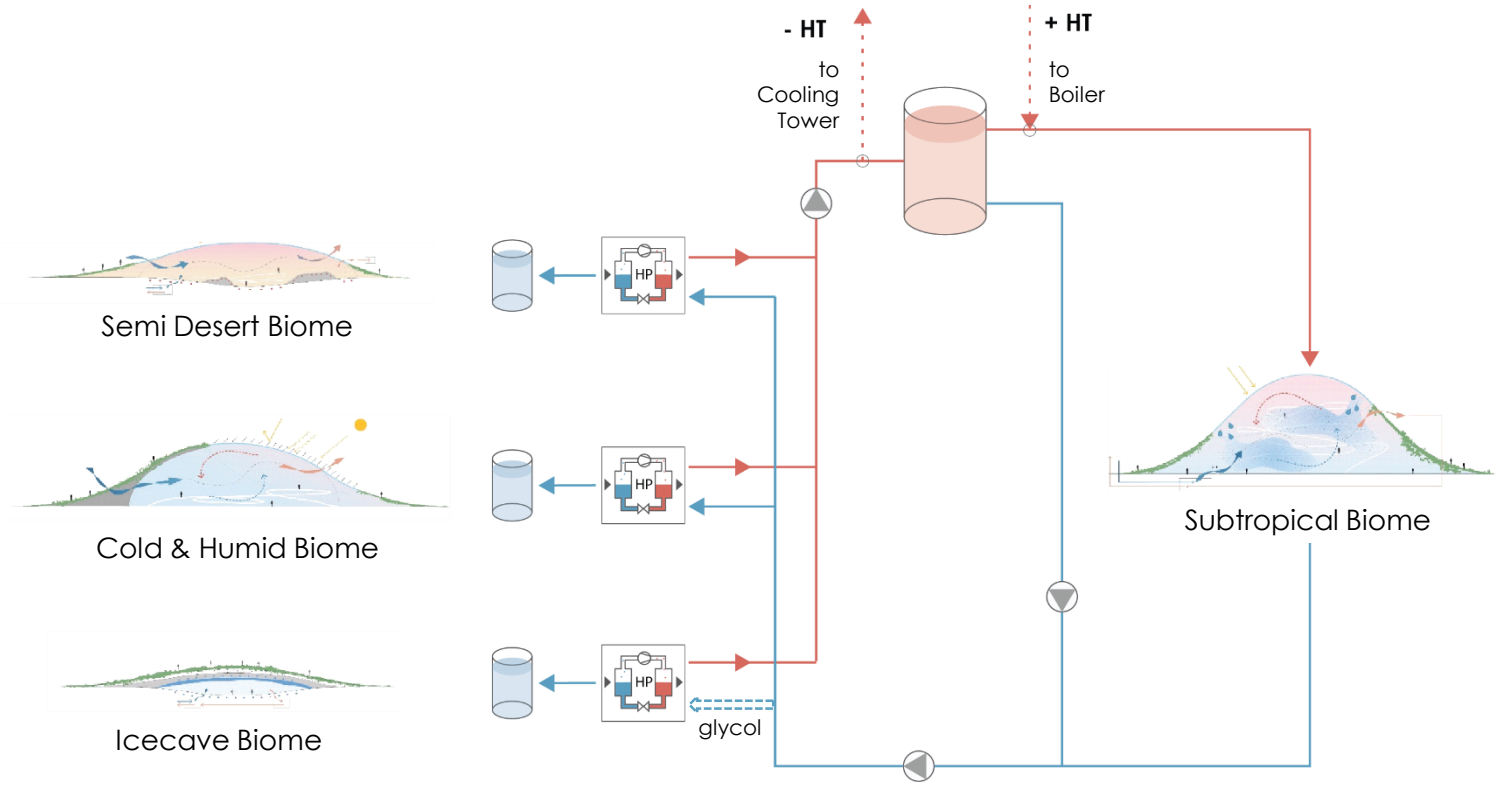




Results indicate that there are 3 cooling driven + 1 heating driven biome, with mainly latent heating demand. The effect of vegetation has not been considered in the thermal model, but is assumed to cover the humidity demand by adiabatic cooling from the plants and by additional water jet nozzles. This consequently decreases the air temperature, which is translated from latent into sensible heating demand.

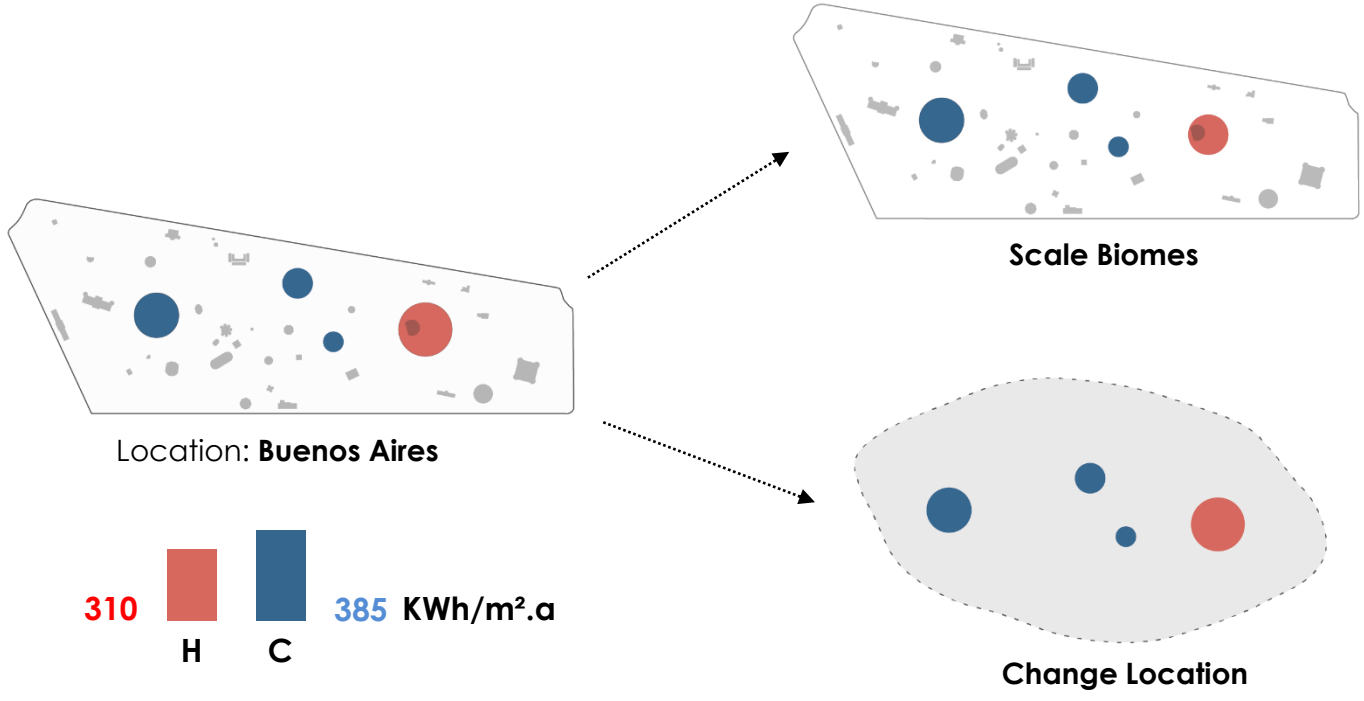


SYNERGIES
ENERGY CONCEPT



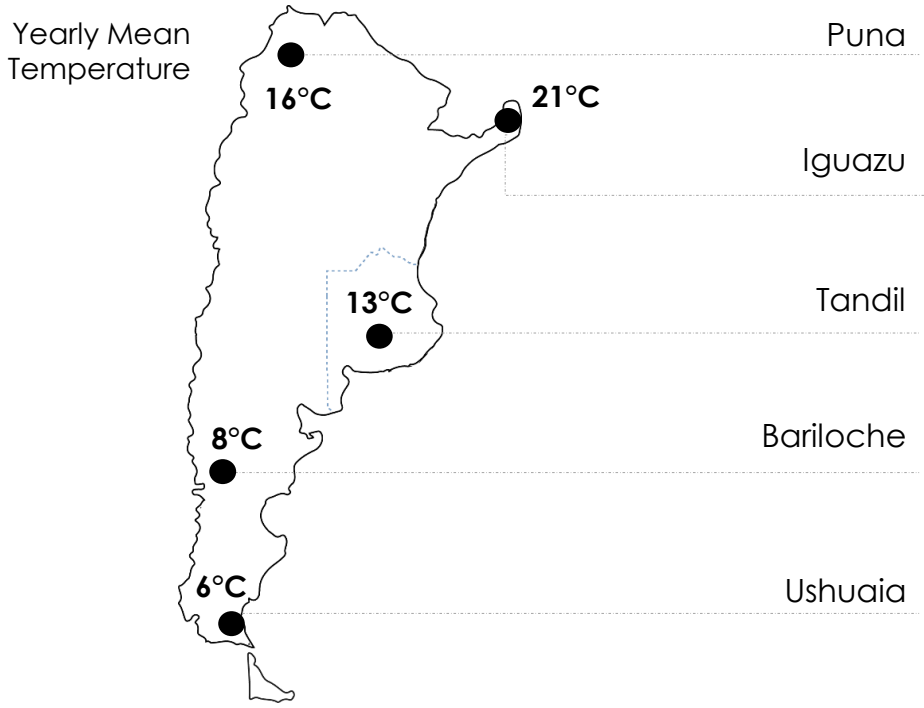
Proposal for energy network flows.

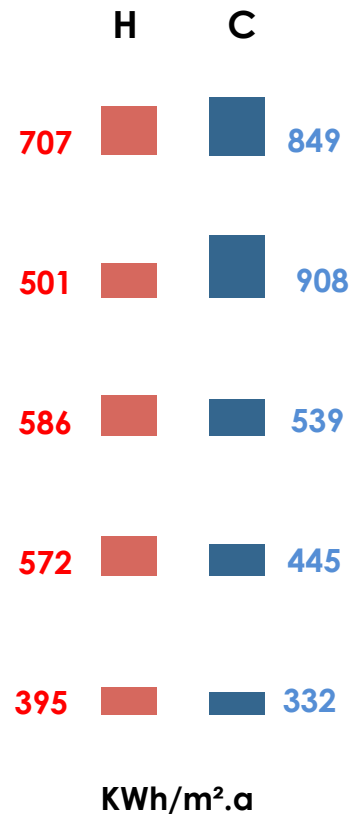
The subtropical biome can be achieved for 'free', with its demand being covered by the energy waste of the 3 resting cooling driven biomes. Cooling and Heating demands would need to be equally balanced for an ideal performance of the system.



The results obtained for the selected site considered in Buenos Aires show that heating and cooling demands are not balanced. Two approaches are considered to achieve this balance:

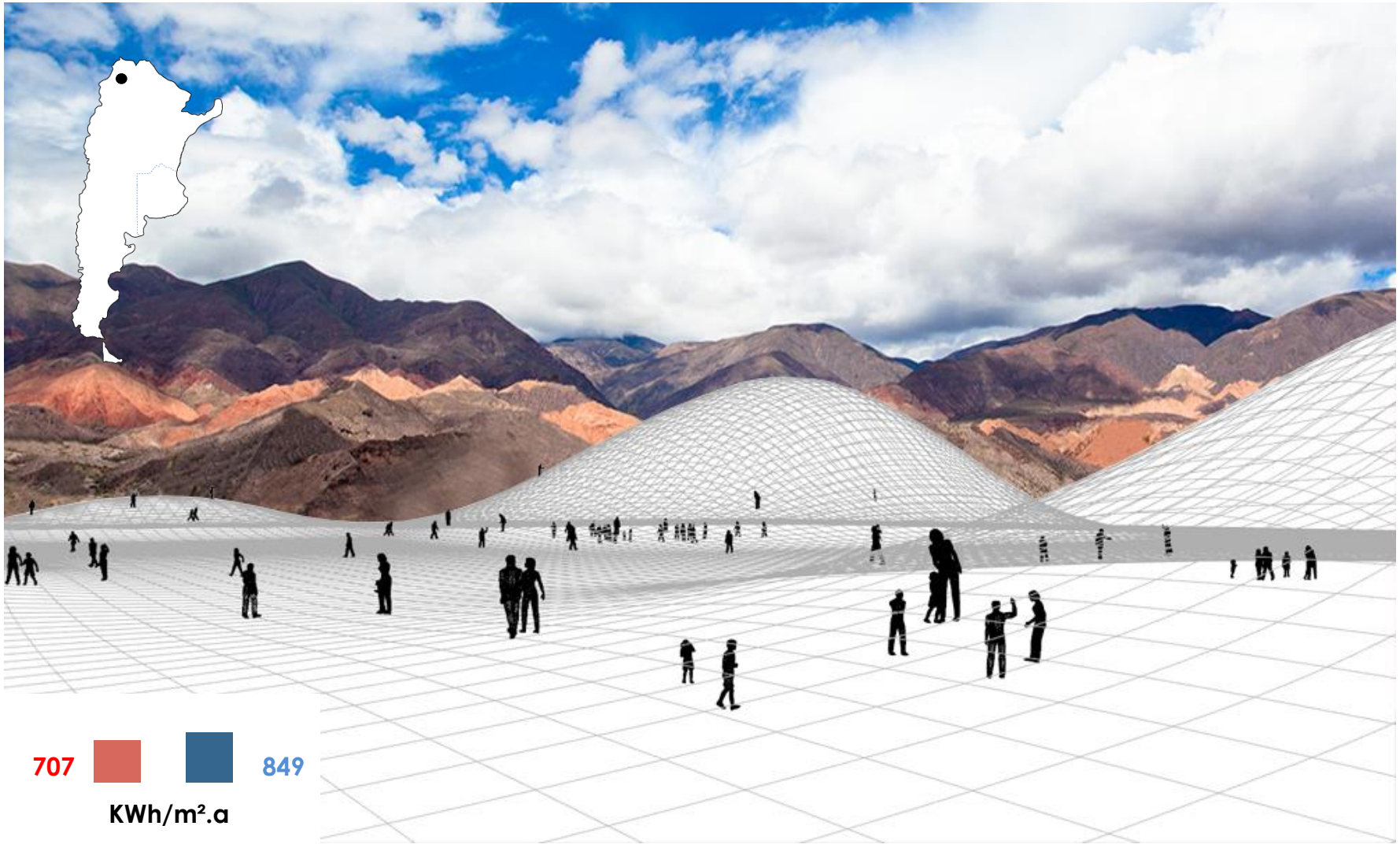
1. Increase the size of the heating driven biome by 25%, or decrease the cooling driven biomes by 20%.
2. Question Buenos Aires' climate as an optimal location for the introduction of this park, and evaluate its performance if situated in other locations along the country.





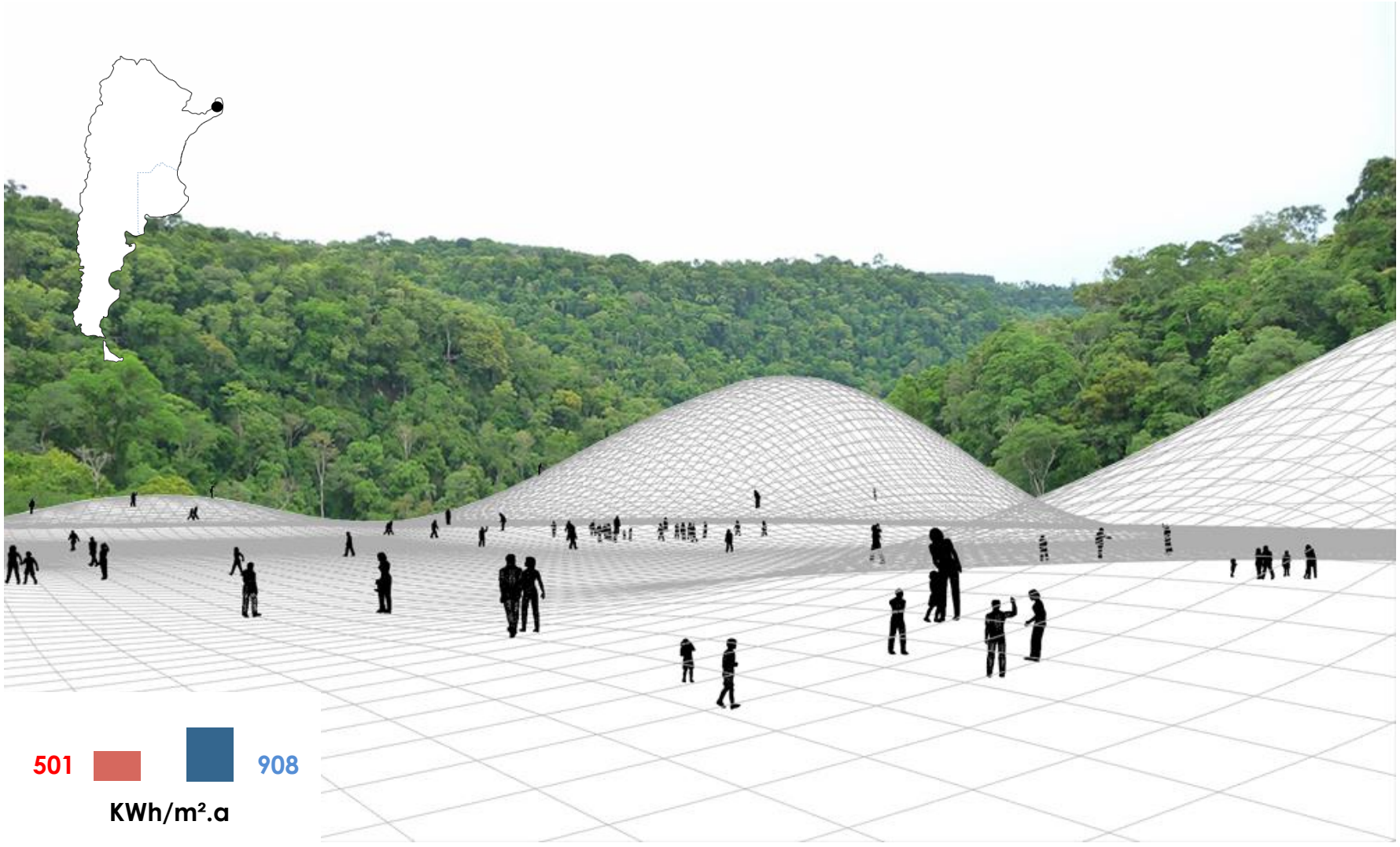
Evaluation and comparison of total energy demands for the climatic park if situated in different locations within Argentina.

The results indicate that Ushuaia's climate (southernmost tip of the country, where the yearly mean T° is of 6°C) would better suit the internal targets aimed for the different biomes, deriving in a lower overall energy demand.



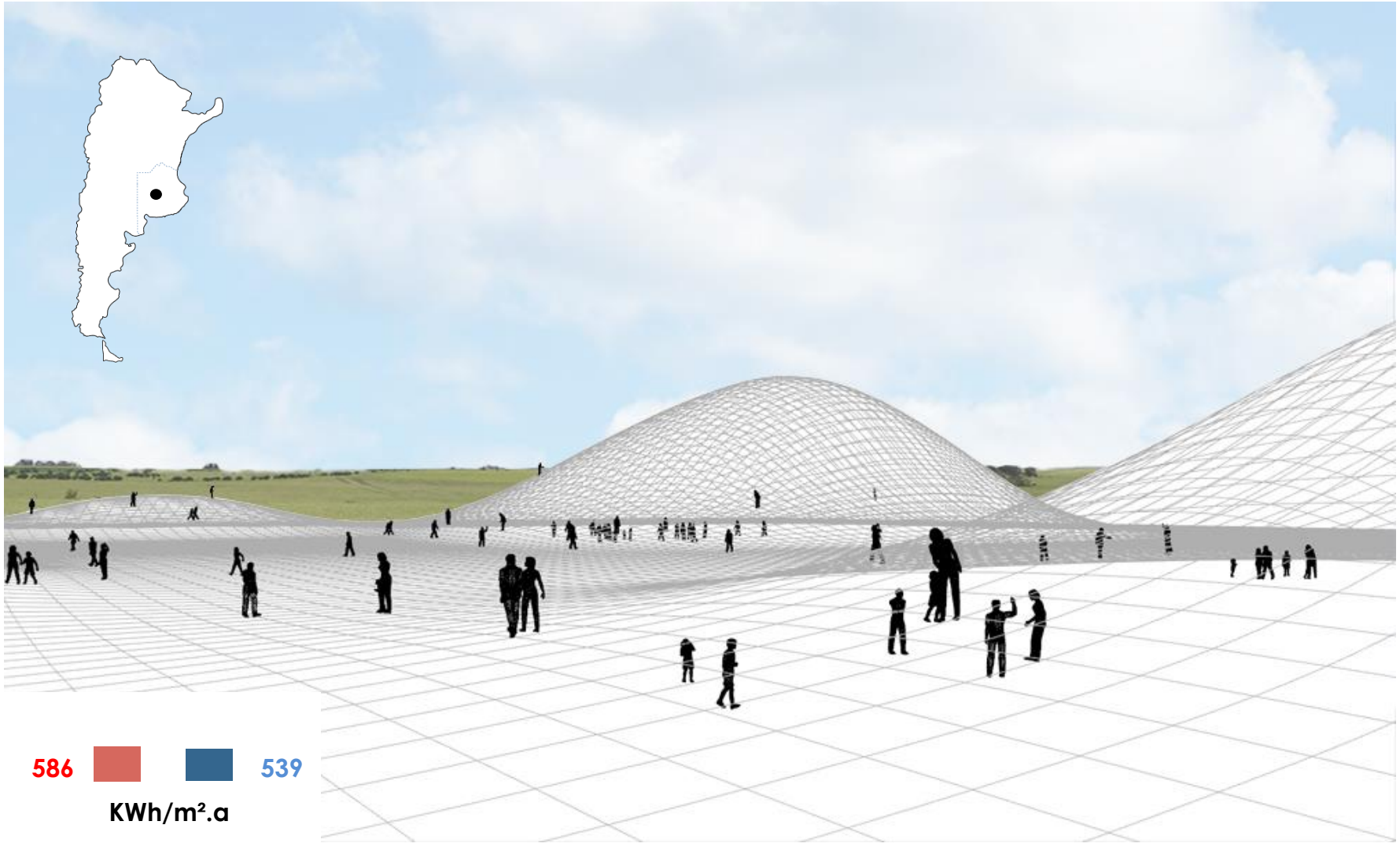
Puna

Visual speculation and results for the climatic park situated in different locations of Argentina.



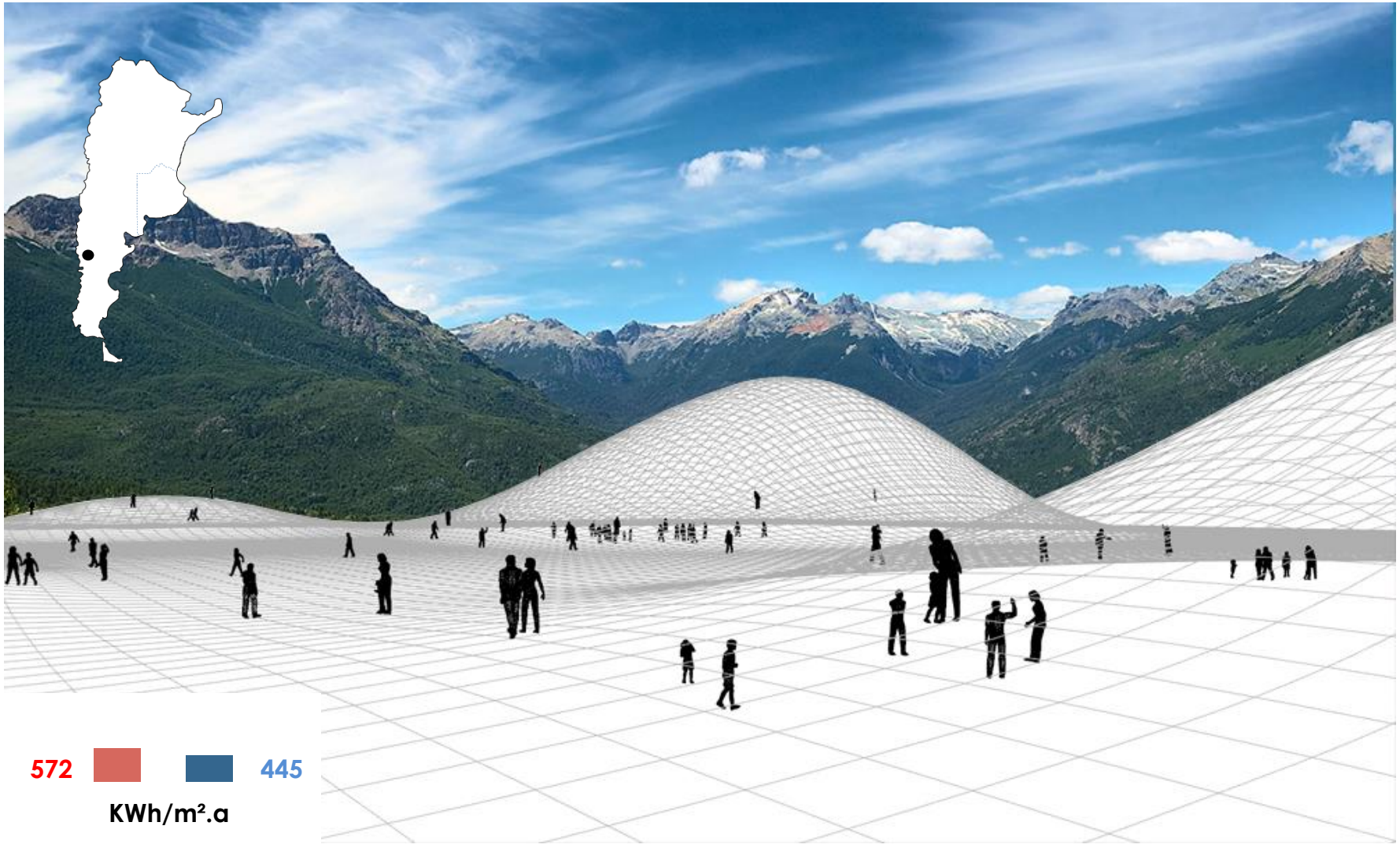
Iguazu

Visual speculation and results for the climatic park situated in different locations of Argentina.



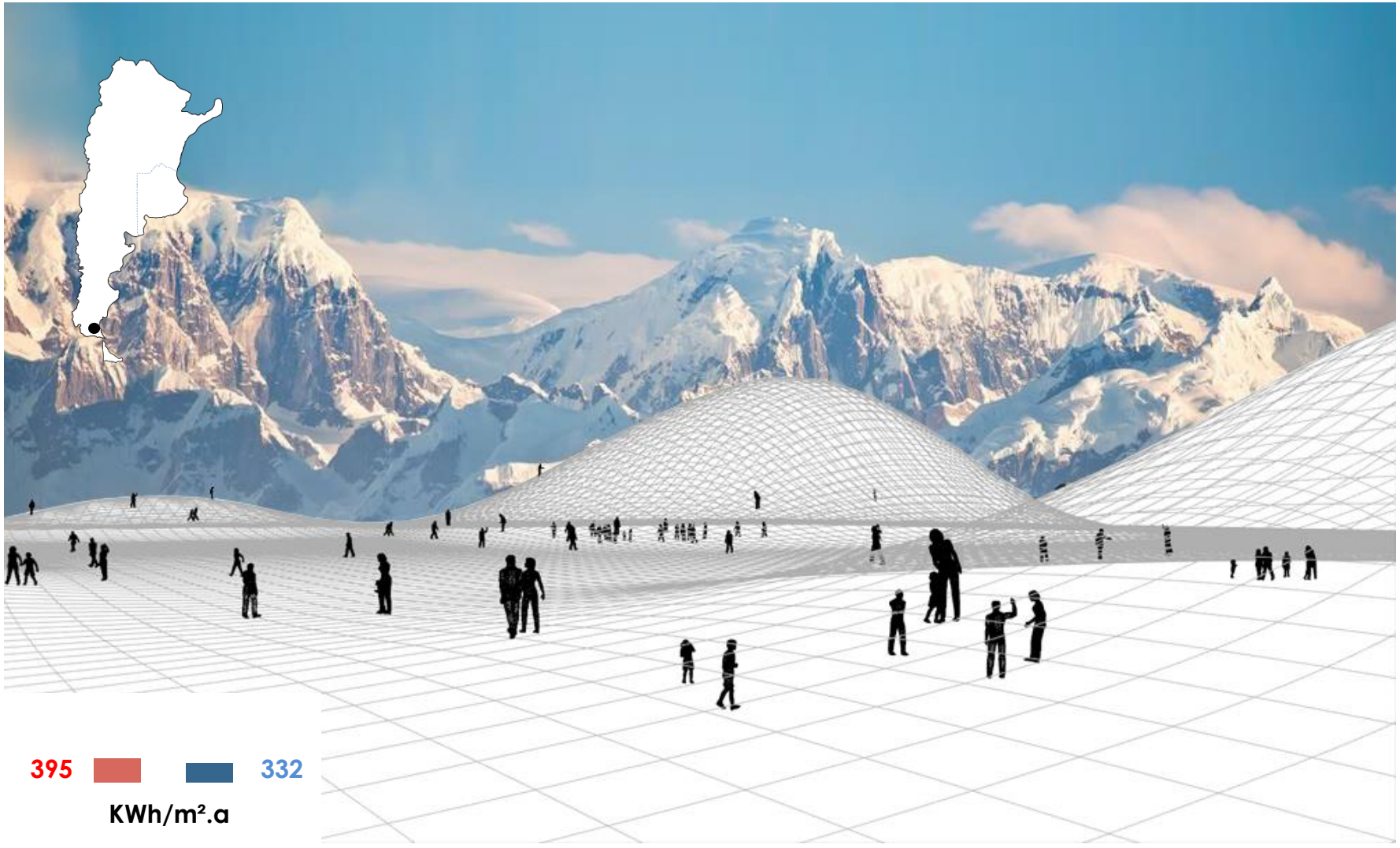
Tandil

Visual speculation and results for the climatic park situated in different locations of Argentina.



Bariloche

Visual speculation and results for the climatic park situated in different locations of Argentina.



Ushuaia

Visual speculation and results for the climatic park situated in different locations of Argentina.