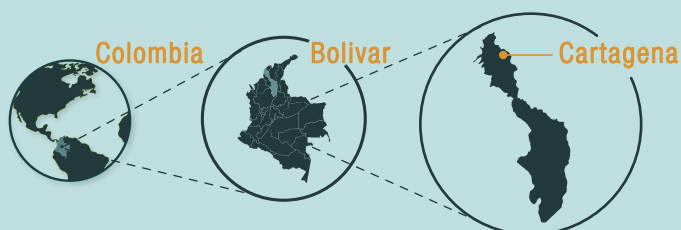


TECHNICAL AND FINANCIAL FEASIBILITY ANALYSIS OF AN ENERGY DISTRICT PROJECT

IN THE RESIDENTIAL UNITS OF THE
ALTANA BUILDING (SERENA DEL MAR ED)
IN CARTAGENA DE INDIAS, COLOMBIA



GENERAL DESCRIPTION/BASELINE SCENARIO

The various residential buildings constructed in Serena del Mar are free to connect, or not, to the chilled water distribution network fed by the cooling plant operated by Celsia-CNC.

The common practice is that builders hand-over the residential units to buyers without air conditioning equipment.

To dissipate the 860 TR of cooling need, 662 individual mini split air conditioning units are required, with an individual capacity of 1.3 TR and an estimated efficiency of 1.8 kW/TR. These systems consume the electrical energy produced by the Serena del Mar cogeneration plant using natural gas as the primary energy source with an emissions factor of 0.203 kgCO₂eq/kWh, and an average HFC 410A refrigerant leakage rate of 10% during each year of the project's life.

SOLUTION FOR THE CONNECTION OF THE ALTANA BUILDING TO THE ENERGY DISTRICT

Energy District Designer and Operator: CELSIA COLOMBIA

Energy District service end-users: Altana building with 200 residential units.

Energy District Application: Supply of chilled water for air conditioning in the new residential units of the Altana building.

Type of Energy District project: Residential (greenfield).

Energy District Status: Built and in operation.

Proposed Energy District scenario: The Serena del Mar cooling plant produces chilled water using electric chillers that consume electric power produced by a cogeneration plant, and absorption chillers that take advantage of the residual heat available in the flue gases, which allows supplying chilled water with an efficiency of 1.04 kW/TR, thus achieving a 40% saving in electric power consumption, equivalent to 1,307,200 kWh/year.



GOBIERNO DE COLOMBIA



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PROJECT BENEFITS

Energy Benefits: 40% reduction in electricity consumption for space cooling at the Altana complex, equivalent to COP \$1,700 million/year (USD \$435,700/year), and approximately COP \$8.5 million/apartment (USD \$2,125/apartment).

Environmental Benefits: The total reduction in GHG emissions compared to the baseline is 437 tonCO₂eq/year.

ECONOMIC INDICATORS

CAPEX for the developer:

The investment to achieve Altana's connection to the Serena del mar ED consisted of USD \$100.000 for the construction of

the SdM-Altana transfer station, and USD \$1.000/residential unit, for the installation of water piping and fan-coil equipment and meters in each of the residential units.

Costs for Altana's Residential Unit Buyers were the installation of thermal energy consumption meters. The costs for the transfer station were 100% subsidized by the UNIDO-ED2 project, and the cost of each fan-coil unit is similar to the cost of the mini split units replaced.

*COP: Colombian Pesos

PROJECT SWOT ANALYSIS

Strengths: The SdM-Altana project benefited from the previous existence of the cooling plant and a surplus capacity that had not yet been commercialized.

Weaknesses: The project currently relies on natural gas as a primary energy source, energy source, thus reducing the positive impact of the energy district's energy savings on GHG avoidance.

Opportunities: The electrification of the project is proposed, to eventually replace the natural gas consumed by its cogeneration system as a "primary" energy source with the electricity supply from the National Grid, thus opting for a cleaner emissions factor per kWh.

Threats/Challenges: For the cooling service operator, the challenge is to achieve successful operation of the supply and billing scheme for 100% of Altana's residential units.

NORMATIVE FRAMEWORK

The cooling supply project by the Serena del Mar Energy District to the Altana residential units has been developed under an outsourced service scheme governed by a private law contract (not regulated by control entities).

NEXT STEPS

Connect and supply chilled water to 100% of the residential units in Altana.

Share the results with builders of future projects in Serena del Mar, and with the public.



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