

Cooling as a Service Case Study: HVAC Solution for Colombian Commercial Building

By selecting this innovative pay-per-use model, a superior air-conditioning system could be installed, saving an estimated 1,2GWh in energy and 440-ton CO₂e in greenhouse gas (GHG) emissions annually.

Overview

The need: Q Group in Medellín, Colombia was constructing a new building intended to accommodate 100 offices. The aim was to deliver a high-quality building (LEED certified) for its occupants with the best comfort standards while optimising capital expenditures.

The solution: MGM Innova Group designed an HVAC solution that included a high efficiency centralised air-conditioning system complete with valves to measure the amount of cooling delivered to each user. The investment was fully carried out by MGM Innova Group and a monthly payment is billed to every office on a Cooling as a Service (CaaS) model.

Benefits: Both the client and the final users enjoy a high-quality air-conditioning system, while focusing on their core-business and avoiding capital expenditures. The system amounts to an annual energy saving of about 1,2GWh while GHG emissions are reduced by an estimated 440-ton CO₂e/year. (This is because the HVAC system was redesigned after deciding to proceed with a CaaS model.)

REGION

Medellín, Colombia

YEAR OF IMPLEMENTATION

2017

SECTOR

Commercial Building

RETROFIT OR NEW

New

PROJECT SIZE (cooling equipment)

2,040kW (580TR)

TECHNOLOGY

Magnetic Bearing Centrifugal Chiller

Why Cooling as a Service (CaaS)?

Air conditioning consumes most of the energy used in the commercial sector, accounting for more than 60% in commercial buildings. "This should lead to the implementation of high efficiency systems, but unfortunately larger upfront costs represent a barrier for such decisions to be made, given that greater value is given to capital resources in the present time," explains Thomas Motmans, Sustainable Energy Finance Specialist at BASE.

The CaaS initiative is driven by the Switzerland-based Basel Agency for Sustainable Energy (BASE), together with the Kigali Cooling Efficiency Programme (K-CEP) with the aim of reducing energy consumption and GHG emissions from cooling through a pay-per-service model for more efficient cooling systems. CaaS involves building and business owners paying for the cooling service instead of purchasing the infrastructure that delivers the cooling. The

technology provider owns the cooling system, maintains it, and covers all operational costs including electricity.

The CaaS initiative is currently implementing various pilot projects around the world to test this innovative new financing model. Although this MGM project in Colombia wasn't driven by the official CaaS initiative, it's a good example showing how the model could be successfully applied in practice.

For this specific project, given that the system installed within this project consumes half the energy compared to the conventional system initially proposed for this project, the CaaS solution is expected to realise savings of around EUR5 million during the entire lifetime of the HVAC solution.

CaaS contract – how does it work?



The building is inhabited by 100 offices, which means 100 different users. Therefore, MGM issues the same amount of bills every month. A main contract was signed with the building constructor and manager for a term of 20 years, which includes an exit payment for each year, allowing the possibility to end the contract earlier. As to the contract with end-users, buyers must sign an internal agreement when acquiring an office, where the acceptance of the air conditioning service is included.

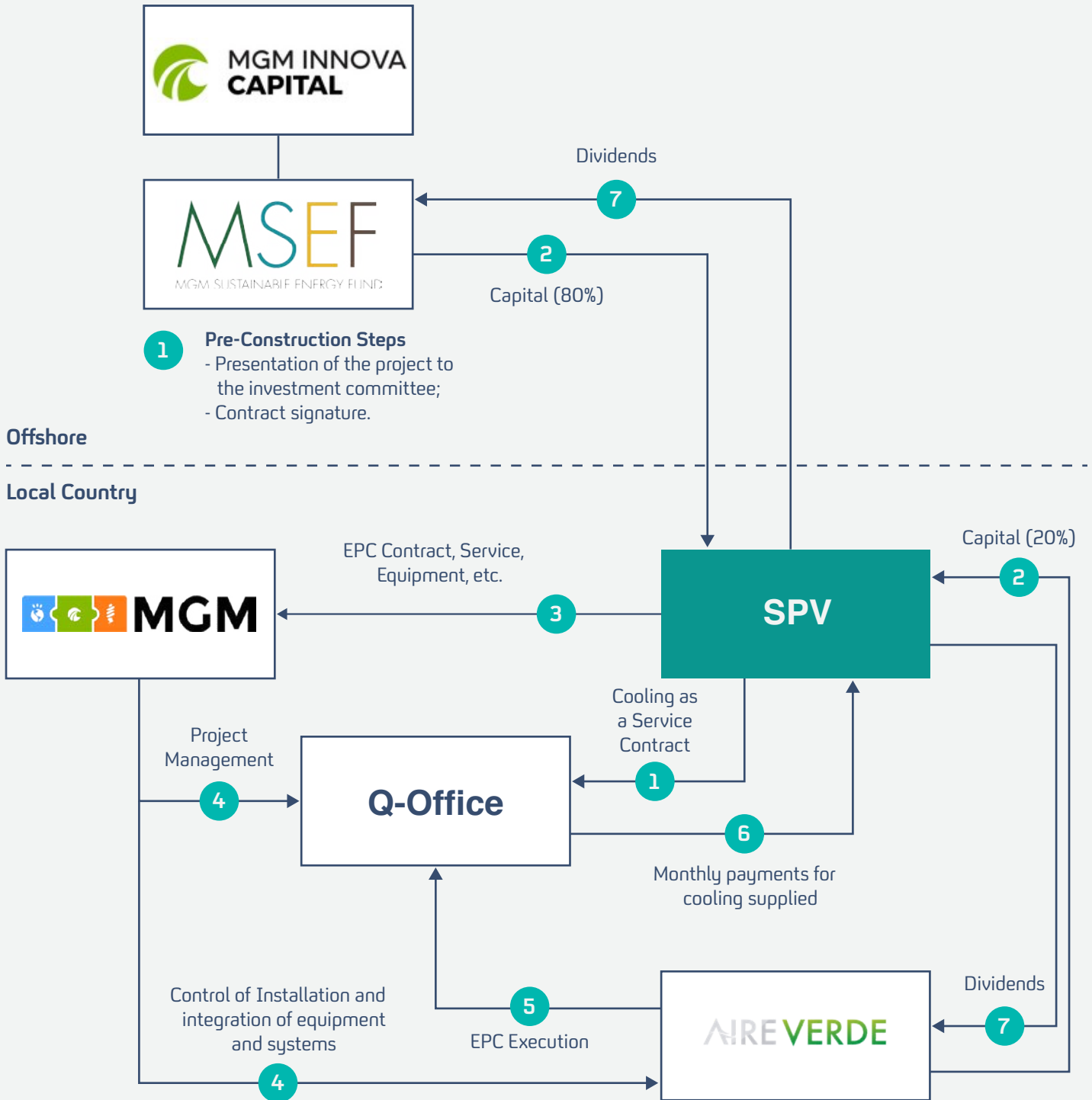
The installed system involves all of the equipment related to cold air production and distribution. That means not only the chiller system and auxiliary equipment, but also the distribution network and Fan Coil Units (FCUs). The amount of cold air delivered to each customer is measured using an energy valve that allows calculating the temperature of inlet and outlet water, and thus the thermal energy deployed by every FCU.

The contract type allows payments to be accounted off-balance since customers are paying for a service and no debt is involved. Common areas in the building pay a fixed amount every month, while individual offices pay a variable fee – they receive an invoice that shows the calculation using the number of refrigeration tons consumed times the price per ton.

The pricing scheme includes the cost of electricity employed to operate, which is US\$0.13/kWh on average, as well as insurance fees, assets management, and operation and maintenance costs, meaning that when paying for the refrigeration ton all system-related costs are covered. The final refrigeration ton price is indexed every year, using inflation and energy price increase applied to the corresponding share.



Investment Structure – Cooling as a Service Contract



1. Contract signature between the SPV and the client
2. Capitalisation of the SPV by MSEF & Aire Verde
3. The SPV buys the equipment, contracts service providers and manages the project implementation through a service contract with MGM InnoVA (MGM) & Aire Verde
4. MGM InnoVA manages the project and controls the integration
5. Aire Verde executes EPC activities
6. Investment repaid through the sale of CaaS services and backed by the savings generated by the project
7. SPV reimburses MSEF and Aire Verde (dividends)

Applying CaaS – a win-win scenario



MGM Innova Group, an active member of the CaaS Alliance, provides integrated environmental, financial and technical solutions that contribute to sustainable energy management and climate change mitigation and adaptation. They manage MGM Sustainable Energy Fund L.P. (MSEF), a private equity fund that focuses on equity and mezzanine financing for projects in the energy efficiency and renewable energy sectors in Latin America and the Caribbean.

Within this project, CaaS was implemented taking into account essential features such as: monitoring and measurement systems that allow charging for the service, contracts that comply with local legislation, and new operation and maintenance models, explained Edgar Botero, Energy Services Director General at MGM Innova Group. “Moreover, the project itself has taught us important lessons about our clients’ idiosyncrasy. They were not used to paying for air conditioning as a service and challenged us to find a suitable manner to communicate the benefits of the model.”

“The overall experience enables us to develop similar projects in the future, following an investment model adjusted to the market and to the expectations of our potential clients,” said Botero.

For project developer Aire Verde Ingeniería, having developed the Q Office project under the CaaS model implies the opportunity to implement a highly efficient air-conditioning system without the initial investment costs being

a concern for the client. “Usually, construction companies need to deliver a competitive price per square metre, so they seek to reduce every initial cost, the AC system included,” said Manuel Buitrago, Owner of Aire Verde Ingeniería.

By applying the CaaS model, MGM Group carried out the total investment, relieving the client from such expenditure. They managed to install a system with a record efficiency of 0.6kWh/TRh, halving the major operation expenditure (AC system accounted for 60% of electricity consumption). The project also realised benefits for the final users, with additional savings in energy, and in operation and maintenance costs. “In general, the CaaS model allows AC projects to be handled by experts, enabling the users to focus on their core business,” confirmed Buitrago.

“The most remarkable learning is that it is possible to design a project with a multiple number of stakeholders and with benefits for them all,” said Botero. (i) The construction company reduces capital investment, (ii) final users reduce operative expenditures and distraction from their core business, (iii) MGM Innova Group reaches its expected return, and (iv) technology providers meet their sales goals.

According to MGM, its next steps will include the dissemination of the Cooling as a Service model as a solution for the implementation of high energy efficient systems, along with exploring the opportunities to include refrigerants with low environmental impact.

