



Cooling as a Service
Refresh the planet

Webinar: How Cooling as a Service can accelerate transition to net zero carbon buildings” by the WorldGBC and BASE (15th of April, 2020)

Questions from participants

Moderator:

- Carla Della Maggiora, *Senior Climate Change Finance Specialist, BASE*

Speakers:

- Thomas Motmans, *Sustainable Energy Financial Specialist, BASE*
- Chris Elizondo, *General Manager, Clima Ideal, Gupo Clima*
- Martín Mendez Decoud, *Product Manager from Smart Division, Grupo BGH*
- Alfredo Nicastro, *Senior VP Operations & Sales, MGM Innova Group*



Questions & Answers

1

How does CAAS help to achieve Net Zero?

In the first place, CaaS makes the most energy efficient technology competitive compared with less efficient ones. This is done by reflecting the actual life-cost of the equipment in the service price, allowing the user to make its decision based on this rather than on the capital cost of the equipment. In second place, CaaS liberates limited capital to invest in other priority areas (users pay for the service with no upfront investment). The latter can be applied to investment to neutralize any remaining emissions from the already efficient cooling equipment or any other source of CO₂e emissions from the building.

2

What is the unit of measurement best suited for CaaS and how is it measured?

Typically the best unit is \$/TR (dolar per tons of refrigeration consumed) measured at the delivery point. Measurement is taken using an energy valve which measures flow and temperature (ΔT).

3

Aren't the customers going to pay more over the lifetime of the cooling product while opting for this service?

In most cases, CaaS will be less expensive for the customers. Indeed, the systems being installed and operated are highly efficient, which considerably reduces operating costs. In addition, preventive maintenance is optimised so that breakdowns and more expensive corrective maintenance is minimised. This analysis that BASE has developed together with the Global Innovation Lab for Climate will give a better insight into the numbers, comparing different scenarios: https://www.climatefinancelab.org/wp-content/uploads/2019/03/Cooling-as-a-Service_Instrument-analysis.pdf

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Is possible to get reference documents of the presentation of the speakers? And Also an example of a case that shows the financial calculations to have a solid overview and idea how to implement this Cooling as a service model?

All slides from the speakers will be shared after the webinar. In addition, this analysis that BASE has developed together with the Global Innovation Lab for Climate will give a better insight into financial calculations made for CaaS, comparing different scenarios: https://www.climatefinancelab.org/wp-content/uploads/2019/03/Cooling-as-a-Service_Instrument-analysis.pdf. An economic model will be made available as part of the CaaS toolkit in summer 2020 on the www.caas-initiative.org website.

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About the cooling service contract details: who is the main benefited of efficiency improve of a cooling system: the provider of the service of the client? Related to this question, what is the unit used to fix the price of the service? the energy consumption of the cooling service? or the cooling demand? and what type of metering requires the system in order to charge the service to the clients?

The customer ultimately benefits from the efficiency gains, since the technology provider can offer a price per unit of cooling that is more attractive if the equipment consumes less electricity (because the cost for the provider to deliver the service is lower). The price paid by the customer depends on the cooling consumption, but not on the energy consumption. If the equipment consumes more than expected, the customer does not pay more. At the same time the provider is able to increase its margin by optimising the operation and increasing the efficiency all the more. Typically the best unit is \$/TR (dolar per tons of refrigeration consumed) measured at the delivery point. Measurement is taken using an energy valve which measures flow and temperature (ΔT).

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Are you familiar with the Kigali Cooling knowledge brief from 2018 prepared by The Carbon Trust which estimates an average 20% cut in electric consumption if AC and refrigeration equipment undergoes routine coil cleanings, filter replacement and related servicing? Would you be willing to deploy such initiatives aggressively now on even existing deployed units/systems?

Here's a link to the knowledge brief to which I referred:

<https://kcep.org/wp-content/uploads/2018/03/Optimization-Monitoring-Maintenance-of-Cooling-Technology-v2-subhead....pdf>

Yes, we are aware of this knowledge brief. CaaS is in fact a true enabler of such maintenance and operation practices: having technology providers owning the equipment and having to pay the electricity to operate the equipment creates a very powerful incentive for excellent preventive and predictive maintenance practices.

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This is an interesting model. How would CaaS work for buildings with existing inefficient ACs but are interested in retrofitting and going net zero carbon.

CaaS works for both new and retrofitting projects. In the case of existing buildings, infrastructure that is already present (e.g. pipeline) would stay under the ownership of the building owner, and the provider would have the right of use as stipulated in the contract (for free or for a fee). This arrangement would be reflected in the price of the service.

Also, in the case where, for example, the piping also requires improvement (to be determined in an initial assessment by the provider), this could be undertaken by the provider, but under an on-balance arrangement within the same contract. That is, the improvement works on the piping would finance as a loan, while the rest of the equipment would be treated as an off-balance service. The key is to acknowledge all specific circumstances within the contract and reflect any specificities in the service price.

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One of the missing pieces of CaaS is the contractual documentation between the parties. Is this available yet?

In Summer 2020 BASE will make publicly available a toolkit on the website of the CaaS initiative www.caas-initiative.org. This toolkit will include a standardised CaaS contract on which we have been working on for many months.

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What is the average cost of electricity that would make the CaaS feasible for an ESCO?

This will depend on several parameters and in particular on the number of hours of operation. Section 8.9 of this analysis that BASE has developed together with the Global Innovation Lab for Climate shows a sensitivity analysis using different electricity price, and showing that CaaS is economically attractive even for electricity prices as low as 0.07 USD/kWh: https://www.climatefinancelab.org/wp-content/uploads/2019/03/Cooling-as-a-Service_Instrument-analysis.pdf

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What if the energy rates affect the projections?

The price per unit of cooling is indexed to electricity price.

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What role would private sector play for Cooling as a Service initiative?

The CaaS Initiative is led by BASE and K-CEP, and involves mostly actors from the private sector as implementation partners (see on “about” page on the caas-initiative.org website). CaaS is a business model that is commercially viable, which means it can be implemented by the private sector without the support from the public sector. Concessional finance and public risk mitigation mechanisms can accelerate its adoption. We encourage players from the private sector to engage with CaaS.

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What steps and practices can you suggest to at least invite investors to fund such green initiatives?

MGM: In our case, there are no specific pre-defined steps or practices. Anyone can introduce a cooling project to our fund (MSEF II). We will review and see if it meets our investment criteria. For an example we only invest in energy efficiency and renewable energy projects in Latin America and Caribbean, that generate GHG emission reductions.

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Who is implementing the pilot project in Mexico?

In Mexico, BASE is working with Daikin Applied Latin America to advance the implementation of CaaS. We held a webinar (in Spanish) in April 2020 with additional information about our collaboration with Daikin, recording of which is available here: <https://youtu.be/wj4cDPsT2AU>

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With the abrupt change on our environment, and with the key introduction of Kyoto Protocol, what are the steps and preparedness your organization had established to look into contributing to beat Climate Change?

Grupo Clima: Faced with the challenge that we have of climate change, Grupo Clima started with a program to offset 100% of the carbon dioxide emissions generated from its operations for more than 10 years. At the same time, he currently participates in several public-private commissions to define the actions that allow the fulfillment of the commitments made by Costa Rica in the Kyoto Protocol and the Paris Agreement.

BGH: BGH has always encouraged and led actions contributing to beat Climate change through our factory process and practices and our product portfolio, having the most complete inverter portfolio in the market. BGH was the first company to manufacture inverter units and R410A Air conditioners.

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What is your stand on the emerging Montreal Protocol? and how did you be able to work out CFC to remove em to your system?, What strategies could you suggest?

Grupo Clima: In the case of Grupo Clima, more than 12 years ago, as part of the corporate strategy, we made the decision of not to sell air conditioning equipment with CFC refrigerants. At the time, it was a pioneering decision in Costa Rica because most of the air conditioners used R22. In the world, Carrier was the first company to introduce R-410A-based residential air conditioning units to the market in 1996 and as exclusive representatives of the Carrier brand, we had the full support of the factory to lead that change. Currently, the Costa Rican market has stopped using CFCs as refrigerants in HVAC equipment.

BGH: BGH was the first company in Argentina to manufacture R410A residential air conditioning units and all of our strategies have always been led by the latest protocols, together with our leading partners in the industry.

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How do you meter cooling consumption for billing?

MGM: Measurements are done by several different instruments combined and connected to a monitoring system but typically are done using energy valves, flow and pressure meters, thermostats among others that allow flow, pressure and temperature (ΔT) measurements.

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How does CaaS integrate with LEED, for example, Is it still part of the building CxA scope?

MGM: LEED certification is not a part of MGM Innova expertise / scope of work. However, our experience is that the CaaS model strengthens the certification process as it adds a series of benefits associated with the rational use of energy, emission reductions and consequent benefits to air quality and comfort / health of workers. The Q-Office project presented as a case study in the webinar was certified LEED Gold during the implementation of our project. We have not experienced any difficulties due to that process.

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In the new commercial building sector, how can we engage early enough to offer cooling as a service (equipment financing for better than BAU technologies) to help overcome financial barriers to high EE investment?

The timings for CaaS are the same as timings for BAU: for new buildings, CaaS should be integrated into the building design stage. Given that it is a new business model, it is better to engage sooner with counterparts such as financiers, and with customers to respond to questions and concerns.

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To Martin (BGH), do you do handle commercial refrigeration too? HVAC only suggested that you cover air conditioning.

BGH: We are focussed in HVAC that cover air conditioning, but thanks to our partners and suppliers we can handle full portfolio for commercial and industrial refrigeration, enabling us to analyse every project.

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What exactly should be the key players to adopt and bring together for the financing?

One of the key actors for the model to work is the contractor. The model requires a qualified contractor to operate and properly maintain the equipment throughout its useful life.

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To Alfredo (MGM), what is the typical return the fund expects for its investment?

MGM: It depends on the project (size, potential of replicability, etc.), country risk, contract currency, counterparty risk, etc.. Since the expected return is impacted by overall project risk it varies from country to country, project to project. The average ROI of our project portfolio is around 15% in US\$. Please have in mind that this is not an interest rate but a return on the investment on a project finance basis. Different than a traditional interest rate from a commercial bank, it also impacted by operational costs such as electricity, maintenance, guarantees, insurances and others not covered by traditional loans.

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Who is the owner of equipment under CAAS methodology? is only owner of big HVAC equip? or all small components as well (end devices)? how long the contracts normally are?

The owner of the equipment is either the technology provider, or the finance provider, depending on the financial structure. What is included in the service depends on the specific arrangement between the technology provider and the customer. It can be the full cooling plant up to the air handling units, including piping and other smaller components as well as air handling units, or it can be limited for example to the chiller system. The delivery point of the service must be well-defined in the contract (i.e. up to which point is the technology provider responsible).

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Is CaaS applicable for the residential sector/ households?

MGM: In general the CaaS model applies to any type of facility. The challenge is to create enough critical mass to justify the investment. It would be possible to implement the model in a condominium format for a multifamily building or as district cooling in a neighborhood. The Q-Office model is similar to what a multifamily building project would be, where we bill each office or residence individually. However, there are contractual complexities to be addressed.

BASE: Transactional costs are higher for smaller projects (residential vs. commercial / industrial) so it is required to use financial structures that adapt to that need, such as pooling a series of projects that make it more attractive to the investors. In any case, current technology allows to be able to monitor equipment remotely, therefore maintenance planning is facilitated and to prevent problems before they occur and this is very relevant when the application is at a residential level, since there will be many more units spatially scattered within a larger area.

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For households, are they supposed to install a dedicated energy meter to measure the energy consumption?

At this stage CaaS is designed for commercial and industrial cooling users. A dedicated meter is indeed installed to meter the energy consumption. If CaaS were to be adapted to the residential sector and if electricity were also included in the price charged to the customer, the technology provider would indeed include a dedicated meter in the cooling system installed to meter the consumption.

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How can the public sector specifically the state/government enterprises push some of these energy efficiency models while present conditions with respect to energy rates and fuel subsidies are high and results in users being decentivised or not acknowledging saving benefits?

It is essential to have the support of the Government of the country to respect the principles of sustainable development by seeking a balance between economic, environmental and social objectives, so that the well-being of the current population is achieved without risking that same right for future ones. generations.

There must be a genuine interest in reducing greenhouse gas emissions and in reducing dependence on hydrocarbons to generate electricity and to serve as an energy source.

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Do you partnership with construction product manufacturer too?

Our work at BASE has been based on partnerships with different companies offering cooling technologies, including manufacturers, to develop pilot projects that are underway. We are currently focussing on developing tools that we will make available for public use.

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To Martin (BGH), what is the source for “39% of all carbon emission from buidlign operation”?

BGH: This data comes from the World GBC.

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To Martin (BGH), what is the source for the energy consumption in offices?

BGH: This data comes from ‘Asociacion de empresas de eficiencia Energética’.

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Are you planning activities in the USA?

The CaaS Initiative is focussed on Latin America, Africa and Asia. However, we strongly encourage stakeholders in the USA and in other regions such as Europe to also adopt CaaS as a new business model for delivering or receiving highly efficient and reliable cooling.

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Have you done any works in the Middle east region? specifically in Saudi Arabia?

No, we haven't. But CaaS is applicable everywhere. The fact that we are not currently working on any specific market is not a sign that the model is not applicable there. Our role is to facilitate the adoption of the model by the market for what we have selected a group of projects to support. The projects that we support are all in the developing world covering Asia, Africa and Latin America as a response to the priorities of our donor. Nevertheless, many of the world leading providers of cooling equipment are members of the CaaS alliance (e.g. Daikin, Trane, Johnson Controls to name a few; you can see all our partners in the About page in caas-initiative.org), meaning they are currently or are interested in developing CaaS in the different markets where they have presence.

Also, we are currently finalizing key tools that will facilitate the adoption of the model anywhere (e.g. contract, pricing model, etc.), all of which will be open source.

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What projects are you working on in India?

In India we have supported a local provider working with the health care and hospitality sectors to develop a CaaS contract. The provider is in the stage of pitching the model to customers.

In addition, via the CaaS incubator we are currently supporting the company CoolCrop that focuses on the provision of cold rooms for agriculture. In the case of the incubator companies (5 selected around the globe), we are supporting the development of the contract, pricing scheme, marketing material to reach out to customers and investors.

The best way to be informed of the progress of these projects is to register to our newsletter in caas-initiative.org

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**1. Do we have off-grid solar AC technologies?
2. In grid connected areas, say a hotel, how does it work or at what time do Caas entities engage? building design stage? after completion? retrofit?
3. How can we engage/partner, with each or either of you, as we are based in Ethiopia and have been interested in low carbon and energy efficient alternatives?**

1. There are solar cooling technologies in the market and as BASE we work with companies offering such solutions, for instance in Nigeria with Koolboks and in India with Coolcrop. Through the CaaS Initiative however we do not focus on developing technologies but rather on supporting partners to implement CaaS with their existing clean and efficient cooling technologies.

2. CaaS is applicable both for retrofit projects and for new projects. In the case of retrofits, CaaS can come in at any time when a retrofit will generate enough savings to make an offer attractive enough to the customer. In the case of new projects, CaaS should be integrated into the building design stage.

3. Please contact us at caas@energy-base.org or through our website www.caas-initiative.org so we can discuss how we can support.

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To Alfredo (MGM), I believe the business models you showed are more applicable to Greenfield developments. what would you suggest differently for brownfield developments?

MGM: The model is very applicable to existing buildings/facilities that require an upgrade/retrofit of the air conditioning system. In such cases MGM would do the investment in the new system and charge for the cooling services provided. In fact in these projects it is easier to demonstrate the benefits of the energy efficiency through the savings associated with the lower electricity consumption. Most of our energy service projects are in existing facilities, so the model applies perfectly fine for both new or existing facilities.

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To Thomas (BASE), what specific assignments are you working on in India? is it related to district cooling?

In India we have supported a local provider Smart Joules working with the health care and hospitality sectors to develop a CaaS contract. The provider is in the stage of pitching the model to customers.

In addition, via the CaaS incubator we are currently supporting the company CoolCrop that focuses on the provision of cold rooms for agriculture. In the case of the incubator companies (5 selected around the globe), we are supporting the development of the contract, pricing scheme, marketing material to reach out to customers and investors.

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Any district cooling examples in caas?

CaaS is different than district cooling in that CaaS can be offered to single buildings, while district cooling is meant to offer cooling from one large cooling plant (often a cogeneration plant) to several buildings simultaneously. Although district cooling is often a highly efficient solution, it requires a large infrastructure and sometimes complex construction permits. CaaS on the other hand is the outsourcing of cooling service for single buildings.

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District cooling only succeeds where Government driven at the moment, as private companies would not invest without guarantees of customers. How will CAAS succeed if not Authority driven?

CaaS is a market driven mechanism that can be applied to single buildings, in contrast to district cooling that has to be applied to many users within the district. Thus, its application is much simpler and relies only on the willingness of the parties, and the investment required by the provider (or investor) is much lower. CaaS aligns the incentives of all relevant stakeholders, creating the incentives for each one to participate.

For the provider: CaaS increase the competitiveness of the energy efficient technologies offered by providers, allowing them to increase their customer base opting for their best technologies.

For the user: access to the most energy efficient technologies without upfront investment, plus transfer of performance risk back to the provider. The latter has the expertise to best manage this risk.

For the investor: an increase pool of green finance opportunities where for example the collateral is not just the equipment, but a contract that generates steady payments and the possibility of a payment guarantee.