MeteoViva

WHITE PAPER

Campus Energy Management for Airports

With regards to Energy Management, most Airports are in a bivalent situation. On one hand side, they often have an obligation to be self-sufficient with regards to energy supply, which comes at a price of equipment and electrical/thermal network redundancy as well as a limited choice of energy mix from its own energy sources. On the other side, they are obliged to continually reduce energy costs and CO_2 footprint, which makes everyday energy supply business an ongoing optimization quest. Dynamic optimization platforms such as MeteoViva Campus which differentiate Internal factors (customers, occupants and equipment restrictions) and External factors (energy suppliers and regulatory environments as well as a changing infrastructure for pricing) are able to help here.

The Internal and External Conflict

The need to be self-sufficient comes along with redundancy for electrical (power generators) and sometimes thermal (CHP, heating power plant) equipment. This electrical and thermal infrastructure has restrictions on availability (maintenance, federal laws) and needs to compete with external suppliers on prices for consumption and load demand charges. It has grown over the years and is mostly controlled individually – the method how to use and mix internal and external energy sources to minimize costs is often "by experience" of the operations team. Replacing old equipment is often done based on local (e.g. building level) scope rather than on campus level scope with an aim to improve energy mix and equipment usage (e.g. replacing traditional chillers with absorption chillers). In this multi-site (different buildings/entities with varying usage/climate profiles) environment, saving

energy locally (in a single building or a small part of the campus) may even be counter productive when it comes to leveraging ressources on campus level.

External resources such as electricity and district heating/cooling are not a constant either. Energy suppliers increasingly work with (time-)variable consumption prices and put heavy penalties on high load demand charges. They can even help their customers to improve the CO_2 footprint with offerings of renewables mixed into or replacing traditional energy source, but often at the cost of limited capacity/availability and maximum load demand. In some countries, customers engage – directly or through their suppliers - on the energy spot market to buy required or sell surplus capacity.

So, what is needed to optimize energy costs in such a dynamic environment is a platform that

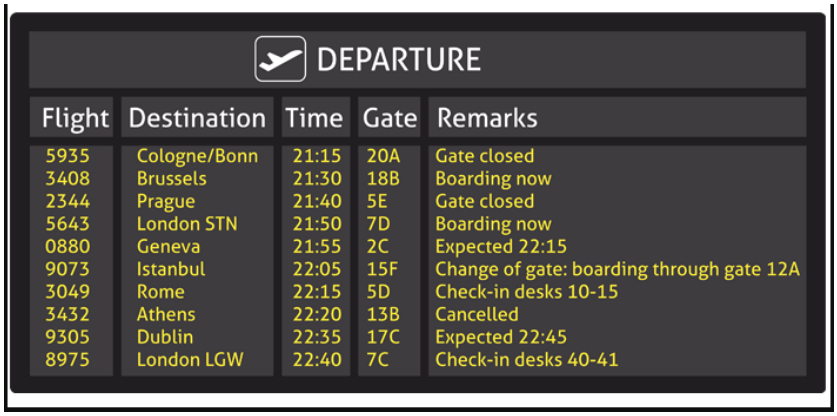
- is plug and play for existing and future energy sources (internal and external)
- makes best use of managing existing and future equipment on a campus level
- generates demand forecast (load and consumption) and matches these forecasts to internal and external sources

MeteoViva Campus

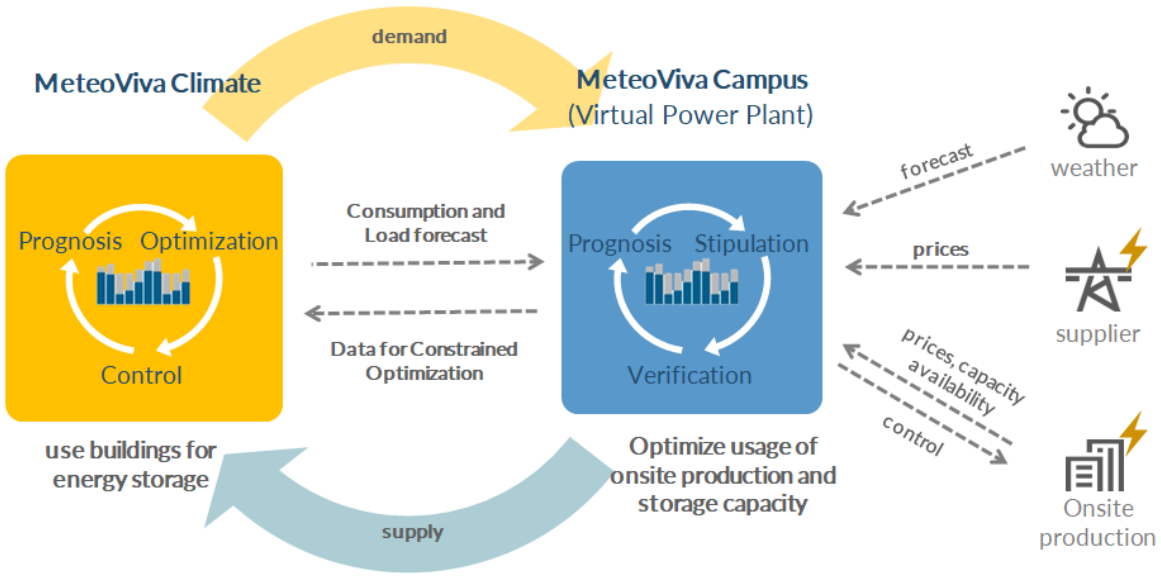
MeteoViva Campus is an open dynamic optimization platform based on a toolbox approach. It consists of two different architecture elements

- MeteoViva Climate (MVC) produces predicitive control data for buildings activyl managed, and demand forecasts for buildings not managed but part of the campus level energy demand
- MeteoViva Virtual Power Plant (VPP) optimizes the use of internal and external energy ressources to minimize energy costs on campus level.

MeteoViva Climate uses a building specific thermo dynamic model, weather forecast and usage pattern information to generate predicitive control data. It also has the capability to use dynamic building related internal load profiles based on external information like flight departure gate assignment to make best use of building level HVAC equipment.



Working together with MeteoViva VPP, MeteoViva Climate is able to work with variable prices for consumption and load demand charges and capable of moving electrical/thermal load and to actively use building physics for energy storage.



MeteoViva Climate produces demand forecasts (consumption and load time series for the next 72 hours) for the buildings actively managed (as a result of the optimization process) and buildings not actively managed (Advanced statistics/correlation of weather, usage pattern and building physics). As this process is repeated multiple times a day whenever updated information on weather, usage patterns, equipment availability or energy prices becomes available, MeteoViva VPP takes the aggregated demand forecasts of MeteoViva Climate and runs simulations to find the most cost effective way to satisfy the energy demand using internal and external data.

Doing so, MeteoViva VPP also communicates capacity/availability/price information for MeteoViva Climate, in turn leading to “incentives” for MVC to take advantage of time windows when power and/or capacity is cheap. MeteoViva VPP is also able to receive and react to demand response signal sent out by energy suppliers to incentify the usage of excess capacity or prohibit usage at times of high demand.

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