MeteoViva

MeteoViva in Action

AMERICAN UNIVERSITY
WASHINGTON, DC

Property
McKinley Building

Customer
American University

City
Washington D.C.

Building Size
58,572 sq. ft.

Equipment
Air Handling Units, Variable Air Volume Boxes, Fan Coil Units, District Cooling, District Steam, Variable Frequency Drives
25 Zones, 279 Data Points

Savings
HVAC Energy Costs: 36%

Payback on Cash Invested
Less than 1 year

American University Reduces Energy Costs and Carbon Footprint with Smart Building Controls

American University (AU) creates meaningful change in the world. With highly ranked schools and colleges, its students distinguish themselves for their service, leadership, and ability to rethink global and domestic challenges and opportunities. As part of AU's strategy to improve energy efficiency and achieve carbon neutrality, the Energy & Engineering staff is pursuing a number of solutions, including the implementation of MeteoViva Climate at the McKinley building.

Assignment

The historic McKinley building on the quad has undergone extensive renovations and is now the new home for the School of Communication. While retaining its iconic domed roof and marble-columned entrance, the building now incorporates a second, modern-glass entrance and houses digital classrooms, a media innovation lab, office spaces, a focus group teleconference suite, the latest communication technology, and a 150-seat theater for master classes and screenings.

With the implementation of MeteoViva Climate, AU is furthering its efforts to reduce energy consumption, reduce carbon footprint and improve the building's indoor climate.

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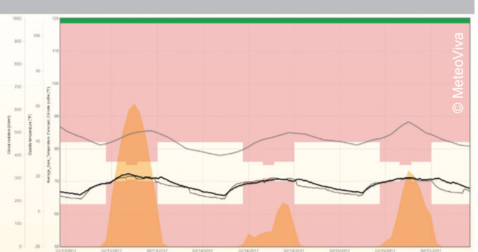
„The historic McKinley building has recently undergone extensive renovations including a modern HVAC system. We are excited that MeteoViva is helping us achieve significant energy savings and bringing us closer to our sustainability goals"

Juan Allen, Energy Conservation and Efficiency Manager at American University.

McKinley features offices and conference rooms on all 4 floors, with large and small classrooms, as well as recreational areas. Areas have different occupancy types, and schedules. While the third floor (and the basement) have a limited amount of windows, the first two receive ample sunlight during the day. Some walls have been entirely rebuilt, while others still contain the original masonry, making for a unique and complex insulation and thermal mass profile.
The building is serviced by district heat with a single setpoint controlling the hot water temperature. A set of central of air handling units (AHU) support multiple variable air volume (VAV) boxes for ventilation, and the delivery of cooling and heating energy.
Washington D.C. offers a variety of weather patterns, including some rapid shifts from sunny with temperatures in the 70s, to windy with temperatures dropping in the 30s within 24 hours.
In addition, the building occasionally experiences situations when one zone requires cooling, while another, serviced by the same AHU, requires heating. Every time this happens, mostly during the shoulder months, the supply air setpoint needs to ensure enough cooling energy is supplied, without creating unnecessary reheating. Of course, this compromise also requires the consideration of dehumidification needs and CO_2 levels.

On any given day, these characteristics would present a challenge in the optimization of the control system. Repeated daily, and with a constantly changing weather pattern, the challenge highlights the value of continuous optimization.

Implementation



The building features a highly distributed HVAC system allowing for the individual control of temperature, humidity and CO_2. It is serviced by a low pressure steam campus system with a single setpoint controlling the hot water temperature. Steam is used for heating during the winter, while an electric domestic water heater is used during the summer.
There are 4 central AHU's serving 96 variable and 5 constant air volume boxes with re-heating coils around the perimeter, and an additional 16 fan coil units that condition spaces such as the server and telecom rooms. The building itself is connected to the campus' chilled water and steam systems. The MeteoViva engineer first performed a detailed analysis of the building identifying the necessary control and log data points to allow for MeteoViva Climate to effectively control the HVAC equipment. Next, working with the client, the usage, orientation, and envelope characteristics of all areas of the building were examined to create a proper zone map while minimizing implementation costs. The result was a total of 25 zones, with 73 control data points and 206 log data points.
With that input, the building model was assembled in the MeteoViva platform, calibrated and started operating the building. The portal allows for a quick view of all setpoints (e.g. supply temperature), forecasted, and actual values (e.g. room temperature, return temperature), as well as historical values.

Conclusion

With MeteoViva Climate running, the energy consumption and costs were reduced significantly. After one year of operation, the savings exceeded the cash outlay for the installation. In addition, the system helped identify several issues that AU was able to address promptly such as the simultaneous activation of heating and cooling control valves in multiple air handling units, a chilled water control valve leakage was detected, a dehumidification sequence of operation documented but not implemented, as well as oscillation of the heating hot water temperature due to bad controller parameters.
Finally, the Energy & Engineering staff has received positive feedback from their most important clients: the faculty and student body.