



CHAPTER/REGIONAL TECHNOLOGY AWARD APPLICATION **SHORT FORM**

(Revision January 2016)

INTRODUCTION:

*This Short Form has been developed to stimulate more participation in chapter and regional competition. **This form is not intended to replace the full Society Technology Award Application form.** Regional winners using the short form will be required to complete the full Technology Award Application form before their applications can be forwarded for Society Competition. (This form does not require extensive narrative, plans or photographs.)*

INSTRUCTIONS:

- A. The individual submitting the Technology Award Application must be a current member of ASHRAE who had a significant role in the design or development of the project.
- B. Complete the "Short Form" and use it as the cover page.
- C. Provide a system schematic/diagram not larger than 11" x 17" in size. In addition, attach a brief narrative (maximum of 2 pages). The narrative should include the gross and net building areas applicable to the project, a description of the major building areas (i.e., operating rooms, laboratories, computer rooms, industrial processes, offices, warehouses) and a brief discussion regarding the following six criteria (if a criterion is not applicable, state accordingly):
 - Energy Efficiency
 - Indoor Air Quality
 - Innovation
 - Operation & Maintenance
 - Cost Effectiveness
 - Environmental Impact
- D. Submit your schematic, brief narrative, and completed form to your Chapter Technology Transfer Committee Chapter (CTTC) Chair for judging at the chapter level in accordance with their instructions.
- E. The ASHRAE Technology Award program is intended for built projects. First place winning projects should be eligible for submission to the Society level competition on September 1st of the following Society calendar year. Therefore, a project submitted to a Chapter or Regional competition shall be occupied prior to September 1st of the current Society year in order to satisfy the Society level competition requirement of one full year of occupancy.

First place winners in each category from chapter competition will be submitted by the CTTC Chapter Chair to the CTTC Regional Vice Chair for judging in the Regional Technology Awards competition. At the discretion of the CTTC Regional Vice Chair, this may require completion of the full Society Technology Award Application form if the chapter submission was done on the Short Form Application.

The CTTC Regional Vice Chair will invite first place winners in each category from regional competition to submit them for judging in the Society level Technology Awards competition. The regional winners will be given the opportunity to incorporate new information or otherwise improve their submittal before submitting it to the society level competition (e.g., by addressing comments from regional judges). At the discretion of the judging panels at the chapter and regional competitions, more than one first place winner may be awarded in each category.

For the regional competition, submit the number of copies requested by the Regional CTTC Vice Chair. The CTTC Regional Vice Chair may require entries into the regional competition to be done on the full Society Technology Award Application form. In any case, all submissions to the Society level competition must be done on the full Society Technology Award Application form.

- F. It is highly recommended that each entrant confirm by letter (and retain a copy for record) to the owner that the owner has granted permission to submit this project to competition.

NOTE: ASHRAE Technology Awards are the HVAC&R industry's most prestigious honor for efficient energy use in buildings and environmental system performance. While the awards do not certify responsible charge or professional license status, they do recognize outstanding design innovation and successful implementation.

CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category - Check one and indicate New, Existing, or Existing Building Commissioning (EBCx)

Commercial Buildings New Existing or EBCx

Institutional Buildings:

Educational Facilities New Existing or EBCx

Other Institutional New Existing or EBCx

Health Care Facilities New Existing or EBCx

Industrial Facilities or Processes New Existing or EBCx

Public Assembly New Existing or EBCx

Residential (Single and Multi-Family)

2. Name of building or project: _____

City/State: _____

3. Project Description: _____

Project Study/Design Period: _____ to _____
Begin date (mm/yyyy) End date (mm/yyyy)

Percent Occupancy at time of submission: _____

4. Entrant (ASHRAE member with significant role in project):

a. Name: _____
Last First Middle

Membership Number: _____

Chapter: _____

Region: _____

b. Address (including country): _____

_____ City State Zip Country

c. Telephone: (O) _____ d. Email: _____

e. Member's Role in Project: _____

f. Member's Signature: _____

5. Engineer of Record: _____

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.

ASHRAE Technology Award Submittal
311 W Monroe, Chicago IL – Verified High-Performance Building from Pre-Design through Post-Occupancy

Introduction | When Harris Bank moved their headquarters out of 311 W Monroe, all but one of the floors of the 394,500 SF building were left vacant for almost 5 years. Chicago developer Sterling Bay embarked on a major renovation and deep energy retrofit to re-envision 311 West Monroe with a fresh modern office design and a robust tenant amenity package. The repositioned 15-story building included the design of all new mechanical systems, which were commissioned (Cx) prior to turnover under IECC 2015 commissioning requirements. Post-occupancy monitoring-based commissioning (MBCx) has since verified design efficiency goals and continuous systems optimization for peak performance.

Energy Efficiency | Designed energy savings of approx. 170,000 kWh were achieved on the core and shell design above the City of Chicago Energy Code/IECC 2015. These 3rd party verified Energy Conservation Measures (ECMs) resulted in a utility incentive of approx. \$24,000 (\$0.14 for every kWh better than code minimum). Post-occupancy energy optimization was achieved through a Monitoring-based Commissioning (MBCx) process. This led to an additional 133,315 kWh or \$14,664 of annual electric operational savings. The ECMs included turning off redundant pumps, reducing a pump pressure setpoint, and optimizing a condenser water temperature reset sequence.

Even with a high-performance design, a thoroughly executed Cx process and a highly knowledgeable O&M team, there were still significant savings. The goal of integrating the MBCx process into the design and construction phases was to apply rigor and persistence to the design ECMs, to avoid the traditional post-occupancy drift of as-designed sequences, setpoints and schedules, and to further optimize performance under actual operations. Ongoing energy efficiency is being maintained with a continuous connected Cx process, where the O&M team are using a data informed approach to continuous systems optimization.

Indoor Air Quality | Dedicated Outdoor Air Supply (DOAS) units were used to provide outdoor air throughout the building. The outdoor air was ducted to the inlet of water source heat pumps serving each zone. This system ensures that the correct amount of outdoor air is supplied to each zone. The building used the ventilation requirements of the Chicago Building Code, which at one-third of 0.6 CFM/SF (0.2 CFM/SF) of outside air, typically results in additional outside air when compared to 0.06 CFM/SF and 5 CFM/Person as recommended by ASHRAE Standard 62.1 for an office space. The DOAS units were sized for 15% more airflow than projected by the core and shell project in event that a tenant needed additional ventilation, which was taken advantage of by a seven-floor tenant that was seeking LEED Certification of their build-out. The DOAS units included MERV 7 prefilters and MERV 13 final filters for particulate capture as well as total enthalpy wheels to recapture some lost humidity in the winter to help maintain better thermal comfort. Additionally, the 15th floor amenity spaces include a 2,900 SF lounge with operable glass walls for natural ventilation in the building community gathering spaces.

Duct mounted monitors installed during the post-occupancy phase align with the RESET Air Standard for Core & Shell and validate base building systems ventilation and filtration strategies. Duct mounted IAQ monitors were installed within 16' of the shared DOAS outdoor air intake in the return/exhaust and in the shared DOAS supply air ductwork. The IAQ monitors are integrated to the BAS. During February of 2022, the outdoor air intake PM2.5 data was less than 12 µg/m³ for 89.9% of occupied hours. In comparison, the February 2022 supply air was less than 12 µg/m³ for 99.9% of occupied hours, which proves proper filtration at the DOAS units while the system was in operation. The building is currently RESET Accredited and will be Certified on Dec. 1, 2022. Real-time data is shared with building occupants via a lobby kiosk and a mobile app. The data is uploaded to the RESET cloud and 3rd party verified in real-time as part of the RESET certification prerequisite.

Innovation | Innovations in design and construction logistics were needed as the single floor data center tenant's lease didn't expire until the contractors were five months into the demolition and construction phase of work. This required the design team to layout rooms, systems, and equipment around chillers that could not be removed in a typical construction sequence. In addition, the demolition was also scheduled to occur over the winter, which would remove the large Scotch marine boilers. To avoid having a 24/7 fire watch, the sprinkler systems remained operational throughout the demolition and construction phases, this meant that the sprinkler system could be subject to freezing conditions on unheated floors when the boilers were removed. The design team created a concept for a temporary heating plant that the owner desired to incorporate into the final systems by relocating the boiler into the new mechanical room. A piping layout design for the temporary heat could later be used in tenant fit-out projects, reducing waste and helping with future cost savings.

A DOAS system with distributed heating and cooling allowed the reduction in required space for duct risers and shaft space. This way the owner to recoup approximately 500 SF of floor space per floor on thirteen floors and obtain over 16,000 SF of leasable

and amenity space on the top floor. In addition, the system allowed for taller ceilings with the avoidance of large medium pressure duct mains. This increased the Net Square Foot of the building from 372,000 to 394,500.

Innovations in building performance started early in the project during the schematic design phase when Sterling Bay engaged the ComEd Energy Efficiency “Accelerate Performance” pilot program, an innovative approach developed by a partnership between the Department of Energy (DOE) and the National Renewable Energy Laboratory (NREL). The program encourages building owners and developers to engage with their utilities early in the planning phase to formalize energy goals in the Owner’s Project Requirements document and to leverage the utility’s technical resources to provide the support necessary to achieve them. It also encourages the design of high-performance building systems and provides incentivize dollars to go beyond the code-minimum options.

311 West Monroe was the first project in Chicago to utilize this initiative to integrate and formalize energy performance goals early in the design process and to formally verify achievement post-occupancy using the ComEd MBCx program. All energy savings measure calculations were 3rd party verified by the MBCx program administrators.

The post-occupancy verification of as-designed energy savings measures and the associated persistence protocols necessary to maintain those savings were achieved by integrating a rules-based fault detection and diagnostics (FDD) platform as part of the commissioning process. Building performance data, including utility bills, interval meter data, building automation system, and lighting controls systems data were integrated into the FDD platform. Additionally, real-time indoor air quality data was integrated, including, Particulate Matter (PM 2.5 and PM 10), Total Volatile Organic Compounds (TVOCs), and Carbon Dioxide (CO2). These data sets were organized and tagged using the Project Haystack methodology. This allowed the design, construction, and Cx teams to seamlessly hand the project over to the owner’s operations team, ensuring that the specified design sequences of operations and the Accelerate Performance energy conservation measures were executed, and that building performance remained within predicted parameters, and avoiding the traditional post-occupancy drift.

This evolution of as-designed building performance simulation and operational data analytics, from pre-design to post-occupancy, ensured a proactive, data-informed approach to systems optimization through each phase of the project’s delivery.

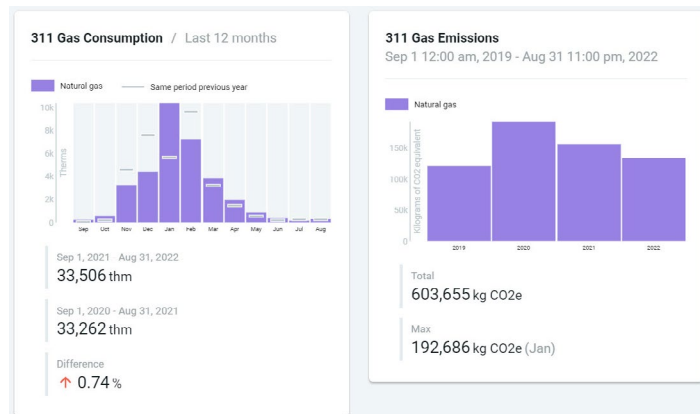
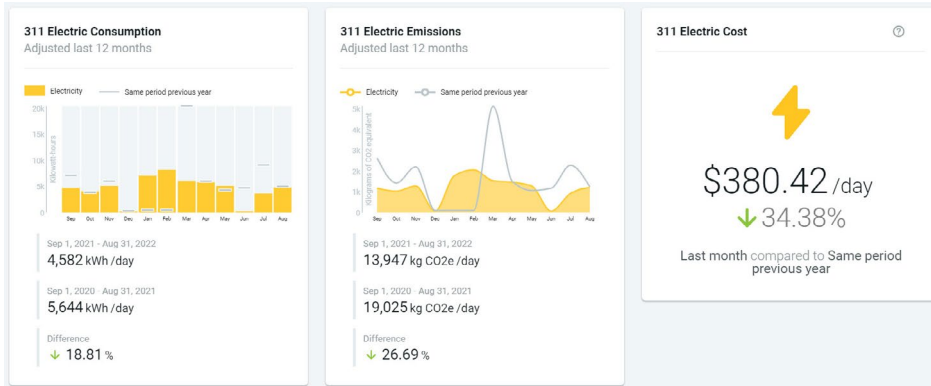
Operation & Maintenance | A data-informed approach to O&M allows the building team to continually optimize systems performance and balance energy efficiency with indoor air quality and occupant thermal comfort. With a continuous connected Cx process driven by the fault detection and diagnostics software and regular quarterly check-ins from an energy professional, the building is maintaining high-performance operations, and using real-time operational data to continually verify performance.

Real-time operational data is being leveraged by the O&M team by optimizing the ASHRAE recommended pre and post occupancy outdoor air purge using real-time air quality data to ensure maximum energy efficiency while maintaining air quality within the thresholds of the highest industry standards. TVOC levels in the air exhausted from the building are monitored by IAQ sensors tied into the BAS to optimize damper position based on the time needed for a pre-occupancy purge. TVOC levels are used as the primary targeted pollutant. TVOC levels build up in occupied spaces overnight while the HVAC systems are off. When the TVOC (and PM2.5 and CO2) levels are monitored below the RESET Air standard thresholds the outdoor air dampers go from purge-mode to minimum position. Likewise in post-occupancy mode CO2 levels are used as the primary KPI and once levels are below the RESET Air threshold the HVAC systems go into night-time operations.

Cost Effectiveness | The building has successfully leveraged dollars from the utility incentive programs to achieve most of the systems optimization and high-performance design efforts to date. By leveraging FDD analytics and a data-informed approach to operations and maintenance, the building team is able to maintain a high-performing indoor environment and balance energy efficiency and carbon emissions. The highest performing healthy building metrics are achieved without compromising energy efficiency with continual data analytics, enabling a cost-effective approach to maintaining enhanced indoor environmental quality.

Environmental Impact | The new mechanical systems with distributed heating and cooling of the water source heat pumps results in there being small refrigerant circuits interior to the packaged equipment, similarly, the DOAS equipment are water cooled packaged units. These systems result in lower total refrigerant per circuit. While R-410A is an environmentally friendly refrigerant, the small systems ensure that in event that there is a refrigerant leak, the amount of released would be minimized. Through the Continuous Connected Cx and data analytics process enabled by the FDD platform the building has deeper insights to systems optimization opportunities and balance resource use with healthy building metrics and carbon emissions.

ENERGY CONSUMPTION



Meter Breakdown / Last year



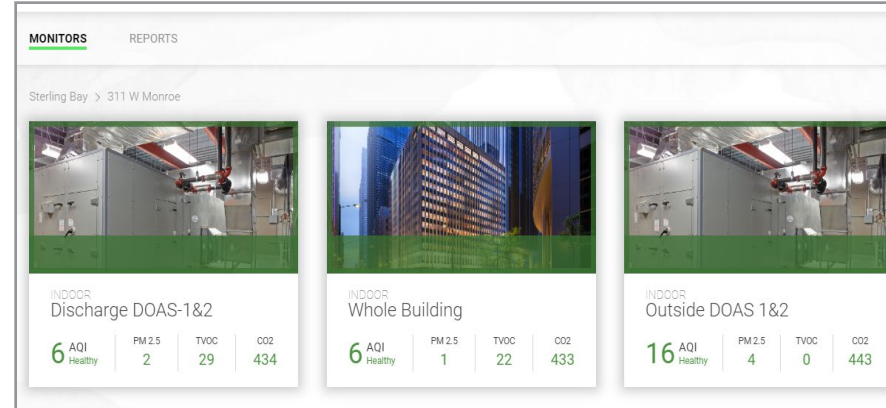
Total
1.78m kWh

Min
49,910 kWh (Nov)

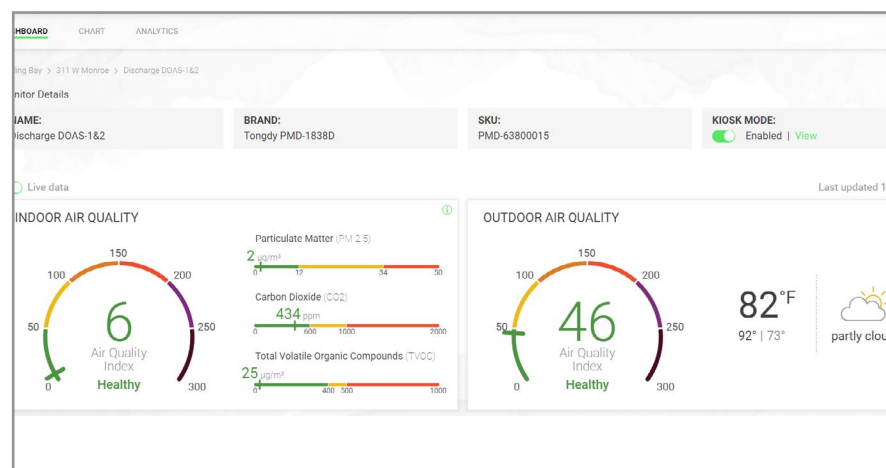
Max
214,666 kWh (Jan)

INDOOR AIR QUALITY

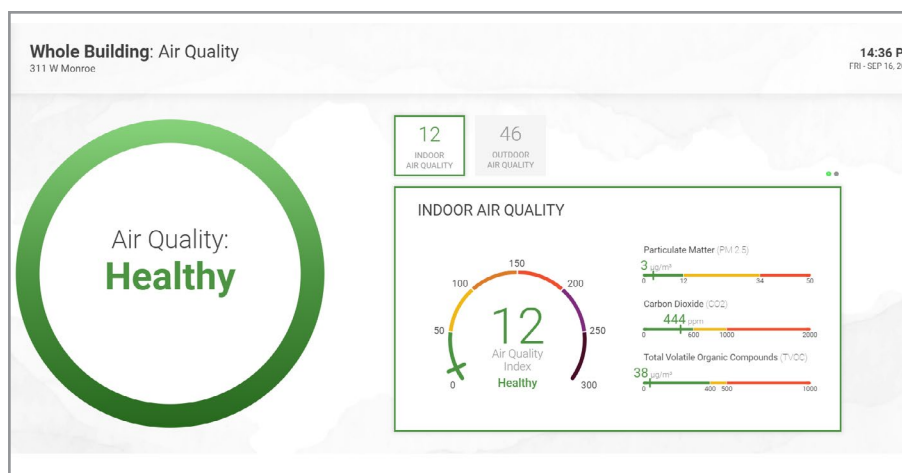
Duct IAQ Monitor Cards



Shared DOAS Discharge IAQ Readings

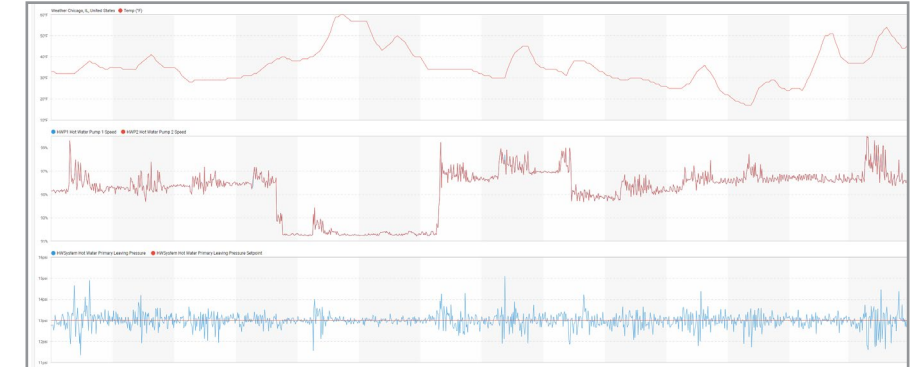


Tenant Facing Whole Building IAQ Dashboard

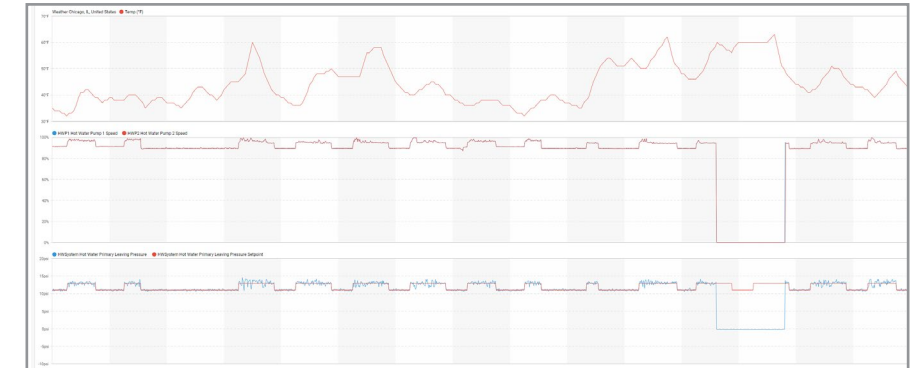


SYSTEM TRENDS

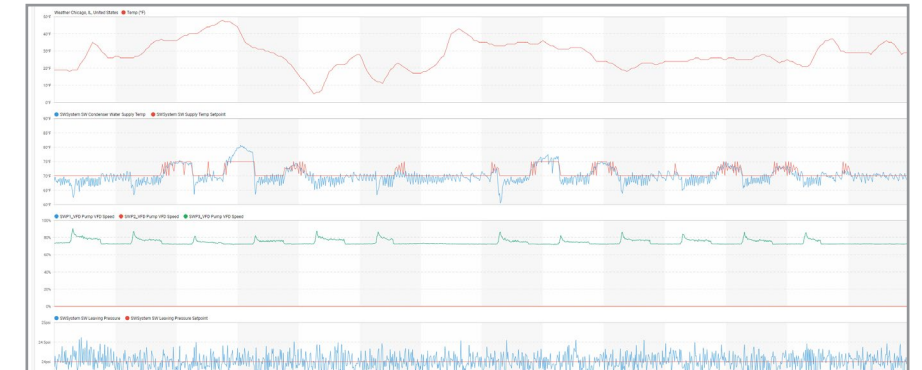
Hot Water Pumps - Baseline



Hot Water Pumps - Verification



Secondary Water System - Baseline



Secondary Water System - Verification

