2016 DAVID L. LAWRENCE CONVENTION CENTER GREEN REPORT

Released July 28th, 2017

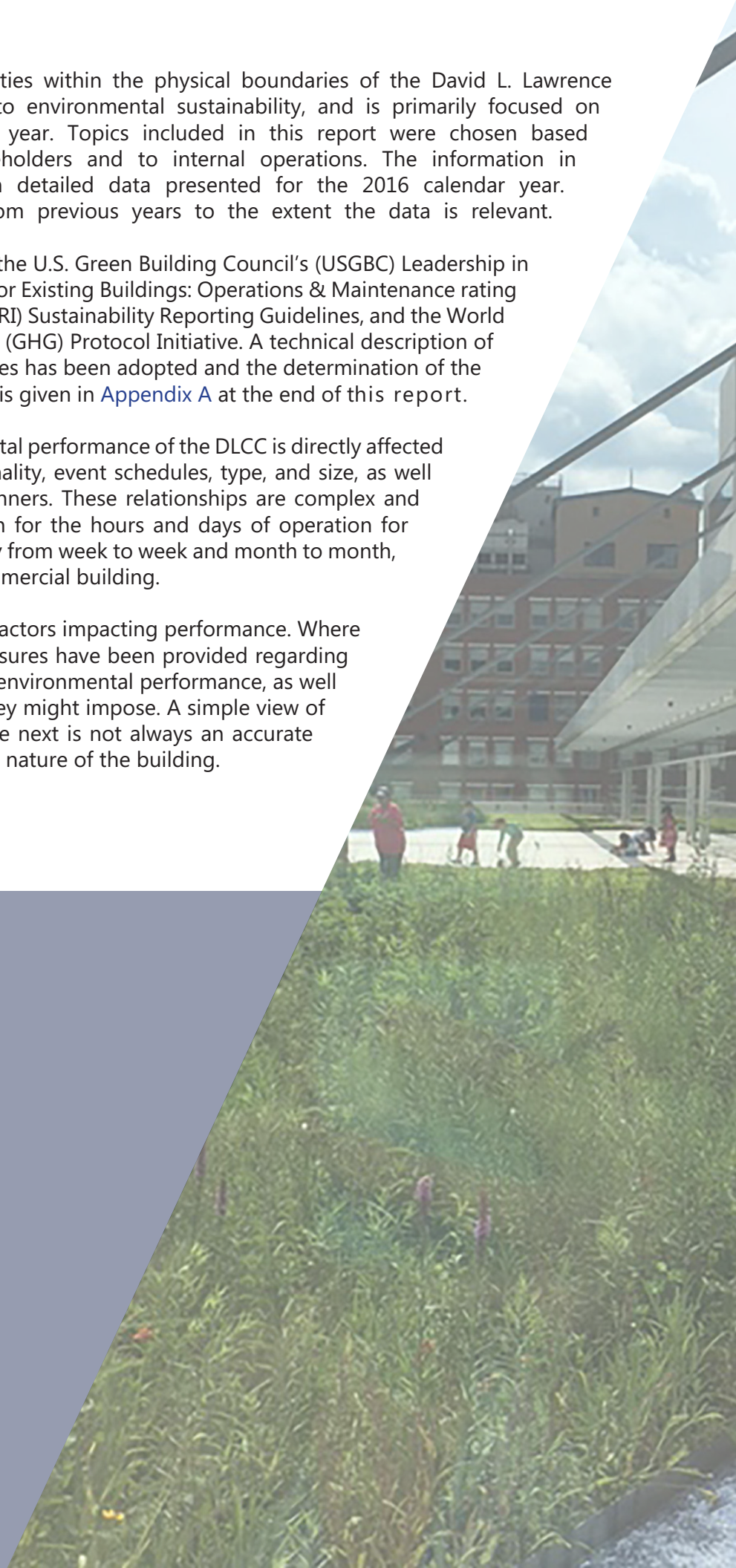
This 2016 Green Report covers all activities within the physical boundaries of the David L. Lawrence Convention Center (DLCC) site related to environmental sustainability, and is primarily focused on performance during the 2016 calendar year. Topics included in this report were chosen based upon their relevance to external stakeholders and to internal operations. The information in this report is summary in nature, with detailed data presented for the 2016 calendar year. Information has also been provided from previous years to the extent the data is relevant.

The framework for the report is based on the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) for Existing Buildings: Operations & Maintenance rating system, the Global Reporting Initiative's (GRI) Sustainability Reporting Guidelines, and the World Resources Institute (WRI) Greenhouse Gas (GHG) Protocol Initiative. A technical description of the extent to which each of these guidelines has been adopted and the determination of the reporting boundaries to which they apply is given in Appendix A at the end of this report.

It is important to note that the environmental performance of the DLCC is directly affected by several external factors such as seasonality, event schedules, type, and size, as well as the needs of attendees and event planners. These relationships are complex and are not always quantifiable. It is common for the hours and days of operation for convention centers to vary widely, not only from week to week and month to month, but from year to year, unlike a typical commercial building.

This report aims to be transparent about factors impacting performance. Where possible, qualitative and quantitative measures have been provided regarding the effects of these types of factors upon environmental performance, as well as the current limitations or challenges they might impose. A simple view of energy consumption from one year to the next is not always an accurate measure of performance given the unique nature of the building.

2016



2016 HIGHLIGHTS

The DLCC hosted a total of **497,929** attendees

Site

20% energy use reduction (from baseline) per attendee

Energy

92 acres of forest saved from deforestation based on total emissions avoided

Emissions

60% waste diversion rate / 259 tons of waste kept out of landfills

Waste

10% of water needs were met by recycled wastewater

Water

The DLCC hosted **17** green-seeking events

Site

19% reduction in total emissions from baseline (not including current offset strategies)

Emissions

Natural ventilation was used on **39%** of event days

Energy

28% of food purchased came from local sources

Purchasing

Water recycled this year is enough to fill **2** Olympic sized swimming pools

Water

Reduction in net emissions in 2016 is equivalent to taking **2,003** vehicles off the road for one year

Emissions

The DLCC purchased **30%** of electricity from Green-e certified sources

Energy

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DAVID L. LAWRENCE CONVENTION CENTER

Located in downtown Pittsburgh, adjacent to the Allegheny River, the five-story, 1.5 million sq. ft. David L. Lawrence Convention Center (DLCC) is a symbol of the city's economic and environmental revitalization. The DLCC opened in 2003 and is owned by the Sports & Exhibition Authority of Pittsburgh and Allegheny County (SEA). The SEA contracts with SMG, a professional management company, for the day-to-day operations of the facility. The DLCC was built as a public investment to attract non-resident attendees to the region and to grow tourism spending in Pittsburgh. With encouragement and support from local organizations, an additional goal was decided upon: to create an innovative and environmentally responsible facility that would showcase the benefits of sustainable building design and operations.

Pittsburgh's philanthropic community played a major role in the development of the DLCC by supporting an international green building design competition for the planning of the convention center. The foundations that funded this $750,000 design competition included the Heinz Endowments, the Hillman Foundation, the Claude Worthington Benedum Foundation, the Buhl Foundation, the Richard King Mellon Foundation, and an anonymous foundation.

In February 1999, the Southwestern Pennsylvania Convention Center Design Commission unanimously selected the design proposal of Rafael Viñoly Architects (RVA). Inspired by the "Three Sisters" suspension bridges adjacent to the site, RVA's design uses a cable support system to suspend a dramatically sweeping roof. Daylighting, natural ventilation, and water reclamation strategies were implemented throughout the facility to an extent that was unprecedented in the meeting and convention industry during that time. In addition to energy and water saving strategies, the DLCC was constructed on the same site as the previous Pittsburgh convention center facility. Reusing the old site virtually eliminated the need for the construction of additional supporting roads and utility infrastructure.

LEED CERTIFICATION

To further the environmental integrity of the building, the Heinz Endowments provided a $4 million grant administered by the Green Building Alliance (GBA) for green building consultation services and commissioning. An additional $3 million loan was given to the SEA to cover costs associated with green technologies. Building construction began in February 2000 and the full building was open for operations in September 2003. Upon completion, the DLCC became the first convention center to receive Gold certification under the LEED for New Construction and Major Renovations rating system,[1] and at that time, was the largest green building in the world.

In 2009, an initial case study was done in order to evaluate building performance, facility management, occupant satisfaction, and operational sustainability. The case study was completed in November 2011. The final report, *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study,* is available to the public on the SEA website.

The DLCC started the process of applying for certification under the LEED for Existing Buildings: Operations and Maintenance (O+M) rating system in 2009. In April 2012, the DLCC received a Platinum Certification under the LEED for Existing Buildings: O+M rating system.

1 LEED and the related logo is a trademark owned by the U.S. Green Building Council (USGBC) and is used with permission. The LEED rating system has four rating levels: Certified, Silver, Gold, and Platinum. LEED rating levels are determined based on the number of points that a LEED project is awarded.

In August 2012, the SEA completed its new interior office space which is located within the DLCC. The location was previously a portion of shell space that was being used for storage. The SEA Office received a Platinum certification under the LEED for Commercial Interiors (CI) rating system in April 2013.

In order to maintain a LEED for Existing Buildings: O+M certification, the DLCC is required to re-certify under this rating system at least once every 5 years. In December 2015, the DLCC registered for LEED recertification and submitted all documentation for review in January 2017. The DLCC is will be notified in the third quarter of 2017 of its most current LEED rating status.

APEX/ASTM SUSTAINABLE MEETING VENUE

The APEX/ASTM Sustainable Meeting Venue is a third-party certification that is specific to the Meeting and Events Industry. APEX/ASTM is a collaboration between APEX (the Convention Industry Council's Accepted Practices Exchange) and ASTM (an ANSI certified international standard development organization). The rating system includes 9 certification categories including: Meeting Venue, Food and Beverage, Exhibits, Destination, and Audio/Visual, among others. The final rating for a venue is based on the number of points that a registered project receives. The level of certification is based on a scale of Level I-IV, with a level IV project being the highest certification. In January 2017, the DLCC earned a Level II certification as an APEX/ASTM Sustainable Meeting Venue to compliment the building's previous LEED Platinum Certification. The DLCC is one of only four convention centers in the world to have an APEX/ASTM certification of Level II or higher.

APEX/ASTM Level II Plaque

ECONOMIC IMPACT

ACTIVITY AT THE DLCC

There is no one measure of building utilization that takes into account the diversity and variations in convention center building usage. Attendance is one measure of building activity that is used in this report. Attendance is the total of (1) the attendee count for public shows, banquets, meetings, and (2) the delegate count for conventions/trade shows.[2] The attendance measure does not take into account event type, duration, or space utilized (e.g., exhibit hall, ballroom, meeting rooms etc.), all of which impact building operations and energy and water use in different ways.

Table 1 highlights 2016 building usage by event type and number of attendees. In 2016, the DLCC hosted 207 events and had a total of 497,929 attendees. The main exhibit halls were occupied by events 51% of the year. Because building usage at the DLCC varies from year to year, strict year to year comparisons are of limited use. SMG reports, however, that the DLCC experienced a 15% increase in the number of events and an increase in attendance of 14,000 in 2016 compared to 2015.

2 A delegate is counted just once, even if the delegate visits the building on multiple days, for a multiple day convention/ trade show.

Table 1. 2016 DLCC events by type.

TYPE	PUBLIC SHOW	CONVENTION/ TRADE SHOW	MEETING	BANQUET	SPORTING/ GAMING/SPECIAL EVENTS*	TOTAL**
ATTENDEES	224,333	84,740	10,032	6,910	171,914	497,929
EVENTS	22	46	60	23	56	207

* This event type was referenced as "Other" in prior reports.
** No internal meetings are included.

MAJOR EVENTS

While the number of attendees is one measure of economic activity used in this report, the DLCC's primary goal of economic impact is measured in other ways. One measure of economic impact is direct spending generated by "major" events (events that have high hotel room usage and could not have been held in Pittsburgh but for the DLCC). Direct spending is defined as spending generated by event attendees, exhibitors, and organizers based on hotel room nights and other spending. Direct spending from the 41 major events held at the DLCC in 2016 was $80,537,058 as provided by VisitPittsburgh. These 41 major events served 153,379 attendees. Direct spending and state and local taxes are calculated with respect to major events only.

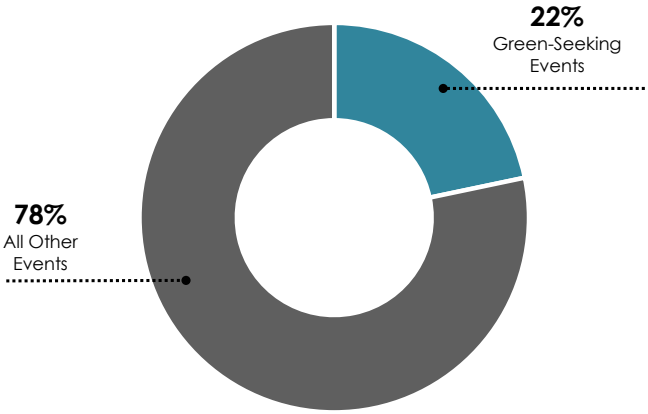


Figure 1. Direct spending from green-seeking events since 2006.

GREEN-SEEKING EVENTS

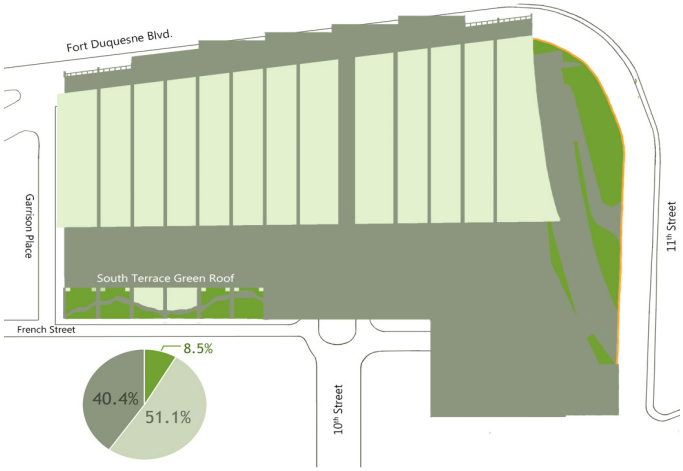
The building's LEED certifications and ongoing sustainable operations at the DLCC attract event organizers who seek facilities with green operations. "Green-seeking" events are those that request or inquire about sustainable features during the sales process, or ask for green information in their request for proposals. Green-seeking events include those hosted by environmental organizations as well as a wide variety of clientele who value sustainability regardless of their industry.

In 2016, the DLCC hosted 17 green-seeking events, including both major and non-major events. These green-seeking events, with 9,997 attendees, accounted for $825,995 of gross revenue for the building in 2016.

Of the 41 major events at the DLCC, 4 were green-seeking events. These 4 major events accounted for $2.1 million of direct spending to the region in 2016. Green-seeking major events have been responsible for $252 million (22%) in direct spending since tracking began in 2006 (Figure 1).

THE BIOPHILIC ADVANTAGE

Ecologist E. O. Wilson introduced the term "biophilia" to describe what he believed to be the intrinsic benefit of reconnecting humans to the natural environment. At the DLCC, proximity to open and vegetated spaces on an urban site has resulted in both practical environmental benefits and a quantifiable "biophilic advantage" that enhances the visitor experience.



DLCC Site Plan

11th Street and Riverfront Plaza

VEGETATED SPACES

11th Street and Riverfront Plaza

The 11th Street site, which borders the east side of the DLCC, was restored with native trees, shrubs, and grasses. The Convention Center Riverfront Plaza has extended this natural landscape along the north side of the building.[3]

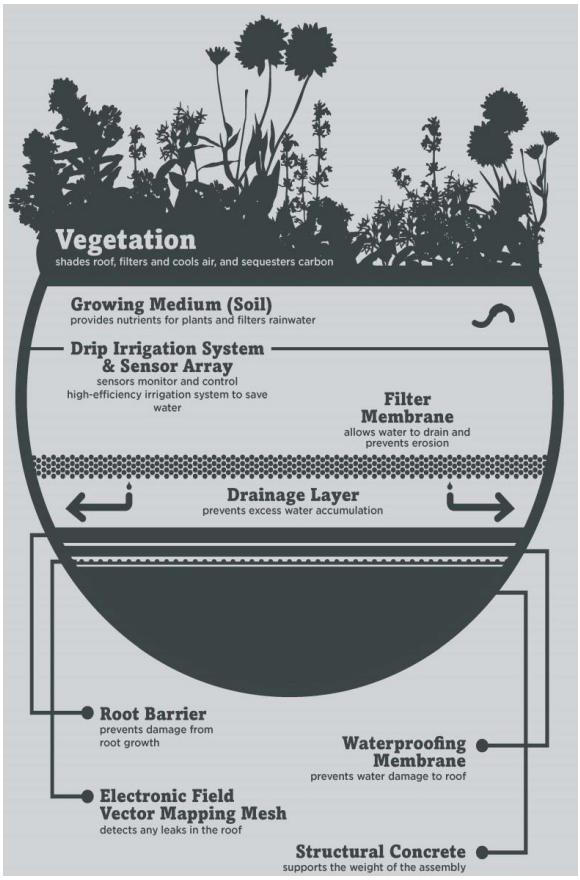
Opened to the public in May 2011, the Riverfront Plaza links two previously disconnected components of Pittsburgh's 22 mile Three Rivers Heritage Trail greenway, providing a safe route for walkers, bikers, and joggers to travel between the Strip District commercial area and Point State Park. The Riverfront Plaza also connects the DLCC Water Feature to the Allegheny River and provides a docking area for 37 boats. The Riverfront Plaza has quickly become a popular destination for both convention center attendees and Pittsburgh residents.

3rd Floor South Terrace Green Roof

In 2011, the third floor terrace outside of the city-side meeting rooms was renovated into a green roof space. May 2012 marked the opening of the South Terrace Green Roof; a fully programmable vegetated roof. The South Terrace Green Roof features a mix of noninvasive adapted sedum species and a "meadow" filled with native perennials, separated by a walking path and a plaza for outdoor receptions. The roof plantings provide a connection to nature for visitors on the southern side of the building. In 2016, 8 events were held on or adjacent to the South Terrace Green Roof.

3 The site plan and green space calculations do not include the Riverfront Plaza.

South Terrace Green Roof



Structure of South Terrace Green Roof

The Green Roof controls stormwater runoff by absorbing rainfall, lessening the DLCC's contribution to Pittsburgh's combined sewer overflows (CSO). Studies by the Penn State Center for Green Roof Research have shown that green roofs in Pennsylvania's climate retain approximately 50% of rainfall on average, reaching up to 100% in the summer.[4] Through natural root intake processes, evaporation and transpiration, plants also remove pollutants from the air and water. Based on research gathered by the US EPA, it is estimated that the South Terrace Green Roof will remove almost 680 pounds of particulate matter from the air annually, which is approximately equivalent to the annual emissions of 255 passenger vehicles.[5]

With the addition of the South Terrace Green Roof, 41,555 sq. ft. of the convention center's site has been restored with native or non-invasive adapted plantings, representing 8.5% of the total site area. A total of 75 different species are represented at the South Terrace Green Roof, 11th Street site border, and the Riverfront Plaza.

4th Floor North Terrace Monarch Waystation

In June 2012, the DLCC established a Monarch Butterfly Waystation (Monarch Waystation Registry #6071) on the North Terrace rooftop garden. Developed by the University of Kansas' Monarch Watch program, Monarch Waystations are a way for individuals to create a habitat for the monarch butterflies. Monarch Waystations are gardens planted with milkweed for Monarch butterflies to lay their eggs, and other complimentary plantings.

South Terrace Green Roof

4 Penn State Center for Green Roof Research. "Stormwater Quantity." *Source: http://plantscience.psu.edu/research/centers/green-roof/research/stormwater/stormwater-quantity*

5 Reducing Urban Heat Islands: Compendium of Strategies. US EPA, Oct 2008.

North Terrace Monarch Waystation Milkweed plantings

The larvae sustain themselves on milkweed plants until they reach adulthood. Each fall, monarch butterflies migrate from Canada and the United States to Central Mexico for the winter and return north in March. Over the last decade, the monarch population has declined as a result of urban sprawl and herbicide-resistant crops, causing habitat loss. For more information on Monarch Waystations visit www.monarchwatch.org.

4th Floor North Terrace Vegetable and Herb Gardens

The abundant sunlight that reaches the North Terrace makes the location an excellent spot for herb and vegetable gardens. Levy Premium Foodservice ("Levy"), the DLCC's food service provider, maintains 1,200 sq. ft. of planters on the roof terrace. In the summer, these planters produce organically-grown heirloom vegetables and herbs such as squash, peppers, beans, tomatoes, eggplant and parsley, which are enjoyed by attendees during catered events.

In 2016, Levy partnered with 55 Carnegie Mellon University architecture students to develop hoop houses to fit over the pre-existing planters on the terrace roof. The hoop houses act as greenhouses by extending the growing season of the produce, increasing the amount of local food served to event attendees at the DLCC.

Maintenance

All landscape maintenance activity conducted by in-house staff and outside contractors adheres to the DLCC's Integrated Pest Management, Erosion Control, and Landscape Management Plan. In accordance with this plan, landscaping and planters are hand-weeded and any landscaping waste is collected for composting. Fertilizers are rarely used. When fertilizers are needed, they are organic.

HEAT ISLAND MITIGATION

Heat islands occur during the summer when sunlight is absorbed by conventional roofing and paving materials and re-radiated as heat energy, causing urban areas to be 1.8°F to 5.4°F warmer than surrounding rural areas.[6] This phenomenon, known as the "heat island effect," results in increased building cooling costs, air pollution, and health issues during the summer months.

Green roofs and other vegetated spaces mitigate the urban heat island effect by reducing solar heat gain and naturally cool the air through evapotranspiration. Measurements taken during hot summer days on the extensive green roof at the nearby Allegheny County Office Building have shown a 40°F-50°F reduction in surface temperature compared with adjacent conventional roof materials and a reduction of 10-20% in heating and cooling costs.[7]

The urban heat island effect can also be mitigated by selecting materials with high solar reflectance index (SRI) values, which absorb and re-radiate less solar energy than conventional materials. SRI is a comparative measurement of heat gain. A standard black surface has an SRI of 0, while a standard white surface has an SRI of 100 (though other materials may exceed these boundaries).

The DLCC further reduces the contribution to urban heat island effect by using white pavers on the South Terrace Green Roof with an SRI value of 85, significantly reducing heat gain in comparison to conventional materials. The SRI value of the DLCC's curving stainless steel roof was measured *in situ* in August 2010 by McGuire Associates on behalf of the material's manufacturer, Contrarian Metal Resources. In accordance with ASTM 1980, the 249,800 sq. ft. surface's measured SRI was 113.9, 52% higher than the minimum requirements for an ENERGY STAR roofing material.[8] Even on a hot day in full direct sunlight, the DLCC's roof remains only 18°F warmer than the surrounding air while conventional roofs are typically 50°F-90°F warmer.[9]

South Terrace Green Roof Pavers

South Terrace Green Roof

6 Berghage, Robert, et al. Green Roofs for Stormwater Runoff Control. US EPA, Feb 2009.

7 3 Rivers Wet Weather. "Green Roofs." *Source: www.3riverswetweather.org/storm-water-green-solutions/stormwater-bmps/green-roofs*

8 ENERGY STAR Program Requirements for Roof Products. Energy Star.gov, 2010. *Source: https://www.energystar.gov/ia/partners/product_specs/program_reqs/Roof_Products_Program_Requirements.pdf*

9 Heat Island Effect. US EPA, n.d. *Source: https://www.epa.gov/heat-islands*

WATER CONSUMPTION

Potable municipal water used at the DLCC is supplied by the Pittsburgh Water and Sewer Authority (PWSA). This water is used for drinking fountains, faucets, kitchen, and laundry purposes. All plumbing fixtures and fittings used in the building (for both potable water and wastewater systems), meet plumbing code requirements assigned by the Uniform Plumbing Code (UPC) and the International Plumbing Code (IPC) standards required by LEED. Fixtures in all restroom facilities throughout the building are equipped with sensor controls and aerating faucets. In 2016, the DLCC consumed 34% of their total water usage from municipal sources, 57% from the aquifer, and 10% from reclaimed wastewater from the on-site wastewater treatment plant (Figure 2).

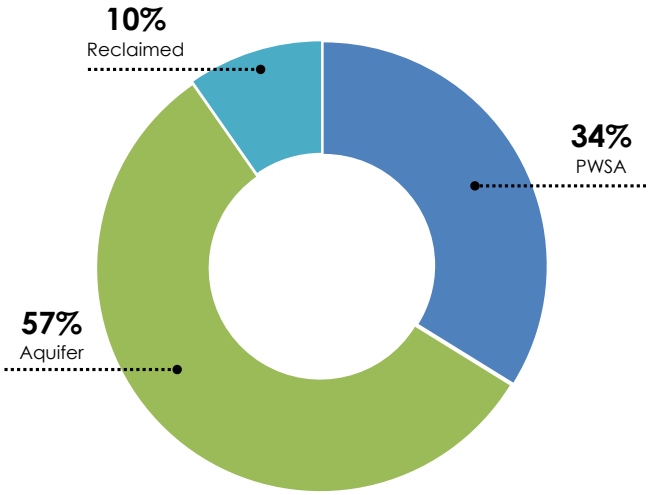
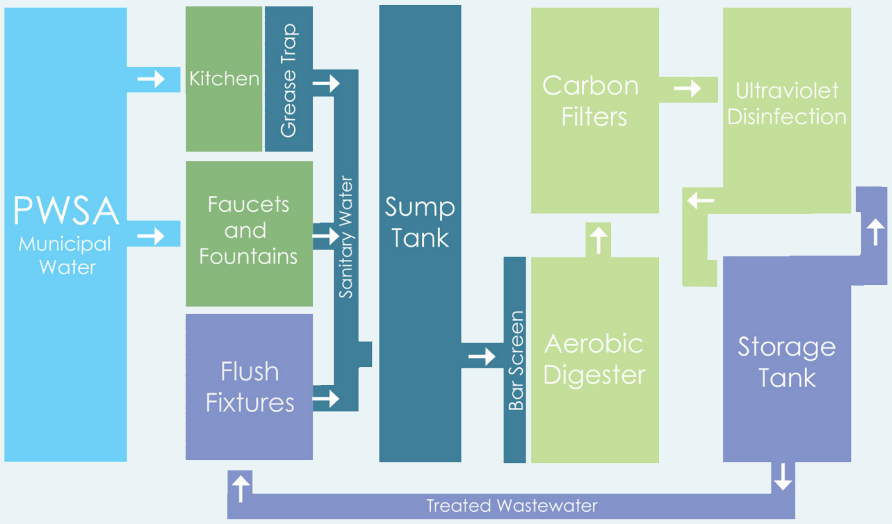


Figure 2. 2016 sources of water use.

WASTEWATER TREATMENT PLANT

The DLCC has a 50,000 gallon capacity on-site wastewater treatment plant that collects and treats wastewater from sanitary and potable uses. This water is recycled throughout the building for toilet flushing once it has been treated. The plant's treatment components include a sump tank, aerobic digester, carbon filter system, and ultraviolet disinfection system. In 2016, the wastewater treatment plant was operated through a contract with Veolia Water North America. One million gallons of water were reused in 2016, accounting for 10% of the total indoor water usage. The 2016 percentage of water consumed from municipal sources is the highest that the DLCC's consumption has been since 2006. This relatively high percentage of municipal water consumption can be attributed to ongoing control system upgrades that were performed on the wastewater treatment plant from December 2015 to August 2016. These necessary upgrades resulted in the water meters for the plant being offline beginning in December 2015. During this time, the plant was operational but water consumption was not being metered. The plant went offline in May 2016 and returned to service in August 2016. The DLCC used municipal water for toilet flushing in lieu of reclaimed wastewater that would have typically been used for this purpose while the plant was being upgraded.



DLCC Wastewater Treatment Plant Process

Although the use of reclaimed water is currently more expensive than paying for municipal water due to the cost of maintaining and operating the plant, the building's decrease in potable water consumption lessens the existing strain on PWSA's and the Allegheny County Sanitary Authority's overall systems. Because the existing municipal sewer system is already undersized for the local demand, recycling wastewater on-site helps to mitigate combined sewer overflows into nearby streams and rivers which is an invaluable benefit to water conservation in the greater Pittsburgh area. In addition, as water and sewage rates continue to rise in the City of Pittsburgh, operating an on-site wastewater treatment plant will continue to make economic sense by providing reclaimed water to the DLCC.

AQUIFER

The Wisconsin Glacial Flow, sometimes referred to as Pittsburgh's "Fourth River," is an aquifer located approximately 50 ft. below the DLCC. Aquifers are geological formations containing or conducting ground water. Although the use of the aquifer conserves municipal water, the aquifer is a precious source of fresh ground water; therefore, every effort is made to conserve the aquifer's use at the building. In total, the aquifer accounted for over 6 million gallons or 57% of the DLCC's water usage in 2016. Using the 2016 average effective rate charged for municipal water, it was estimated that the use of aquifer water saved the DLCC about $82,000 in utility costs.

Cooling Tower

The aquifer is the source for the cooling tower water used in the chiller plant. In 2016, 3.4 million gallons of aquifer water were used by the chiller plant, representing 31% of the DLCC's water requirements. The use of aquifer water eliminates the need for potable water for this purpose.

10th Street Water Feature

The aquifer is the main water source for the 10th Street Water Feature. Using the aquifer to supply the Water Feature reduced the DLCC's use of potable water by over 2.9 million gallons in 2016.

GREEN SPACE IRRIGATION

3rd Floor South Terrace Green Roof

Moisture sensors continually monitor the South Terrace Green Roof's growing medium and control a high-efficiency drip irrigation system based on natural rainfall patterns. These sensors relay data (surface and subsurface soil temperature, soil moisture, and rainfall data) to a web-based monitoring system. This system allows the irrigation cycle to automatically shut off when irrigation is not needed. The South Terrace Green Roof did not require irrigation in 2016, further conserving aquifer water.

11th Street Vegetated Area

It is the DLCC's formal policy to use the irrigation system (aquifer water) serving the 11th Street area only in extreme or prolonged drought conditions. In 2016, the 11th Street irrigation system was not used. Plantings in the 11th street vegetated area consist of native and adaptive species per the building's site and irrigation policy. These species thrive under normal site conditions, eliminating the need for irrigation and fertilizers. The lack of irrigation use for the DLCC in 2016 is notable considering the water needs of conventional irrigation practices.[10]

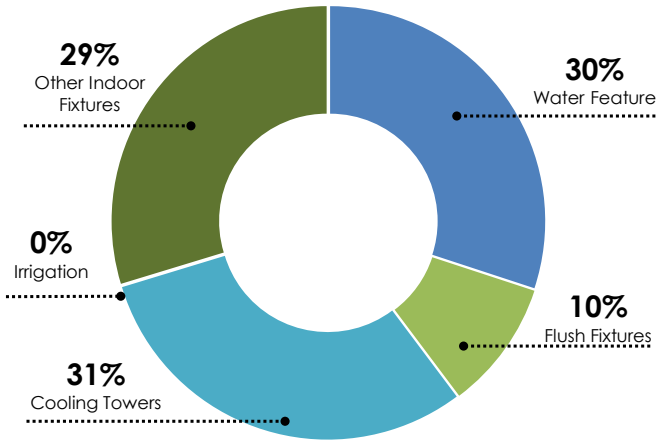
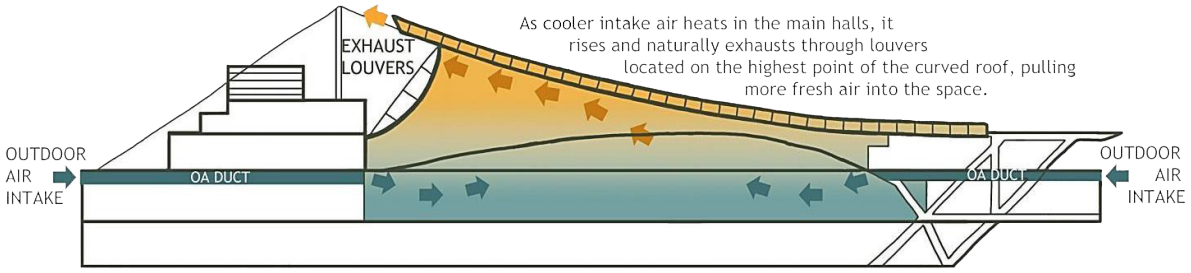


Figure 3. 2016 water end uses.

10 Conventional practice irrigation calculation includes both plant selection and irrigation, as in the LEED for Existing Buildings: O+M design case calculation baseline. LEED does not recognize ground source fresh water, like the aquifer, as a non-potable source.



OPTIMIZING ENERGY USAGE

Due to the nature of the convention industry, the DLCC is subject to significant variations in occupancy, and therefore, in energy demand. In-between events, major spaces may be unoccupied for several days or weeks at a time. During event days, occupancy may range from a few people in a meeting room to thousands of attendees occupying all five exhibit halls. DLCC technicians are able to minimize the energy waste that might result from these patterns by carefully programming HVAC and lighting schedules through the Building Automation System (BAS) to match each client's needs. High-resolution HVAC zoning capabilities and the use of variable fan drives allow conditioning to be turned on or off in each room. Lighting systems are controllable on a fixture-by-fixture basis, such that lighting can be completely customized to event needs. When spaces are not occupied by either attendees or staff, they are left dark and unconditioned.

NATURAL VENTILATION

The natural ventilation system is capable of delivering direct outdoor air to the main exhibit halls and is used when weather conditions are suitable. Operable intake louvers are located along all four walls of the building between the second and third floor level.

When the system is in operation, outdoor air is directly ducted to the primary exhibit halls and released through identical interior louvers. Exhaust louvers are located along the higher end of the building's curved roof letting warmer air flow out, with the resulting lower pressure at floor level causing outside air to flow inside the building. This process is commonly referred to as the "chimney effect" or "stack effect."[11]

Building technicians operate the natural ventilation system through the same computer-based building automation system as the mechanical air handling units. Through the BAS, the pneumatic valves that open and close each damper can be controlled from a single interface. When the natural ventilation system is in operation, the BAS automatically records and monitors airflow and building pressure. The system is used when the outside air temperature is between 45°F and 64°F. The natural ventilation system was utilized for 85 days in 2016, which accounts for event days as well as exhibit hall move-in and move-out days, eliminating the need for artificial cooling or heating of the spaces on those days. Using the natural ventilation system when conditions allow, particularly in spring and fall months, contributes to energy conservation by eliminating the need for mechanical heating and cooling.

11 For an explanation on how the "stack effect" or "chimney effect" works, visit: http://www.greenbuildingadvisor.com/stack-effect-when-buildings-act-chimneys

DAYLIGHTING

The original design team built a physical model of the building to test for the most effective daylighting strategy. Of the regularly occupied spaces in the building, 85% are daylit, which reduces the need for artificial lighting and energy use. The main exhibit halls can be entirely lit by daylight. The DLCC was the first convention center in the world to implement daylighting on such an extensive scale, departing from the typical "black box" convention center model.

Natural Daylighting in Exhibit Hall A

SPACE CONDITIONING

Heating

The building uses steam provided by Pittsburgh Allegheny County Thermal (PACT) to heat the building in the winter months. After the steam is used for this purpose, it condenses to become hot condensate. The DLCC is equipped with a pump system to return the 170°F-180°F condensate water back to PACT. This system increases the efficiency at the PACT facility by providing hot water for their process.

In 2014, PACT advised the DLCC that the 4-inch steam line that was currently used to deliver steam to the building was not accurately measuring low steam flow during periods of low heating demand. In March 2014, PACT switched the DLCC to a 3-inch line; however, the smaller line was not capable of providing enough steam during high demand months in the winter. Because of this, the DLCC and PACT agreed to use the 4-inch line between December 1 and March 15, and to use the 3-inch line for the rest of the heating season in order to gain a more accurate measure of steam consumed by the DLCC.

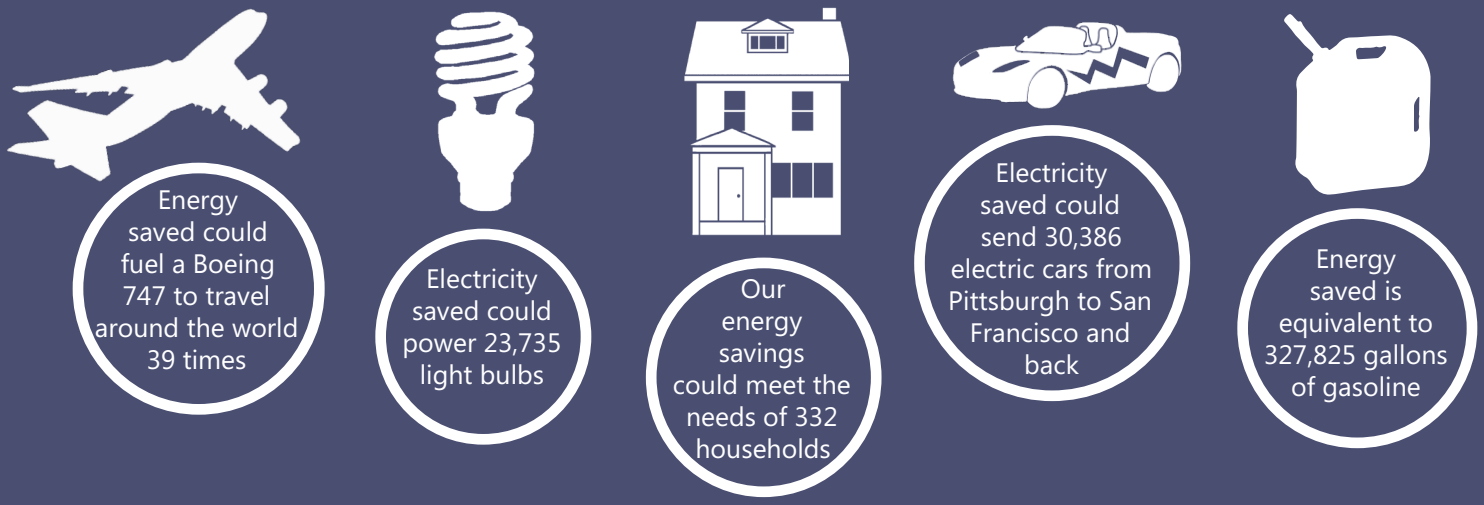
Cooling

Cooling in the building is provided by an on-site chiller plant that is operated through a contract with Veolia Water North America. The cooling towers are supplied by filtered aquifer water instead of municipally-supplied potable water. Water cooling is delivered to spaces through cooling coils in the air handling units. The building's HVAC system uses low-temperature cooling equipment, which enables higher efficiencies. The plant equipment consists of two 1,500 ton centrifugal chillers, a 750 ton centrifugal chiller with a variable frequency drive, an idled 1,500 ton chiller, and two 6,000 gallon capacity cooling towers (See the "Conservation Measures – 2013 / 2014: Chiller Plant Reconfiguration" section for more information about the chiller plant).

OZONE-DEPLETING SUBSTANCES

The DLCC does not use equipment containing chlorofluorocarbons (CFCs), which are known to damage the ozone layer. Building and food and beverage equipment use less damaging hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), which balance potential environmental impact with desired efficiency. The DLCC's weighted average refrigerant impact per ton is 21, much less than the threshold of 100 required by the LEED for Existing Buildings: O+M rating system.[12]

12 For more information on the refrigerant impact determination used here, please see The Treatment by LEED of the Environmental Impact of HVAC Refrigerants, TSAC HCFC Task Group, 2004, available at http://leadinggreen.com/wp-content/uploads/2014/01/The-Treatment-by-LEED-of-the-Environmental-Impact-of-HVAC-Refrigerants.pdf



ENERGY STAR PORTFOLIO MANAGER

Energy Star Portfolio Manager is a web-based energy management tool developed by the U.S. EPA and the U.S. Department of Energy as a component of the ENERGY STAR energy performance rating system. The SEA began using Portfolio Manager in 2010 so that all utility information could be accessed. Although the DLCC is not able to obtain an ENERGY STAR rating (convention centers are not eligible), the figures generated by the Portfolio Manager tool can be benchmarked against a standard used for LEED for Existing Buildings: O+M certification. Based on this benchmarking, the DLCC performed 30% better than the national average of all entertainment venues in 2016.

ENERGY PERFORMANCE

In 2016, the DLCC's total Site Energy Usage Intensity (EUI) (the total energy consumed by a building relative to its size) was 61.6 (kBtu/sf) and is a 32% reduction from the DLCC's baseline year.[13] However, it is important to note that the energy usage profile of the building varies greatly from year to year without consideration of the efficiency of the systems (see Figure 4 for a historical view of energy use). In order to gain a more accurate representation of energy use, the data can be normalized for event attendance. Considering the per-attendee energy use intensity, the 2016 usage is a 20% reduction compared to the 2004 baseline per-attendee energy intensity.[14]

Energy demands at the DLCC are impacted by factors such as event size, square footage used, event schedule, type of event, seasonality (heating degree days [HDD] and cooling degree days [CDD]),[15] and the needs of attendees and event planners. Changes in seasonality typically influence the electricity used to produce chilled water in warming months, and steam use in colder months (Figures 5 and 6).

In 2016, the DLCC used 49,301,873 kBtu[16] (14,449,552 kWh) of total electricity. Of this total, electricity from the chiller plant[17] was 5,774,015 kBtu (1,692,267 kWh) and all other electricity consumption was 43,527,858 kBtu (12,757,285 kWh). PACT Steam consumption was 33,072,248 kBtu (27,699 kLb) and natural gas was 1,064,192 kBtu (1,034 Mcf) (Figure 7).

13 As reported by the Green Building Alliance 2030 District 2017 building report to the Convention Center, this adjusted EUI considers up to 10% of the DLCC's annual renewable energy credits (RECs). The non-adjusted site EUI for the building is about 70 kBtu/sf, representing a 22% reduction below the 2004 baseline year of 90.2 kBtu/sf.

14 It is recognized, however, that a per-attendee intensity measure is an imperfect measure that does not take into account building activity level and demand, weather, event-specific volume, type, schedule, size and needs of attendees and event planners. A per-attendee measurement is used because it is easily quantifiable by dividing the building's total energy consumption by number of attendees to the building in 2016.

15 Cooling degree days (CDD) are defined as the number of degrees that a day's average temperature exceeds 65°F. Conversely, heating degree days (HDD) are the number of degrees that a day's average temperature is below 65°F. There were 19% more cooling degree days (CCD) in 2016 (CDD = 1150) compared to 2015 (CDD = 965). Additionally, there were a total of 4,869 HDD in 2016, 11% less compared to 2015.

16 For consistency and comparability, all energy performance metrics (electricity, steam, and natural gas) can be expressed in a common standard unit called thousand British thermal units (kBtu). For more information on ENERGY STAR and thermal conversion factors, see "Portfolio Manager Technical Reference: Thermal Conversion Factors" at https://www.energystar.gov/buildings/tools-and-resources?search=thermal

17 Electricity from the chilled water plant does not include electricity generated by air-handling units (AHUs) that would contribute additional electricity to this figure. Electricity from AHUs is captured in "other" electricity.

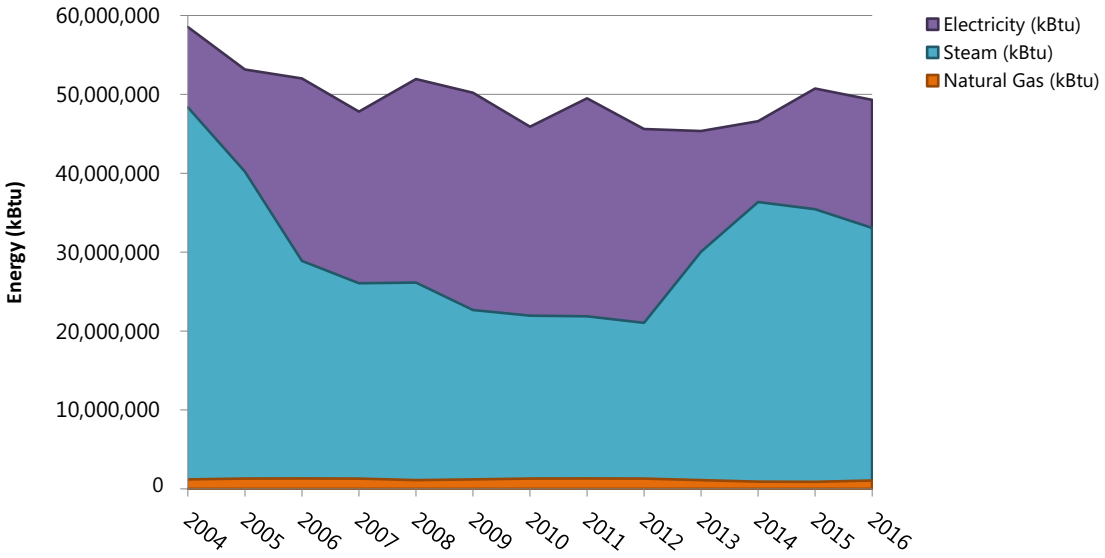


Figure 4. Annual energy consumption from 2004-2016.

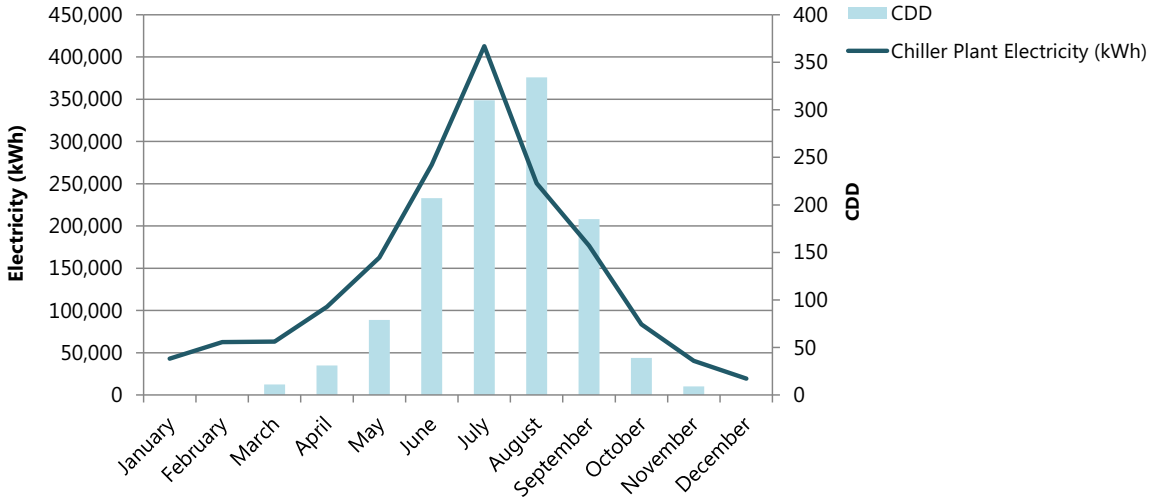


Figure 5. 2016 cooling degree days (CDD) and chiller plant electricity.

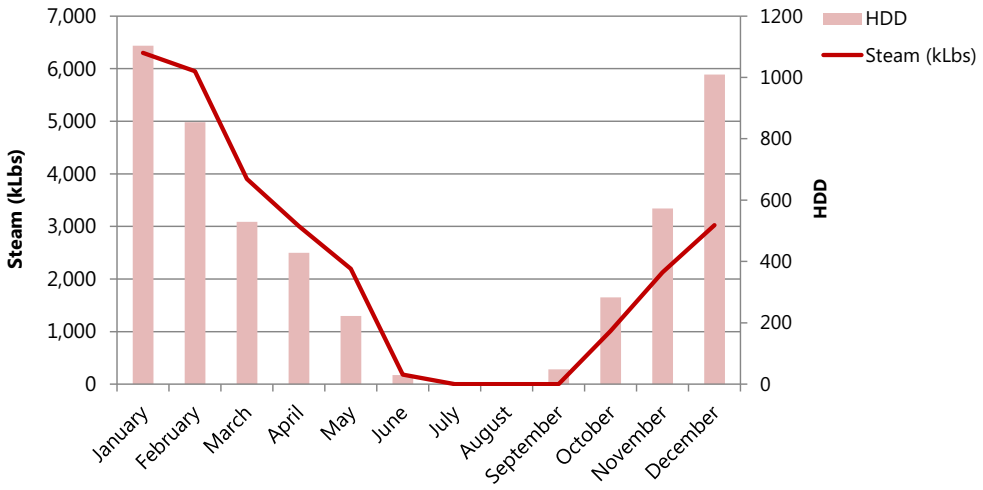


Figure 6. 2016 heating degree days (HDD) and steam consumption.

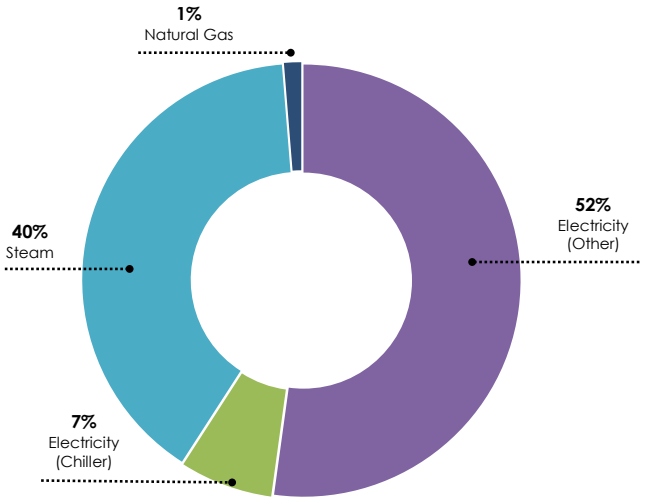


Figure 7. 2016 energy sources.

ENERGY PERFORMANCE VERIFICATION

The original commissioning of the facility was completed by Burt Hill Kosar Rittelmann Associates (BHKR), with a final report being issued in November 2004. In July 2006, BHKR provided a report which described the estimated energy utilization for the DLCC. BHKR concluded that the DLCC was performing as originally intended with respect to energy consumption, as demonstrated by energy utilization models.[18]

The 2006 BHKR study was analyzed as part of the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011). The analysis concluded that actual performance is consistent with the 2006 BHKR model and the DLCC is meeting, if not exceeding, forecasted energy savings.[19] Based on this energy reduction over the ASHRAE-defined baseline model, the DLCC has saved $3,031,311 in electricity costs since 2004.[20]

DEMAND RESPONSE

Demand response curtailment is a program through which businesses receive payments for voluntarily reducing their electricity use when heavy demand threatens the reliability of the region's electricity grid. In June 2016, the SEA entered into a two year curtailment service provider agreement with EnerNOC. The DLCC turns off non-essential electrical loads, such as the 10th Street Water Feature lighting, in order to reduce electricity demand during electrical grid emergency events. In 2016, the DLCC reduced its peak load of electricity to 1,500 kWh for one test event. It is recognized that during building events, demand response strategies must be conservative in order to keep event attendees comfortable. There is no penalty to the DLCC for non-compliance.

ACT 129 INCENTIVES

The *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011) provided recommendations for improvements in energy efficiency, the majority of which have been implemented.[21] Additional projects for energy conservation have been identified and implemented as a result of ongoing operations and maintenance of the DLCC.

Special consideration is given to energy efficiency projects that qualify for the Act 129 incentive funds. Signed into law in 2008, Act 129 requires electric distribution companies in Pennsylvania to develop cost-effective plans that will reduce energy consumption across their service territory by specific percentages in target years. Duquesne Light, the DLCC's electricity provider, has an Act 129 compliant commercial sector incentive program based on kilowatt-hours saved. Duquesne Light has provided partial reimbursement to the SEA for qualified projects and upgrades including:

- Wastewater treatment plant control system upgrade
- Building automation system upgrade (ongoing)
- Chiller plant reconfiguration
- DLCC parking garage LED lighting upgrade
- Water feature lighting upgrade
- Local cooling units
- Lighting upgrades for the loading docks, utility corridors, and stairwells
- Natural ventilation system repairs

The DLCC has implemented the use of sub-meters for electricity and water use in the building. Having these sub-meters installed (see Table 2) helps to provide the DLCC with a record of energy and cost savings resulting from building investments. For a timeline of the DLCC's conservation measures and electricity reductions compared to the DLCC's baseline performance, see Appendix D.

18 See BHKR Associates (2006), David L. Lawrence Convention Center Energy Study for the Sports and Exhibition Authority.

19 See the *David L. Lawrence Convention Center: A Building in Operation [Bio] Case Study* (2011), Section 2.1 Benchmarking for more information.

20 As of 2016, energy saved from 2004 has been adjusted to reflect the actual annual utility rates and annual energy mix for electricity and steam on a year to year basis to provide for a more accurate estimation of savings.

21 See the *David L. Lawrence Convention Center: A Building in Operation [Bio] Case Study* (2011), Section 3.1 Energy Conservation Measures for further discussion of each recommendation.

Table 2. Water and electrical sub-metered systems at the DLCC.

ELECTRICAL SUB-METERS
Chiller Plant (800amp/400amp)
Water Feature motors
AT&T cellular tower equipment
Electric vehicle charging stations
Retail spaces
Waste Water Treatment Plant
SEA Offices
DLCC parking garage lighting*

WATER SUB-METERS
Cooling tower make-up (aquifer water)
Water Feature (aquifer/municipal water)
11th Street irrigation (aquifer water)
South Terrace Green Roof irrigation (aquifer water)
Retail spaces (reclaimed water/municipal water)
Waste Water Treatment Plant (municipal water make-up/ bypass water, ancillary water use)
SEA Office

*The DLCC parking garage is not monitored through a sub-metering device for electricity consumption; however, data can be extracted through an electrical controls interface when needed.

2015 - 2016

Wastewater Treatment Plant Control System Upgrade

Deckman Control Systems completed upgrades to the controls of the wastewater treatment plant through installation of new control software from December 2015 to August 2016. The software integrated the controls with the existing Alerton BAS software system. In addition to giving the wastewater treatment plant operators remote access to the plant controls, the DLCC is able to collect data from water and electrical meters that were installed as part of this project. In the event of a mechanical issue, the controls can automatically switch over to the municipal water backup supply, avoiding any interruption of service.

To further improve the plant's efficiency, the current aeration blowers were equipped with variable frequency drives which directly resulted in a savings of over 29,000 kWh in only nine months of operation in 2016. The actual tested energy savings of this improvement were nearly double of what the estimated annual savings were.[22] This project qualified for an Act 129 rebate of $3,750 and has an estimated payback period of 2.1 years.

2014 - 2017

Building Automation System Upgrade

A full system upgrade of the BAS was started in 2014 and will be completed in 2017. The BAS system components installed as a part of the original construction of the DLCC are technologically obsolete and/or have exceeded their useful life. An upgrade is necessary to keep the HVAC system operating properly.[23]

The upgrade includes hardware replacement and software updates on the BAS user interface computer workstation and a full re-commissioning of all network-level controllers, field-level controllers, and end devices. An ongoing service contract is also put in place to maintain commissioning efforts for maximum system efficiency. In addition to estimated savings in utility costs, this project will be eligible for an Act 129 rebate, estimated at $30,000 to $50,000, and has an estimated payback period of 4.1 years.

22 Veolia Water North America initially estimated that this upgrade would save 50,000 kWh of electricity in one year. Upon actual testing of the upgraded system, this project is projected to save at least 94,431 kWh of electricity on an annual basis, resulting in an estimated savings of $6,960 in electricity costs per year based on the 2016 average rate per kWh.

23 This project was recommended by *The David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011).

2013 / 2014

Chiller Plant Reconfiguration

The original chiller plant equipment consisted of four 1,500 ton Trane Model CVHF Centrifugal Chillers and two 6,000 gallon capacity cooling towers. The plant was originally sized for a cooling design load for maximum use of the building and operation of an adjacent hotel, yet to be built. The design loads significantly exceeded the actual usage loads. As a result, the chillers had an excessive number of start and stop cycles. The low load condition also affected the efficiency of the chillers, increasing electricity consumption by 150% or more.

By the summer of 2013, all four chillers required repairs. Two of the original chillers, and one cooling tower, were taken offline and the motors of these two chillers were rebuilt and placed back into service. A third chiller was idled and still remains on-site. In August 2014, the fourth original 1,500 ton chiller was removed and replaced with a 750 ton Trane centrifugal chiller with a variable frequency drive. This 750 ton chiller helps to address low load conditions and increases the efficiency of the chiller plant, resulting in electricity savings for the DLCC. Following its removal from the chiller plant, the 1,500 ton chiller was dismantled and sent to a metals recycling facility. The installation of the 750 ton chiller qualified for an Act 129 rebate of $63,871 and a payback period of 4.8 years.

With these improvements, the amount of electricity used to produce a ton-hour of chilled water decreased from 2.12 kWh per ton-hour of chilled water in 2013 (prior to improvements) to 1.15 kWh per ton-hour in 2016, resulting in a 46% increase in production efficiency. This resulted in a savings of $123,043 in electricity costs for the DLCC in 2016 alone. This savings represents 10% of the DLCC's total 2016 electricity costs. Since upgrades were made, the DLCC avoided a total of $256,351 in electricity costs due to the improved efficiency of the plant.[24]

Another benefit of this project was the reduction in the total amount of refrigerant used in the plant. By replacing one of the 1,500-ton chillers with the 750-ton chiller and removing a second 1,500-ton chiller from service, the chiller plant's total refrigerant usage has decreased from 11,200 pounds to 7,250 pounds.

Parking Garage LED Lighting Upgrade

Lighting technology has advanced significantly since the DLCC was originally constructed. The original DLCC parking garage lighting consisted of uncontrolled metal halide fixtures. The new parking garage lighting project, started in 2013 and completed in 2014, included the installation of new LED fixtures and a wireless control system which incorporates occupancy sensors for increased energy savings.[25]

This project was designed to reduce annual electricity usage in the garage and annual maintenance costs due to the increased life of the fixtures. The estimated payback period for the project is 5.5 years. The parking garage lighting project qualified for $28,608 in Act 129 rebate which is included in the payback calculation.

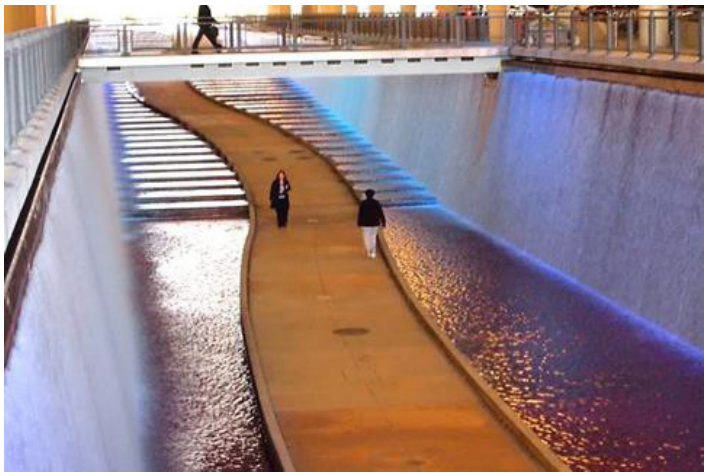
24 This cumulative savings is based on the monthly production efficiencies (kWh/ton-hr) of the 2013 baseline year before upgrades were made.

25 This project was recommended by *The David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011).

2012

Water Feature Lighting Upgrade

The 10th Street Water Feature was originally illuminated by underwater metal halide fixtures. For the lighting upgrade, the fixtures were removed from the pools and new LED lights were installed above the Water Feature. This project reduced the lighting load by 95% and is saving an additional $60,000 (estimated) in annual maintenance costs due to the increased life of the fixtures. Mounting the new fixtures to the ceiling also eliminates the damage from flooding that was experienced previously. The estimated payback for the project is 4.1 years. The project qualified for $36,149 in an Act 129 rebate which is included in the calculation.[26]



10th Street Water Feature

2011

Local Cooling Units

New independent cooling units were installed for the information technology / audio visual (IT/AV) computer equipment rooms. The IT/AV rooms require year-round cooling. These independent cooling units allow for the complete shutdown of the chiller plant when cooling is not needed elsewhere. The annual electricity savings for this project was estimated at 600,000 kWh.[27] By providing for about $75,000 in electricity savings, the local cooling unit project qualified for $35,485 in Act 129 rebates and had a payback period of 1.5 years.

Power Factor Correction

Monthly utility bills for the building included Power Factor penalties ranging from 1.16 to 1.45 times demand charges, which resulted in increased annual utility costs at an average of $71,500 per year. The installation of two capacitors in August 2011 reduced the Power Factor multiplier to 1.0, resulting in significant annual cost savings. The DLCC has not received a Power Factor penalty charge since the installation of the capacitors. The payback period for this project was 4.2 years.

Lighting Upgrades: Loading Docks, Utility Corridors, and Stairwells[28]

The 2011 lighting upgrades included a fixture change and the addition of occupancy sensors in the loading docks, utility corridors, and stairwells. The estimated payback period for the project was 4 years. The payback calculation includes the Act 129 rebate which was $26,680.

Natural Ventilation System Repairs[22]

The natural ventilation system repairs began in October 2011. The initial phase included minor repairs, cleaning, adding access doors, and repairing dampers that were stuck in the open position. In order to have a fully functioning system and reap the maximum energy savings as an integral component of the building's BAS, a second phase of more robust repairs was completed in 2012. The completion of this project has resulted in approximately $65,000 in energy savings per year.[29]

26 Ibid.

27 Ibid.

28 A portion of the lighting and natural ventilation projects were completed in 2012.

29 This project was recommended by *The David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011).

The DLCC quantifies annual greenhouse gas (GHG) emissions using the methodology of the GHG Protocol Initiative and the ENERGY STAR Portfolio Manager program.[30] The DLCC strives to reduce its impact on the climate by reducing both total emissions (actual emissions produced as a result of on-site activities) and net emissions (total emissions less carbon offset strategies).

CARBON OFFSET STRATEGIES

Although energy conservation is the primary strategy for reducing total emissions, technological limitations and the need to balance environmental concerns with the goals of clients, limit its effectiveness as a single tactic. The DLCC continues to evaluate strategies to reduce total GHG emissions, including the pursuit of planned upgrades and working closely with clients during the event planning process. The DLCC has complemented conservation efforts with ongoing carbon offset strategies to make a greater difference in emission reductions.

The SEA, City of Pittsburgh, Allegheny County, and PWSA, among others, entered into an aggregated electricity procurement agreement which stipulates that a percentage of the electricity purchased is derived from Green-e certified sources.[31] In 2016, the SEA purchased 30% of electricity from renewable sources. In May 2017, an agreement commenced with Direct Energy which provides for the procurement of 35% electricity from Green-e certified sources.

In 2016, to coincide with the DLCC's pursuit of LEED for Existing Buildings: O+M recertification, further measures were sought to offset remaining GHG emissions. In November 2016, the DLCC purchased Carbon Offsets to offset 28.8% of the DLCC's total carbon emissions. Emissions from steam and natural gas, which were not included in the existing procurement agreement with Direct Energy, were separately covered by the purchase Carbon Offsets created by landfill gas mitigation projects.

30 The GHG Protocol is the most widely used and accepted emissions accounting methodology. More information may be found at ghgprotocol.org.

31 Green-e certification is a nationally recognized program to help consumers identify green electricity products that have undergone an independent, third-party certification.

2016 TOTAL EMISSIONS

Total emissions in 2016 were equivalent to 12,466 metric tons of carbon dioxide ($MtCO_2e$), 10,224 Mt of which were from electricity consumption, 2,187 Mt were from steam consumption and 55 Mt were from natural gas consumption. This is a reduction of 19% below the 2004 baseline of 15,397 Mt.

Emissions intensity (the total emissions of a building relative to its size) per attendee amounted to $4.6x10^{-5}$ pounds CO_2e/sf/attendee.[32] Measuring progress against the DLCC's historical performance is the main focus of this report, but it is also important to note how actual emissions compare to the facility's originally predicted performance. Based on the source breakdown present in the BHKR energy model[33] and current emissions factors, the theoretical baseline building used to predict the DLCC's energy performance would produce 15,814 $MtCO_2e$ annually. As a result of the sustainable components integrated into the building's original design and improvements made, the DLCC has saved an accumulated total of 44,769 $MtCO_2e$ from this baseline since 2004.

NET EMISSIONS

Net emissions are determined by subtracting the emissions mitigated through carbon offset strategies from total emissions. Net emissions in 2016 were equivalent 5,186 $MtCO_2e$, which takes into account the carbon mitigation realized from the purchase of 30% electricity from Green-e climate sources and also the purchase of 4,437 $MtCO_2e$ Green-e Climate Landfill Gas Carbon Offsets from the Climate Action Reserve. As a result of carbon offset strategies, the DLCC has mitigated 87,105 $MtCO_2e$ since 2004.

ELECTRIC VEHICLE CHARGING STATIONS

As part of a greater effort to reduce emissions in the region, the SEA, in partnership with Pittsburgh Region Clean Cities and 13 other local organizations, received a grant through the Alternative Fuels Incentive Program to provide 40% funding for two Tier 2 electric vehicle charging stations in the DLCC's public parking garage in 2011. They were installed in December 2012 as the first publicly-accessible EV charging stations in Downtown Pittsburgh, providing an amenity to DLCC attendees and local commuters. The stations are part of the Energy Corridor 376 project that established 45 electric vehicle charging stations along Interstate 376 and surrounding areas. Energy Corridor 376 is a partnership of 19 regional public and private entities working to expand electric vehicle infrastructure in the region.

In 2016, 5,100 kWh of electricity was used in the charging process. Based on the fuel economy of a 2016 Nissan Leaf,[34] this charging activity at the DLCC provided the electricity needed for an electric vehicle to travel more than 17,000 miles, saving an equivalent of about 548 gallons of gasoline.[35] The cost to the DLCC for these two charging stations was $418 in 2016, based on electricity used.

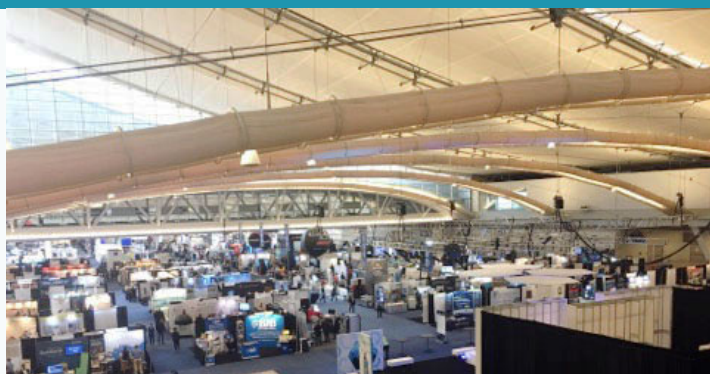
32 In previous years, emissions from the SEA office had been excluded from the emissions totals of the DLCC. Since 2015, all emissions from the SEA office are included in the results of this report as there are currently 4 years of consistent and reliable data.

33 The energy model used in the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011). See Section 2.1 Benchmarking | Internal for further details.

34 "Find and Compare Cars: 2017 Nissan Leaf." Fuel Economy. US Department of Energy. *Source: https://www.fueleconomy.gov/feg/noframes/38428.shtml*

35 "2017 Nissan Altima" 31 mpg city/highway. *Source: https://www.fueleconomy.gov/feg/bymodel/2017_Nissan_Altima.shtml*

Providing an exceptional indoor environment is a key goal of the DLCC. Through effective ventilation, pollution source control methods, and constant monitoring, the DLCC strives to ensure the health and well-being of all building occupants.



VENTILATION RATES

Adequate ventilation is an essential step in maintaining high indoor air quality (IAQ) levels. Higher ventilation rates have been shown to improve occupant comfort, increase productivity, and promote general well-being.[36] Increasing ventilation also dilutes and eliminates indoor air contaminants, preventing IAQ-related health issues such as Sick Building Syndrome. Mechanical and natural ventilation strategies are employed at the DLCC and are detailed below.

Mechanical Ventilation

All mechanical air-handling units in the facility are tested regularly to confirm they are capable of exceeding the prescriptive ventilation rate requirements of ANSI/ASHRAE Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality. The most recent testing cycle was completed in 2016. Each air handling unit undergoes maintenance every 3,000 hours runtime to keep all components working properly. Key IAQ-related factors such as CO_2 levels and temperature are continually monitored by a centralized Building Automation System (BAS), and can be adjusted in real-time through this system to maintain the client's requested setpoints. If any contaminants ever exceed recommended maximum acceptable levels, 100% outside air is brought into the room until indoor air quality is restored.

Natural Ventilation

The natural ventilation system incorporated in the main exhibit halls was modeled during the building's design in order to confirm its ability to provide adequate ventilation. When this system is in operation, airflow and building pressure are automatically recorded by the BAS. Additional mobile CO_2 monitors, which can be placed directly in the breathing zone and moved to accommodate each event layout, are added prior to use of the natural ventilation system to ensure that indoor air quality standards are maintained.

SOURCE CONTROL AND GREEN CLEANING

The IAQ management process is simplified by reducing air pollutants at their sources. Volatile organic compounds (VOCs), commonly found in paints, adhesives, and furniture assemblies, are a common source of IAQ-related health issues.[37] During the DLCC's design and construction, indoor materials with low VOC concentrations were installed to prevent the accumulation of harmful chemicals. Following those original standards, recommended by LEED, the DLCC's Sustainable Purchasing Policy mandates that all products used during ongoing facility maintenance adhere to the VOC limits set forth by the South Coast Air Quality Management District (SCAQMD).

The DLCC's Green Cleaning Policy and Plan also mitigates contaminants and contributes to exceptional indoor air quality. The plan specifies the use of sustainable cleaning products, including those which meet applicable Green Seal standards,[38] are made of bio-based and biodegradable content, and/or have low VOC concentrations. Green Seal provides several standards that are based on life cycle research of environmental impacts and are recognized by LEED.

Continued on next page

36 U.S. Green Building Council. LEED for Existing Buildings: Operations and Maintenance v2009 Reference Guide, page 330.

37 "Volatile Organic Compounds." An Introduction to Indoor Environmental Air Quality (IAQ). US EPA, 03 May 2012.

38 Green Seal provides environmental certification standards to help manufacturers, purchasers and consumers make responsible product choices. To learn more about Green Seal Standards, visit http://www.greenseal.org/AboutGreenSeal.aspx.

In 2016, 55% of the cleaning products purchased (by cost) met the goals provided in the DLCC Green Cleaning Policy and Plan.

To help protect the health of housekeeping staff, sustainability standards were also created for all indoor and outdoor cleaning equipment. In 2016, 100% of the cleaning equipment purchased met at least one or more applicable purchasing criteria, including dust-capturing filters, low operating noise levels, and ergonomic design. All cleaning equipment is scheduled to be serviced regularly and maintenance logs are tracked to ensure that equipment continues to operate safely and at peak efficiency.

TRANSPORTATION

The SEA and DLCC's management does not have direct control over transportation modes chosen by building employees, but these decisions are a component of the facility's environmental impact. As part of the 2016 LEED for Existing Buildings: Operations and Maintenance (O+M) recertification process, transportation surveys were administered to all DLCC employees.[39]

DLCC Employees

Employees were surveyed during a seven day week in February, 2016. The survey requested information on the employee transportation choices for each working day of the week prior to taking the survey. During the survey period, 57% of employees commuted by single occupant vehicle (SOV), 11% of employees drove green vehicles[40], 5% carpooled with at least one other person, 35% rode the bus, 1% walked to work, and 2% of employees had a combination of different modes of transportation in one work-day (Figure 8). The survey results showed that 59.2% of commuting trips were more sustainable than conventional commuting[41]. The average one-way commuting distance for DLCC employees was 10.3 miles.

To calculate the carbon footprint of employee commuting, estimations can be made based on the national average emission rates for each transportation mode, the number of days worked by each employee, and the length of each employee's commute. Using this method, the commuting footprint within the survey period was estimated to be 1.80 $MtCO_2e$, which is 63.4% lower than if all employees had chosen to drive their personal vehicle to work [42].

Commuting by single occupant vehicle was responsible for 83% of the total estimated emissions during the week (Figure 9). Due to the variability of operational schedules over the year, annual emissions have not been extrapolated from the 2016 survey.

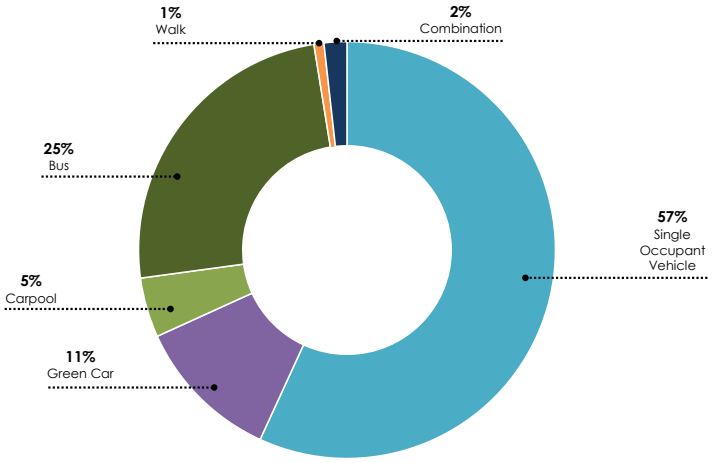


Figure 8. Employee commuting survey responses.

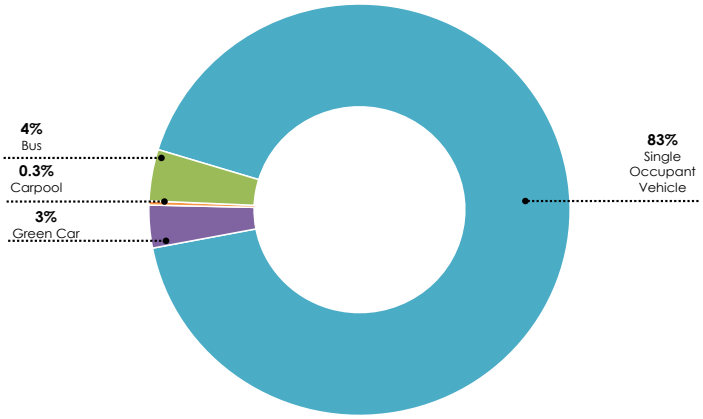


Figure 9. Transportation mode emissions.

39 In accordance with current LEED guidelines, adapted from SCAQMD Rule 2202, overall impact was determined by measuring the percentage of trips to and from the building that used alternative transportation modes.

40 Green vehicles are classified as vehicles that have a minimum green score of 40 of the vehicle-rating guide of ACEEE.

41 Conventional commuting trips are classified as the total number of single occupant vehicle trips plus half of the number of the carpool trips taken by employees. This number is divided by the total number of trips recorded by the survey to get the percentage of conventional trips. Conventional commuting trips from this survey were 40.8%.

42 "Personal Vehicle" is defined as a SOV that does not have a ACEEE green vehicle rating of 40 or above.

At the DLCC, environmental management strategies aim to minimize the depletion of natural resources at each stage of the manufacturing cycle. This includes reducing unnecessary source waste, recycling as much material as possible, and by purchasing materials with high levels of recycled content or other positive environmental qualities.

SUSTAINABLE PURCHASING BY CATEGORY

In April 2011, the DLCC instituted a Sustainable Purchasing Policy which formalized and quantified preexisting practices regarding material purchases. The policy covers all purchases made by SMG, the DLCC's building operator, including office supplies, furniture, electronic equipment, lamps, and cleaning products. The policy includes specific sustainability criteria for each purchasing category, aligning to the LEED for Existing Buildings: Operations and Maintenance (O+M) rating system standards.[43] When possible, the DLCC requests that its retail vendors and its supply chain provide goods, packaging, and shipping options with product lifecycle impacts in mind. The DLCC makes its purchasing decisions based on these sustainability-related factors.

The DLCC has developed a sustainable purchasing tracking system that is integrated into the existing accounting program. This facilitates regular evaluation of current purchasing performance against the goals set forth in the Sustainable Purchasing Policy. Criteria for each category, along with 2016 performance, are listed in Table 3.

LOCAL PURCHASING

When practical, the DLCC purchases goods that are manufactured locally which supports the local economy and reduces energy needed to transport materials. During the event planning process, clients are also encouraged by event services staff to use local manufacturers, printers, and suppliers in order to reduce their own impact.

LEVY PREMIUM FOODSERVICE

The DLCC's exclusive food and beverage provider is Levy Premium Foodservice. Levy has developed a set of sustainable catering options and practices for events which can be implemented whenever feasible. In January 2016, Levy reports that the DLCC was designated as a Platinum Plate Sustainable Pittsburgh Restaurant for its commitment to sustainability. As a program developed by Sustainable Pittsburgh, a Sustainable Pittsburgh Restaurant demonstrates a commitment to managing the social and environmental impacts of its operations as central to its strategy for business success.

In alignment with LEED guidelines, sustainable choices consist of food that is organic, extracted and produced within a 100 mile radius of the site, and meet equitable harvesting standards.[44] The large volume of food purchases required to meet demand each year, as well as the geographic location of the DLCC are some challenges to local food sourcing. Although it is not currently possible to achieve 100% locally-sourced products, 28% of all food and beverage purchases in 2016 were local. Levy also maintains 120 linear feet of rooftop planters on the fourth floor North Terrace, growing herbs and vegetables which are served during catered events throughout the growing season.

The use of local and organic ingredients is highly dependent on the requests of clients, and must be able to suit both the volume of food requested and the client's price point.

43 Per the DLCC's LEED for Existing Buildings: Operations and Maintenance (O+M) certification, up to 10% of the building's square footage can be exempt from the Sustainable Purchasing credit as the facility includes outside vendors whose purchases are not controlled through SMG.

44 Standards include: Food Alliance Certified, Protected Harvest Certified, Fair Trade, or the Marine Stewardship Council's Blue Eco-Label.

Table 3. Sustainable purchasing by category.

CATEGORY	CRITERIA	GOAL*	2016 PERFORMANCE
ONGOING CONSUMABLES**	•Contain at least 10% post-consumer and/or 20% post-industrial content •Contain at least 50% rapidly renewable material •Contain at least 50% materials harvested and extracted within a 500-mile radius •Contain at least 50% Forest Stewardship Council (FSC)-certified paper products •Contain rechargeable batteries	50%	99%
FURNITURE	•Contain at least 10% post-consumer and/or 20% post-industrial content •Contain at least 70% salvaged materials •Contain at least 50% rapidly renewable materials •Contain at least 50% materials harvested, extracted, and processed within a 500 mile radius •Contain at least 50% FSC-certified products	40%	100%
ELECTRONICS	•Energy Star-labeled products, when available •Electronic Product Environmental Assessment Tools (EPEAT) bronze-rated products or better •Maintenance equipment and vehicles which replace conventional gas-powered equipment	40%	93%
CLEANING PRODUCTS	•Meet the applicable Green Seal standard for the product •Meet the applicable Environmental Choice standard for the product •Follow the EPA's Comprehensive Procurement Guidelines •Are USDA Certified Bio-based products •Do not exceed the maximum volatile organic compound (VOC) limit specified by the California Code of Regulations	60%	46%
CLEANING EQUIPMENT	•CRI Green Label or Seal of Approval, as applicable •Operating sound levels less than 90 dBA (70 dBA for vacuum cleaners) •Equipped with filters for capturing fine particulates •Uses gel batteries	100%	100%
FACILITY MAINTENANCE & ALTERNATIONS	•Paints and sealants meeting the applicable Green Seal standard or VOC limits set by the South Coast Air Quality Management District •Contain at least 10% post-consumer and/or 20% post-industrial content •Contain at least 70% salvaged materials •Contain at least 50% rapidly renewable materials •Contain at least 50% materials harvested, extracted, and processed within a 500 mile radius •Contain at least 50% FSC-certified products	50%	63%

* Each goal is based on the percentage of annual purchases within the purchasing category that meet at least one of the applicable sustainability criteria.
** Ongoing consumables are defined as goods regularly used and replaced through the course of business. These materials include paper (printing or copy paper, notebooks, notepads, envelopes), toner cartridges, binders, batteries and desk accessories. Food and beverages are excluded from this category.

Achieving a high diversion rate of materials from landfill by "reducing, reusing, and recycling" is a cornerstone of the DLCC's sustainability efforts. Ongoing improvements to the recycling plan and the increasing capabilities of local recycling entities have increased diversion rates since the program's inception and diverted 2,185 tons of recyclable waste from landfills. Additionally, careful planning and source reduction measures have been put in place in order to eliminate rejections of shipments due to contamination ratios, and to reach the highest diversion rates possible.

WASTE REDUCTION

Reducing the total amount of waste generated by DLCC operations reduces the extraction of raw materials and lessens the economic and environmental costs associated with recycling. Reducing the amount of waste is achieved through environmentally preferable purchasing (reusable items, items with less packaging) .

To further facilitate internal source reduction, DLCC management operates a reuse program which complements the preference for using durable goods throughout the facility. For instance, DLCC staff collects and reuses salvageable office supplies, and turns single-sided printouts into "second-life" note paper.

Levy also incorporates source reduction into their purchasing process by buying in bulk and requiring reduced packaging options for products. Practices such as serving water in large refillable "cambros" and pitchers instead of individual bottles, further reduces the waste generated by events and building operations. Event organizers have the option to request either reusable chinaware or compostable, disposable servingware to be used for catered events.

Any disposable servingware that is used for events is made from cornstarch and other biodegradable materials. The use of compostable servingware allows Levy to create fully compostable boxed lunches, which eliminates the need to sort organic waste from packaging materials.

As part of the g1 program, event planners are encouraged by staff to make use of these and other sustainable options, such as the DLCC's reusable sign boards, throughout the course of their event. Event planners are also encouraged to include reusable and/or recyclable materials in their own purchasing decisions.

In 2016, the DLCC produced an average of 1.3 pounds of waste per attendee,[45] 45% lower than the 2005 baseline of 2.34 pounds per attendee and 66% lower than the 2009 external benchmark of 3.78 pounds per attendee.[46] While these numbers indicate that current source reduction strategies are effective, the DLCC continues to explore means to further reduce waste.

45 A per-attendee intensity measurement is used because it is easily quantifiable; it is recognized, however, that this is an imperfect measure that does not take into account weather, event volume, type, schedule, size and needs of attendees and event planners or number of visits.

46 See the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011), Section 2.2 Benchmarking | External for the determination of the 2009 external benchmarks.

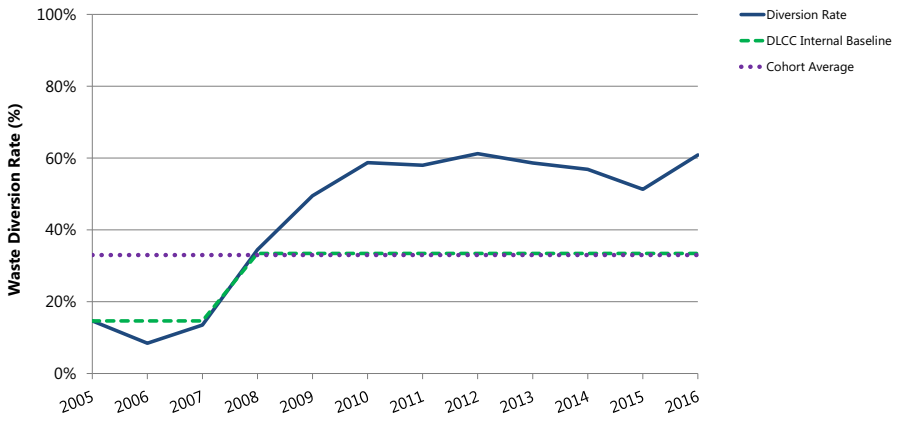


Figure 10. DLCC annual waste diversion rate compared to internal and external baselines.

RECYCLING

As part of the DLCC's recycling program, waste is collected at stations throughout the building and brought to a single point, where it is stored and sorted. This practice ensures that waste diversion tracking remains accurate, and that no waste leaves the building in uncontrolled methods. All recycling companies that the DLCC works with have local Pittsburgh locations, reducing the transportation costs associated with recycling activities. Waste is transported no more than 12 miles away for processing.

After sorting, materials such as paper and aluminum are sent to a local sorting and recycling facility. Large carpet scraps and surplus building supplies are regularly donated to Construction Junction, a nearby reuse center, and Habitat for Humanity, while furniture and other smaller durable goods such as computers and monitors are typically either donated or recycled through Evolution E-cycling. Wood pallets are collected in a designated area and picked up by Largent, a local company that reuses the pallets. Food scraps and landscaping waste are sent to AgRecycle, a Pittsburgh-based composting facility. Because AgRecycle is capable of composting food-contaminated paper and cardboard in addition to organic materials, items such as disposable coffee cups which would otherwise be sent to landfills are also diverted. Small electronic items and batteries are collected in the East Lobby and recycled by Batteries Plus, while light bulbs are collected by the building's electricians and recycled by Scott Electric. Used cooking oil is donated to New Market Waste Solutions to be converted to biofuel. Surplus prepared food is donated to the Greater Pittsburgh Community Food Bank and Jubilee Soup Kitchen.

In 2016, the DLCC initiated a new effort to recycle baled plastic film through Roadrunner Waste Management, a local company who hauls and processes the material. Non-contaminated linear low-density polyethylene (LLDPE) as well as low and high density polyethylene (LDPE, HDPE) plastic wraps are collected by Levy and DLCC sorters. The plastic is stored until enough is gathered to make a bale. Non-contaminated plastic wraps are baled approximately four times a year.

Although source reduction measures and capture rates have consistently improved since the waste diversion program's inception, the greatest single contributing factor to diversion rates at the DLCC has been the addition of composting in 2008. Organic composted waste has accounted for 38% (600 tons) of all waste diverted since 2008. Based upon this program's performance, the DLCC has set a goal of a minimum 50% annual diversion rate, which it has met for the past eight years.

Achieving this goal requires careful planning on both sides of the client-facility relationship, as diversion rates are highly dependent on the volume and type of waste generated at each event. Waste-intensive public shows and trade shows with unusual waste streams pose the greatest challenges to the waste diversion program. Proper planning for diversion methods and for adequate labor is required. In particular, any strategies for diverting or donating unusual event-specific materials must be considered prior to the event in order to be successful.

Meetings and conferences typically produce a more manageable waste stream in terms of volume and content so that diversion rates well above the average can easily be reached. Attendee buy-in has a large impact on the success of the waste diversion program. Proper identification and sorting of recyclable goods by building occupants facilitates higher diversion rates by reducing the labor needed to re-sort recycling after collection.

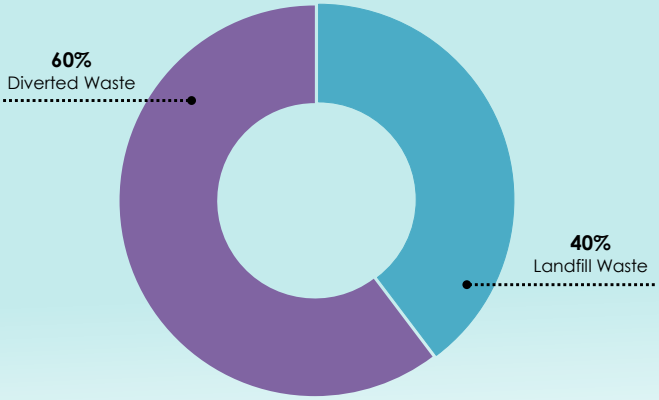


Figure 11. 2016 waste performance.

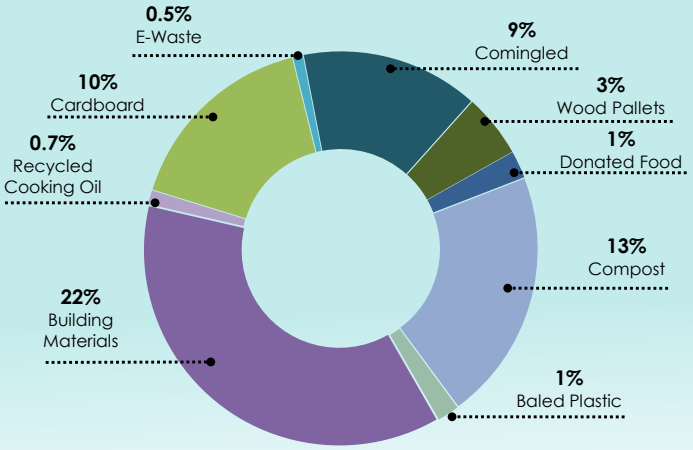


Figure 12. 2016 diverted waste.

2016 DIVERSION PERFORMANCE

The diversion rates reported are based solely on the on-site waste management practices; downstream loss rates at recycling facilities are not currently taken into consideration and are beyond the control of the DLCC. DLCC management, however, regularly communicates with these recycling management facilities, and has conducted on-site visits to confirm that downstream waste management practices meet the building's own sustainability standards.

In 2016, the amount of waste sent to landfill was 170 tons. Through the DLCC recycling program, 259 tons of waste was diverted from landfills out of a total 430 tons of waste generated, achieving an annual diversion rate of 60.3% (Figures 10 and 11). See Figure 12 for a breakdown of the DLCC's waste stream. By weight, diverted materials in 2016 were as follows:

•Cardboard: 43 tons
•Commingled Glass / Plastic / Aluminum: 39 tons
•Wood Pallets: 14 tons
•Building Materials[47]: 97 tons
•Compost: 55 tons

Additionally, 6 tons (1.4 %) of food was donated to local food banks, 3 tons (.71%) of used cooking oil was donated for conversion into biofuel, 4.8 tons (1.3%) of plastic was baled, and 2 tons (0.5%) of E-waste[48] was generated and disposed of in an environmentally-safe manner.

Although the environmental impacts associated with the recycling program cannot be accurately tracked in full at this time, energy saved by manufacturers and total emissions mitigation as a result of recycling activities can be estimated using the EPA's Waste Reduction Model (WARM). The factors used in WARM are based upon comparisons between typical lifecycle impacts of manufacturing processes using raw materials and of those using recycled content.[49] 2016 diversion of cardboard, paper, glass, plastic, aluminum, and compost was responsible for an estimated savings of 337 $MtCO_2e$. An estimated total of 4,042 Mt CO2e has been avoided since recycling began in 2005.

47 Waste management for major renovations is a requirement to track and is included in project specifications. Beginning in 2012, this data is included in the building's total waste data as "Building Materials."

48 "E-waste" or electronic waste, is a term to describe used electronics that are at the end of their useful life that can be recycled. Examples of e-waste include: computers, monitors, TVs, printers, scanners, cell phones and other electronic devices.

49 Emissions impact includes transportation by hauler to the recycling facilities. In the interest of consistency, the DLCC has estimated impacts from only those products included in WARM. Other components of the DLCC's waste stream have not been included in these impacts. For more information on the model and its methodology, visit epa.gov/warm.

2030 DISTRICT GOALS

ENERGY	**2020 GOAL:** *20% reduction below the 2004 DLCC baseline by 2020* **DLCC 2016 STATUS: EXCEEDING THE 2020 GOAL (32% BELOW BASELINE)**
WATER	**2020 GOAL:** *20% reduction below the 2006 DLCC baseline by 2020* **DLCC 2016 STATUS: EXCEEDING THE 2020 GOAL (74% BELOW BASELINE)**
VEHICLE EMISSIONS	**2020 GOAL:** *20% reduction below the DLCC baseline by 2020* **DLCC 2016 STATUS: DATA NOT YET AVAILABLE**
INDOOR AIR QUALITY	**2020 GOAL:** *Still in development as of 2016* **DLCC 2016 STATUS: IN DEVELOPMENT**

PITTSBURGH 2030 DISTRICT®

GREEN BUILDING ALLIANCE™

The Pittsburgh 2030 District is a collaboration of building owners in both the Downtown Pittsburgh, Oakland, and Northside neighborhoods that aim to dramatically reduce energy and water consumption, reduce emissions from transportation, and improve indoor air quality. The 2030 District is facilitated by the Green Building Alliance (GBA). The SEA, as building owner of the DLCC, was one of the founding partners of the launch of the 2030 District in October 2012. At the end of 2016, 72.5% of real estate in Downtown Pittsburgh, Oakland, and the Northside were committed to the 2030 District, representing 491 buildings and over 78.7 million sq. ft. By becoming a 2030 District partner, the DLCC committed to the goals described above. A detailed listing of all 2030 District goals can be found in Appendix B of this report.

The Energy Use baseline is measured by Site Energy Use Intensity (Site EUI). Site EUI measures a building's annual energy performance normalized by its gross square footage and is an output from EPA ENERGY STAR Portfolio Manager. The majority of District partners use 2003 Commercial Buildings Energy Consumption Survey (CBECS) data from the U.S. Energy Information Administration to set their baselines, but CBECS does not include convention centers. Therefore, GBA established the Energy Use baseline for the building at 90.2 kBtu/sq. ft., which is reflective of the actual performance of the building in 2004, the first full year of operations. The Site EUI for the DLCC in 2016 was 61.6 kBtu/sq. ft., which represents an 32% reduction from the baseline.[50] A 32% reduction demonstrates that the DLCC is already exceeding their 2020 goal (20% reduction from baseline) established by the 2030 District.

The Water Use baseline is measured by Site Water Use Intensity (Site WUI). Site WUI functions similarly to Site EUI in that it measures a building's annual water performance normalized by its gross square footage. Since no national water consumption data for existing buildings exists, the baseline was developed using historic water consumption information. GBA established the Water Use baseline for the building at 4.46 gal/sq. ft., which is reflective of the actual performance of the building in 2006, the first full year that the wastewater treatment plant was in operation. The actual Site WUI for the DLCC in 2016 was 2.6 gal/sq. ft. This is a 74% reduction from the baseline and demonstrates that the DLCC is already exceeding their 2030 goal (50% reduction from baseline).

Transportation data for the DLCC is currently not available. Transportation data for the DLCC will be included in the 2017 report.

The indoor air quality baseline and goals are currently being established by the GBA.

Visit www.2030districts.org/pittsburgh for more information regarding the Pittsburgh 2030 District initiative.

50 As reported by the Green Building Alliance 2030 District 2017 building report to the Convention Center, the DLCC's EUI is 61.6 (kBtu/sf) and is a 32% reduction from the DLCC's baseline year. This adjusted EUI considers up to 10% of the DLCC's annual renewable energy credits (RECs). The DLCC currently is getting 35% of their annual electricity from Green-e certified sources per the current agreement with the energy consortium (see pg 18).

In September 2008, SMG, as building manager, launched the g1 (greenfirst) program to highlight the facility and staff's commitment to sustainability and to putting "green first" in everyday activities. Under the g1 umbrella is an array of educational initiatives targeted towards groups who regularly interact with the building: employees, event planners, attendees, Pittsburgh residents, and sustainability professionals.

EMPLOYEES

For employees, the g1 program is part of overall workplace culture. The program is linked to sustainable purchasing, recycling procedures, and operational practices. Employees are aware of the DLCC's reputation as a green leader, and regularly consider how their actions affect this reputation. Employee awareness of sustainability and their resulting choices are evident in the energy performance, waste reduction, and water consumption of the building.

EVENT PLANNERS

An overview of the building's sustainable operations practices is highlighted on the program's dedicated website, www.greenfirst.us. This website lists suggestions for "green practices" geared specifically towards event planners and exhibitors. These suggestions cover practices from pre- to post-event, including publicizing transit options to attendees, using recycled and recyclable materials for packaging and signs, and sending virtual copies of company literature rather than distributing physical copies. Discussing these practices in detail during the event planning stages increases their implementation.

Interested events may request a report which provides feedback on their waste diversion efforts. This report allows event planners to quantify their efforts for the purposes of communicating with attendees and evaluating future event practices.

COMMUNITY AND ATTENDEE OUTREACH

A passive education program targets convention center attendees who may be interested in the building's green components. This program is accessible in three ways: (1) through a series of physical signage developed by the Green Building Alliance, located in the third floor pre-function area; (2) as an audio tour; and (3) as a series of web-pages designed for smartphones. Wall decals throughout the building list the phone number to call for an audio topic and include a QR code leading to the corresponding smartphone web-page. In each version of the tour, the topics of the building's construction, natural ventilation, daylighting, water reduction strategies, and recycling strategies are covered in a depth appropriate to the medium.

The DLCC recognizes its leadership role and the educational resources it can provide to those interested in sustainability in the built environment. SEA and SMG provide tours to parties interested in learning about the building's sustainable design features in greater detail. A total of 267 guests were given green tours in 2016. These visitors included university students as well as local and national organizations.

ORGANIZATIONAL BOUNDARIES

The content of this report is primarily focused on decisions made with regard to the DLCC. Reporting boundaries typically follow the physical site boundary of the building. Decisions by event planners and attendees also affect the convention center's environmental performance, and therefore event practices which directly impact the DLCC's operations have been included in the scope of this report.

The DLCC encourages each event to adopt relevant sustainable practices, and some of its own improvements are a direct result of increased interest in sustainability in the convention and meeting industry. However, the DLCC cannot reasonably take responsibility for the full impact of event purchasing, attendee transportation choices, and other external decisions. Event practices which do not directly affect the building's environmental impact have not been measured by the DLCC at this time. Likewise, upstream and downstream practices by external organizations are not explicitly included in this report.

BASELINES, METRICS, AND GOALS

Performance indicators presented in this report have been chosen due to their perceived importance to external stakeholders and to internal operations. In order to measure performance in a broadly accepted and translatable manner, the DLCC has adopted the metrics and methodologies of the LEED for Existing Buildings: O+M rating system, the goals of the Pittsburgh 2030 District (see Appendix B), and certain performance indicators of the Event Organizers Sector Supplement of the GRI G4 Sustainability Reporting Guidelines,[51] an internationally-adopted framework for measuring and reporting sustainability performance.

As the first full year of operations and the first year for data measurement, 2004 levels have been adopted as the DLCC's baseline for most performance indicators. Following the guidance of the Global Reporting Index G4 Sustainability Reporting Guidelines, organic growth or decline did not cause any adjustments to baseline values. Baselines have only been adjusted to reflect changes in reporting scope or adoption of new program elements which significantly affect performance. In this report, baselines have been changed from 2004 levels for three specific categories:

- **Energy** – 2004 is the current baseline year. The SEA Office is included in the associated analysis but its effects are negligible.
- **Water** – The DLCC's on-site wastewater treatment plant became operational in 2006, eliminating the use of potable water for flush fixtures. In 2010, filters were installed to allow aquifer water to replace potable water in the 10th Street Water Feature, reducing municipal water needs per attendee by five gallons each. 2010 is the current baseline year. The SEA Office is included in the associated analysis but its effects are negligible.
- **Waste** – The waste diversion program was initiated in 2005, and a composting program was added in 2008. This has resulted in an increase of 33% in diverted materials since 2008, and is therefore considered a significant operational change. 2008 is the current baseline year. The SEA Office is included in the associated analysis but its effects are negligible.

Sustainability performance at the DLCC, particularly in the key indicators of water consumption, energy consumption, and waste diversion, is highly dependent on building usage. While the full environmental impact of the building must be measured in absolute values, any inter-annual comparison of absolute values would not be accurate unless event size and frequency are also taken into consideration. For this reason, many metrics are given in terms of both absolute values and per-attendee intensity metrics. It is important to note that the activity level and building demands at the DLCC are directly affected by several external factors such as weather, event volume, event schedules, event type and size, and the needs and desires of attendees and event planners. Using the per-attendee intensity metric does not account for these other factors. Per-attendee intensity metrics were used throughout the *David L. Lawrence Center: A Building in Operation [BiO] Case Study* (2011), and this report seeks to build on those metrics where possible.

The organizational goals presented throughout this report reflect the DLCC's LEED for Existing Buildings: O+M certification strategy and the commitment to

51 The GRI is a nonprofit organization that develops and provides broad and consensus-based sustainability reporting guidelines. For more information, please visit globalreporting.org.

maintaining or exceeding the level of practice recognized by its LEED Platinum certification. These goals will continue to be refined in the future as a result of operational experience and other developments.

GREENHOUSE GAS INVENTORY METHODOLOGY

The DLCC quantifies annual GHG emissions using the methodology of the GHG Protocol Initiative[52] and the ENERGY STAR Portfolio Manager program. This methodology categorizes emissions into three separate scopes, according to the degree of control the reporting body has over the source.

SCOPE I

Scope I emissions, also referred to as direct emissions, result from fuel combustion or other on-site emissions-releasing activities. The largest Scope I source at the DLCC is the combustion of natural gas used in the operation of the kitchen equipment. In 2016, emissions from this source comprised 1% of the building's total emissions. All other Scope I emissions result from the combustion of gasoline and propane which fuels the nonelectric maintenance equipment used throughout the site.

These emissions are considered de minimus, and are not directly tracked at this time.[53] The annual carbon sequestration by the growth of plants in restored landscaped areas on site is also estimated to be small compared to the magnitude of the DLCC's footprint and has likewise not been included.

SCOPE II

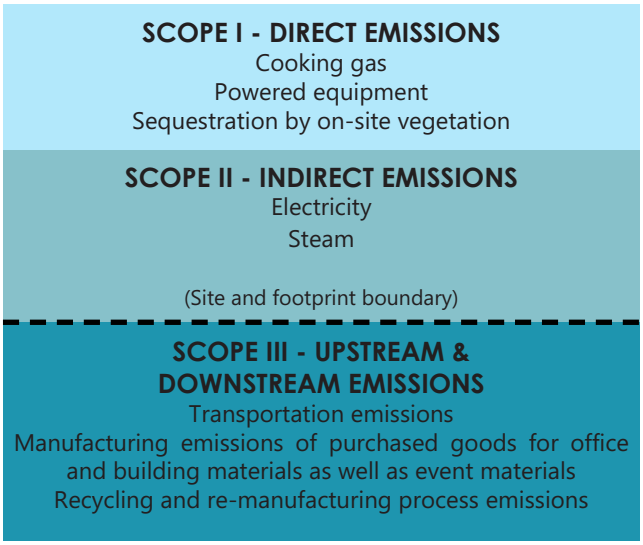
The entire effective carbon footprint of the facility consists of indirect, or Scope II, emissions from the purchase of electricity and steam. Emissions resulting from electricity consumption are calculated based upon the most recent grid-specific factors reported to the US EPA, while emissions as a result of district steam consumption are based on a national average used in the Portfolio Manager program.

SCOPE III

Scope III emissions are also called upstream and downstream emissions. These emissions are from sources outside the direct control of the reporting organization, but may still be influenced by the organization's decisions or activities. Under the GHG Protocol, these emissions are optional to track because they do not fall within the organization's direct responsibility.

At the DLCC, sources which could potentially be included under Scope III emissions include those associated with material consumption, waste management, and transportation of visitors to and from the facility. Although the DLCC has made efforts to quantify these activities when feasible, it is currently beyond the organization's capabilities to accurately track every variable associated with these emissions. Because the uncertainty associated with Scope III emissions would reduce the integrity of the DLCC's formal carbon footprint, they are not included in the same management strategy as Scope I and II emissions.

The carbon footprint given in the emissions section of this report therefore represents only the facility footprint—the emissions associated with the use of the physical building and its systems. When possible, estimates of the emissions resulting from those Scope III sources that the DLCC has influence over or are otherwise considered to be of interest are provided elsewhere in the report.



52 The GHG Protocol Initiative is the most widely used and accepted emissions accounting methodology and is administered by the World Resources Institute and the World Business Council for Sustainable Development. More information may be found at ghgprotocol.org.

53 Defined by the California Climate Registry as any emissions comprising less than 5% of the total footprint, de minimus emissions are not typically directly tracked in an inventory unless deemed otherwise significant.

PITTSBURGH 2030 DISTRICT®

GREEN BUILDING ALLIANCE™

	2030 DISTRICT GOALS	DLCC PERFORMANCE
ENERGY	**2015 GOAL:** *10% reduction below the DLCC baseline* **2020 GOAL:** *20% reduction below the DLCC baseline* **2025 GOAL:** *35% reduction below the DLCC baseline* **2030 GOAL:** *50% reduction below the DLCC baseline*	**DLCC ACHIEVED GOAL** ✓ **DLCC ALREADY MEETING GOAL** **DLCC ON TRACK TO MEET GOAL** **DLCC ON TRACK TO MEET GOAL**
WATER	**2015 GOAL:** *10% reduction below the DLCC baseline* **2020 GOAL:** *20% reduction below the DLCC baseline* **2025 GOAL:** *35% reduction below the DLCC baseline* **2030 GOAL:** *50% reduction below the DLCC baseline*	**DLCC ACHIEVED GOAL** ✓ **DLCC ALREADY MEETING GOAL** **DLCC ALREADY MEETING GOAL** **DLCC ALREADY MEETING GOAL**
VEHICLE EMISSIONS	**2015 GOAL:** *10% reduction below the DLCC baseline* **2020 GOAL:** *20% reduction below the DLCC baseline* **2025 GOAL:** *35% reduction below the DLCC baseline* **2030 GOAL:** *50% reduction below the DLCC baseline*	**DATA NOT YET AVAILABLE**
INDOOR AIR QUALITY	**2020 GOAL: IN DEVELOPMENT** **2025 GOAL: IN DEVELOPMENT** **2030 GOAL: IN DEVELOPMENT**	**IN DEVELOPMENT**

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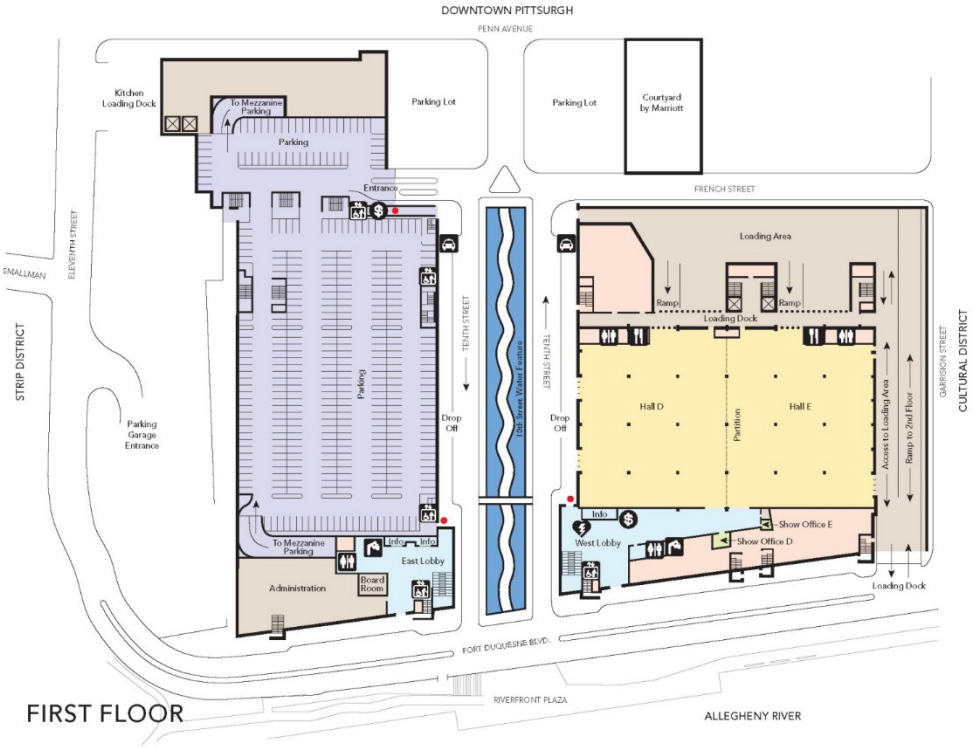
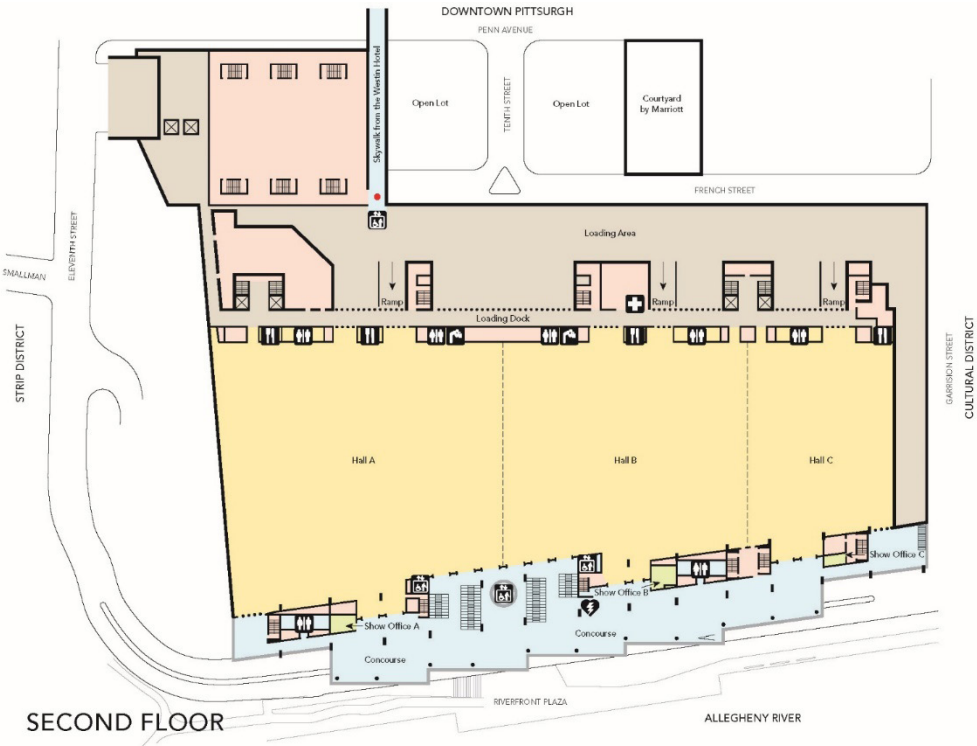
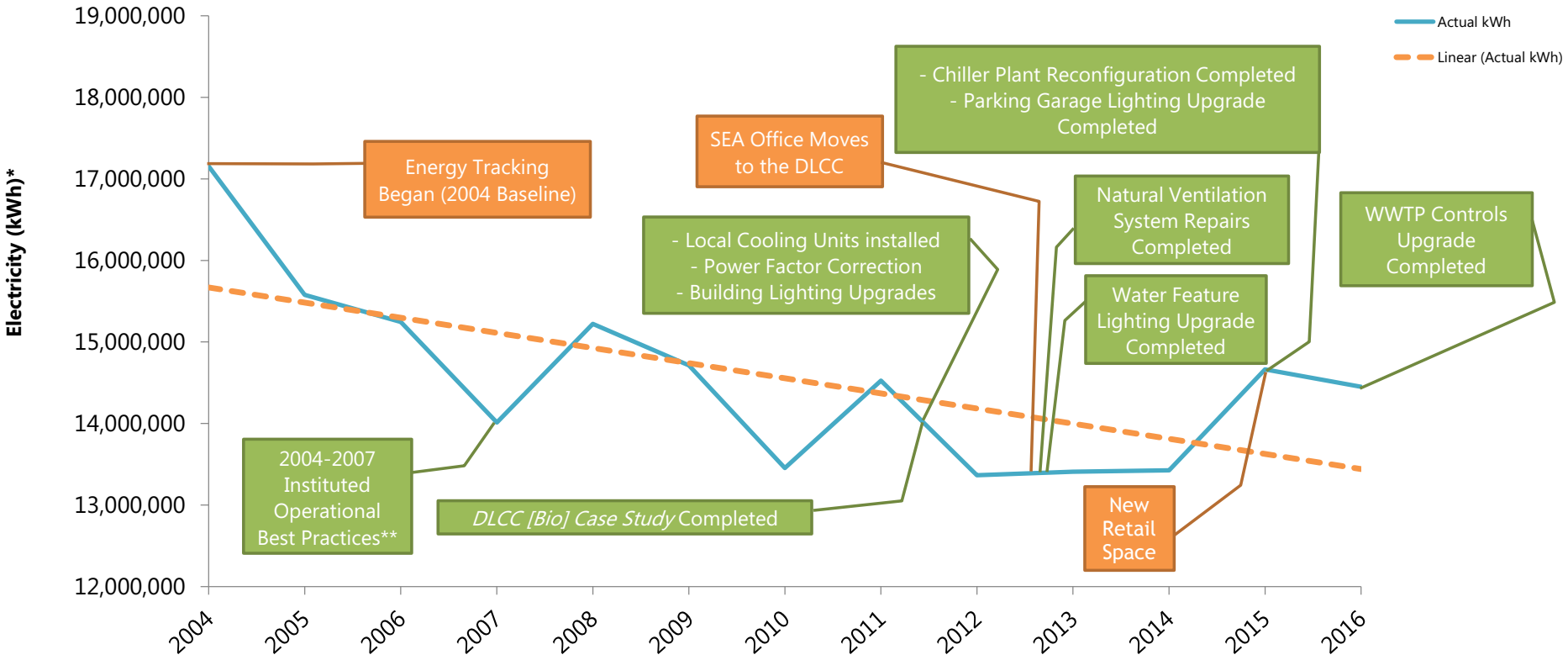

DOWNTOWN PITTSBURGH
PENN AVENUE
Kitchen Loading Dock
To Mezzanine Parking
Parking
Parking Lot
Parking Lot
Courtyard by Marriott
Entrance
FRENCH STREET
ELEVENTH STREET
SMALLMAN
STRIP DISTRICT
TENTH STREET
Parking
Drop Off
Parking Garage Entrance
To Mezzanine Parking
Info
Info
East Lobby
Administration
Board Room
Old Street Market Fashion
TENTH STREET
Loading Area
Ramp
Loading Dock
Ramp
Hall D
Partition
Hall E
Drop Off
Access to Loading Area
Ramp to 2nd Floor
GARRISON STREET
CULTURAL DISTRICT
Info
West Lobby
Show Office E
Show Office D
Loading Dock
FORT DUQUESNE BLVD.
RIVERFRONT PLAZA
ALLEGHENY RIVER
FIRST FLOOR


DOWNTOWN PITTSBURGH
PENN AVENUE
Skywalk from the Westin Hotel
Open Lot
TENTH STREET
Open Lot
Courtyard by Marriott
FRENCH STREET
ELEVENTH STREET
SMALLMAN
STRIP DISTRICT
Loading Area
Ramp
Ramp
Ramp
Loading Dock
GARRISON STREET
CULTURAL DISTRICT
Hall A
Hall B
Hall C
Show Office C
Show Office B
Show Office A
Concourse
Concourse
RIVERFRONT PLAZA
ALLEGHENY RIVER
SECOND FLOOR


DOWNTOWN PITTSBURGH
PENN AVENUE
Service Corridor
Kitchen Area
C
Spirit of Pittsburgh Ballroom presented by Dollar Bank
A
B
Open Lot
TENTH STREET
Open Lot
Courtyard by Marriott
FRENCH STREET
Terrace
Green Room
Gallery
East Atrium
West Atrium
South Terrace Green Roof
SMALLMAN
ELEVENTH STREET
STRIP DISTRICT
301 302 303 304 305
306 307
308
Service Corridor
310 311
309
313 314 312 315 316 317 318
Service Corridor
319 320 321
322
GARRISON STREET
CULTURAL DISTRICT
[Hall A Below]
Visitor Corridor
[Hall B Below]
Service Corridor
[Hall C Below]
Visitor Corridor
Service Corridor
Service Corridor
330 329 328 327 326
325 324 323
Allegheny Overlook
Service Corridor
338 336 335 334 333 331 332 337
Noresco Riverside Terrace
Noresco Riverside Terrace
RIVERFRONT PLAZA
ALLEGHENY RIVER
THIRD FLOOR


DOWNTOWN PITTSBURGH
PENN AVENUE
Service Corridor
[Ballroom Below]
Service Corridor
Open Lot
TENTH STREET
Open Lot
Courtyard by Marriott
Entrance
Escalator
Stairs
Emergency Exit
Service Elevator
Roll Doors
Glass Walls
Permanent Art
Elevators
Restrooms
Concessions
Automated Teller
Water Fountain
First Aid
AED
Taxi
FRENCH STREET
Atrium Below
Atrium Below
South Terrace Green Roof
Terrace
SMALLMAN
ELEVENTH STREET
STRIP DISTRICT
401 402 403 404 405
406 Lecture Room
407 Lecture Room
408 409 410 411 412
413 414 415
Garrison Overlook
Service Corridor
Service Corridor
GARRISON STREET
CULTURAL DISTRICT
Roof
Visitor Corridor
Roof
North Terrace
North Terrace
RIVERFRONT PLAZA
ALLEGHENY RIVER
Public Areas
Halls
Meeting Rooms
Service Areas
Maintanence Area
Parking
FOURTH FLOOR



* Data has not been normalized for building utilization and weather. Electricity demands at the DLCC are largely impacted by the energy demands of building tenants and the number of events and attendees per year. Factors such as event size (sq. ft.), event schedule, type of event, seasonality, and the needs of event planners impact the DLCC's energy demand from year to year.
** 2004-2007 operational best practices included a series of minor ongoing conservation measures that had a positive impact on reducing energy consumption in the building. These operational best practices included sealing escalator openings, staggering the start of HVAC units, and adjusting heating and cooling schedules.