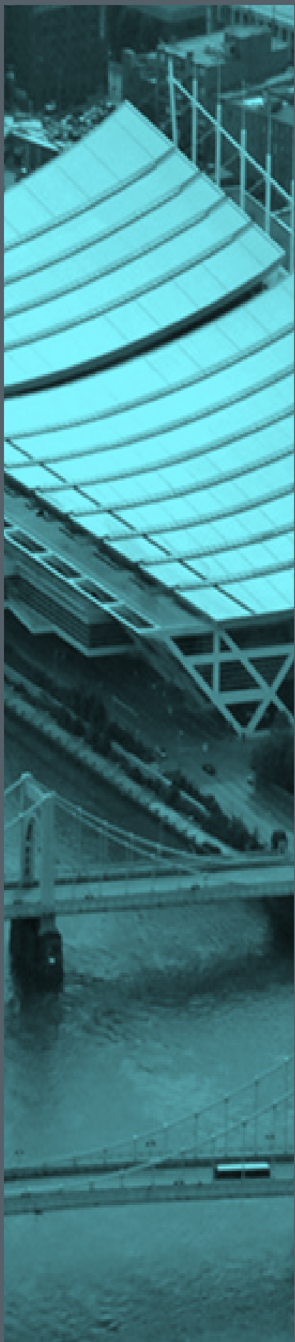
Sports & Exhibition Authority
When you have the time, Pittsburgh has the place.

DLCC PITTSBURGH
DAVID L. LAWRENCE
CONVENTION CENTER
PITTSBURGH

2017 GREEN REPORT

DAVID L. LAWRENCE CONVENTION CENTER



This 2017 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 2017 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 2017 calendar year. Information is provided from previous years to the extent it 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.

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 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.

A glossary defining key terms in this report is provided in Appendix B.

2017

HIGHLIGHTS 2017

LEED PLATINUM RE-CERTIFICATION

DLCC was re-certified LEED Platinum® for Operations and Maintenance: Existing Buildings, the highest level achievable under the LEED rating system. (page 2)

ENERGY

36% reduction of energy usage per square foot from the DLCC's baseline year in 2004 (page 11)

This year the DLCC saved enough energy to fly a Boeing 747 airplane around the world 59 times (page 11)

WATER

30% of all water used was from on-site wastewater recycling (page 7)

RECYCLING

Achieved a 55% diversion rate (page 18)

Recycled 39 tons of cardboard (page 18)

Recycled enough baled plastic to manufacture 3200 square feet of decking (page 18)

WASTE

Only 0.52 pounds of waste per attendee reached the landfill, a full 74% decrease over the 2005 baseline of 2 pounds per attendee (page 17)

FOOD

Donated 4.5 tons of food to local food pantries and donated 3.9 tons of cooking oil to be converted into biofuel (page 18)

EVENTS

The DLCC hosted 17 green-seeking events with 10,457 attendees (page 3)

TOURS

Hosted sustainability tours for 292 attendees at the DLCC (page 3)

Table of Contents

DAVID L. LAWRENCE CONVENTION CENTER

Located in downtown Pittsburgh, adjacent to the Allegheny River, the 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 (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 $750,000 design competition was funded by 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 near 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. The new center employed energy and water saving strategies, and it was constructed on the same site as the previous Pittsburgh convention center. Reusing the old site virtually eliminated the need for the construction of additional supporting roads and utility infrastructure.

LEED Certification

LEED was integrated into the design of the building from its inception. To further the environmental goals of the building, the Heinz Endowments provided $7 million in grants and loans, administered by the Green Building Alliance (GBA), for costs associated with green building consultation services, commissioning, and integration of green technologies.

In 2003, upon completion, the DLCC became the first convention center to be certified LEED Gold® for Building Design and Construction. The DLCC was one of only seventy-five LEED New Construction certified projects and the largest building to get LEED certification at the time.

In 2012, the DLCC initially earned LEED Platinum® for Existing Buildings: Operations and Maintenance (O+M) which focuses on building operations and maintaining operational sustainability. Focusing on efficiency in operations is important because during the lifetime of a building they contribute more to energy and resource use than the building's original construction. The commitment to sustainability at the DLCC is practiced every day by reducing energy and water use, purchasing recycled products, and diverting refuse away from the landfill and towards recycling and composting, among other things.

In 2012, the SEA completed its new interior office space, located within the DLCC. The location was previously a storage area. The SEA Office earned LEED Platinum® for Commercial Interiors (CI) in April 2013.

In order to maintain LEED for Existing Buildings: O+M, re-certification is required every 5 years to show that sustainable operations continue at a high level. In 2017, the DLCC was re-certified LEED Platinum for Existing Buildings: O+M.

APEX/ASTM Sustainable Meeting Venue

APEX/ASTM® standards for environmentally sustainable meetings are set by the Events Industry Council in partnership with the American Section of the International Association of Testing Materials. The designation consists of 9 certification categories including: Meeting Venue, Food and Beverage, Exhibits, Destination, and Audio/Visual. There are four levels of certification, with the fourth (IV) level being the highest. In January 2017, the DLCC earned Level II certification as an APEX/ASTM Sustainable Meeting Venue. The DLCC is one of only ten convention centers in the world to have an APEX/ASTM certification of Level II or higher.

DLCC LEED and APEX/ASTM plaques

ACTIVITY AT THE DLCC

No single measure of building utilization accounts for the diversity and variation 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 attendance count for public shows, banquets, meetings, and (2) the delegate count for conventions and trade shows.

Table 1 shows the number of events and attendance in the past 5 years. Neither measure differentiates between event type, duration, or spaces utilized (e.g., exhibit hall, ballroom, meeting rooms etc.), all of which impact building operations, energy and water use differently.

YEAR	2013	2014	2015	2016	2017
ATTENDEES	415,338	447,168	483,852	497,929	558,336
EVENTS	176	168	176	207	223

Table 1. DLCC Events 2013-2017

Green-Seeking Events/Green Tours

The building's LEED certifications and on-going sustainable operations at the DLCC attract event organizers who seek facilities with green operations, known as green-seeking events.

Of the 223 events at the DLCC in 2017, 17 were green-seeking events (1 major and 16 non-major events). These green-seeking events, with 10,457 attendees, accounted for $835,910 in gross revenues to the DLCC. The major event generated $2.25 million of direct spending to the region. Green-seeking major events have been responsible for $254.4 million (20%) in direct spending to the region since tracking began in 2006 (Figure 1).

In addition to events, the DLCC engaged 292 individuals in educational green tours of the building, highlighting various features from the roof to the wastewater treatment plant. Anyone can request a free sustainability tour at the DLCC given by SEA or SMG staff.

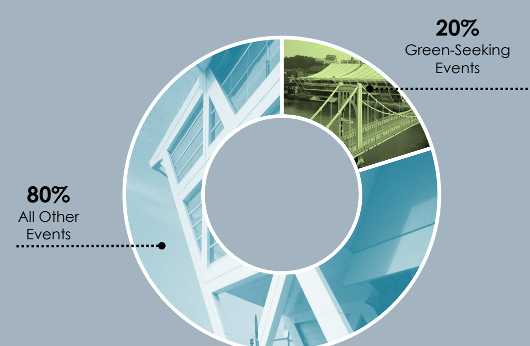


Figure 1. Percentage of direct spending generated from green-seeking events between 2006 and 2017

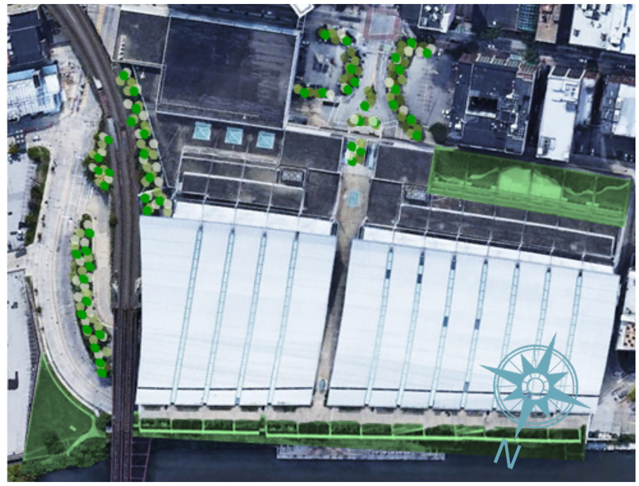
One green-seeking event in 2017 was the Climate Reality Conference hosted by Al Gore that attracted over 1400 participants.

GREEN AND VEGETATED SPACES

11th Street and Riverfront Plaza

The 11th Street side of the site, which borders the east side of the DLCC, is a 13,200 sq. ft. hillside that has been restored with native trees, shrubs, and grasses. The Convention Center Riverfront Plaza (Riverfront Plaza) extends this natural landscape along the north side of the building.

Opened to the public in May 2011, the Riverfront Plaza links two previously disconnected components of Pittsburgh's 22-mile Three Rivers Heritage Trail, providing a safe route for walkers, bikers, and joggers to travel between the City's Strip District commercial area and Point State Park. The DLCC Water Feature provides pedestrian access from the City-side to the river trail.



Aerial view highlighting green spaces


DLCC Riverfront


3rd Floor South Terrace looking westward

3rd Floor South Terrace Green Roof

The third floor terrace outside of the City-side meeting rooms was renovated into a green roof space and opened in May 2012. The 3rd floor South Terrace Green Roof (Green Roof) features a mix of non-invasive adapted sedum species and a "meadow" filled with native perennials, separated by a walking path and a plaza for outdoor receptions. The Green Roof plantings provide a connection to nature for visitors on the southern side of the building. In 2017, 11 events were held on or adjacent to the Green Roof, hosting up to 16,000 attendees.

Studies have shown that green roofs in Pennsylvania's climate retain 50% of rainfall on average, with up to 100% retention in the summer.[1] 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 Green Roof removes almost 680 pounds of particulate matter from the air annually, which is approximately equivalent to the annual emissions of 255 passenger vehicles.

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

1 Penn State Center for Green Roof Research. "Stormwater Quantity." Source: https//plant-science.psu.edu/research/centers/green-roof/research

4th Floor North Terrace Monarch Waystation

In June 2012, the DLCC established a Monarch Butterfly Waystation (Monarch Waystation Registry #6071) on the North Terrace. The Monarch population has declined from habitat loss resulting from urban sprawl and herbicide-resistant crops.[1] Monarch Waystations are planted with milkweed and other complimentary plantings, creating a habitat suitable for Monarch butterflies to lay their eggs.

The butterfly 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.

Butterfly and milkweed plants on 4th Floor Terrace

Maintenance

All landscape maintenance activity 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 landscaping waste is collected for composting. Fertilizers are rarely used. When fertilizers are needed, they are organic. Irrigation is only used when necessary. Some areas, such as the Green Roof, relied only on rainwater in 2017.

4th Floor North Terrace Vegetable 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 and beverage 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.

Levy partnered with 55 Carnegie Mellon University architecture students to develop hoop houses to fit over the planters. The hoop houses act as greenhouses by extending the growing season of the produce, increasing the amount of local food served to attendees at the DLCC. In 2017, the hoop houses were featured in *Facilities and Destination Magazine*, and the *Meetings & Conventions Blog*[2].

Students working on the hoop houses. Photo from the *Meetings and Conventions Blog* [2]

1 For more information on Monarch Waystations visit www.monarchwatch.org.

2 http://www.meetings-conventions.com/Blogs/Green-Standard/post/2017/01/25/A-Bountiful-Rooftop-in-Pittsburgh?cid=EltrMtgNews

Heat Island Mitigation

Heat island effect occurs during the summer when sunlight is absorbed by roofing and paving and re-radiated as heat energy. This causes urban areas to be 1.8°F to 5.4°F warmer than surrounding rural areas[1] and results in increased cooling costs, air pollution, and health issues.

Green roofs and vegetated spaces reduce solar heat gain by naturally cooling the air through evapotranspiration. The nearby Allegheny County Office Building green roof showed a 40°F-50°F reduction in surface temperature compared with adjacent buildings whose roofs are made of conventional roofing materials, and a reduction of 10-20% in heating and cooling costs.[2] The differential temperatures vary depending on the building's sun exposure and the type of roofing materials on neighboring buildings.

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 (some materials exceed these boundaries).

The DLCC further reduces the contribution to urban heat island effect by using pavers on the Green Roof with an SRI value of 85, significantly reducing heat gain in comparison to conventional materials. The SRI value of the DLCC's 249,800 sq. ft. curving stainless steel roof was measured in-situ in August 2010, in accordance with ASTM E 1980 [3], to be 113.9, 52% higher than the minimum required SRI for ENERGY STAR roofing materials.[4] Even on a hot day in direct sunlight, the DLCC's roof surface is only 18°F warmer than surrounding air, while surrounding buildings with conventional roofing systems may have surface temperatures 40°F to 70°F warmer than surrounding air.[5]

The "Meadow" on the 3rd Floor South Terrace Green Roof

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

2 3 Rivers Wet Weather. "Green Roofs." *Source: www.3riverswetweather.org/storm-water-green-solutions/stormwater-bmps/green-roofs*

3 Https://www.usgbc.org/glossary/term/5590

4 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*

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

WATER

Water Consumption

The DLCC, unlike a typical building, has multiple sources of water serving the needs of the building and its occupants. The DLCC uses municipal water, filtered aquifer water, and reclaimed wastewater. In 2017, 20% of the water used at the DLCC was municipal water, 50% was from the aquifer, and 30% was reclaimed wastewater from the on-site wastewater treatment plant (Figure 2). Figure 3 shows the end uses of the total water usage at the DLCC.

Potable Water

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 meet plumbing code requirements from the Uniform Plumbing Code (UPC) and the International Plumbing Code (IPC) which align with LEED standards. Fixtures in all restroom facilities are equipped with sensor controls and aerating faucets.

Wastewater Treatment Plant

The DLCC has a 50,000-gallon on-site wastewater treatment plant that collects and treats wastewater from sanitary and potable uses. This water is treated, and re-used for toilet flushing only. The plant's treatment components include a sump tank, aerobic digester, carbon filter system, and ultraviolet disinfection system. In 2017, the wastewater treatment plant was operated through a contract with Veolia Water North America (Veolia).

3.6 million gallons of reclaimed water were reused in 2017, accounting for 30% of the building's total water usage. This amount of water would have cost the DLCC $66,752 if purchased through municipal sources.

The building's decrease in potable water consumption lessens the DLCC's impact on the PWSA and Allegheny County Sanitary Authority systems. 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 benefits water management in the greater Pittsburgh area.

Operating the on-site wastewater treatment plant is currently more expensive than using municipal water services. Operating the wastewater treatment plant, however, provides reclaimed water to the DLCC at a consistent cost, while municipal water and sewage rates are expected to rise.

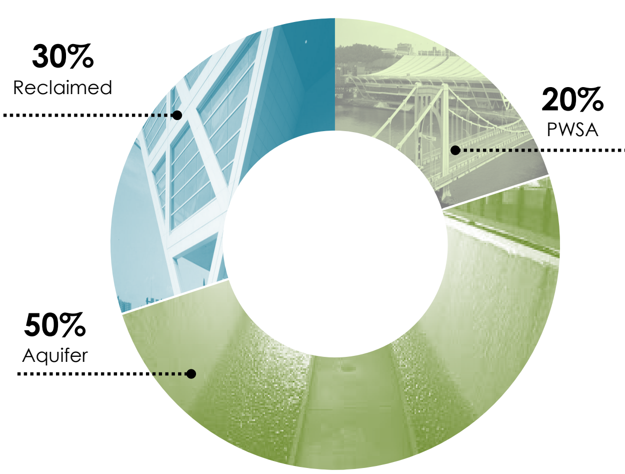


Figure 2. 2017 sources of water use

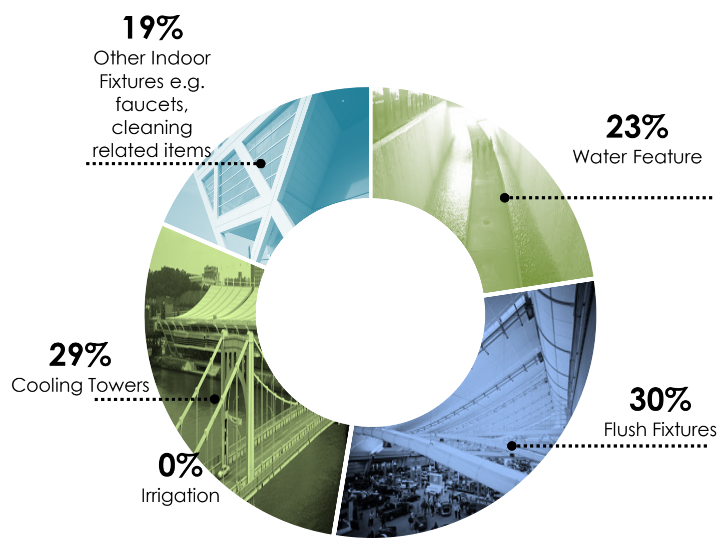


Figure 3. 2017 total building water end uses

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. Aquifers, when correctly managed, recharge through groundwater infiltration. Precipitation is absorbed into the ground, and eventually passes through rock and soil layers and then into the water-bearing rock layers making up the aquifer. The aquifer is a precious source of ground water that helps conserve the use of municipal water, therefore every effort is made to withdraw water in moderation. In total, the aquifer accounted for over 6 million gallons or 50% of the DLCC's total water usage in 2017. Using the 2017 average effective rate charged for municipal water, it was estimated that the use of aquifer water saved the DLCC about $110,916 in municipal water costs.

Cooling Tower

The aquifer is the source for the cooling tower water used in the chiller plant. In 2017, 3.5 million gallons of aquifer water were used by the chiller plant, representing 29% of the DLCC's total water usage.

10th Street Water Feature

The aquifer is the main water source for the 10th Street Water Feature (Water Feature). The aquifer that the DLCC utilizes provides water with a very high iron content due to specific rock layers the water infiltrates as it travels through the ground strata. Originally, the high iron content stained the walls of the Water Feature. To address the staining issue, the water now goes through an iron filtration process before being used in the Water Feature. Using the aquifer to supply the Water Feature reduced the DLCC's use of potable water by over 2.5 million gallons in 2017.

3rd Floor South Terrace Green Roof

The aquifer provides water for irrigation of the Green Roof on the rare occasions it is necessary. Moisture sensors continually monitor the Green Roof's growing medium and control a high-efficiency drip irrigation system that draws filtered aquifer water. 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 Green Roof did not require irrigation in 2017 and relied entirely on rainwater.

11th Street Vegetated Area

The aquifer also provides water for irrigation of the 11th street vegetated area. It is the DLCC's policy to use the irrigation system serving the 11th Street area only in extreme or prolonged drought conditions. In 2017, the 11th Street irrigation system was not used and the area relied entirely on rainwater. The native and adaptive species planted there thrive under normal site conditions, minimizing the need for irrigation and fertilizers.

DLCC 10th Street Water Feature

SYSTEMS: LIGHT AND HVAC

Daylighting

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. Of the regularly occupied spaces in the building, 85% (including Exhibit Halls A,B, and C) can be fully lit with natural daylighting, which reduces the need to use energy for artificial lighting.

Space Conditioning: Heating

The building uses the district energy steam system provided by Pittsburgh Allegheny County Thermal (PACT) to heat the building. 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, increasing the efficiency of the PACT facility by providing hot water for its processes.

Space Conditioning: Cooling

Cooling in the building is provided by an on-site chiller plant that is operated through a service contract with Veolia. Filtered aquifer water is used to supply the cooling towers. 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 efficiency. The primary 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.[1]

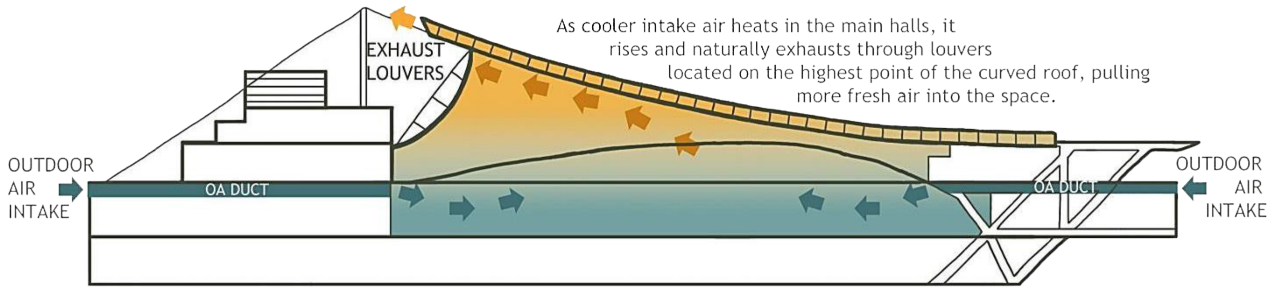
Ozone Depleting Substances

The DLCC does not use refrigeration equipment containing chlorofluorocarbons (CFCs) which are known to damage the ozone layer. Food and beverage equipment uses hydro-chlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), which are less damaging and balance potential environmental impact with efficiency. The DLCC's weighted average refrigerant impact, a measure used by LEED to look at the balance between refrigeration power and refrigerant toxicity, is 21, which is much less than the maximum threshold of 100 set by the LEED for Existing Buildings: O+M rating system.[2]

Natural Daylighting in Exhibit Halls

1 See the "Conservation Measures – 2013 / 2014: Chiller Plant Reconfiguration" section for more information about the chiller plant in the 2016 Green report

2 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



DLCC Natural Ventilation Diagram - Main Exhibit Halls

SYSTEMS: VENTILATION

Ventilation is essential to maintain indoor air quality (IAQ) levels, which improve occupant comfort, increase productivity, and promote general well-being.[1] Increasing ventilation eliminates indoor air contaminants, preventing IAQ-related health issues associated with "sick building syndrome."

Natural Ventilation

The natural ventilation system delivers outdoor air to Exhibit Halls A, B, and C. It is used when the outside air temperature is between 45°F and 64°F, and during move-in/move-out days when the loading dock garage doors are open. In 2017, the natural ventilation system was utilized for 20 event days in addition to move-in/move-out days. Using the natural ventilation system (when conditions allow) conserves energy by eliminating the need for mechanical heating and cooling.

The natural ventilation system uses the operable intake louvers located between the second and third floor level. Cooler outdoor air is directly ducted to the exhibit halls at floor level. The air warms and rises naturally, and then exits through the exhaust louvers at the higher end of the curved roof. The exit of the warmer air through the exhaust louvers in the roof results in a lower pressure at floor level thereby drawing cooler outside air into the building. This process of air flow is referred to as the "chimney effect" or "stack effect."

When the natural ventilation system is in operation, airflow and building pressure are automatically recorded by the Building Automation System (BAS). Mobile CO_2 monitors placed directly in the breathing zone, and moved to accommodate each event layout, measure key IAQ-related factors which are continually monitored by the centralized BAS. The CO_2 levels and other data, such as temperature, are used to continually adjust airflow to meet IAQ standards and the client's requested set-points.

Mechanical Ventilation

All mechanical air-handling units (AHU) are tested regularly to verify that they meet ANSI/ASHRAE Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality. Each AHU undergoes maintenance every 3,000 hours runtime to keep all components working properly. Mechanical ventilation brings in air from the outside, conditions it through cooling, heating, and filtration and distributes it where necessary throughout the building using the AHUs. The mechanical systems work in concert with the natural ventilation to provide optimal air quality and comfort efficiently.

1 US Green Building Council LEED for Existing Buildings: Operations and Maintenance v2009 Reference Guide, page 330

ENERGY

Energy Usage

The DLCC is subject to variations in occupancy and energy demand on a daily basis. Occupancy may range from a few visitors in a meeting room to thousands occupying all five exhibit halls. The energy usage profile of the building also varies greatly from year to year. See Figure 4a for a historical view of energy use and Figure 4b for the 2017 breakdown by energy type. DLCC technicians minimize energy waste by carefully programming HVAC and lighting schedules through the BAS to match each client's needs. High-resolution HVAC zoning capabilities and the use of variable fan drives allow HVAC levels to be adjusted incrementally. Lighting systems in controllable groupings are customized to event and safety needs. When spaces are not occupied they are left unlit and unconditioned. To put the savings into perspective: in 2017 the DLCC saved enough energy to fly a Boeing 747 airplane around the world 59 times.

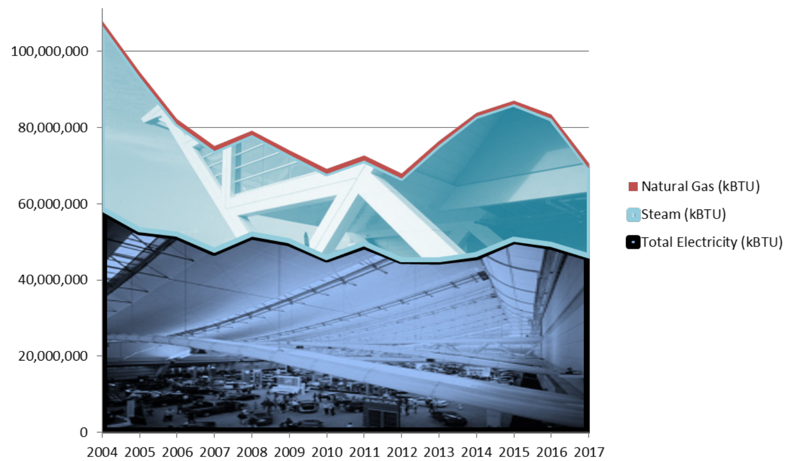


Figure 4a. Annual energy consumption from 2004-2017

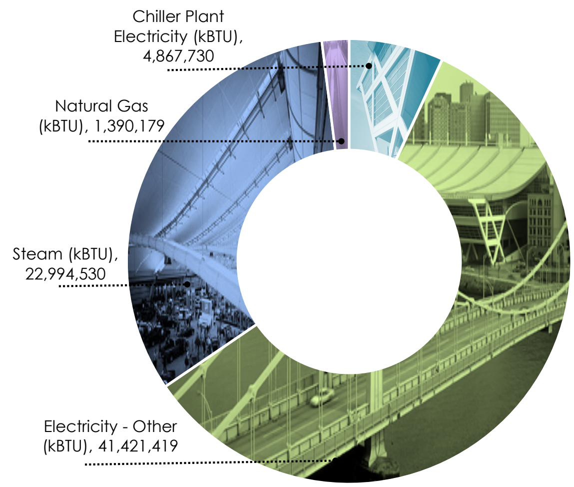


Figure 4b. 2017 Energy consumption

Energy Performance

2017 DLCC Energy usage (in thousand British thermal units (kBtu) and thousand Watt hours (kWh)):

- Total electricity consumption: 46,289,148 kBtu (13,566,573kWh)
    - Chiller plant consumption: 4,867,730 kBtu (1,426,650 kWh)
    - All other electricity consumption: 41,421,419 kBtu (12,139,923 kWh)

- PACT steam consumption: 22,994,530 kBtu (19,258.4 kLb (thousands of pounds))

- Natural gas consumption, for cooking: 1,390,179kBtu (1,351 Mcf (thousand cubic feet of gas))

2017 DLCC Site Energy Usage Intensity (EUI) (the total energy consumed by a building relative to its size in kBtu per square foot):

- DLCC EUI of energy usage per square foot 57.4 (kBtu/sf)
    - 36% reduction from the DLCC's baseline year in 2004
- DLCC energy usage per attendee per square foot is .105 Btu/sf/attendee
    - A 41% reduction over the 2004 baseline per-attendee energy intensity
    - Increased attendance has less of an effect on energy usage due to efficiency upgrades

Figure 5a. 2017 Cooling Degree Days (CDD) and chiller plant electricity usage

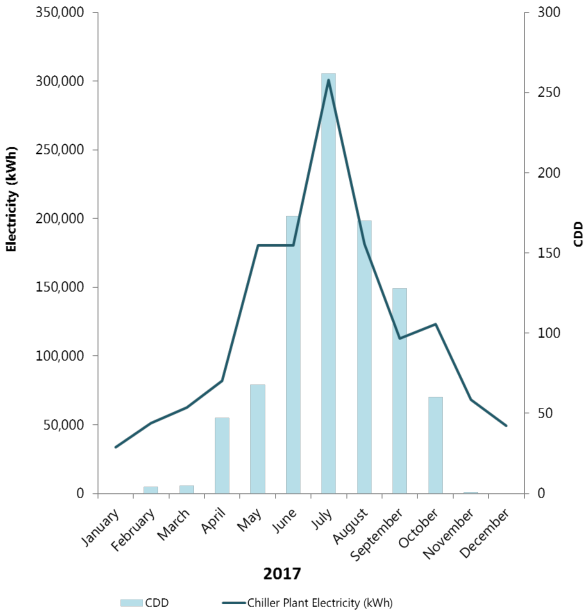
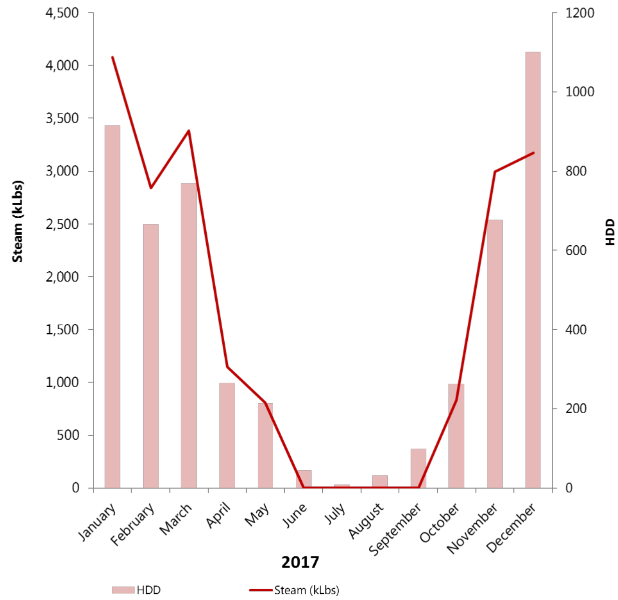


Figure 5b. 2017 Heating Degree Days (HDD) and PACT Steam usage

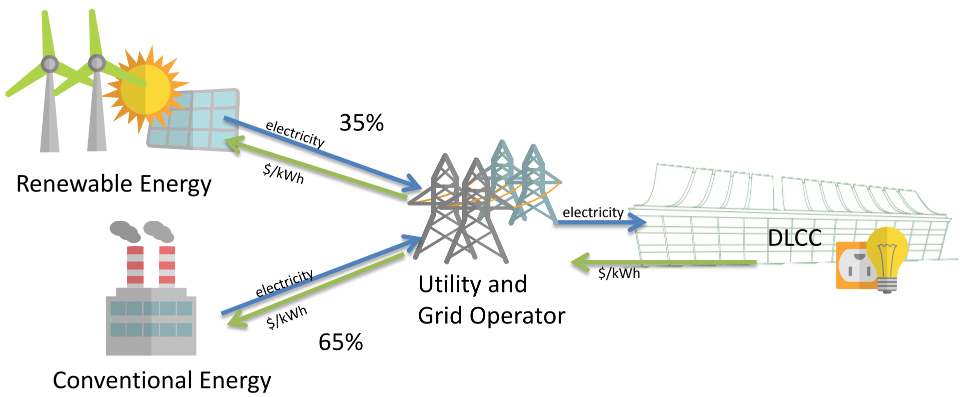


Seasonality

Seasonal changes typically influence the electricity used to produce chilled water in warmer months and the steam used in colder months (Figures 5a and 5b). Heating Degree Days (HDD) and Cooling Degree Days (CDD) (the monthly sum of daily average temperature differences above or below 65°F) help track the impact of exterior temperatures on indoor energy usage. While the use of steam for heat and electricity for air conditioning generally fits along the CDD and HDD fluctuations, there are also some months where the degree-days don't line up with energy usage, especially in border months that have both cool and warm weather.

Green Energy

The SEA, City of Pittsburgh, Allegheny County, PWSA, and others (referred to as the Western PA Electricity Consortium), have entered into aggregated electricity procurement agreements which stipulate that a percentage of the electricity purchased is to be derived from Green-e certified sources. In May 2017, the consortium entered into an agreement with Direct Energy, a retail electricity provider, that provides for 35% electricity from Green-e certified sources, an increase from 30% in previous contracts.



Flow of Conventional and Renewable Energy for the DLCC

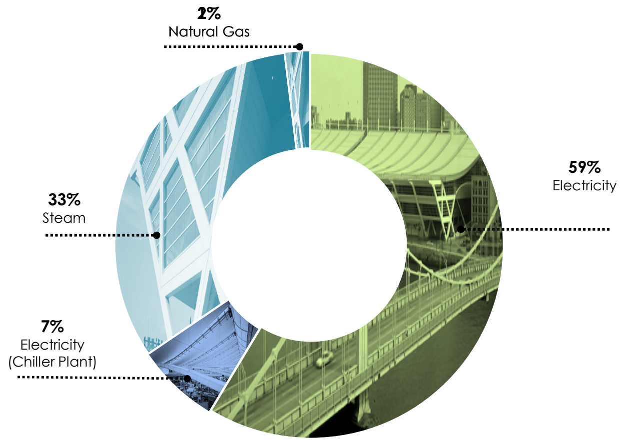


Figure 6. 2017 energy sources

Energy Performance Verification

During the development of the building design, construction, and subsequent operation, the DLCC energy performance has been tracked and studied to ensure that all building systems are operating efficiently. In 2006, Burt Hill Kosar Rittelmann Associates (BHKR) reviewed operations and energy use as part of the building's commissioning process and concluded that the DLCC was performing as the original design intended. BHKR set 2004, the first full year of operations, as the baseline.

In 2011, the David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study analyzed data from 2008-2010, as well as the data collected by BHKR. The BiO concluded that the performance of the DLCC was meeting expectations, and that there were opportunities for energy efficiency improvements, the majority of which have been implemented.[1]

The DLCC has saved 147,080,812 kBTU in cumulative energy since 2004 due to improvements in energy efficiency. The savings are modeled on the 2004 baseline, and the additional data illustrated in the BiO. See Figure 6 for a breakdown of the 2017 energy sources.

The DLCC continually evaluates and implements opportunities to become more energy efficient as operations and technology evolve. See Appendix C-1 for improvements made in 2017 to further efficiency and sustainability.

Act 129 Incentives

PA Act 129 requires electric distribution companies in Pennsylvania to reduce energy consumption across their service territory. PA Act 129 programs include, among other things, rebates for customers pursuing energy efficient upgrades. Pursuant to its program, Duquesne Light has provided rebates for qualified DLCC projects including:

- Wastewater treatment plant control system upgrade
- Building automation system (BAS) upgrade
- Chiller plant reconfiguration
- DLCC parking garage LED lighting upgrade
- Water feature lighting upgrade
- Local cooling units
- Lighting upgrades
- Natural ventilation system repairs

Sub-meters

The DLCC has implemented the use of sub-meters for electricity and water use in the building. These sub-meters help provide the DLCC with a record of energy, water, and cost savings resulting from building investments.

Sub-Meters

Energy 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 Office**
- **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)**
- **SEA Office**
- **Retail spaces (reclaimed water/municipal water)**

For a timeline of the DLCC's conservation measures compared to the DLCC's baseline performance, see Appendix C-2.

1 See the *David L. Lawrence Convention Center: A Building in Operation [Bio] Case Study* (2011)

EMISSIONS

2017 Emissions

The DLCC calculates annual greenhouse gas (GHG) emissions resulting from building energy consumption using GHG Protocol Initiative methodology.[1] The DLCC strives to reduce impact by reducing energy usage and thus reducing total emissions.[2]

In 2017 total DLCC emissions were equivalent to 11,191 metric tons of carbon dioxide ($MtCO_2e$)[3], a 27% reduction in comparison with the 2004 performance which had 15,399 $MtCO_2e$ in emissions.

2017 Emissions break down as follows:

- 9,599 $MtCO_2e$ from electricity
- 1,520 $MtCO_2e$ from steam
- 72 $MtCO_2e$ from natural gas

Since 2004, the DLCC has saved 43,559 $MtCO_2e$ in cumulative emissions through energy efficient improvements.

Emissions Intensity

Total building emissions relative to building size and overall attendance is a method of looking at how the emissions are affected by the DLCC's activity. In 2017 the emissions per attendee based on building size equates to 4.6×10^{-5} pounds of carbon dioxide of emissions per square foot per attendee (CO_2e/sf/attendee). Figure 7 shows the historical emissions intensity and overall attendee numbers.

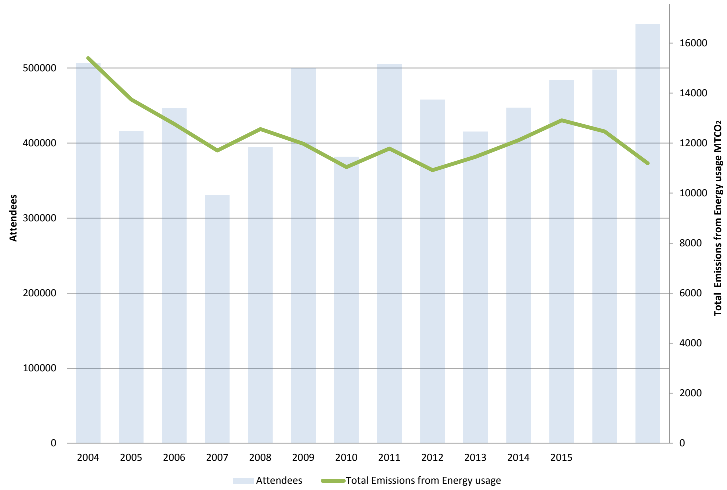


Figure 7. Historical Emissions Intensity and Attendees

Net Emissions

The purchase of green power or carbon offsets to mitigate the effects of building usage lowers net emissions values. Net DLCC emissions in 2017 were 7,832 $MtCO_2e$, which takes into account the carbon mitigation realized from the purchase of 35% electricity from Green-e climate sources. Cumulatively, the DLCC has mitigated 94,936 $MtCO_2e$ in cumulative emissions since 2004 through the purchase of green energy and carbon offsets.

Electric Vehicle Charging Stations

In 2012, the DLCC installed the first free publicly-accessible universal EV charging stations in Downtown Pittsburgh. The DLCC EV stations are listed on the registry of the EPA Alternative Fuel Data Center for vehicle chargers, information which is used by most mapping systems that assist EV drivers in finding charging stations.

In 2017, 8,240 kWh of electricity was used in the charging process. Based on the fuel economy of a 2017 Nissan Leaf,[4] this charging activity at the DLCC provided energy equivalent to 885 gallons of gasoline.[5] The electricity cost to the DLCC for these two charging stations was $701 in 2017, based on electricity used.

In 2018, the DLCC will install four new Tesla chargers, and two additional universal EV charging units for users of the DLCC garage.

DLCC Garage user charging their car

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

2 Actual emissions produced as a result of on-site activities and net emissions (total emissions less carbon offset strategies).

3 The predicted emissions based on BHKR's energy model was 15,814 $MtCO_2e$ in emissions annually. In 2004 the DLCC performed better than predicted with 15,399 $MtCO_2e$ in emissions.

4 "Find and Compare Cars: 2017 Nissan Leaf" Fuel Economy. US Department of Energy. Www.fueleconomy.gov/feg/noframes/38428.shtml

5 Data used: 2017 Nissan Altima 31 mpg city/highways from www.fueleconomy.gov/feg/bymodel/2017_Nissan_Altima.shtml

CLEANING AND PURCHASING

DLCC cleaning and purchasing decisions aim to decrease the environmental impact of maintaining and operating the center while promoting a healthy indoor environment. This includes reducing packaging, recycling, and purchasing materials that have sustainable qualities.

Indoor Air Quality

Indoor Air Quality (IAQ) is affected by the products used at the DLCC. The DLCC focuses on only using products and equipment that do not emit toxic compounds that become part of the occupants' breathing space.

The IAQ management process involves reducing air pollutants at their sources. Volatile organic compounds (VOCs), commonly found in paints, adhesives, and furniture, are a source of IAQ-related health issues.[1] During the DLCC's construction, materials with low VOC concentrations were installed to prevent the accumulation of harmful chemicals.

As a continuation of that commitment the DLCC requires that all products used during facility maintenance adhere to the VOC limits set forth by the South Coast Air Quality Management District (SCAQMD)[2].

Sustainable Purchasing by Category

The DLCC's Sustainable Purchasing Policy quantifies purchasing practices and sets minimum standards for all purchases whenever possible. The standards are based on sustainability criteria for each purchasing category aligning to LEED standards.[3] The policy covers all purchases necessary for the DLCC including office supplies, furniture, electronics, lighting, and cleaning products. Criteria for each category, along with 2017 performance, are listed in Table 2.

The key metrics from Levy purchases, which are tracked separately, are as follows: 79.2% of Levy's cleaning products were ecologically friendly; and 80% of the disposable serveware used was compostable.

CATEGORY	CRITERIA	GOAL*	2017 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%	91%
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%	83%
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%	89%
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%	27%
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%

Table 2. Sustainable purchasing by category

*Each goal is based on the percentage of annual purchases within the purchasing category that meet at least one of the applicable sustainability criteria

**On-going 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.

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

2 Http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book

3 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.

Local Purchasing

When practical, the DLCC purchases goods that are produced within a 100 mile radius of the DLCC in order to support the local economy and reduce transportation emissions. During the event planning process, clients are also encouraged to use local suppliers in order to reduce the environmental impact from their operations.

Cleaning Products and Equipment

The DLCC's Green Cleaning Policy and Plan specifies the use of sustainable cleaning products, including those which meet applicable Green Seal standards[4], which may include being made of bio-based and biodegradable content, and have low/no VOC concentrations. Green Seal provides standards that are based on life cycle research of environmental impacts and are recognized by LEED.

To protect the health of staff, sustainability standards are followed for all cleaning equipment as well. In 2017, 100% of the cleaning equipment purchased met one or more sustainability criteria such as dust-capturing filters, operating on electricity versus gasoline, among others. All cleaning equipment is serviced regularly to ensure that the equipment continues to operate at optimal safety and efficiency.

One of the most innovative pieces of equipment on-site at the DLCC is the Orbio unit which makes a scent-free and VOC-free solution of sodium hydroxide in water. It creates the solution by passing electric current between two electrodes through a medium of tap water and sodium chloride (salt). The DLCC uses the Orbio solution to clean glass, carpet, counters, stainless steel, laminate, fabric surfaces, and tile as well as sidewalks near the entryway.[5]

Food and Beverage

The DLCC food service provided by Levy is designated as a Platinum Plate Sustainable Pittsburgh Restaurant.[6] This designation is in recognition of the sustainable food and beverage practices utilized by Levy for DLCC events.

Sustainable food and beverages are those that are organic, produced within a 100-mile radius of the site, and/or meet equitable harvesting standards.[7] The large volume of food purchased, the variability in types of food served, as well as Pittsburgh's geographic location and seasonality all pose a challenge to sourcing local food. In 2017, 34.8% of all food and 68.4% of all beverages purchased were local.

Levy maintains rooftop planters growing herbs and vegetables served during catered events.

SUSTAINABLE PGH RESTAURANT

PLATINUM

4 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.

5Https://www.tennantco.com/content/dam/resources/orbio/case-studies/Case%20Study%20SMG.pdf

6 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.

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

WASTE AND RECYCLING

Reducing, re-using, and recycling is a cornerstone of the DLCC's sustainability efforts.

Diversion rate is the percentage of total refuse leaving the building that goes to a non-landfill facility, such as recycling, donation, or composting. On-going improvements to the recycling plan and the capabilities of local recycling entities have increased diversion rates. Since the program's inception, the DLCC has diverted 2,372 tons of recyclable waste from landfills. Figure 8 (see following page) shows the historical diversion rates for the DLCC.

Waste Reduction

The DLCC is committed to a source reduction policy that reduces the overall waste generated by operations, with the goal of minimizing the need to extract raw materials and the energy used for recycling. To facilitate source reduction there is a focus on environmentally preferable purchasing (e.g. reusable items, and items with less packaging), and the use of durable goods.

The DLCC's food and beverage operations make a practice of buying in bulk and requiring reduced packaging options for products. Practices such as serving water in pitchers instead of individual bottles significantly reduces the waste generated by events and building operations.

Event organizers have the option of choosing between reusable china, and/or single-use compostable serveware. Using compostable serveware, rather than conventional single-use serveware, eliminates the need to separate organic waste from the plates, trays, cups, and utensils.

In 2017, the DLCC produced an average of 0.52 pounds of waste per attendee, 74% lower than the 2009 benchmark of two pounds per attendee. While these numbers indicate that current source reduction strategies are effective, the DLCC continues to explore means to further reduce waste going to landfills.

Recycling

Waste is collected at stations throughout the DLCC and brought to a single point to be sorted into compost, recycling, and landfill categories. This ensures that waste diversion tracking is accurate, and that no waste leaves the building in uncontrolled methods. All recycling facilities utilized by the DLCC are located within a 12-mile radius. DLCC management periodically verifies that the recycling entities continue to meet sustainability goals and standards.

DLCC Recycling Entities

Agrecycle: Compostable items such as food scraps, serveware, paper, and landscaping waste
Construction Junction: Usable construction waste, furniture, reusable lighting, and building components
BatteriesPlus: Small electronics and batteries from East Lobby collection point
Evolution E-Cycling: Computers and monitors
Greater Pittsburgh Community Food Bank, 412 Food Rescue, and Jubilee Soup Kitchen: Surplus prepared food
Junction and Habitat for Humanity: Carpet scraps, surplus building supplies, furniture
Largent: Pallets
New Market Waste Solutions: Cooling oil
Roadrunner Waste Management: Baled plastic films, Non-contaminated linear low-density polyethylene (LLDPE) and low/high density polyethylene (LDPE, HDPE). In 2017 enough baled plastic was recycled by the DLCC to manufacture 3,200 square feet of decking materials, the most likely end use for the plastic.
Scott Electric: Light bulbs

In order to meet recycling and composting goals, careful planning on both sides of the client-facility relationship are required. Diversion rates are dependent on the volume and type of waste generated at each event or during DLCC improvements. Event planners are encouraged to include reusable and/or recyclable materials in their own purchasing and operating decisions.

Public shows and trade shows with significant and sometimes unusual waste streams pose the greatest challenge to the waste diversion program. Proper planning for diversion methods and for adequate labor is required. Strategies for diverting unusual materials must be considered prior to the event in order to be successful.

2017 Waste Diversion Performance

The diversion rates reported are based on the on-site waste management practices. The DLCC has set a goal of 50% for the annual diversion rate, which it has met each year during the past nine years. The composting program started in 2008 has had the greatest impact on the DLCC diversion rates. Compostable waste makes up 38% (600 tons) of all waste diverted since 2008. This changed the baseline year for waste management comparison to 2008 from 2004.

In 2017, 153 tons of waste went to landfill and 187 tons of waste was diverted away from landfills resulting in a diversion rate of 55% (see Figure 8 for historical diversion rates). Figure 9 shows the breakdown for diversion and landfill. By weight, diverted materials in 2017 were as follows:

- 39 tons of cardboard baled and recycled
- 51 tons of commingled glass /plastic /aluminum recycled
- 12 tons of wood pallets donated/reused/recycled
- 9 tons of building materials[1] donated or recycled
- 60 tons of organic waste composted
- 4.5 tons of food donated to local food banks
- 3.9 tons of cooking oil donated for biofuel
- 6.6 tons of plastic baled and recycled
- 0.6 tons of E-waste[2] recycled and donated

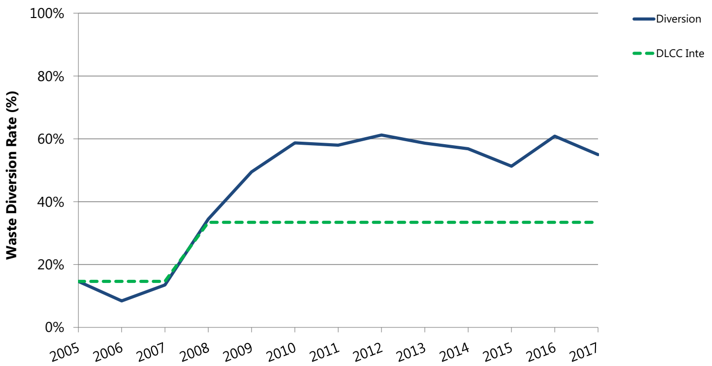


Figure 8. Waste Diversion Rate 2005 to 2017

Although the environmental impacts associated with the waste diversion program cannot be accurately tracked at this time, the impact 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.[3] 2017 diversion of cardboard, paper, glass, plastic, aluminum, and compost was responsible for an estimated savings of 372 $MtCO_2e$. An estimated total of 4,414 $MtCO_2e$ has been avoided since recycling began in 2005.

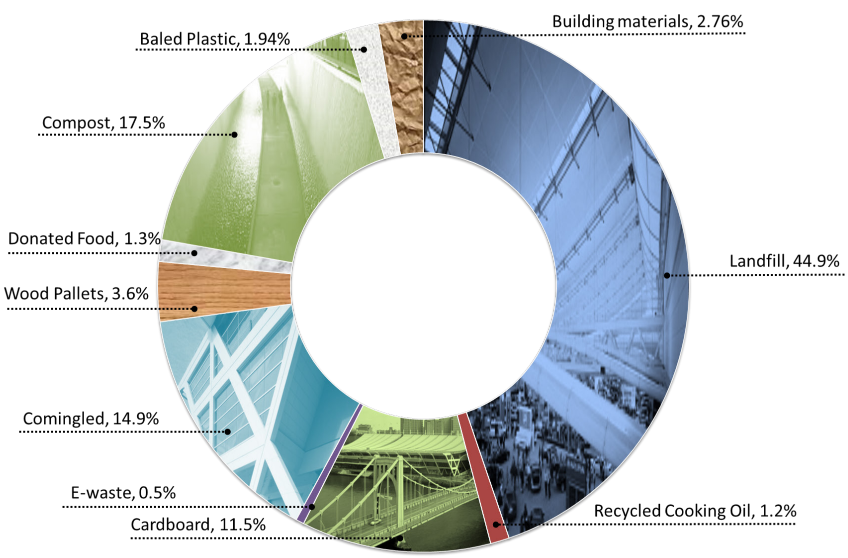


Figure 9. 2017 Waste Breakdown

1 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."

2 "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.

3 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* **2030 GOAL:** *50% reduction below the 2004 DLCC baseline by 2030* **DLCC 2017 STATUS: EXCEEDING THE 2020 GOAL**
WATER	**2020 GOAL:** *20% reduction below the 2006 DLCC baseline by 2020* **2030 GOAL:** *50% reduction below the 2006 DLCC baseline by 2030* **DLCC 2017 STATUS: EXCEEDING THE 2030 GOAL**

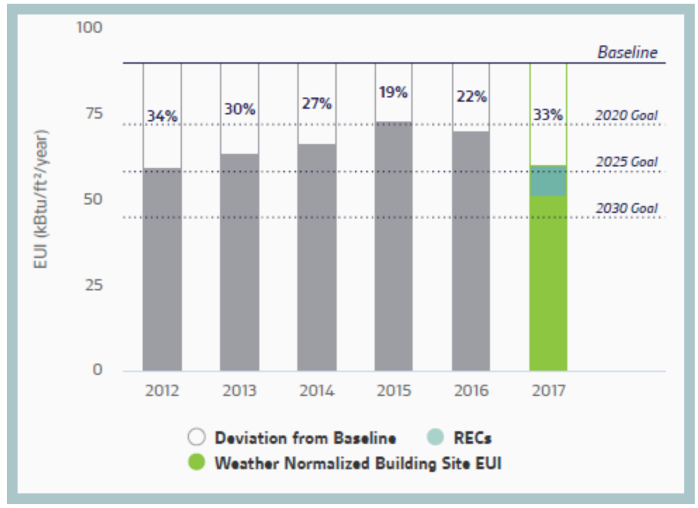
The Pittsburgh 2030 District is a collaboration of building owners in Downtown Pittsburgh, Oakland, and Northside that aims to dramatically reduce energy and water consumption, reduce emissions from transportation, and improve indoor air quality. The 2030 District is facilitated by the GBA. The SEA, as the owner of the DLCC, is a founding partner of the 2030 District.

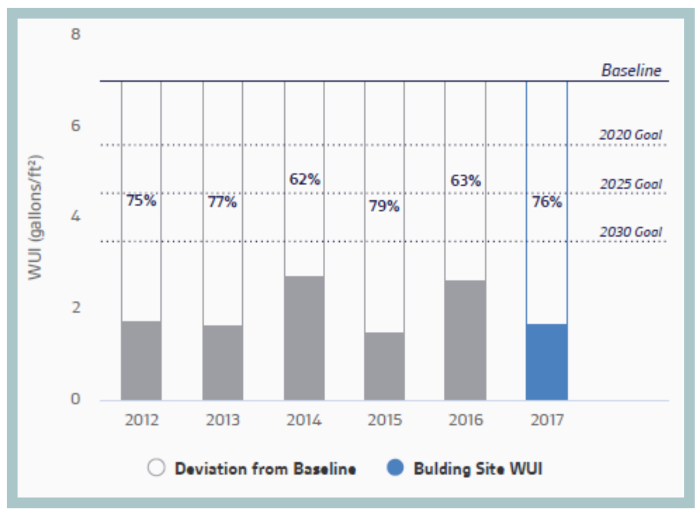
The 2030 District uses site EUI as a gauge of performance. The GBA established the energy use baseline for the DLCC at 90.2 kBtu/sq. ft., which is the actual performance of the DLCC in 2004. The site EUI for the DLCC in 2017 was 51 kBtu/sq. ft., a 43% reduction from the baseline[1] which exceeds the 2020 goal and approaches the 2030 goal.

The 2030 District uses site Water Use Intensity (site WUI) to gauge water usage. Site WUI is similar to site EUI in measuring a building's annual water usage per square foot. GBA established the Water Use baseline for the DLCC at 4.46 gal/sq. ft., representing the actual performance in 2006, the first full year that the wastewater treatment plant was in operation. The Site WUI for the DLCC in 2017 was 1.7 gal/sq. ft., a 76% reduction from the baseline which exceeds the 2030 goal.

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

Excerpts from DLCC 2030 District Report





1 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.

APPENDIX A: REPORTING SCOPE

ORGANIZATIONAL BOUNDARIES

Reporting boundaries typically follow the site boundary of the building. Decisions by planners and attendees are difficult to quantify in most cases, they are discussed but not generally included in building statistics.

The DLCC encourages each event to adopt relevant sustainable practices, however, the DLCC cannot reasonably account for the impact of event purchasing, attendee transportation choices, and other externalities. Practices which do not directly affect the building's environmental performance have not been measured and included in this report.

BASELINES, METRICS, AND GOALS

To measure performance in a broadly accepted and translatable manner, the DLCC adopted the metrics and methodologies of LEED for Existing Buildings: O+M; the goals of the Pittsburgh 2030 District; and some performance indicators from the Event Organizers Sector Supplement of the Global Reporting Index G4 Sustainability Reporting Guidelines.[1] Multiple metrics are tracked in absolute values and in per-attendee intensity. It is important to note that the activity level and building demands at the DLCC are affected by externalities such as weather, event schedules, and event needs, type, and size.

2004 was the first full year of operations and data measurement and was generally adopted as the DLCC's baseline year. Baseline years are adjusted to reflect changes that significantly shift performance as follows:

- Water – The DLCC uses 2010 as a baseline year for internal tracking due to the change in water types used in building operations (filters were installed to allow aquifer water to replace potable water in the 10th Street Water Feature, reducing municipal water needs). The 2030 District uses 2006 as a baseline year due to the wastewater treatment plant coming online (it reflects a significant change in overall water consumption consistent with their program parameters).
- Waste – The DLCC uses 2008 as the baseline year, due to a composting program that was added in that year (significantly increasing the diversion rate).

GREENHOUSE GAS INVENTORY METHODOLOGY

The DLCC quantifies annual Greenhouse Gas (GHG) emissions according to the methodology of the GHG Protocol Initiative[2] and the ENERGY STAR Portfolio Manager program. This methodology separates emissions into three different scopes according to the relationship between the emission's origination and the level of control over those emissions.

SCOPE I

Scope I emissions, known as direct emissions, result from on-site emissions-releasing activities. The largest Scope I source at the DLCC is the combustion of natural gas used by the kitchen equipment, which only comprises 1% of the building's total emissions. All other Scope I emissions are considered de minimus, and are not directly tracked at this time.[3]

SCOPE II

Scope II is the carbon footprint of the facility that consists of 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. Emissions from district steam consumption are based on a national average reported by the Portfolio Manager program.

SCOPE III

Scope III 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, Scope III emissions include those associated with purchased materials, waste management, and transportation of visitors. It is currently beyond the organization's capabilities to accurately track these emissions. The uncertainty associated with Scope III emissions would reduce the integrity of the DLCC's formal carbon footprint, therefore they are not included with Scope I and II emissions.

The carbon footprint given in the emissions section of this report represents only the facility footprint (i.e. the emissions associated with the use of the physical building and its systems).

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

2 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.

3 Defined by California Climate Registry as emissions comprising less than 5% of total footprint, de minimus emissions aren't tracked in an inventory unless deemed otherwise significant.

APPENDIX B: GLOSSARY

Act 129 Rebate Program	PA Act 129 requires electric distribution companies in PA to develop plans to reduce energy consumption. Electricity distributors often offer monetary incentives such as rebates to clients that make qualified energy savings upgrades.
aerating faucets	Controls faucet flow and regulates its pressure by adding air to the water flow.
Air-Handling Units (AHUs)	Device used to regulate and circulate air as part of a heating, ventilating, and air-conditioning (HVAC) system.
APEX/ASTM Sustainable Meeting Venue	A third-party certification that is specific to the meeting and events industry. APEX/ ASTM is a collaboration between APEX and ASTM.
APEX	The Accepted Practices Exchange
ASTM	American Section of the International Association for Testing Materials
aquifer	Geological formation containing or conducting ground water.
ASHRAE	The American Society of Heating, Refrigerating and Air-Conditioning Engineers.
biodegradable	Substances which will naturally decay, usually by bacteria or other microorganisms, over time.
biofuel	A fuel derived directly from living matter.
building commissioning (Cx)	The process of verifying that all or some of the systems in a building are operating as designed, with recommendations to improve performance when applicable. These systems can include: HVAC, plumbing, electrical, fire/life safety, building envelope, sustainable systems, lighting, wastewater, controls, and security systems.
Building Automation System (BAS)	A comprehensive tracking and controlling system that can monitor conditions inside the DLCC, like building pressure and air flow, and set activation parameters for building elements. It is designed to simultaneously help keep guests comfortable and reduce the unnecessary use of energy.
built environment	The man-made spaces in which we all live, including buildings, developed open spaces, and transportation infrastructure.
carbon offset	A reduction in emissions of carbon dioxide in order to offset an emission made elsewhere. The reduction can be sold through certified agencies in order to allow others to compensate for their emissions.
centrifugal chiller	Removes heat from chilled water lowering its temperature in the process
compostable	Organic substances that may be used to fertilize soil, like leaves, unused food, or paper and cardboard products.
Cooling Degree Days (CDD)	Days with an average temperature exceeding 65 degrees Fahrenheit, such days increase the strain on and use of building cooling systems. Taken in a year, the number of CDDs help put cooling-related energy usage into perspective.
cooling tower	Device that rejects waste heat to the atmosphere as a result of cooling a water stream to a lower temperature.
daylighting	The utilization of windows and other portals for natural light. This reduces electricity usage and improves the atmosphere of a building.
demand response curtailment	A program through which businesses receive payments for voluntarily reducing their electricity usage when heavy demand threatens the reliability of the region's electricity grid.

diversion rate	The rate at which materials are diverted from landfill by "reducing, reusing, and recycling".
emissions intensity	The total emissions of a building relative to its size measured in CO_2e/sqft or, for cross-year comparison including the relative intensity related to attendance levels, CO_2e/sqft/attendee is used.
Energy Star Portfolio Manger	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.
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 purchasing materials with high levels of recycled content or other positive environmental benefits.
evapotranspiration	The process by which water and moisture are moved from the soil to the air through both the ordinary heating of water into vapor and the escape of water through the porous leaves of plants.
Green Building Alliance (GBA)	A regional non-profit that has been promoting sustainable practices in Western Pennsylvania since 1993.
Green-e Certified	A clean energy certification that ensures that green energy purchases are regulated and conform to standards.
Greenhouse Gases (GHG)	Any gas that absorbs infrared radiation from the sun and re-radiates it, like carbon dioxide or chlorofluorocarbons. These substances are associated with climate change and the greenhouse effect.
green-seeking events	Events 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.
heat island effect	The increased temperatures experienced in urban areas when sunlight is absorbed by roofing and paving materials and the light is re-radiated as heat energy, causing built up and paved areas to be significantly warmer than rural and undisturbed areas.
Heating Degree Days (HDD)	Days with an average temperature below 65 degrees Fahrenheit. Such days increase the strain on and use of building heating systems. Taken in a year, the number of HDDs help put heating-related energy usage into perspective.
Indoor Air Quality (IAQ)	The air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants
Integrated Pest Management, Erosion Control, and Landscape Management Plan	A DLCC management plan mandating landscaping and planters to be hand-weeded, and landscaping waste collected is composted. Fertilizers are to be used rarely, and when used, must be organic.
LEED (Leadership in Energy and Environmental Design) certification	Issued by the U.S. Green Building Council which is a globally recognized symbol of sustainable achievement in the built environment.
major events	Larger events that typically book 18 months and further into the future, require the Center's facilities (i.e. there is no other local venue that can physically accommodate the event), and uses a significant number of hotel rooms

net emissions — The difference of total emissions less the emissions mitigated through carbon offset strategies.

payback period — A common measure of a project's financial viability. The cost is divided by the annual expected returns which results in the amount of time it will take for the project to pay for itself.

sick building syndrome — Health related effects on people occupying buildings with poor indoor air quality. Those who spend too much time in buildings with poor ventilation or chemical contaminants may experience headaches, eye/nose/throat discomfort, difficultly concentrating, or nausea.

Site Energy Usage Intensity (Site EUI) — The total energy consumed by a building relative to its size. An output from the EPA's ENERGY STAR Portfolio Manager, this measure takes the building's annual energy performance over its gross square footage.

Site Water Usage Intensity (WUI) — A similar measure to Site EUI, this measure takes the building's annual water performance over its square footage.

SCAQMD — South Coast Air Quality Management District, the air pollution agency responsible for regulating stationary sources of air pollution in the South Coast Air Basin, in Southern California. The regulations are used throughout the country.

stack effect — Also called the "chimney effect," this is the phenomenon of natural, cyclical ventilation and cooling that occurs when cool air enters a building to replace the warm air escaping upward.

sub-meters — Meters that measure water or energy usage in a sub-section or component of a building.

Thousand British Thermal Units (kBtu) — A common standard unit for energy performance, used to ensure consistency and comparability across electricity, steam, and natural gas usages.

Variable Frequency Drives (VFDs) — Effective method of reducing the energy and operational costs of motors in air-handling units and allows HVAC systems to better adjust to changes in demand.

Volatile Organic Compounds (VOCs) — Components of many household and office products, like paint, adhesives, or furniture, that concentrate much more heavily inside than outside of buildings and may have adverse health effects that range from simple eye/nose/throat discomfort to the long-term threat of cancer, depending on the chemical in question.

Waste Reduction Model (WARM) — Created by the EPA to estimate recycling-related energy savings. Compares the typical lifecycle impacts of manufacturing processes that employ raw materials to those that use recycled materials.

wastewater — Any water that has been affected by human use.

Appendix C-1: 2017 SUSTAINABILITY AND CONSERVATION MEASURES

Building Automation System Upgrade

A full system upgrade of the BAS was started in 2014 and completed in 2017. The BAS system components dating back to the original construction of the DLCC were technologically obsolete. An upgrade was necessary to keep the HVAC system operating properly.

The upgrade includes hardware replacement, software updates and a full re-commissioning of all network-level controllers, field-level controllers, and end devices. An on-going service contract is in place to maintain commissioning efforts for maximum system efficiency. In addition to estimated savings in utility costs, this project qualified for a PA Act 129 rebate of over $83,000, and the project has an estimated payback period of 4.1 years.

Air Handling Unit Variable Frequency Drive Upgrade

Design of the replacement of the drives in the Air Handling Units (AHU) with Variable Frequency Drives (VFD) was done in 2017 with installation work in 2018. VFDs are an effective way to manage energy by reducing operational cost of motors by varying torque loads for the AHUs and other HVAC operations. Motors account for 20% of energy used in buildings and 95% of the life cycle cost is in maintenance and repairs.[1] Instead of running the motor at full output for all uses, it can switch to a lower output and save energy when conditions allow. The ability to throttle down the intensity of the motor also results in less wear and tear on the gears, thereby reducing maintenance costs. A small investment in a VFD results in lifetime savings.

The estimated energy savings is 66% over the current motors. This is achieved through a constant speed reduction of 30% (70% of maximum speed). Actual results may vary, as the drives will operate at a variety of speeds depending on demands throughout the year. The payback period is between eight months and 36 months for the VFD replacement. The upgrade qualifies for PA Act 129 rebates.

10th Street and Ft. Duquesne Lighting Upgrade

The exterior lighting over 10th Street and the Fort Duquesne Blvd. consisted of the original metal-halide fixtures from the building's original construction. In 2017 the design process of replacing the fixtures with retrofit kits that feature high-quality, programmable LED lights occurred, with installation done in 2018. The energy usage of the new fixtures will be 50%-60% less than current fixtures and will require less maintenance.

Waste Receptacle Replacement

The DLCC purchased 42 three-compartment landfill/compost/recycling receptacles for use by visitors in Exhibit Halls A through E. The receptacles are composed of recycled material and feature graphics showing visitors where to place their compostable and recyclable items.

Cooking Oil Management Program Installation

The DLCC instituted an oil management program that involves a built-in filtration system attached to the fryer setup. The oil is directly siphoned into tanks and those tanks are then drained into the trucks that arrive on site as needed for delivery to a local facility that recycles the cooking oil into biofuel. The system is safer for employees and makes it easier to recycle cooking oil.

[1]Https://www.buildings.com/article-details/articleid/9345/title/roi-from-vfds-cutting-costs-with-variable-frequency-drives

Appendix C-2: Conservation Measures Highlights vs. Actual kWh usage of the DLCC Building