2015 GREEN REPORT

DAVID L. LAWRENCE CONVENTION CENTER

This 2015 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 2015 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 2015 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 (GBA) 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's (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 the Appendix A: Reporting Scope section at the end of this document.

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 office building.

This report aims to remain transparent on factors impacting performance. Where possible, qualitative observations 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 efficiency.

Table of Contents

75 native or adapted plant species on-site

SITE

14% energy use per attendee reduction*

ENERGY

Reduction in net emissions in 2015 is equivalent to saving 68 acres of forest from deforestation*

EMISSIONS

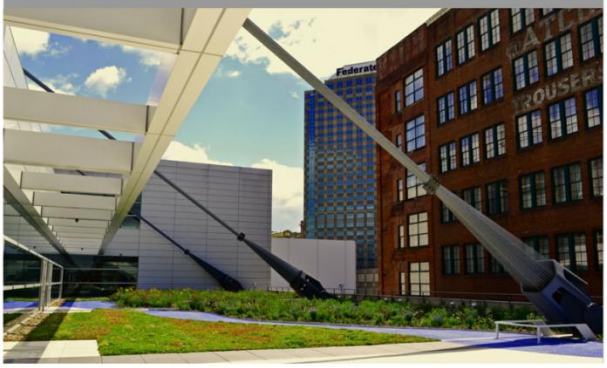
53% diversion rate / **190** tons of waste kept out of landfills

WASTE

36% of water needs were met by recycled wastewater

WATER

2015 HIGHLIGHTS



100% of electronics purchased in 2015 met sustainability standards**

PURCHASING

16% reduction in total emissions (not including current offset strategies)*

EMISSIONS

The natural ventilation system was used on **45%** of event days

ENERGY

26% locally purchased food products

PURCHASING

Water recycled this year is enough to fill **7** Olympic sized swimming pools

WATER

Reduction in net emissions in 2015 is equivalent to taking 1,472 vehicles off the road for one year*

EMISSIONS

51% of the site area is covered in high-SRI (Solar Reflectance Index) materials

SITE

* Compared to the 2004 DLCC baseline of 15,397.29 MT CO_2e.

** Based on the DLCC's Sustainable Purchasing Policy aligned with LEED® standards. Each purchasing category must meet at least one of the applicable sustainability criteria (see "Purchasing" section).

The DLCC

INTRODUCTION AND HISTORY

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 visitors to the region and to bring tourism spending to 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 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 additional foundation that chose to remain anonymous.

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.

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, a case study process was initiated to evaluate building performance, facility management, occupant satisfaction, and operational sustainability. The case study was completed in November 2011. The final report, the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* is available to the public at www.pgh-sea.com/conventioncenter**.**

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

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

Economic Impact

ACTIVITY AT THE DLCC

In 2015, the DLCC hosted 176 total events and had a total attendance of 483,852 guests. The mix of business at the DLCC varies from year to year. 2015 building usage, by event type, is highlighted in **Table 1.**

Table 1. *2015 DLCC Events by Type*.

TYPE	Public Show	Convention/ Trade Show	Meeting	Banquet	Other*	TOTAL
EVENTS	17	41	65	23	30	**176**
ATTENDEES	227,493	110,474	10,570	10,891	124,424	**483,852**

* "Other" event type refers to special events, sports events, and other miscellaneous events.

SMG reports that in 2015, the DLCC experienced a slight increase in the number of events and an increase of nearly 40,000 attendees compared to 2014 data. Attendence increases were seen across all event types in 2015. The main exhibit halls were occupied by events for 66% of the year.

The total number of attendees is used throughout this report to calculate per-attendee intensity metrics. A per-attendee intensity measurement is used because it is easily quantifiable; however, it should be noted that this measure does not account for other factors that may affect the activity level and energy demands at the DLCC.[2]

[1] LEED® and the related logo is a trademark owned by the U.S. Green Building Council (USGBC) and is used with permission.

[2] In addition to the number of event attendees, the activity level and energy demands at the DLCC are affected by external factors such as seasonality, event volume, schedule, type, and the needs of attendees and event planners. In addition, the "attendee" measure does not take into account the number of visits an attendee would make for an event lasting more than one day.

MAJOR EVENTS

While the number of attendees to the building is a 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 could not have been held in Pittsburgh but for the DLCC). Direct spending is defined as spending by the attendees, exhibitors, and organizers based on hotel room nights and other spending. As calculated by VisitPittsburgh, direct spending from the 38 "major" events held at the DLCC in 2015 was $106.3 million.[3]

GREEN-SEEKING EVENTS

The LEED® certifications and ongoing sustainable operations at the DLCC attract patrons who seek facilities with green operations. "Green-seeking" means that the clients specifically asked about the DLCC's sustainable or green initiatives during the sales process, or requested 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 2015, there were 14 green-seeking events in total including both major and non-major events. These green-seeking events, with 7,087 attendees, accounted for $751,016 of gross revenue for the building in 2015.

In 2015, of the 38 "major" events at the DLCC, 3 were green-seeking events. These 3 "major" events accounted for $3.5 million of 2015 direct spending to the region. Green-seeking major events have been responsible for $250 million (23%) in direct spending since tracking began in 2006 (**Figure 1**).

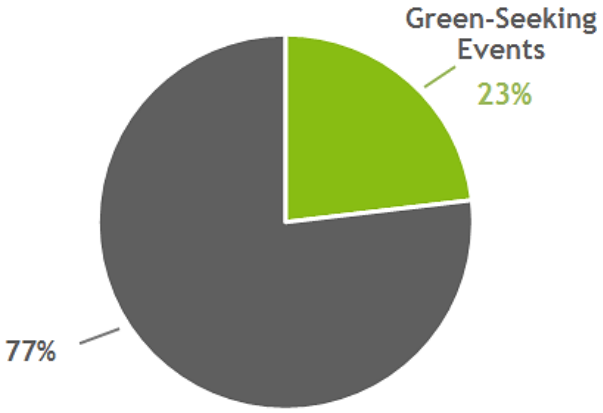
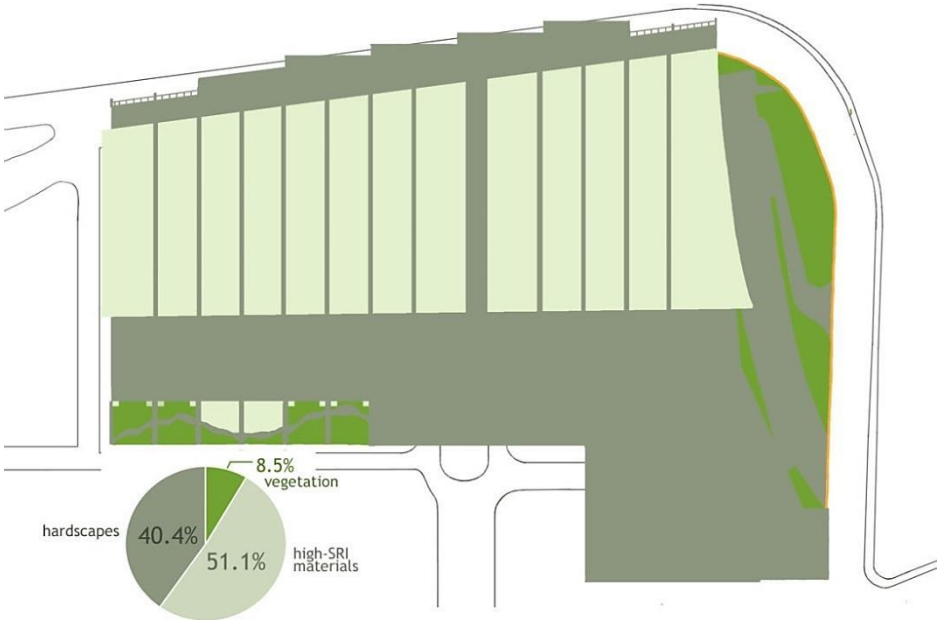


Figure 1. Direct Spending from Green-Seeking Events Since 2006

[3] VisitPittsburgh: *2015 DLCC Economic Impact Report to SMG*. Direct spending and state and local taxes are calculated with respect to "major" events only.

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

VEGETATED SPACES

11TH STREET AND RIVERFRONT PLAZA

The 11th Street site border to the East 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.[4]

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 up to 37 boats. The Riverfront Plaza has quickly become a popular destination for both convention center attendees and Pittsburgh residents.

Riverfront Plaza

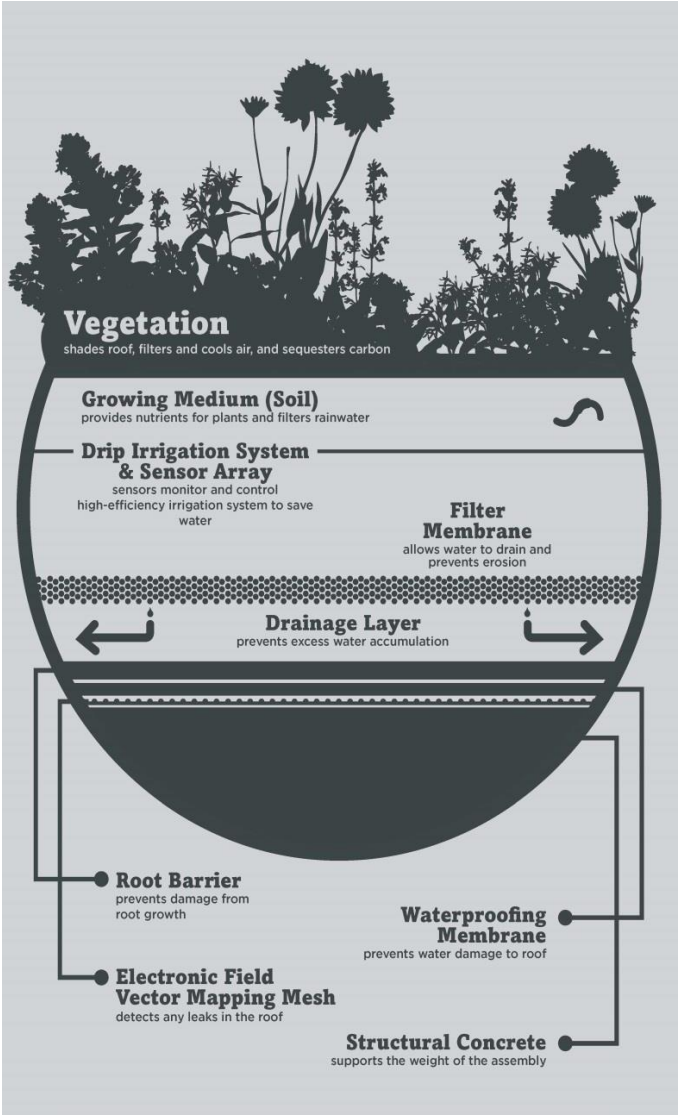
[4] The site plan and green space calculations do not include the Riverfront Plaza.

SOUTH TERRACE GREEN ROOF

In the summer and fall of 2011, the third floor terrace outside of the cityside meeting rooms was renovated. 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 2015, 34 events were held on or adjacent to the green roof.

The green roof functions as a stormwater runoff control device, lessening the DLCC's contribution to Pittsburgh's combined sewer overflow (CSO) events. Studies by the Penn State Center for Green Roof Research have shown that green roofs in the Pennsylvania climate retain approximately 50% of rainfall on average, reaching up to 100% in the summer.[5] 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 lbs. of particulate matter from the air annually, which is approximately equivalent to the annual emissions of 255 passenger vehicles.[6]

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.



Structure of the South Terrace Green Roof

[5] *Stormwater Quantity*. Penn State Center for Green Roof Research. Web. 19 May 2016. http://plantscience.psu.edu/research/centers/green-roof/research/stormwater/stormwater-quantity

[6] *Reducing Urban Heat Islands: Compendium of Strategies*.US EPA, Oct 2008. Web. 30 March 2016. http://www.epa.gov/heatisland/resources/pdf/GreenRoofsCompendium.pdf.

MONARCH WAYSTATION

In June 2012, the DLCC established a Monarch Waystation (#6071) on the North Terrace's rooftop gardens. Monarch Waystations are gardens planted with milkweeds and nectar-providing plants where Monarch butterflies can lay their eggs. From the time they hatch, until they reach adulthood, the larvae only eat from the milkweed plant on which they were born. Developed by the University of Kansas' Monarch Watch program, Monarch Waystations are a way for individuals to create a habitat for the monarch butterflies. Each fall, millions of monarch butterflies migrate from the United States and Canada to spend the winter in Central Mexico. In March, they begin their return journey north. Over the last decade, the monarch population has declined as a result of urban sprawl and herbicide-resistant crops, which have caused habitat loss. For more information on Monarch Waystations visit www.monarchwatch.org.

Monarch Waystation

VEGETABLE AND HERB GARDENS

The abundant sunlight that reaches the North Terrace makes the location an excellent spot for gardens. Levy Restaurants, 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, tomatoes, and parsley, which are enjoyed by visitors during catered events.

Rooftop Planters

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, landscaping waste is collected for composting, and only organic fertilizers are used if needed.

URBAN HEAT ISLAND MITIGATION

During the summer, sunlight is absorbed by conventional roofing materials and re-radiated as heat energy, causing densely-developed urban areas to be 1.8°F to 5.4°F warmer than surrounding rural areas.[7] This phenomenon, known as the "urban heat island effect," can result in increased cooling costs, air pollution problems, and health issues during the summer.

Green roofs and other vegetated spaces mitigate the urban heat island effect by reducing solar heat gain and naturally cooling 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 50°F reduction in surface temperature compared with adjacent conventional roof materials.[8]

The urban heat island effect can also be mitigated by selecting materials with a 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 pavers on the South Terrace Green Roof have 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.[9] 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 can become 50°F-90°F warmer.[10]

South Terrace Green Roof

[7] Berghage, Robert, et al. *Green Roofs for Stormwater Runoff Control*. US EPA, Feb 2009.
[8] "Green Roof." *Allegheny County Accomplishments*. County of Allegheny. 2016. Web.19 May 2016. http://www.alleghenycounty.us/allegheny-green/energy-conservation/green-roof.aspx
[9] *ENERGY STAR Program Requirements for Roof Products*. Energy Star.gov, 2010. Web.19 May 2016. https://www.energystar.gov/ia/partners/product_specs/program_reqs/Roof_Products_Program_Requirements.pdf
[10] *Heat Island Effect*. US EPA, n.d. Web. 19 May 2016. http://www.epa.gov/heatisland/about/index.htm.

WATER COMSUMPTON

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. All plumbing fixtures and fittings used in the building (for both potable water and graywater systems), meet plumbing code requirements assigned by the Uniform Plumbing Code (UPC) and the International Plumbing Code (IPC) standards recommended by LEED®. Fixtures in all restroom facilities throughout the building are equipped with sensor controls and aerating faucets. In 2015, the DLCC consumed 17% of their total water usage from municipal sources (**Figure 2**). This is the lowest percentage of potable water consumed since tracking began in 2004.

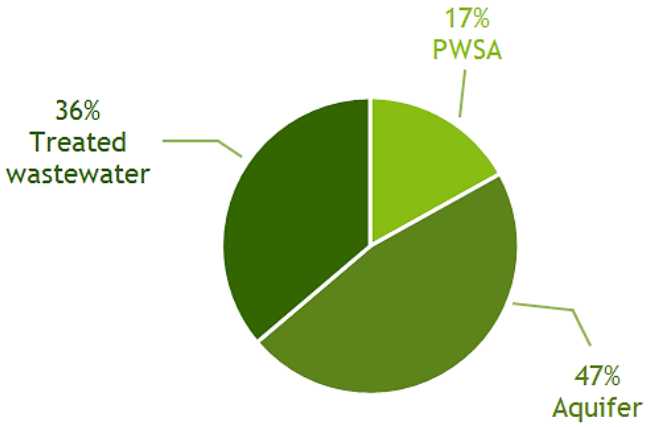
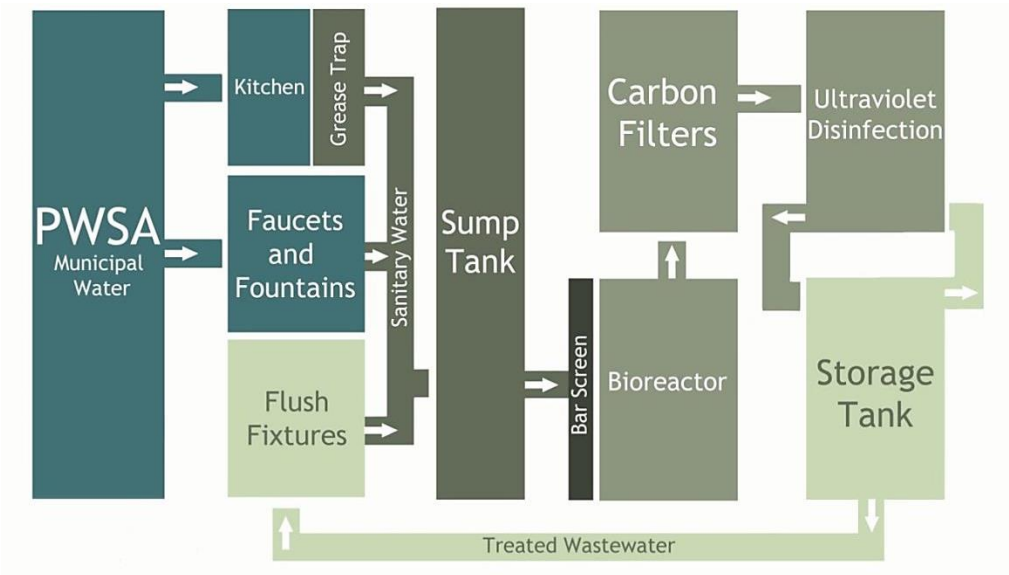


Figure 2. 2015 Water Sources

WASTEWATER TREATMENT PLANT

The DLCC has a 50,000 gallon capacity on-site wastewater treatment plant that collects and treats all wastewater from sanitary and potable uses. This water is then recycled throughout the building for toilet flushing. The plant's treatment components include a sump tank, aerobic digester, carbon filter system, and ultraviolet disinfection system. In 2015, the wastewater treatment plant was operated through a contract with Veolia Water North America. 4.7 million gallons of water were reused in 2015, accounting for almost 36% of the total indoor water usage.

Although the use of reclaimed water is more expensive than using municipal water, the decrease in potable water consumption and discharge of water to the municipal sanitary system has a significant impact on the operation of PWSA's and the Allegheny County Sanitary Authority's overall systems.



DLCC Wastewater Treatment Process

AQUIFER

The Wisconsin Glacial Flow is an aquifer located approximately 50 ft. below the DLCC. Aquifers are geological formations containing or conducting ground water. Unlike most aquifers that do not follow a channel, the Wisconsin Glacial Flow is more like an "underground river" as it flows at the slow rate of five to six miles a day along a fixed path. 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 47% of the DLCC's water usage in 2015. Using the 2015 average effective rate for municipal water, it was estimated that the use of aquifer water saved the DLCC over $89,600 in utility costs.

COOLING TOWER

The aquifer is the source for the cooling tower water used in the chiller plant. In 2015, 3.9 million gallons of aquifer water were used by the chiller plant, representing 30% of the DLCC's water requirements. The use of aquifer water eliminates the need for potable water for this process.

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 2.1 million gallons in 2015.

GREEN SPACE IRRIGATION

The aquifer is also the source of water for the irrigation of the South Terrace Green Roof and the 11th Street area when necessary. An array of moisture sensors continually monitor the Green Roof's growing medium and control a high-efficiency drip irrigation system based on natural rainfall patterns. It is the DLCC's formal policy to use the irrigation system serving the 11th Street area only in extreme or prolonged drought conditions. In 2015, the 11th Street vegetation system was not used. The South Terrace Green Roof used 6,617 gallons of aquifer water for irrigation in 2015. This figure also represents the total irrigation use for the DLCC in 2015, which is a 94.7% reduction in water over conventional irrigation practices.[11]

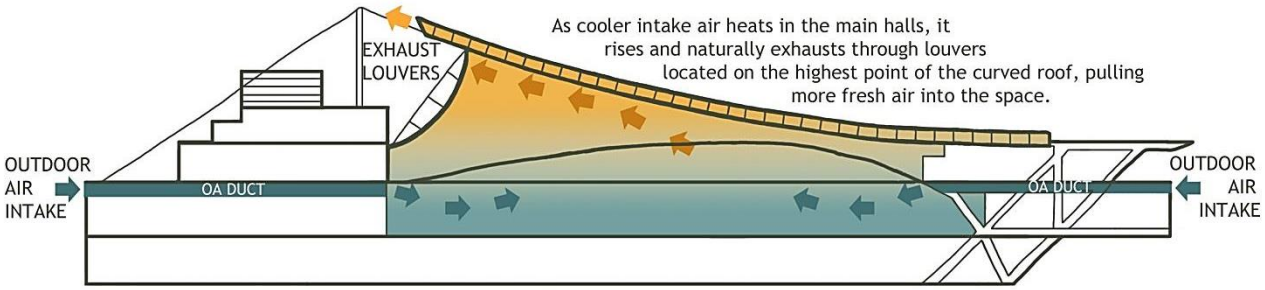
South Terrace Green Roof

[11] Conventional practice 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

By the nature of the convention industry, the DLCC is subject to significant variations in occupancy, and therefore, in energy demand. When no attendees are in the building, major spaces may be unoccupied for several days. During event days, occupancy may range from a few people in a meeting room to thousands of visitors 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 via 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 use 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



Natural Ventilation System

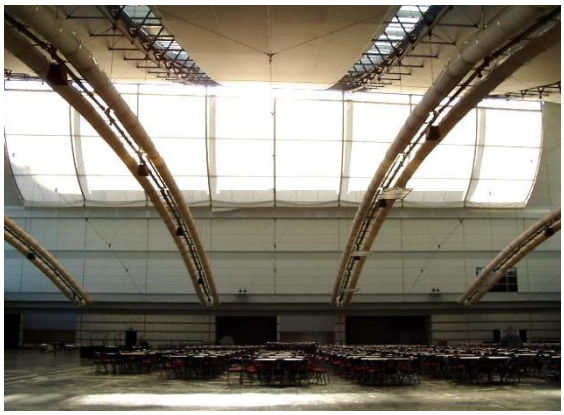
The natural ventilation system is capable of delivering direct outdoor air to the main exhibit halls and is used when weather conditions are suitable. Operable intake louvers are located along all four walls of the building between the second and third floor level. When the system is in operation, outdoor 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. Air is passively exhausted through these louvers using natural "chimney effect" dynamics.

Building technicians operate the natural ventilation system through the same computer-based building automation system (BAS) 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 45ºF and 64ºF. The natural ventilation system was utilized for 110 days in 2015, which accounts for event days as well as exhibit hall move-in and move-out days, eliminating the need for artificial cooling / 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 cooling / heating. If the outdoor conditions are within the operation range, the natural ventilation system is also utilized during peak heating and cooling seasons.

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.



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.

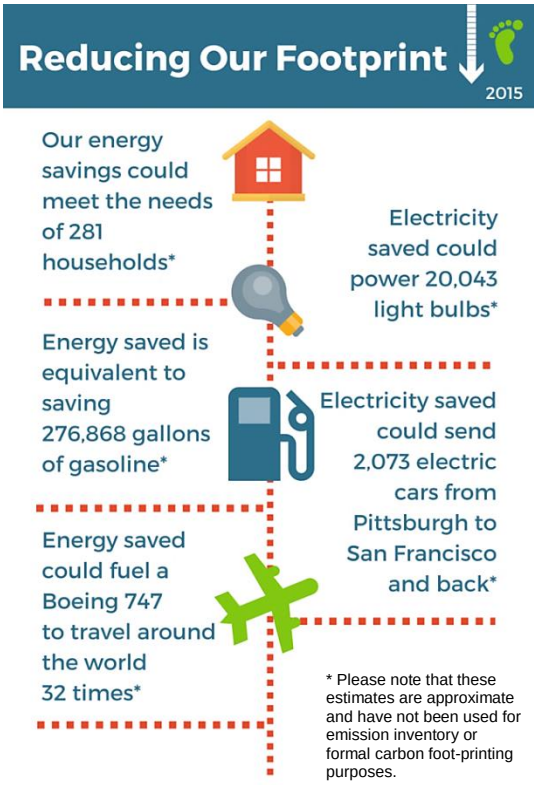
In 2014, PACT advised the DLCC that the 4-inch steam line that was currently used to deliver steam to the building, was not accurately measuring low steam flow during periods of low heating demand. In March 2014, PACT switched the DLCC to a 3-inch line; however, the smaller line was not capable of providing enough steam during high demand months in the winter. Because of this, the DLCC and PACT agreed to use the 4-inch line from December 1 through 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 was operated pursuant to a contract with Veolia Water North America in 2015. 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 1500 ton centrifugal chillers, a 750 ton centrifugal chiller with a variable frequency drive, an idled 1500 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).

ENERGY STAR PORTFOLIO MANAGER

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 28% better than the national average of all entertainment venues in 2015.



ENERGY PERFORMANCE

The total Site Energy Usage Intensity (EUI) (the total energy consumed by a building relative to its size) was 72 kBTU/sf, a reduction of 19% below the 2004 baseline year. 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. In order to gain a more accurate representation of energy use, the data can be normalized for event attendance by counting the number of visits to the building. Considering the per-visitor energy use intensity, the 2015 usage is a 14% reduction compared to 2004 per-visitor energy intentsity.[12] The DLCC's annual energy consumption from 2004-2015 is shown in **Figure 3**.

In 2015, the DLCC used 50,737,480 kBTU[13] (14,870,305 kWh) of total electricity [electricity (other) consumption was 44,920,073 kBTU/13,165,320 kWh and electricity (chiller plant) was 5,817,405 kBTU/1,704,984 kWh], 35,443,890 kBTU (29,685 Mlb) of PACT steam, and 898,317 kBTU (873 Mcf) of natural gas (**Figure 4**).

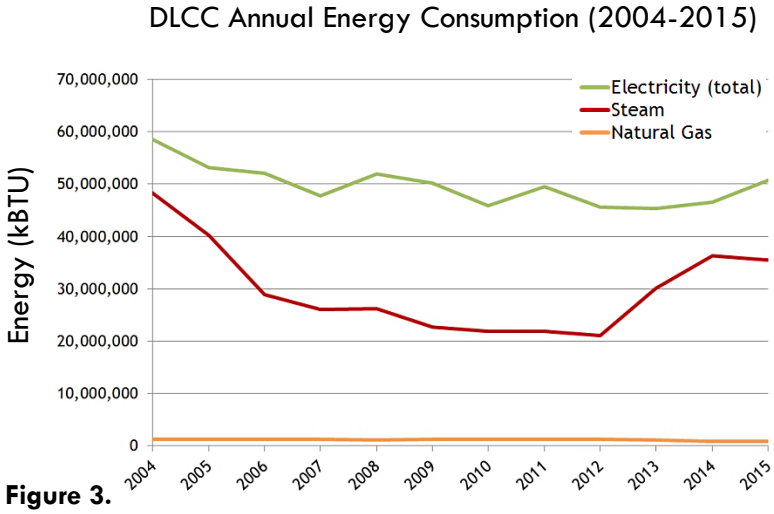


Figure 3.

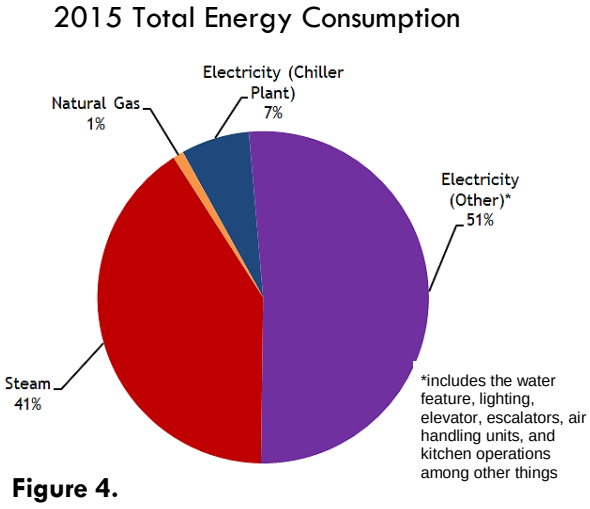


Figure 4.

[12] A per-visitor intensity measurement is used because it is easily quantifiable by dividing the building's total energy consumption by number of total visits to the building for 2015; it is recognized, however, that this 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.

[13] 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

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]),[14] and the needs of attendees and event planners. There was an increase in electricity usage from 2014 to 2015, which can be attributed to several factors including an increase in warmer weather for the Pittsburgh region relative to 2014 (**Figures 5 and 6**)

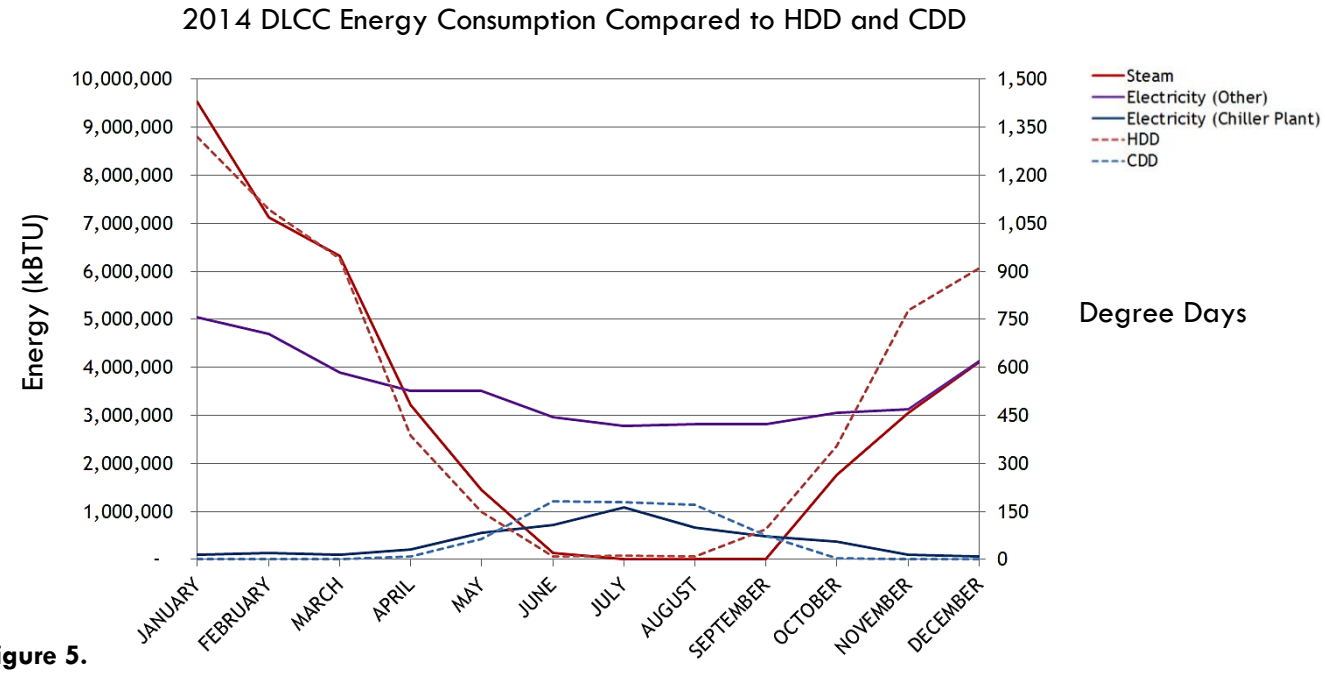


Figure 5.

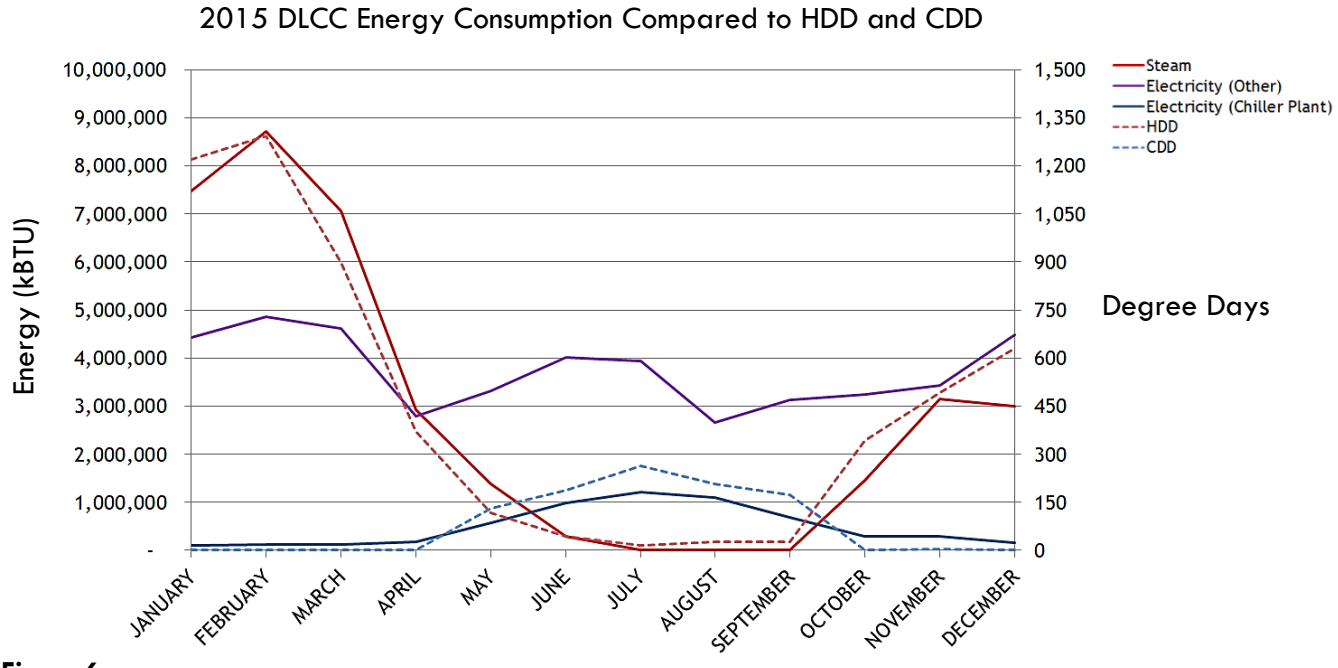


Figure 6.

[14] 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 41% more cooling degree days (CCD) in 2015 (CDD = 965) compared to 2014 (CDD = 683). Additionally, there were a total of 5,473 HDD in 2015, 10% less compared to 2014.

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.[15]

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.[16] Based on this energy reduction over the ASHRAE-defined baseline model, the DLCC has saved more than $3,214,349 in utility costs since 2004.

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 2013, the SEA entered into a curtailment service provider agreement with CPower Corp. (formerly Comverge, Inc.) for the DLCC which will last through May 2016. The DLCC turns off non-essential loads at the building, such as the 10th Street Water Feature, in order to reduce electricity demand during electrical grid emergency events. 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. In 2015, the DLCC curtailed electrical load for one test event.

Conservation Measures

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.[17] 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 is providing partial reimbursement to the SEA for qualified projects as detailed below.

The DLCC has sub-meters for electricity and water use to ensure that building improvement results are tracked for data collection. Having these sub-meters installed (see **Table 3**) 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 B**.

[15] See BHKR Associates (2006), *David L. Lawrence Convention Center Energy Study* for the Sports and Exhibition Authority.
[16] See the *David L. Lawrence Convention Center: A Building in Operation [Bio] Case Study* (2011), Section 2.1 Benchmarking for more information on this analysis.
[17] 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 3. *Water and electrical sub-metered systems at the DLCC*

Electrical sub-meters	Water sub-meters
Chiller Plant (800amp/400amp)	Cooling tower make-up (aquifer water)
Water Feature motors	Water Feature (aquifer/PWSA municipal water)
AT&T tower equipment	11th Street irrigation (aquifer water)
EV charging stations	South Terrace Green Roof irrigation (aquifer water)
Retail spaces	Retail spaces (graywater/ PWSA municipal water)
Waste Water Treatment Plant (2016)	Waste Water Treatment Plant (PWSA municipal water make-up/ bypass water, ancillary water use)
DLCC parking garage lighting*	

2014 / 2015

BUILDING AUTOMATION SYSTEM UPGRADE

A full system upgrade of the Building Automation System (BAS) was started in 2014 and will be completed in 2016. 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.[18]

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 ROI (return on investment) of 4.1 years.

2013 / 2014

CHILLER PLANT RECONFIGURATION

The original chiller plant equipment consisted of four 1500 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 / stop cycles and chiller surge. 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 1500 ton chiller was removed and replaced with a 750 ton Trane centrifugal chiller with a variable frequency drive. This 750 ton chiller will help to address the low load condition and increase the efficiency of the chiller plant, resulting in anticipated electricity savings for the DLCC. Following its removal from the chiller plant, the 1500 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. With these improvements, the amount of electricity used to produce a ton-hour of

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

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

chilled water decreased from 1.8 kWh per ton-hour of chilled water in 2014 to 1.2 kWh per ton-hour in 2015. This saved the DLCC $105,132 in 2015 electricity costs. This cost savings represents 9% of the DLCC's total electricity costs for the building in 2015.

Another benefit of this project was the reduction in the total amount of refrigerant used in the plant. By replacing one of the 1500-ton chillers with the 750-ton chiller and removing a second 1500-ton chiller from service, the chiller plant's total refrigerant usage has decreased from 11,200 lbs. to 7,250 lbs.

PARKING GARAGE 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.[19]

This project was designed to both reduce annual electricity usage in the garage and reduce the annual maintenance costs due to the increased life of the fixtures. The estimated ROI for the project is 4.9 years. The parking garage lighting project qualified for $27,620 in Act 129 rebate which is included in the ROI calculation.

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 ROI for the project is 4.1 years. The project qualified for $36,149 in Act 129 rebate which is included in the ROI calculation.[20]

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.[21] By providing electricity savings, the local cooling unit project qualified for $35,485 in Act 129 rebate

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

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.

LIGHTING UPGRADES: LOADING DOCKS, UTILITY CORRIDORS, & STAIRWELLS[22]

The 2011 lighting upgrades included a fixture change and the addition of occupancy sensors in the loading docks and utility corridors, and the addition of occupancy sensors in the stairwells. The estimated ROI for the project is 4 years. The ROI 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, a second phase of more robust repairs was completed in 2012. This project is expected to save approximately $65,000 per year in energy costs.[23] The project was not eligible for an Act 129 rebate.

[22] A portion of the lighting and natural ventilation projects were completed in 2012.
[23] This project was recommended by The *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011).

Emissions

The DLCC quantifies annual greenhouse gas (GHG) emissions using the methodology of the GHG Protocol Initiative and the ENERGY STAR Portfolio Manager program.[24] The DLCC strives to reduce its impact on the global climate by reducing both total emissions (actual emissions produced as a result of on-site activities) and net emissions (total emissions net of off-site investments and offsets, i.e. total emissions less carbon offset strategies)

CARBON OFFSET STRATEGIES

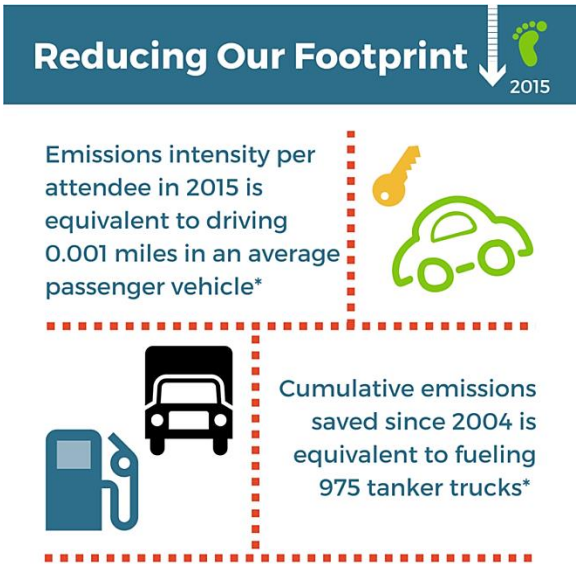
Although energy conservation is the primary strategy for reducing total emissions, technological limitations and the need to balance environmental concerns with the goals of clients limit its effectiveness as a single tactic. The DLCC continues to evaluate strategies to reduce total GHG emissions, including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

The SEA, City of Pittsburgh, Allegheny County, and PWSA, among others, have entered into an aggregated electricity procurement agreement. Part of this procurement agreement stipulates that 25% of the electricity purchased is derived from Green-e certified sources.[25] At the conclusion of the current agreement in May 2016, a new agreement will commence with Constellation Energy which will provide for the procurement of 30% electricity from Green-e certified sources.

2015 TOTAL EMISSIONS

Total emissions in 2015 were equivalent to 12,912 metric tons of carbon dioxide (MT CO_2e), 10,522 MT of which were from electricity consumption, 2,344 MT were from steam consumption and 46.4 MT were from natural gas consumption. This is a reduction of 16% below the 2004 baseline of 15,397 MT. Emissions intensity (the total emissions of a building relative to its size) per attendee[26] amounted to $4.9*10^{-5}$ lbs. CO_2e/sf/ attendee.[27]

Measuring progress against the DLCC's own 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[28] and current emissions factors, the theoretical baseline building used to predict the DLCC's energy performance would produce 15,814 MT CO_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 41,421 MT CO_2e from this baseline since 2004.



[24] The GHG Protocol 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.

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

[26] 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.

[27] 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 3 years of consistent and reliable data.

[28] 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.

* Emissions equivalents are estimated from https://www.epa.gov/energy/measure-your-impact. Note that these estimates are approximate and have not been used for emission inventory or formal carbon foot-printing purposes.

NET EMISSIONS

Net emissions are determined by subtracting the emissions mitigated through carbon offset strategies from total emissions. Net emissions in 2015 were equivalent to 7,891 MT CO_2e, which takes into account the carbon mitigation realized from the purchase of 25% electricity from Green-e certified sources. As a result of carbon offset strategies, the DLCC has mitigated 73,674 MT CO_2e since 2004.

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 32, much less than the threshold of 100 required by the LEED® for Existing Buildings: O&M rating system.[29]

ELECTRIC VECHICLE 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 Level 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 visitors 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.

EV Charging Stations in DLCC Garage

In 2015, 3,815 kWh of electricity was used in the charging process. Based on the fuel economy of a 2015 Nissan Leaf,[30] this charging activity at the DLCC provided the electricity needed for an electric vehicle to travel more than 12,700 miles, saving an equivalent of about 410 gallons of gasoline.[31] The additional cost to the DLCC for these two charging stations was $479 in 2015, based on actual electricity used.

[29] 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 usgbc.org/Docs/LEED_tsac/TSAC_Refrig_Report_Final-Approved.pdf.

[30] "2015 Nissan Leaf Fuel Economy, Compare Side-by-Side." *Fuel Economy*. US EPA Office of Transportation and Air Quality, n.d. Web. 5 May 2016. https://www.fueleconomy.gov/feg/Find.do?action=sbs&id=34918.

[31] Based on a comparable midsized 2015 Nissan Altima with a combined city/highway of 31 mpg. See "Model Year 2015 Fuel Economy Guide," n.d. p. 16. Web. 6 June 2016. https://www.fueleconomy.gov/feg/pdfs/guides/FEG2015.pdf

Indoor Environmental Quality

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

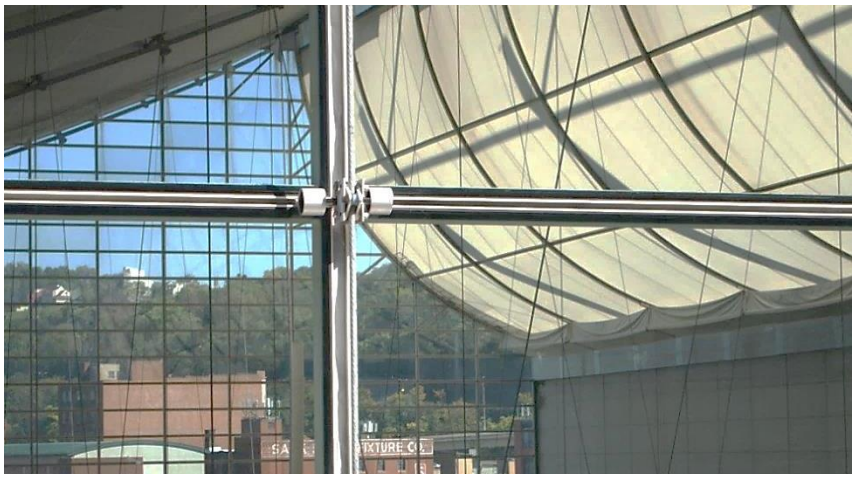


Exhibit Hall A

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.[32] 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 2015. Each of these air handling units undergo 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.

In 2015, the natural ventilation system was utilized a total of 110 days, which is more than double the previous high of 50 days in 2008. The natural ventilation system was used on 45% of all event days in 2015, compared to 28% of all event days in 2008.

[32] U.S. Green Building Council. *LEED® for Existing Buildings: Operations & Maintenance v2009 Reference Guide*, page 330.

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.[33] 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.

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, 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 impact and are recognized by LEED®. The use of these chemicals is tracked indirectly by cost of the chemical purchases. In 2015, 78% of the cleaning products purchased 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 2015, 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 regular cleaning equipment maintenance is logged by the Director of Operations 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 attendees or staff, but these decisions are a component of the facility's environmental impact. Evaluating transportation habits quantifies this impact and assists in identifying means to promote sustainable options. As part of the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011) and the LEED® for Existing Buildings: Operations & Maintenance™ (O&M) certification process, computer-based transportation surveys were administered to both attendees and employees.[34, 35]

ATTENDEES

Attendees were surveyed during five separate events that occurred from August 2010 through January 2011. Survey respondents were asked about their transportation choices when traveling to and from Pittsburgh and the DLCC.

Local attendees were most likely to drive to the DLCC, with only 19% choosing an alternative transportation mode (bus, bicycle, or walk) (**Figure 7**). Alternative transportation, however, was popular for non-local attendees when traveling from their hotels to the DLCC. 41% of non-local attendees walked or biked to the building, while 17% used public transportation (bus or light rail) (**Figure 8**). Attendees who stayed at one of the 14 hotels within walking distance to the DLCC, benefit most from the facility's downtown location, and in doing so, avoid creating potential emissions.

[33] "Volatile Organic Compounds." *An Introduction to Indoor Environmental Air Quality (IAQ)*. US EPA, 03 May 2012. Web. 30 May 2012.
[34] See the *David L. Lawrence Convention Center: A Building in Operation [BiO] Case Study* (2011), Section 5.2 Operations | Transportation Review for a more detailed analysis and explanation of the survey.
[35] 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 which use alternative transportation modes

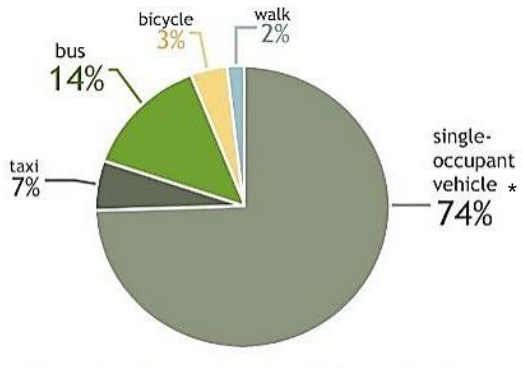


Figure 7. Local Attendee Travel from Residences to DLCC (2010-2011)

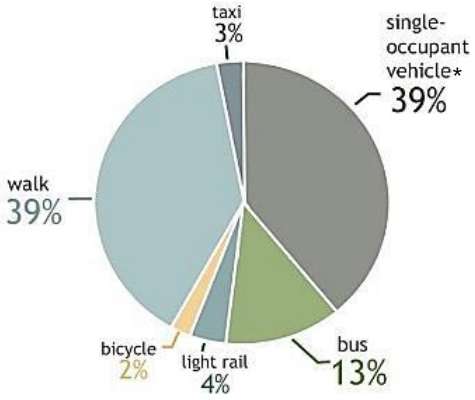


Figure 8. Non-Local Attendee Travel from hotels to DLCC (2010-2011)

EMPLOYEES

Employees were surveyed in 2011. The survey requested information on the employee's transportation choices for each working day of the week prior to taking the survey. During the seven day survey period, 58% of employees commuted by single-passenger vehicle, 6% carpooled with at least one other person, and 36% chose an alternative transportation mode (including high-efficiency or fuel-efficient vehicles according to third party standards), resulting in an overall reduction of conventional commuting trips by 84% (**Figure 9**). The average one-way commuting distance was 9.8 miles.

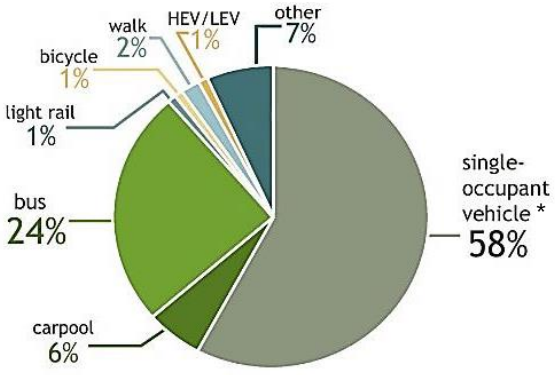


Figure 9. Employee Commuting to DLCC (2011)

Not enough data is currently available to calculate the carbon footprint of employee commuting with certainty. However, estimations can be made based on 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 week-long survey period was estimated to be 3.07 MT CO_2e, which is 27% lower than if all employees had chosen to drive their personal vehicle to work. As the most frequently-used alternative transportation mode, bus transportation was responsible for 55% of the total estimated emissions reduction. Due to the variability of operational schedules over the year, annual emissions have not been extrapolated from the 2011 survey. A 2016 survey will be reported in the 2016 Green Report.

* "Single-occupant vehicle" includes all respondents who chose to drive to the DLCC in their personal vehicle.

Purchasing

At the DLCC, environmental management strategies aim to minimize the depletion of natural resources at each stage of the manufacturing cycle: by reducing unnecessary source waste, by recycling as much waste 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 & Maintenance™ (O&M) rating system standards.[36] When possible, the DLCC requests of its retail vendors and supply chain to 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, integrated into the existing accounting program, which facilitates regular evaluation of current purchasing performance against the goals set forth in the Sustainable Purchasing Policy. Criteria for each category, along with 2015 performance, are listed in **Table 2**.

LOCAL PURCHASING

When practical, the DLCC purchases goods which are manufactured locally, reducing the energy needed to transport materials and supporting the local economy. 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 RESTAURANTS

The DLCC's exclusive food and beverage provider is Levy Restaurants. Levy has developed a set of sustainable catering options and practices for events which can be implemented whenever feasible. In alignment with LEED® guidelines, sustainable choices consist of food which is extracted and produced within a 100 mile radius of the site, organic food, and products meeting equitable harvesting standards.[37]

The large volume of food purchases required to meet demand each year, as well as the geographic location of the DLCC, challenges local sourcing. Although it is not currently possible to achieve 100% locally-sourced products, 26% of all food purchases in 2015 were local. Levy Restaurants also maintains 120 linear feet of rooftop planters on the 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. Client requests remain the greatest factor in implementing or hindering sustainable catering practices throughout the year.

[36] Per the DLCC's LEED® for Existing Buildings: Operations & 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.
[37] Standards include: Food Alliance Certified, Protected Harvest Certified, Fair Trade, or the Marine Stewardship Council's Blue Eco-Label.

Table 2. *Sustainable purchasing by category.*

CATEGORY	CRITERIA	GOAL*	2015 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%	0%
Electronics	• EnergyStar-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%	100%
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 Biobased products • Do not exceed the maximum volatile organic compound (VOC) limit specified by the California Code of Regulations	60%	78%
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 and Alterations	• 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%	66%

* 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.

Waste

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 2,000 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.

SOURCE 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) and the advice given to event planners during the planning process.

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. Furniture which no longer meets operational standards or is not currently needed for events is stored and inventoried for future refurbishment.

Levy Restaurants 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 2015, the DLCC produced an average of 1.49 lbs. of waste per attendee,[38] 36% lower than the 2005 baseline of 2.34 lbs. per attendee and 61% lower than the 2009 external benchmark of 3.78 lbs. per attendee.[39] While these numbers indicate that current source reduction strategies are effective, the DLCC continues to explore means to further encourage waste reduction.

RECYCLING

As part of the DLCC's recycling program, all 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.

[38] 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.

[39] 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.

After sorting, materials such as paper and aluminum are sent to a local sorting and recycling facility (currently a facility owned by Waste Management). 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. All small electronic items and batteries are collected in the East Lobby and recycled by Batteries Plus, while lamps are collected by the building's electricians and recycled by Scott Electric. Lastly, surplus prepared food is donated to the Greater Pittsburgh Community Food Bank and Jubilee Soup Kitchen, and used cooking oil is donated to New Market Waste Solutions to be converted to biofuel.

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. 545 tons of organic waste has been composted, accounting for 35% of all waste diverted since 2008. Based upon this program's performance, the DLCC has set a goal of a minimum 50% annual average diversion rate, which it has met for the past seven 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.

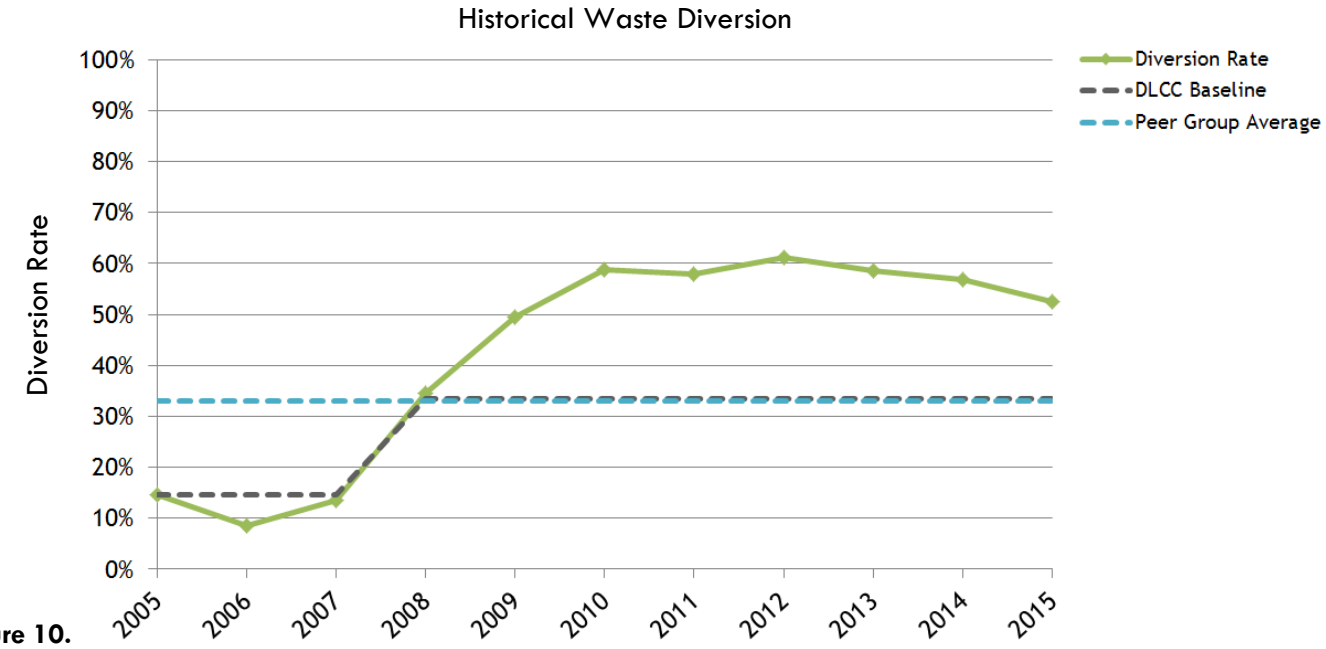


Figure 10.

2015 DIVERSION PERFORMANCE

The diversion rates reported here 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 2015, the DLCC recycling program diverted 190 tons of waste from landfills of a total 361 tons of waste generated, achieving an annual diversion rate of 52.6% (**Figure 10**). See **Figure 11** for a breakdown of the DLCC's waste stream. By weight, diverted materials in 2015 were as follows:

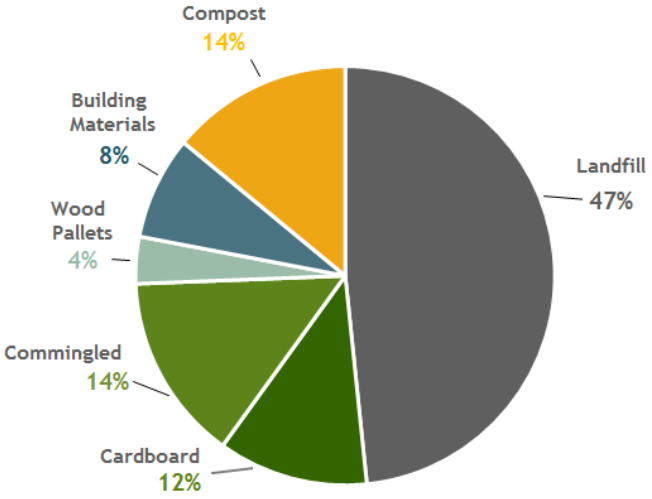


Figure 11. 2015 Waste Stream Performance

- Cardboard: 40.8 tons
- Commingled Glass / Plastic / Aluminum: 50.9 tons
- Wood Pallets: 12.8 tons
- Building Materials[40]: 28.1 tons
- Compost: 49.4 tons
- Waste to Landfill: 170.2 tons

Additionally, 5.5 tons (1.5%) of food was donated to local food banks, 2.1 (0.6%) tons of used cooking oil was donated for conversion into biofuel, and 0.4 tons (0.1%) of E-waste was generated.

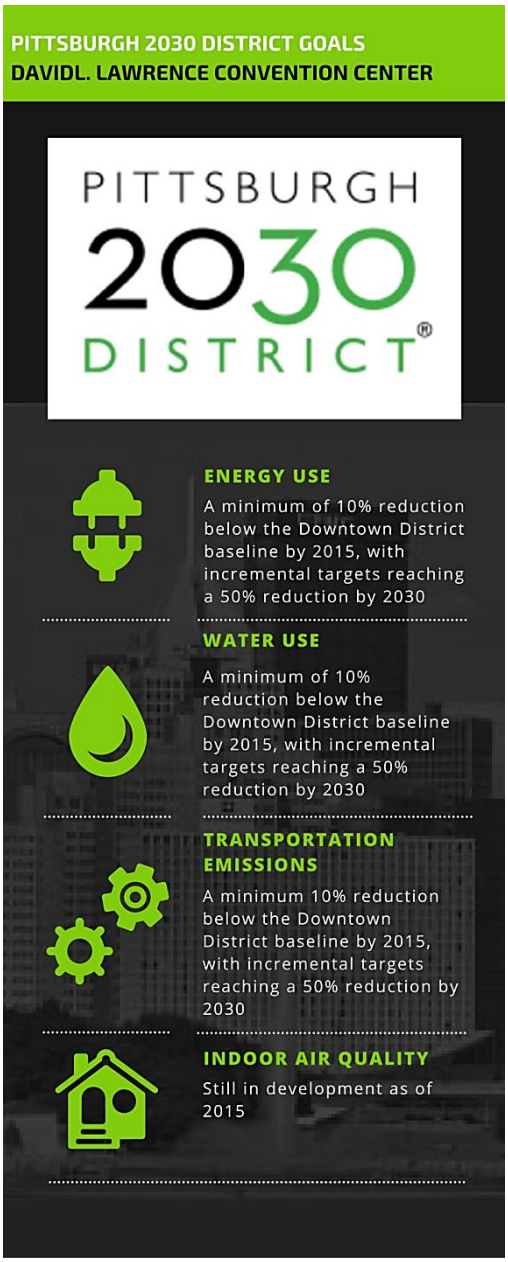
Although the environmental impacts associated with the recycling program cannot be accurately tracked in full at this time, energy saved by manufacturers and total emissions mitigation as a result of recycling activities can be estimated using the EPA's Waste Reduction Model (WARM). The factors used in WARM are based upon comparisons between typical lifecycle impacts of manufacturing processes using raw materials and of those using recycled content.[41] 2015 diversion of cardboard, paper, glass, plastic, aluminum, and compost was responsible for an estimated savings of 375.5 MT CO_2e. An estimated total of 3,705 MT CO_2e has been avoided since recycling began in 2005.

[40] 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."

[41] 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

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 2015, 69% of real estate in Downtown Pittsburgh and Oakland were committed to the 2030 District, representing 438 buildings and over 68.2 million sq. ft. By becoming a 2030 District partner, the DLCC committed to the following goals in the figure below.



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 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/sqft, which is reflective of the actual performance of the building in 2004, the first full year of operations. The actual Site EUI for the DLCC in 2015 was 73.6 kBTU/sqft, which represents an 18% reduction from the baseline. An 18% reduction demonstrates that the DLCC is on track to meet the 2020 goal (20% reduction from baseline) established by the Pittsburgh 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 building exists, the baseline was developed using historic water consumption information. GBA established the Water Use baseline for the building at 4.46 gal/sqft, which is reflective of the actual performance of the building in 2006, the first full year that the wastewater treatment plan was in operation. The actual Site WUI for the DLCC in 2015 was 1.46 gal/sqft. This is a 67% reduction from the baseline that demonstrates that the DLCC is already meeting the 2030 goal (50% reduction from baseline).

The baseline for transportation emissions is being finalized and this information is expected to be included in the 2016 report.

The baseline for indoor air quality is currently in development.

Visit www.2030districts.org/pittsburgh for the most up to date information regarding the DLCC's progress.

g1 (greenfirst)

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 webpages 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 webpage. 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.

Additionally, 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 144 visitors were given green tours in 2015. These visitors included university students, local, national, and international organizations.

Appendix A: Reporting Scope

ORGANIZATIONAL BOUNDARIES

The content of this report is primarily focused on decisions made with regard to the DLCC and reporting boundaries typically follow the physical site boundary. 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 and certain performance indicators of the Event Organizers Sector Supplement of the GRI G4 Sustainability Reporting Guidelines,[42] 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:

- Water – The DLCC's onsite 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.

- Energy – 2004 is the current baseline year. The SEA Office is included in the associated analysis but its effects are negligible.

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

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 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[43] 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 Levy Restaurants' kitchen equipment. In 2015, emissions from this source comprised less than 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.[44] 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.

DLCC Carbon Footprint

[43] 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.

[44] 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.

Appendix A: Reporting Scope

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

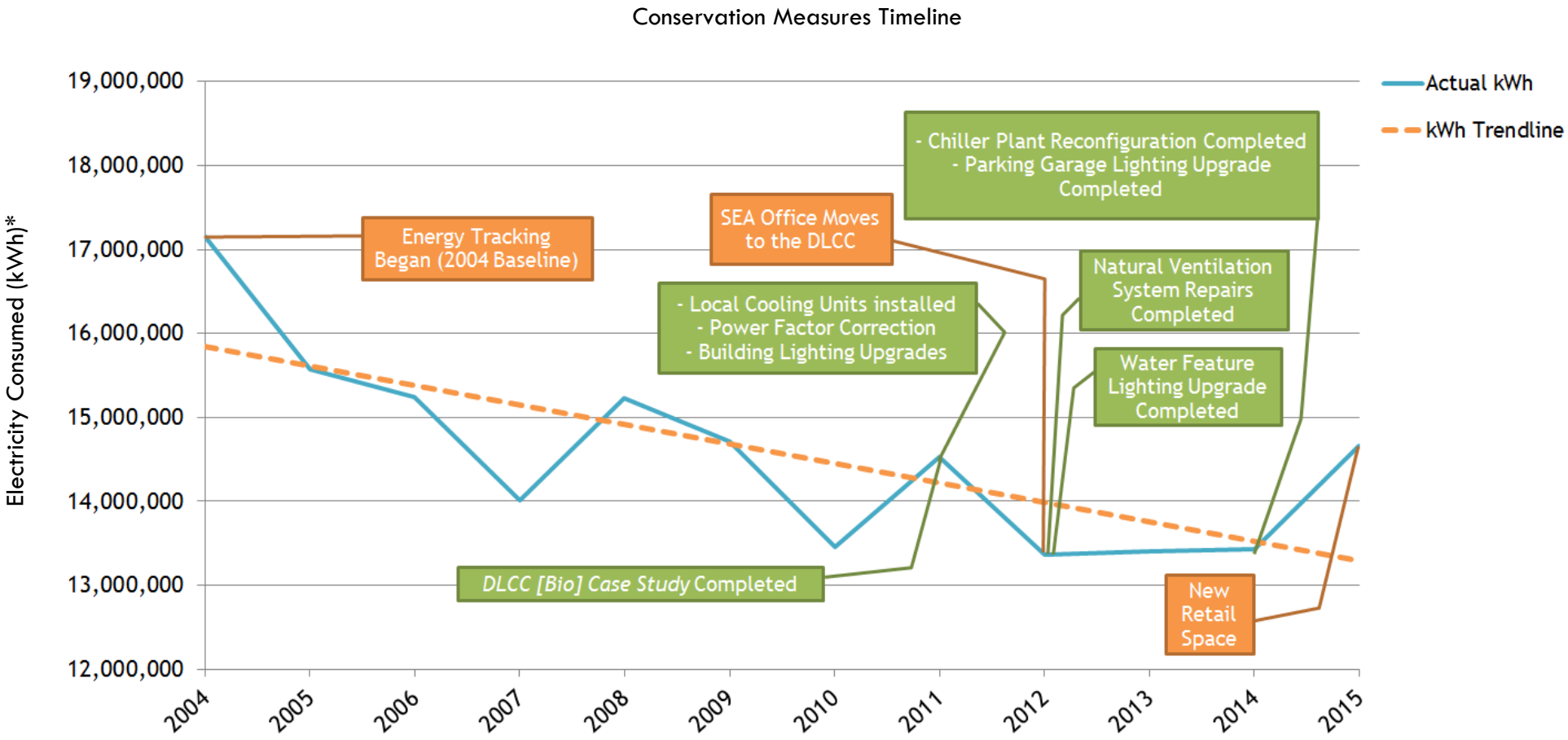
Scope III emissions are also called upstream and downstream emissions. These emissions are from sources outside the direct control of the reporting organization, but may still be influenced by the organization's decisions or activities. Under the GHG Protocol, these emissions are optional to track because 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.

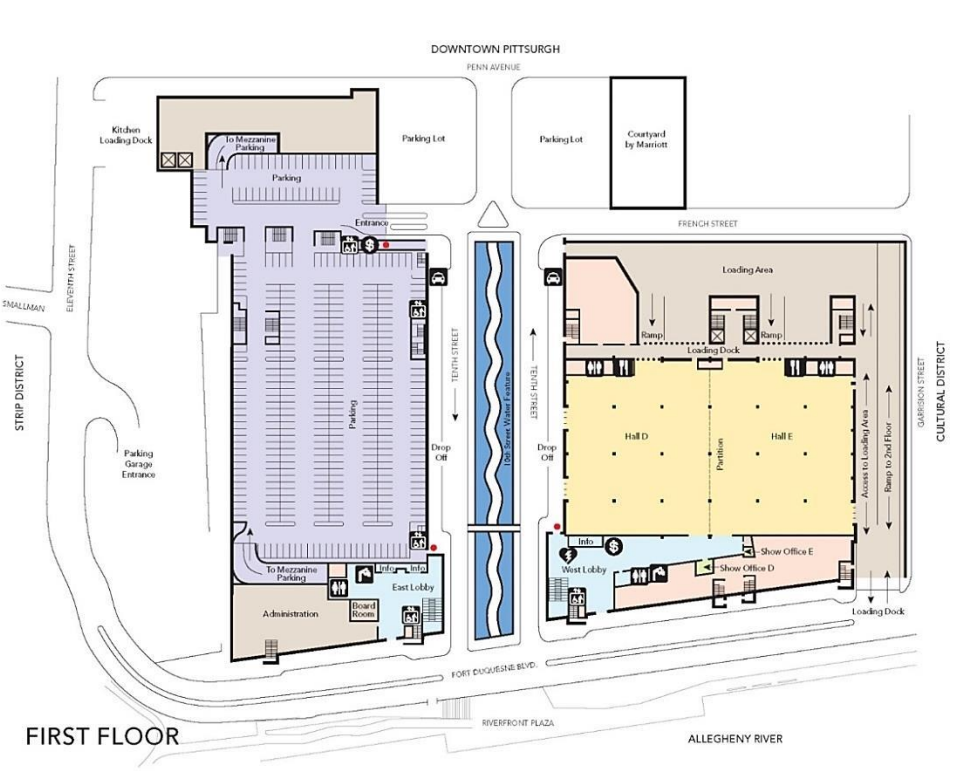
[42] The GRI is a nonprofit organization that develops and provides broad and consensus-based sustainability reporting guidelines. For more information, please visit globalreporting.org.

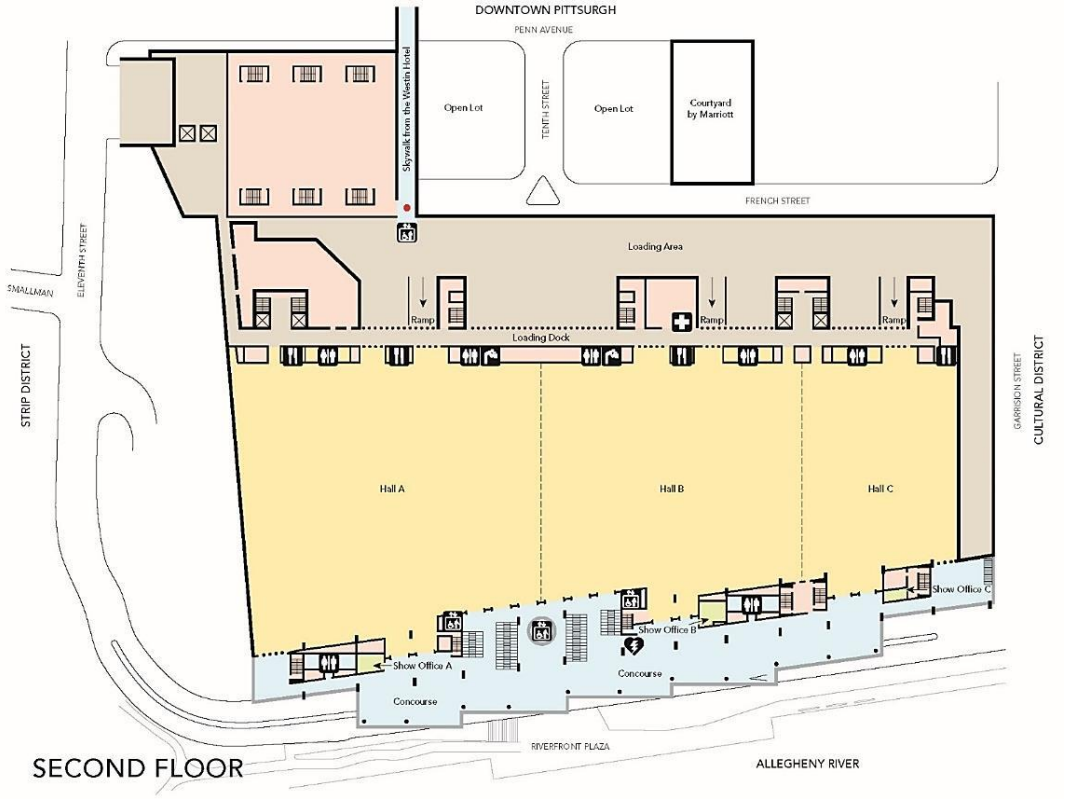
Appendix B: Conservations Measures Timeline



* 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.

Appendix C: DLCC Floor Plans





Appendix C: DLCC Floor Plans