AURORA PUBLIC SCHOOLS: INNOVATIONS FOR INCENTIVIZING ENERGY CONSERVATION

SOLUTION OVERVIEW
Aurora Public Schools (APS) located in Colorado, serves 39,000 students at 64 traditional and charter schools with an ENERGY STAR® monitored portfolio footprint of 4.3 million square feet. When the district implemented its energy reduction strategy, it proactively included building occupants in the effort. As a result, APS designed an incentive-based energy conservation program to create excitement for the district-wide initiative and to recognize student engagement efforts. To date, the program has substantially contributed to the 12 percent reduction measured in 2017 (from a 2013 baseline), well situated to meet the district wide goal to achieve a 20 percent reduction in consumption by 2023.

ORGANIZATION TYPE
K-12 School District, Suburban School District Student Population: 39,000

GOAL
Reduce district-wide energy intensity by 20% by 2023

BARRIER
Older and inefficient mechanical HVAC equipment, and lack of the systematic practice of site-based energy conservation behaviors

SOLUTION
Natural and Renewable Resources Incentive Program

OUTCOME
By 2017, supported overall district’s 12% reduction in building energy use intensity from a 2013 baseline, contributing roughly 20% of over $1 million in cumulative cost avoidance since 2013.

https://betterbuildingssolutioncenter.energy.gov/implementation-models/aurora-public-schools-innovations-incentivizing-energy-conservation
For more information, visit https://betterbuildingssolutioncenter.energy.gov
POLICIES
The district’s energy conservation policy established a portfolio wide reduction goal of 20 percent by 2023. As a means to measure and evaluate progress towards this goal, the district partnered with EnergyCAP®, an online energy management software database service, to capture monthly utility bill consumption for all fuel types. APS uses bill data analytics combined with 15-minute electric interval meter data on district-wide and site-specific dashboards, delivering the same set of tools to the classroom that the district’s Natural and Renewable Resources Team uses to readily identify outliers for seasonal and annual energy consumption.

Benchmarking Awareness
In order to maximize the savings potential of the district’s energy conservation efforts, APS decided to build awareness among building occupants (students, faculty and staff.) It did so by presenting the benchmarked consumption and interval meter data for each school building on interactive web-based dashboards made accessible to school staff, as well as to the general public. This system enables school officials to understand real time and overall energy consumption patterns, and to observe measured improvement resulting from energy efficient upgrades and joint conservation efforts.

Incentive Program & Student Engagement
In addition to the qualitative information provided, the district provided schools the option each semester to participate in a voluntary incentive program, awarding fund to schools demonstrating both reduced energy consumption and prescriptive levels of student engagement. Energy consumption reductions are measured using the ENERGY STAR Portfolio Manager tool which provides a score for each school building in the APS portfolio. This quantification of school consumption enabled the district to document improvements over time for each building.

APS created a digital badging system to manage the student engagement effort. Within this system, students earned badges with varying point values across a series of categories based on the action completed. Digital badging is a credentialing mechanism used to assess and validate learning indicators tied to a unique skill, its production quality, and an area of interest. In addition to earning badges individually in online accounts, student accomplishments are also incorporated into the financial awards given to the schools as a way to recognize individual student contributions toward their school’s sustainable success.

Serving APS as a whole, the Natural and Renewable Resources Team also oversees continual efforts to conserve energy via energy efficient upgrades and building equipment/control optimization. Part of the funding for these upgrade projects comes from the savings derived from the effort of students engaged in their school’s incentive program. Regardless of the source of energy savings ($1 million since FY 2013/14), the district made a conscious decision to give at least 20 percent of the aggregate savings back to participating schools in order to equitably recognize all students for the social value demonstrated through their collaborative adoption of energy conservation behaviors.

Participating schools are allowed to preselect the expenditures on which their award will be spent.
and are encouraged to carefully consider the voice of their students, whether the award be $500, $1,000, $5,000 or $10,000. The only restrictions placed on the use of funds awarded is to serve the individual school’s goals, as well as the district’s broader mission to “accelerate learning for all students to shape successful futures.”

Tools:

- APS Badging Initiative
- Incentive Plan Presentation
- Incentive Plan 2014-15

**PROCESS**

Since all of the district’s schools are eligible to participate in the incentive program, an initial barrier to overcome was the accurate collection of vast amounts of data. (i.e. monthly electric and natural gas bills, obtaining ENERGY STAR scores, and inventory of individually acquired student digital badges). APS was fortunate to have paved the way toward automating much of its utility data collection through digitally reformatted scanned images of utility bills. This process eliminated the manual entry of bill details into two separate databases: the district’s accounts payable database and energy management software. The service also automates both the transmission of fuel consumption into Portfolio Manager and extracts up-to-date energy scores. The aggregated digital badge data is maintained for easy reference within Credly®, an online digital credentialing service.

With the substantial reduction in data processing effort, the district was prepared to move forward with a robust incentive program that offered equally quantitative and prescriptively qualitative opportunities for impact.

**Quantitative**

The Portfolio Manager tool assigns buildings a 1-100 rating for energy performance. Based on the initial score (as of July 1 for the first school semester, and as of January 1 for the second semester) and the regularly updated score, each school is evaluated on a monthly basis by their incremental score improvements. Based on their initial scores, sites are segmented into discrete “e-State” groups: inherently inefficient (ES < 45), moderately efficient (ES 45-74), and highly efficient (ES > 75). The “e-State” groupings were created to take into account the difficulties of more efficient buildings to achieve additional savings. Attempts were also made to normalize the disparity in likely occupant effort expended to achieve a one-point improvement in a building whose baseline ENERGY STAR rating is 20, versus the likely occupant effort expended to achieve one-point improvement in a building whose baseline rating is 90. While as many as 100 separate “e-State” groupings can be made (one for each of the available 100 ratings), APS ultimately chose to design the program around three.

For clarity and to spur competition, “e-State” groupings were further differentiated by tiers within which designated points of incremental rating improvements were established as minimum thresholds to meet. Progress toward tier levels are updated monthly as revised ratings are received.
Final tier designation is based on the difference between the initial ENERGY STAR rating and the rating corresponding to the six-month competition end date: either December 31 or June 30.

APS chose to separately tally the weather normalized energy savings realized by all benchmarked schools, and use the cumulative of these calculated savings as the basis to disperse its 20 percent award incentives. Actual incentive amounts are further broken down into dollar per pupil equivalents, and awarded on a percentage basis as determined by the school’s final end-of-competition tier. Of the remaining unallocated 20 percent savings, bonus funds are granted to each the highest performing elementary school, middle/K-8, and high school on an equal dollar per pupil basis.

Qualitative

The qualitative side of the program includes an online interface with Credly.com for occupants to upload individual engagement evidence and receive recognition in the form of digital badges. The digital badges measure overall school behavioral performance across several categories, distinguished district-wide to represent 21st Century Skills. Schools must agree to take a number of actions and have students submit deliverables in order to earn points representative of the full spectrum of badge designations. Similar to the energy rating “e-State” improvement tiers, threshold badge levels are set every semester for each prescriptive tier, judged by quantity and range of badge types awarded. The expected rigor needed to achieve prescriptive points are normalized based on each school’s student count and participating grade levels. These prescriptive points are allocated equitably regardless of a school’s assigned “e-State” category.

Tools:

- Energy Reduction Spreadsheet Tracker
- APS Digital Badging Guide

OUTREACH

The district enacted policies to recognize the efforts of site-based conservation advocates (i.e. teacher, custodian, administrative support) and earn their school an equitable portion of the district-wide savings resulting from avoided utility costs (i.e. electricity and natural gas). Instrumental to these cost reduction activities is the engagement of building occupants (primarily students) to adopt collaborative conservation practices for energy, water and landfill waste both in school and at home, expanding the impact of the district’s efforts to the local community.

The incentive program introduced natural competition to promote energy conservation amongst students within their respective schools by leveraging the district’s digital badge program. This documented individual levels of engagement, recognizing students’ district-wide efforts both inside and outside of school.

The custodial staff was another key building occupant targeted by the incentive program for the role they play as site-based energy conservation champions. Custodial, Natural and Renewable Resources, and HVAC Maintenance all fall under the same Maintenance and Operations leadership structure within the district. The M&O department is motivated to increase interest and
accountability around interdepartmental efforts to conserve energy and reduce waste. Recognition is provided in the form of digital badges tied to individual custodian incentives, and marginal site allocated awards are planned similar to the general incentive program.

Custodial education is provided through the dissemination of the electronic monthly newsletter, APS Green Gloves and the sharing of best practices and updates to all 200 custodians across the district. The Natural and Renewable Resources Team also meets face-to-face with the high school head custodians as well as the site’s HVAC Technicians to conduct site inspections twice per year. Focal areas of these inspections include lighting retrofits, occupancy lighting sensors installations, HVAC scheduling needs, and general maintenance of the building. Meeting summaries and action items are distributed to all parties following each visit.

Additionally, the M&O office maintains a Key Performance Indicator (KPI) Report for each school, which details the building’s overall operational performance; from utility use and waste volumes to site generated work order levels and vandalism. Site staff automatically receive updated reports at the beginning of each month. Group meetings take place on a regularly between the Natural and Renewable Resources Team and site HVAC Master Technicians to troubleshoot problematic issues and forecast energy use using a state-of-the-art touchscreen monitor.

Tools:

- **Custodial Energy Action Plan**

**MEASURING SUCCESS**

All APS schools have utility information benchmarked in the EnergyCAP energy management software which then pushes the data into Portfolio Manager. Utilities for all of APS’ 53 traditional schools are registered within Portfolio Manager with an average score of 71. Since inception, 31, or nearly two-thirds of the district’s schools have voluntarily participated and earned money through the incentive program.

For fiscal reconciliation, the district measures each individual school and district-wide portfolio on an annual basis, measuring both the percent of energy reduction as well as cost savings. A portion of the cost savings is reinvested into the schools based on the incentive program. The remaining savings are used for meeting overall district service and support goals. To date, APS has measured a 12 percent reduction in building energy use intensity from a 2013 baseline in 2017 and realized over $1 million in cumulative cost avoidance since the 2013/14 school year.

**OUTCOMES**

As a result of their energy efficiency efforts to date, Aurora Public Schools has achieved a 12 percent savings in energy use intensity per square foot in 2017 from a 2013 baseline as part of its goal to achieve a 20 percent reduction by 2023.

Over the two years of the program’s operation, 31 of 53 APS schools participated, involving over 50 teachers and faculty, and culminated in the award of over 1,000 digital badges to over 500 students. The program also awarded over $100,000 in incentives. Feedback from staff and students was overwhelmingly positive; the program also provided an opportunity for APS to strengthen its
community ties by leveraging partnerships with the local Regional Office of the Environmental Protection Agency, several experiential learning non-profits, as well as the district’s water utility and waste disposal providers.

APS Natural and Renewable Resources Team has been recognized for multiple awards over the last three years, including:

- 2015 “The Innovator” - Lucid Design Group
- 2015 “Most Successful Community Engagement Award” – U.S. Green Building Council Colorado Chapter
- 2016 “Innovative Environmental Education Program Award” – Colorado Alliance for Environmental Education
- 2016 “Sustainability Award” - City of Aurora Small Business Recognition
- 2017 “Silver Partner” – Colorado Environmental Leadership Program
- 2017 “Gold Standard of Excellence” – Healthy Facilities Institute
- 2018 “Certificate of Appreciation” – U.S. Environmental Protection Agency

Unfortunately, the district energy monitoring technologies and conservation incentive plan were believed to be ahead of their time in both practical classroom application and academic integration. As such, the incentive plan was paused in 2017 with hopes to resume efforts in the near future.