

City of San Diego Smart City Open Urban Platform (SCOUP)



Brief Summary

In 2017, the City of San Diego (city) received a grant from the California Energy Commission to launch the Smart City Open Urban Platform (SCOUP) pilot to enable remote, automated control, and tracking of energy systems at city facilities. Under the pilot, energy use data and U.S. Environmental Protection Agency ENERGY STAR Portfolio Manager (ESPM) benchmarking data for all 3,500 municipal energy meters were integrated into SCOUP databases and displayed through public-facing energy dashboards. Additionally, four buildings were integrated into a central Building Automation System (BAS) equipped with fault detection and diagnostics. The project buildings included three municipal libraries and the

City Administration Building. With this system in place, the city expects to operate the buildings more efficiently and experience both energy and greenhouse gas (GHG) reductions. The project was completed in March 2022.

The Clean Energy and Pollution Reduction Act of 2015 (Senate Bill 350, De Leon, Chapter 547, Statutes 2015) mandates a statewide doubling of energy efficiency savings in electricity and natural gas end uses by 2030. Similarly, at the time of grant award, the city's Climate Action Plan required a 35 percent reduction in municipal GHG emissions by 2035, from a 2010 baseline. The city is in the process of updating its GHG goal to net zero by 2035, including a 100 percent reduction of emissions in city buildings. The SCOUP technologies are anticipated to reduce energy consumption and GHG emissions in the four participating buildings by an average of 10 percent.

The main task was installing a BAS that integrates four city facilities. Heating, ventilation, and air conditioning (HVAC) systems from three libraries were fully integrated in the BAS. The City Administration Building received upgraded direct digital control thermostats and British thermal Units meters which were also integrated into the BAS in conjunction with the existing electric sub-meters. This allows for remote management of energy systems by city energy managers and facilities staff. However, implementation of the project resulted in a significant outcome that would not have otherwise been realized – collaboration and recognition among key internal stakeholder departments regarding the significant value and work associated with establishing a citywide, enterprise BAS.

SCOUP will help the municipality be better prepared to weather climate-change-driven disruptions. The SCOUP dashboards will provide better transparency into demand shifting opportunities that will not only decrease costs, but also allow the city to play its part in times of grid stress, thereby reducing risks of outages and wildfires, and increasing safety and resiliency across communities. Remote accessibility to energy system controls increases response times of facilities' staff and ensures building energy systems can be managed more easily in times of disruption.

Lead Agency and Partnerships

Lead agency: City of San Diego, Lead department: Sustainability & Mobility Department – coordinated all grant activities; worked with internal procurement teams to execute contracts with grant partners (i.e., subcontractors); facilitated lengthy, ongoing approval process with Department of Information Technology (DoIT); and managed work of all subcontractors.

Subcontractors: SC Engineers – designed system of record; Cypress EnviroSystems – installed direct digital control thermostats to replace analog thermostats at Civic Center Plaza; Dynalectric Company – established platform and integrated system data to develop dashboards and establish control functionality.

The most essential collaboration in the SCOUP project was with the city's DoIT. Every aspect of the system required review and approval by DoIT, as all aspects touched the city IT network in some way and network security was and is the most critical concern. Significant time was spent working with various DoIT staff. DoIT's "IT Governance" process, which provides a venue for review and approval of all IT installations, was leveraged repeatedly and iteratively throughout the project.

Additional stakeholders included the Library Department, as well as the Department of General Services Facilities Division. As the ultimate users of the control dashboards, the facilities team provided essential input regarding existing conditions and the functionality of the final product.

Drivers

The SCOUP project was driven by the city's ambitious goals to reduce municipal energy consumption by 35 percent by 2035. Leadership recognized the value of an enterprise BAS to increase the efficiency of energy management among the City of San Diego's ~500 occupied facilities. This pilot project that integrated just a few buildings was necessary to secure engagement from key internal stakeholders and serve as a test case for citywide implementation.

Engagement Process

SCOUP engagement focused on city staff and the ultimate system users. DoIT staff received education on BAS technologies and approaches. Department of General Services Facilities staff were engaged to inform system design and received training on how to best leverage the final product. In the future, the public facing dashboards will be leveraged during engagement with community stakeholders as the city reviews progress toward new Climate Action Plan goals of achieving zero emission municipal buildings and operations by 2035.

Climate Impact Area

The SCOUP pilot is intended to reduce energy consumption and GHG emissions at participating facilities by increasing operational efficiency and allowing for more granular, real-time tracking of energy performance through the installation and use of BAS dashboards with fault detection and diagnostic displays. Post-project monitoring will determine whether the intended energy consumption and GHG emission reduction goals were met.

Funding Source

The project was funded by the American Recovery and Reinvestment Act of 2009 through a California Energy Commission Local Government Challenge grant, along with in-kind labor from city staff.

Research and Data

The project installed 171 wireless pneumatic thermostats for direct digital control in the downtown City Administration Building to incorporate into the SCOUP platform, which has been critical in providing greater insight and controls for thermostats in a building that shares an electric meter with four other buildings. Niagara JACE technology was installed at the four locations and integrated into a central dashboard available to facilities staff providing real-time data regarding building performance of the energy systems – reducing facilities response times for maintenance action. The city also released a Request for Information during the course of the project to confirm the selection and application of the Tridium Niagara platform for SCOUP.

Challenges

One challenge the team faced, was that the city originally selected five sites for integration into the SCOUP – specifically bigger energy consumers and facilities that had been slated for Capital Improvement Program-funded improvements that would increase the likelihood of successful integration. Early in the grant term, Capital Improvement Program funding was redirected, making those sites unviable from a timing and energy-savings perspective. The city identified replacement sites where

existing energy systems and controls allowed for a less complicated integration into the new platform, allowing the project to move forward in a timely manner.

Additionally, while examining the municipal meters that were input into ESPM, the team found that the city did not have a uniform naming convention. To address this, the team developed a uniform naming convention that was agreeable to all stakeholders. A similar challenge was revealed during development of fault detection and diagnostics rules. All the control points in existing energy management systems had unique names and descriptions, which is not ideal for running fault detection and diagnostics. To address that issue and avoid future data integration challenges, the team established a point naming convention for all buildings integrated into the SCOUP platform and leveraged project haystack's point tagging convention to add descriptors to each control point.

Outcomes

The most significant outcome is increased awareness and understanding among key internal city departments regarding the significant value and work associated with establishing a BAS platform. This will be critical as the city considers implementation of a citywide, enterprise BAS soon. Integration efforts were completed at the end of the grant term and expected outcomes such as reductions in energy use at participating facilities will be tracked and monitored. Other outcomes include significant lessons learned regarding administration of grant funds, and related procurement challenges. For example, based on the SCOUP experience, city staff are now better equipped to review grant proposals to ensure they provide adequate time for procurement of subcontractors, or buy-in from leadership to navigate sole-source procurement, if required.

Replicability

Other local governments may glean important information about the complexities and benefits associated with implementing an enterprise BAS at similar scale and across older building portfolios.

Further Information

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