



## CITY OF DEL MAR

# The Del Mar Civic Center Energy Enhancements Project

### Project Summary

**Project Overview:** The Del Mar Civic Center Energy Enhancement Project, funded through a California Energy Commission (CEC) Local Government Challenge grant, centered on the installation of a photovoltaic (PV) and energy storage system (ESS), as well as outreach efforts to disseminate project results and inspire replication among other local government and commercial sites.

This project yields several benefits to the City of Del Mar and its residents. The PV and ESS technologies installed at the Del Mar Civic Center complex (City Hall and Town Hall) make these buildings more energy efficient, energy advanced, and energy resilient. The technology reduces electricity consumption from the grid by generating most of the buildings' electricity needs with on-site solar, provides back-up power when grid power is lost and allows battery discharge to strategically reduce the site's peak demand and to power early evening events when time-of-use rates are the highest.

In addition to the on-site energy and cost benefits the project provides, this system also bolsters the resiliency and functionality of the City's designated Emergency Operations Center at the Town Hall. The combined solar plus storage project serves as a valuable demonstration project to other local government, municipal, and commercial sites considering investment in resilient renewable technology.

**Project Start and End Dates:** March 2017 – June 2019

**Goals/Objectives:** The goals of this project were to assess the expected electricity consumption of the site as well as the anticipated performance of a PV and ESS at the City's new City and Town Hall campus.

There were four objectives supporting this goal including:

1. To further reduce the energy usage and emissions footprint by incorporating solar PV generation on the roof of the City Hall building.
2. Implement an ESS to reduce overall demand use and to avoid times of the day when energy is costlier and grid emissions are higher.
3. Enable the ESS to provide the ability to power the Town Hall distribution panel loads, allowing demonstration of emissions-free municipal operations during regular evening meetings by City committees.

4. Allow the ESS to be available as a power source for the Emergency Operations Center of the City, which has no dependence on fuel availability in times of crisis.



**Relevance to State Policy Goals:** Policy goals regarding energy efficiency, renewable energy, and greenhouse gas (GHG) emissions relevant to this project include, but are not limited to:

- Senate Bill 32 (Pavley, Chapter 249, Statutes of 2016) – requires a reduction in GHG emissions by 40 percent below 1990 levels by 2030.
- Senate Bill 350 (De León, Chapter 547, Statutes of 2015) – requires the state to double statewide energy efficiency savings in electricity and natural gas end uses by 2030; and increases California’s renewable energy procurement goal from 33 percent by 2020 to 50 percent by 2030.

**Integrated Climate Approach:** This project employed an integrated climate approach, as it included mitigation and adaptation strategies ranging from energy efficiency, electrification, and renewable energy to battery storage and microgrids.

**Key Project Deliverables:**

- A 71 kilowatt (KW) PV system and 30 kW/120 kilowatt hour (kWh) ESS, which combined, allows self-generation and storage on site.

## Lead Agency and Partnerships

**Lead Agency and Partner Organizations:** This project was led by the City of Del Mar and involved several other partner organizations. Key stakeholders included:

- The Center for Sustainable Energy
- Miller-Hull Architects (facility architecture firm)
- Randall Lamb (subcontractor to Miller-Hull for design of mechanical, electrical, and plumbing systems)
- RA Burch-EC Constructors, a joint-venture (general contractors for construction of the Del Mar Civic Center)
- Baker Electric (contractor)
- Investor Owned Utilities
  - San Diego Gas and Electric (SDG&E)

## Drivers

**Local and State Legislation/Policy:** Del Mar is committed to reducing GHG emissions and improving energy efficiency. This long-term commitment has been an identified goal of the city since the inception of the Community Plan in 1976, which outlines a goal of “reducing energy consumption.” On June 6, 2016, the Del Mar City Council adopted a Climate Action Plan (CAP), which sets targets for reducing GHG emissions by reducing energy use in buildings to meet the goals of 15 percent reduction in GHG emissions by 2020 and a 50 percent reduction by 2035, and identifies strategies to meet those targets. State legislation also drove the need for this project, including Senate Bills 32 and 350, and Assembly Bill 802 (Williams, Chapter 590, Statutes of 2015).

## Engagement Process

**Stakeholders:** Project stakeholders included: The City of Del Mar Sustainability Advisory Board, Center for Sustainable Energy, the City Council, and the citizens of Del Mar.

**Engagement Process:** The design process for the Del Mar Civic Center, which transpired from Summer 2013 to January 2016, included extensive community engagement opportunities. As part of that process, the Sustainability Advisory Board, a City Council-appointed citizen advisory committee provided extensive feedback on the types of sustainability features they recommended for incorporating into the project. Maximizing energy efficiency was one of their goals.

**Engagement Outcomes:** Based on the recommendations of the Sustainability Advisory Board, many energy and water-use efficiency measures were incorporated into the Civic Center Design. In addition to designing the City Hall roof structure to accommodate the weight and roof pitch necessary to support solar panels, other features included pre-plumbing the facility to use reclaimed water if it becomes available to the site in the future, and water-efficient landscaping. The forward-thinking roof design was committed to before the City was awarded the challenge grant and without

secured funding for the solar system. This was a way to proactively plan to accommodate the solar panels upon availability of future funding.

## Climate Impact Area

**GHG Reduction:** The primary climate impact this project responds to is reduction in GHG emissions by reducing energy use in buildings to meet the goals of 15 percent reduction in GHG emissions by 2020 and a 50 percent reduction by 2035.

## Funding Source

- \$388,893 from CEC Local Government Challenge grant
- \$100,487 in match share funding from the City of Del Mar

## Research and Data

**Resources:** Key resources used for this project included:

- City of Del Mar CAP
- Center for Sustainable Energy
- Center for Sustainable Energy Building Load Solar PV and Energy Storage Performance Assessment
- See additional resources below for link

## Challenges

**Challenges:** As with any local new construction project at that time, the building was built with a solar-ready design, which incorporated elements such as conduit to prepare for necessary PV and inverter wiring and stanchions on the roof for the solar racking to be installed upon. These racking elements were one detail of the project that later resulted in a fairly interesting lesson learned. As it turned out, the parcel that the Civic Center sits on has a slight grade, sloping down towards the Pacific Ocean. This resulted in sections of the final racking that were installed (with modules atop) to actually exceed the City's height ordinance.

**Overcoming Challenges/Solutions:** The racking was reworked to be in compliance with the height ordinance.

## Outcomes

These were the main performance outcomes:

From March 1, 2019 through February 29, 2020, the City of Del Mar's Civic Center consumed over 208,000 kWh of electricity. While actual energy consumption exceeded modeled projections by 17 percent, Civic Center energy consumption falls in line with median energy consumption for similarly sized office buildings and public assembly spaces across the United States, according to Energy Information Administration (EIA) and Environmental Protection Agency (EPA) databases.

The PV system generated over 107,000 kWh of renewable electricity, equivalent of 51 percent of annual electric consumption at the Civic Center. Of those 107,000 kWh, the Civic Center consumed nearly 70 percent of those onsite at the time of production and exported the remaining PV energy to the SDG&E grid in exchange for net energy metering (NEM) billing credits.

The ESS was able to prevent about 4,500 kWh from being exported and stored it for later usage onsite. It should be noted that the ESS operations modes were being refined throughout the year, so the benefits ebbed and flowed, and the ideal operations were fine-tuned. ESS continues to provide the Civic Center with “peak-shaving” benefits, discharging the battery during expensive on-peak periods to avoid costly monthly demand charges, particularly during late afternoon City Hall meetings when those are back in session.

Overall, the PV and ESS system saved the City over \$20,000 in utility bill costs. As another income stream, the City also saw over \$6,700 in annual revenue from the onsite electric vehicle charging stations.

In the absence of solar PV and battery storage, the City would have paid nearly \$54,000 in annual electricity bills compared to actual SDG&E bills that came in closer to \$30,000.

In conclusion, the City of Del Mar’s Civic Center Energy Enhancements project was a success and is well-suited to serve as a model for other local government project endeavors. It was a really fun and interesting project to work on and City staff look forward to seeing what similar projects will emerge around the state.

## **Replicability**

**Replicability to Other Communities/Regions:** This project can be replicated by other municipalities by demonstrating the performance characteristics and energy savings available from similar projects. City Council, Design Review Board, Planning Commission, and other committee meetings typically begin at 6 p.m. and last until 9:00 p.m. or later, so battery storage could provide electricity to the Town Hall for these events and avoid the highest (projected at ~\$0.36/kWh or more) time-of-use generation charge from SDG&E. These savings can be reinvested in promoting other energy savings goals of the CAP, including more public outreach and expedited permitting for energy efficient residential or non-residential projects. The major benefits are:

- GHG Reductions
- Energy savings to meet CAP goals
- Cost savings by reducing energy usage by projected 90 percent
- Cost savings by peak shaving of time-of-use charge
- Providing back-up power during outages/reducing use of diesel generator
- System redundancy for Emergency Operations Center
- Reinvesting in energy efficiency upgrades for other municipal buildings
- Lower power use from grid helps reduce pollution from carbon-based energy generation

- Real-time metering of energy usage and web monitoring will provide clear data for other municipalities and local non-residential projects

### **Additional Resources**

- [Link to Civic Center Enhancement Project Webpage](#)

### **Further Information**

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