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Revolutionizing the Integration of Sustainability & Zero Net Energy in the San Diego Region

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San Diego Regional Climate Collaborative

Enabling Regional Leadership & Science-Based Action

The San Diego International Airport New T1 Project & Zero Net Energy Facilities

Zero Net Energy

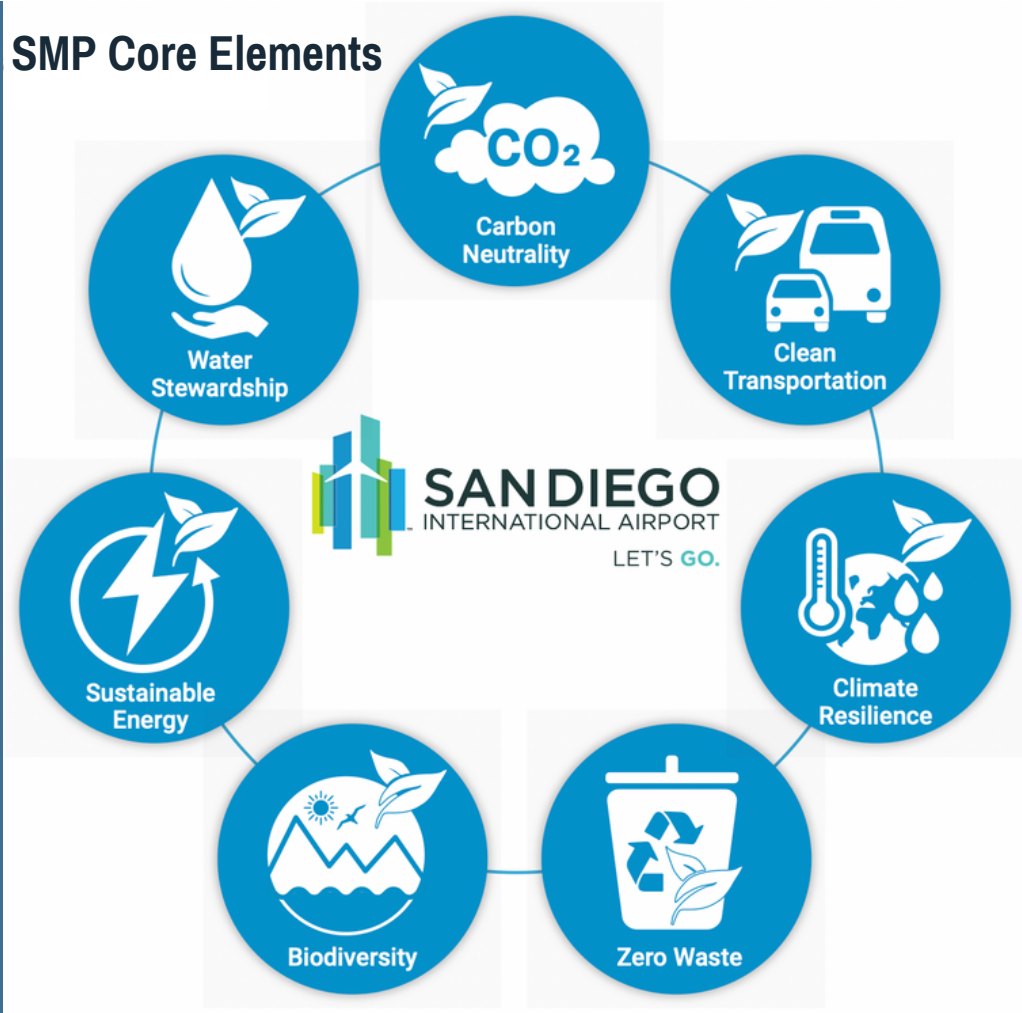
Energy Education & Resource Hub

Abstract

The San Diego County Regional Airport Airport Authority (Airport Authority) manages the day-to-day operations of the San Diego International Airport (SAN) and addresses the region's long-term air transportation needs. SAN is also the busiest single-run commercial airport in the United States. To lessen SAN's greenhouse gas emissions impact on local climate change vulnerabilities from the airport's operations (i.e. minimizing energy usage), the Airport Authority has integrated sustainability across its social, environmental, and economic functions. In their commitment to sustainability, the Airport Authority is using the New Terminal 1 (New T1) project and zero-net energy (ZNE) Airline Support Facilities (ASF) as an opportunity for the Airport Authority to raise the profile of local climate leadership with an international impact, as well as sustain economic development and environmental stewardship for the San Diego region. Along with pursuing ZNE buildings, SAN's climate reporting and planning efforts showcase how sustainable design and data-driven project planning can uplift the economic value, environmental stewardship, and regional community impact SAN and the Airport Authority contribute.

Climate Action & the San Diego International Airport

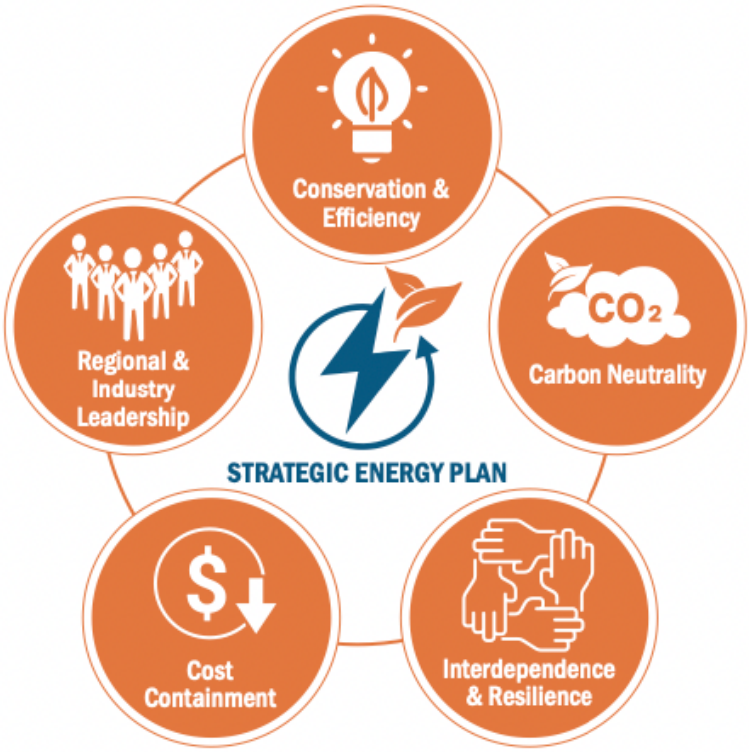
The San Diego County Regional Airport Airport (Airport Authority) was established in 2003 as an independent agency to manage the day-to-day operations of the San Diego International Airport (SAN) and address the region's long-term air transportation needs. As an agency that serves the entire San Diego region and national and international customers, the Airport Authority is committed to implementing sustainability into everyday operations. Driven by this commitment, the Airport Authority has completed industry-leading projects, such as the construction of the world's first Leadership in Energy and Environmental Design (LEED) Platinum-certified airport terminal (Terminal 2 West Expansion "Green Build"), and has developed innovative and effective greenhouse gas (GHG) reduction programs that were recognized by the Airports Council International's Airport Carbon Accreditation (ACA) program.[1] The Airport Authority is now using the New Terminal 1 (New T1) project and the modernization of SAN Airline Support Facilities (ASF) as an opportunity to raise the profile of local climate leadership with an international impact, as well as sustain economic development and environmental stewardship for the San Diego region. The Airport Authority has also integrated sustainability, informed by the best available climate science and data, into seven core plans within the detailed Sustainability Management Program (SMP). The plans related to air quality and GHG reductions include the Strategic Energy Plan (STEP), Clean Transportation Plan (CTP), Carbon Neutrality Plan (CNP), and Climate Resilience Plan (CRP).



https://www.san.org/Portals/0/Documents/Environmental/2020_SAN_SMP_Summary.pdf?ver=2020-09-04-095753-707

The Airport Authority's Strategic Energy Plan

This graphic represents the five core elements of the Airport Authority's Strategic Energy Plan:



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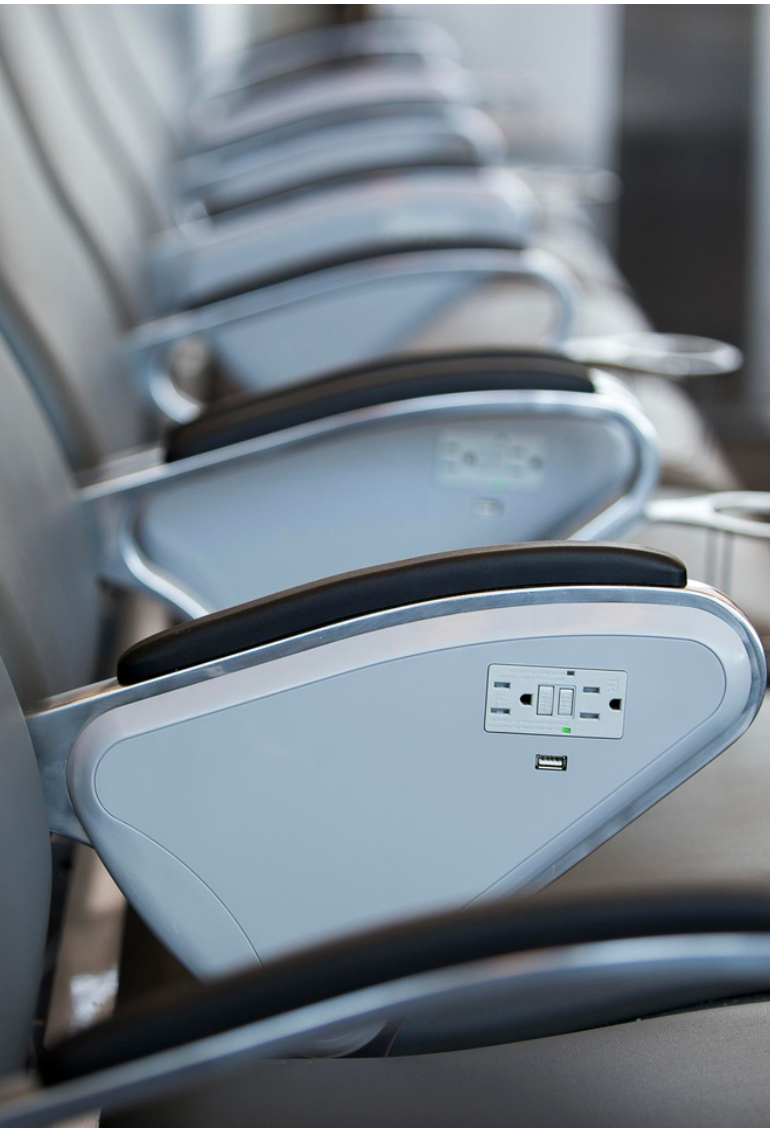
Prioritizing Sustainability in Daily Operations

Each of the SMP core plans highlights various initiatives that provide a pathway to reaching net-zero emissions. Net-zero emissions indicate reaching a balance between GHG emissions introduced to the atmosphere and emissions removed. The Airport Authority is working in alignment with IPCC's 2018 Summary for Policymakers and Airports Council International, an industry organization, to reach net zero-emission goals by 2050.[2] The Airport Authority will continue using its SMP and core value of sustainability to implement holistic projects and practices that support the multiple benefits of economic growth, social welfare, and environmental stewardship for the San Diego region.

The goal of the New T1 project is to integrate sustainability into the modernization of the terminal's operations and building functions in order to better serve passengers and employees. This effort will provide the San Diego region and SAN's occupants with a high-performing campus that is resilient in the face of climate change-induced vulnerabilities. The Airport Authority set aggressive Energy Use Intensity (EUI) targets (per passenger/per square foot) to look at the functionality and redesign of the New T1 through a holistic lens. EUI is an indicator of the energy efficiency of a building's design and/or operations.[3] These EUI targets focused on the New T1's bagging system, cooking outlets, water heating, and more energy-intensive systems to ensure maximum energy efficiency benefits are obtained.



This data-driven approach is being used by the Airport Authority to redevelop a terminal that will reduce SAN's overall GHG emission output and improve climate-smart energy use practices. Construction on the New T1 began in 2021 and the first phase of the New T1 will be completed in 2025.[4] When the New T1 is complete, it will advance the Airport Authority's SMP plans: CTP, CRP, CNP, and STEP while also providing passengers and SAN campus occupants a better experience.

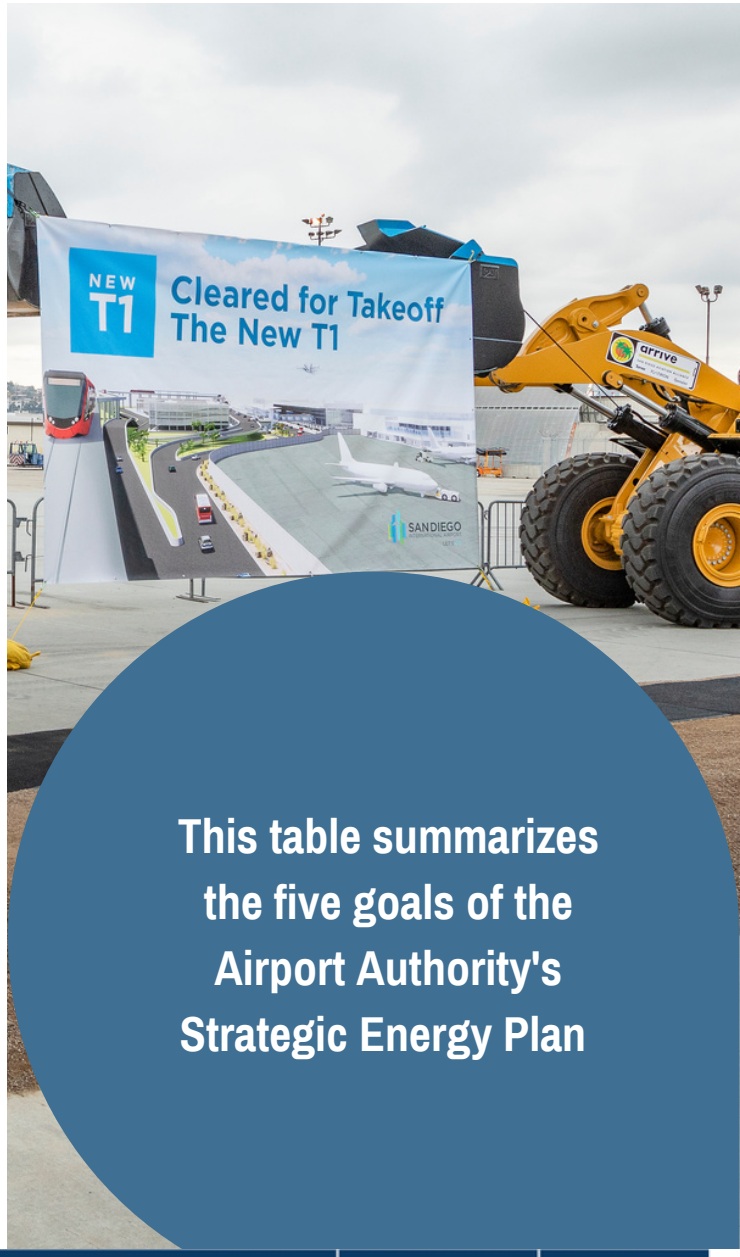
Advancing Zero Net Energy (ZNE) & the SMP

Zero net emission goals are made feasible to achieve with the design, development, and construction of zero net energy (ZNE) buildings. A ZNE building is an energy-efficient building where, on a source energy basis, the annual consumed energy is less than or equal to the onsite renewable energy generated. As stated in California's Energy Efficiency Strategic Plan, all new commercial construction will be ZNE by 2030.

The California Strategic Plan also states that 50% of commercial buildings will be retrofitted to ZNE by 2030.[5] With these goals in place, policies and practices have been identified to promote potential pathways for onsite clean power generation. The Airport Authority is supporting California's statewide efforts to reach these ambitious ZNE targets for the built environment. As part of this effort, SAN has committed four ASF structures to be designed to achieve ZNE certifications and run on 100% renewable electricity, rather than natural gas.[6] SAN's four ASF updates are also designed to consume less energy than the renewable energy generated onsite - significantly reducing carbon emission outputs. The Airport Authority's decision to modernize available facilities as ZNE buildings closely ties back to the agency's guiding principle with climate action projects: the SMP.[7]

Implementing SMP Goals into Current Projects

The New T1 construction and design, along with ZNE ASF structures, reflects the Airport Authority's industry-leading commitment to innovation and sustainability through energy and water conservation, as well as clean-air and zero-waste initiatives. The Airport Authority has a formal policy to achieve at least LEED Silver certification for relevant new construction projects, including the New T1. LEED certifications do not just focus on the environmental benefit of a building, but also focus on the human health impacts, green economic value, water resource conservation, biodiversity impact, natural resource use, and community impact of a building.[8] ZNE buildings provide tangible results to climate change vulnerabilities through holistic building design principles that put people and the environment as its beneficiaries.



This table summarizes the five goals of the Airport Authority's Strategic Energy Plan

Aspirational Goals	Metric(s)	Target(s)	Target Timeframe
1. Reduce Energy Use Promote a culture of energy efficiency and conservation through quantifiable metrics	Energy use (kBtu) per passenger	10% by 2022 20% by 2028 30% by 2035	2035
2. Reduce GHG Emissions Use low carbon energy to achieve zero net GHG emissions in facility operations	Total energy demand met by renewable sources (including off-site)	30% by 2022 60% by 2028 100% by 2035	2035
3. Increase Resiliency Incorporate energy resilience into planning and operations	Number of hours of potential operation at each service level* (normal, medium, and critical)	Normal: 2 hrs Medium: 6 hrs Critical: 24 hrs	2035
4. Reduce Cost for Energy Achieve energy goals in a financially responsible and feasible way	Annual energy cost per passenger, adjusted for escalation	10% by 2022 20% by 2028 30% by 2035	2035
5. Lead in the Region and Industry Deploy a robust, innovative, and cost effective energy program that fully supports Airport operations	Number of conference and/or community presentations made related to energy and sustainability Number of articles, Airport Cooperative Research Program (ACRP) reports, and other published materials	N/A	Annually

https://www.san.org/Portals/0/Documents/Environmental/2020_SAN_SMP_Summary.pdf?ver=2020-09-04-095753-707

The New T1's Integrated Approach to Sustainability

01

Electric Vehicle Charging: Modern sustainability strategies are being implemented in the New T1's parking plaza as 10% of the future lot will be dedicated to electric vehicle (EV) charging. SAN has been working to provide the EV infrastructure necessary to support the increased EV charging capacity. Achieving and reaching these EV charging goals is a priority of the New T1 project.

02

Electric Shuttle Transportation: SAN's electric shuttle service has been incredibly successful. Currently, an electric shuttle goes from Old Town Transit Center to SAN. This electric shuttle offers passengers a carbon-neutral transportation option to SAN as well as supports SAN's larger zero net emissions efforts.

03

Improving Energy Use Intensity: The Airport Authority is currently evaluating different energy loads to tweak and optimize SAN's Energy Use Intensity (EUI) targets. EUI is an indicator of the energy efficiency of a building's design and/or operations.[9] The metric expressed in the New T1 project is relative per passenger or per square foot.

04

Energy Resilience: The Airport Authority is focused on the New T1 project's construction design to ensure there is redundancy in grid-delivered electricity (that is 100% renewable and carbon-free).

05

Solar Photovoltaic Installation: The Airport Authority is also working to increase the volume of photovoltaic (PV) solar battery storage as the load demand grows. There is an opportunity to lock in electricity rates and promote cost containment with a long-term solar power purchase agreement (PPA), typically lasting 10-25 years.[10] Using solar to power SAN can shave peaks off of its electricity demand while avoiding pulling electricity off the grid. The Airport Authority is also focused on ensuring enough battery storage is available for this renewable energy generation.

06

Zero Net Energy: The Airport Authority has planned for four of SAN's ASF structures to be ZNE buildings. These buildings are designed to not use natural gas and to be powered on 100% renewable electricity - a way to pursue a ZNE certification.[11]

07

Growing the Region's Economy: SAN's current economic output for the region is 12 billion dollars annually.[12]

Advice & Lessons Learned

The New T1 project and campus energy performance updates will have a direct impact on SAN's economic output, environmental impact, and customer experience. Throughout the process of deeply embedding sustainability, the project illuminated key lessons for the Airport Authority. These lessons include:

01

Data Collection - It is necessary to obtain current energy savings data to identify effective pathways to meet projected carbon savings. Using data as the guiding metric for carbon reduction is crucial when designing a zero-net energy building.

02

Implementation - Implementation is challenging, but possible when sustainability goals are made with adaptation measures to be flexible for changing variables - such as economic trends and evolving environmental standards.

03

Maintaining Project Goals - The Airport Authority learned the importance of reiterating and enforcing redundancy to support the guiding project goal: climate-smart practices that align with SAN's SMP.

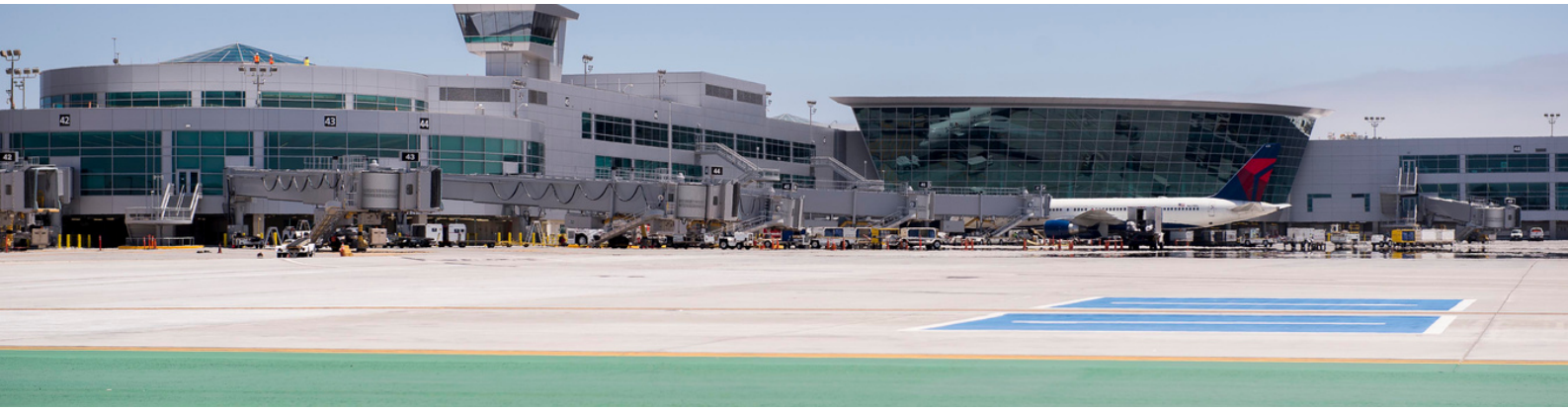
04

Collaboration - Collaboration with other commercial airports that have done best practices in this space is important. It is also important to collaborate on a regional level with organizations that have done relative projects and can also share best practices. Participation with the San Diego Regional Climate Collaborative's Sea Level Rise Working Group and Adaptation Policy Working Group supported the Airport Authority in the New T1 project scope by better understanding regional climate action priorities through these group dialogues. As more agencies undergo an energy efficiency transition, there is a need for the scope of collaboration to evolve and become more inclusive of regional conversations.

Future Climate Action & Resilience Measures for SAN

One path to help diversify SAN's power supply and maintain energy load efficiency is through the local Community Choice Aggregation (CCA) program. CCAs give residents and businesses an opportunity to choose who will purchase energy on their behalf, an example being either the CCA or a private utility company. A larger factor in this decision for many when approaching climate action goals is the renewable energy content of their electricity portfolio. The Airport Authority has committed to be a Power100 Champion of San Diego Community Power (SDCP). This means that the electricity SDCP delivers to the Airport Authority and SAN is 100% renewable energy. SDCP is a locally run, nonprofit public agency that is an electric generation service provider. SDCP purchases renewable power, like solar and wind, and feeds it into the electricity grid, working with SDG&E to deliver it to its member cities.[14] The benefits of this 100% carbon-free electricity will support the Airport Authority's ZNE targets, broaden climate goals to elevate regional and statewide energy resilience, and zero out carbon intensity for energy load supply.

The Airport Authority will continue to uphold its industry-leading commitment to sustainability and support creating a resilient San Diego region. The Airport Authority has developed a best practice approach to climate action in the industry through its Climate Resilience Plan (CRP). The CRP provides an organized framework for enhancing business continuity as climate impacts progress by adapting existing infrastructure and practices while incorporating future climate conditions into future projects using climate science.[15] The Airport Authority maintains leadership in regional climate action as it serves on the Advisory Board of the San Diego Regional Climate Collaborative (Climate Collaborative). The Climate Collaborative is dedicated to connecting the San Diego region to advance comprehensive solutions to reduce GHG and prepare for local climate change impacts. The Airport Authority has participated in several of the Climate Collaborative's working groups and studies, including those focused on economic vulnerability to sea-level rise and stormwater infrastructure.[16] Looking toward the future, the Airport Authority has developed science-based targets and metrics, to represent where SAN will be in the next 15 to 20 years, supporting resilience as climate change progresses.



Resources & Relevant Blog Posts:

Resources:

- San Diego International Airport Sustainability Management Program
- New T1 Website
- San Diego County Regional Airport Authority

Cost-Relevant blog posts:

- A New Option to Get to the Airport from Old Town Transit Center
- SAN Stormwater Management Raises the Bar on Sustainability
- Envisioning the Future at SAN

The New T1 project and SAN's larger energy efficiency efforts present an opportunity for the Airport Authority to raise the profile of local climate leadership with an international impact, as well as sustain economic development and environmental stewardship for the San Diego region.

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