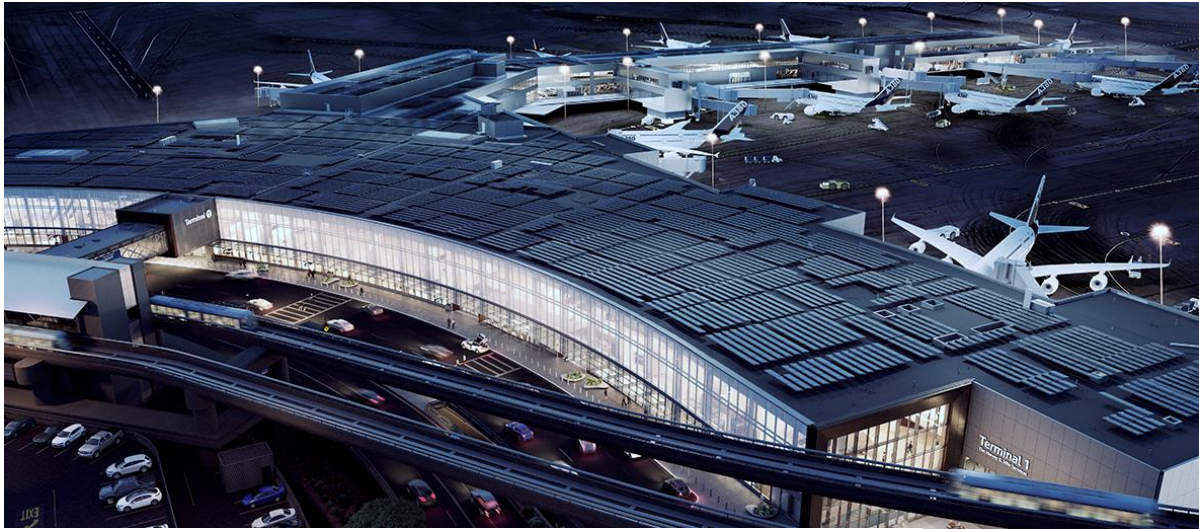


The \$2.4 billion redevelopment of San Francisco International Airport (SFO) Terminal 1 will elevate SFO's standard of providing a world-class, environmentally friendly travel experience. What is the total cost of ownership and the broader social and environmental impacts of SFO's redevelopment?



Source: SFO Terminal 1 - SFO

### Challenge: Make the case for sustainability investments and design elements in SFO's Terminal 1 redevelopment

SFO is redeveloping Terminal 1: a 1.18 million square foot project, that includes 770,000 square feet for the Terminal 1 Center (T1C) renovation project. This project is targeted to achieve a LEED Gold certification.

#### The \$2.4 billion project includes:

- design and construction of T1's pre-security concourse
- a spacious central concourse with an art gallery, food halls showcasing the best in Bay Area fare, and integrated technology to facilitate the passenger journey
- accommodate millions of passengers each year with a world-class, environmentally friendly travel experience.

A triple bottom line cost benefit analysis (TBL-CBA) was conducted using Autocase, a cloud-based software tool, to provide insights into the economic outcomes of design scenarios. The impacts of more sustainable, healthy, and resilient design can be measured. Benefits of design innovations can be measured in terms of emissions reductions, reduced potable water use, passenger experience, as well as the health and productivity of employees.

With the TBL-CBA approach, as costs and benefits are expressed in dollar terms, different design alternatives can be compared on an "apples-to-apples" basis in an objective and defensible manner.

### Solution: Autocase's TBL-CBA approach allowed the airport to prioritize and rank proposed design investments.

**Ranking Design Features** - The T1C design-build team looked at several design alternatives including:

- a green roof
- electrochromic glazing
- motorized window shades
- interior landscaping
- radiant heating and cooling, and
- a ground source heat pump instead of using the existing central plant.

Autocase provided the full financial, social, and environmental picture allowing the alternatives to be ranked and prioritized.

**Evaluating Energy Scenarios** - The T1C design-build team also provided information on two scenarios:

- i. one using the regional grid as the source of power and potable water supply sourced from a utility, and
- ii. the second keeping the current source of carbon-neutral 100% hydroelectric emission-free power, and 85% of water supply sourced from the on-site recycled water facility.

## LEED Pilot Credit Checklist

The design-build team also evaluated energy scenarios for four designs that include:

- i. energy use reductions
- ii. energy efficiency measures
- iii. a photovoltaic system; and central plant heat recovery.

A TBL-CBA analysis of these investments yielded benefit cost ratios of between 1.5 and 4.9; proving their worth.

**Choosing the Right Materials** - In addition to evaluating energy scenarios, the design team looked at selecting design and construction materials to reduce life cycle embedded carbon emissions. This initiative yielded the highest social & environmental benefit for their respective costs. Health, productivity, and absenteeism are key drivers of benefits. Investments in both low emitting materials and thermal comfort exhibited strong returns, given the improvements to passenger and employee productivity, health outcomes, and reduced employee absenteeism.



- ✓ Minimum of 6 total LEED credits analyzed
- ✓ Includes additional 5 "soft dollar" impacts
- ✓ Minimum "Core" LEED credits analyzed
- ✓ Capital expenditure costs included
- ✓ O&M costs included
- ✓ Replacement costs included
- ✓ Relative to a baseline
- ✓ Study period > 20 years (or project's life)

**Results: A green roof, interior landscaping, and electrochromic glazing provide environmental, employee, and passenger benefits. Energy designs have benefits that outweigh the costs up to five-to-one. And low emitting materials and thermal comfort investments give strong returns to passenger and employee productivity, health outcomes, as well as reduced employee absenteeism.**

**With Autocase, SFO:**

- valued the health, productivity, and absenteeism benefits quickly
- demonstrated the value of its already implemented sustainability measures that use a recycled water plant and 100% certified emission-free electricity
- selected design and construction materials to reduce life cycle embedded carbon emissions.

**Autocase: Making the business case for high performing and sustainable buildings.**



Autocase for Buildings is a software tool that models the environmental and social dollar values of building designs and, together with financial costs, evaluates their net, triple bottom line (TBL) benefit over the life of a project using a rigorous cost-benefit analysis (CBA) framework. With Autocase, the cost and time required to compare design alternatives at any stage of a project is a fraction of today's custom studies. As a result, design firms can easily evaluate and justify different approaches and, in doing so, can contribute to the future economic, social, and environmental success of every project.

For more information about how TBL-CBA would assist your project, go to [www.autocase.com](http://www.autocase.com)