

OFFICE CARBON FOOTPRINT

The California Energy Design Assistance Program can help you decarbonize your commercial office building.

California's electric grid is transitioning to cleaner energy. To reduce the carbon footprint of your commercial office building, you must first determine how your energy is being used and the associated carbon footprint. This can depend on your building's climate zone and associated heating and cooling needs.

Using electricity instead of natural gas to serve your building's space heating and water heating needs ensures your building asset continues to reduce its carbon footprint year over year.

The California Energy Design Assistance Program can help you build in resiliency by analyzing which carbon reduction strategies meet your goals and budget.

Did you know that as of July 2023, new gas connections will no longer receive subsidies?

Key electrification systems for commercial office projects:



Electrify heating systems using central heat pumps providing hot and chilled water to a VAV system or ground coupled heat pump systems

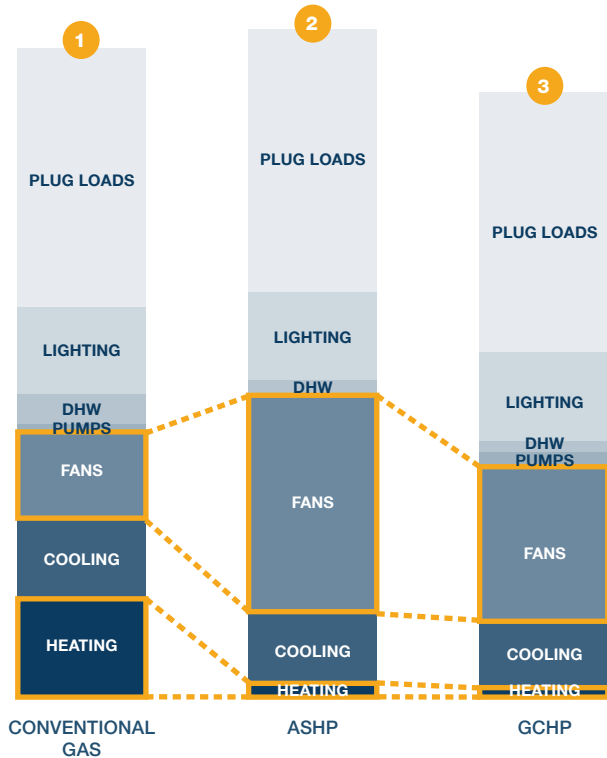


Increase envelop performance to minimize conditioning loads



Utilize refrigerants with low global warming potential

2026 carbon emissions by building system end uses for a commercial office building in Southern California



This chart details a typical commercial office building in Southern California using three different systems and shows how the focus on the types of carbon reduction measures changes based on the system type:

- 1 First bar shows that **conventional gas systems** had the largest carbon output on the heating side.
- 2 Second bar shows the results if a distributed **air source heat pump (ASHP)** was used instead of the conventional gas systems while keeping all other inputs the same. This shows strong carbon offset on the heating load but increase in the fan system. Further savings could be found on the fan side utilizing central heat pumps to provide hot and chilled water to a standard VAV system. A VAV system also allows the ability to apply economizer control for further reduction.
- 3 Third bar shows a further reduction when using a **ground coupled heat pump (GCHP)** system.

Electrification of heating can promote a reduction in carbon emissions and be found to benefit this project, but attention needs to be paid to the fan system to maximize benefits. Reduction of plug loads and electric light usage are also important carbon reduction strategies for an office building.

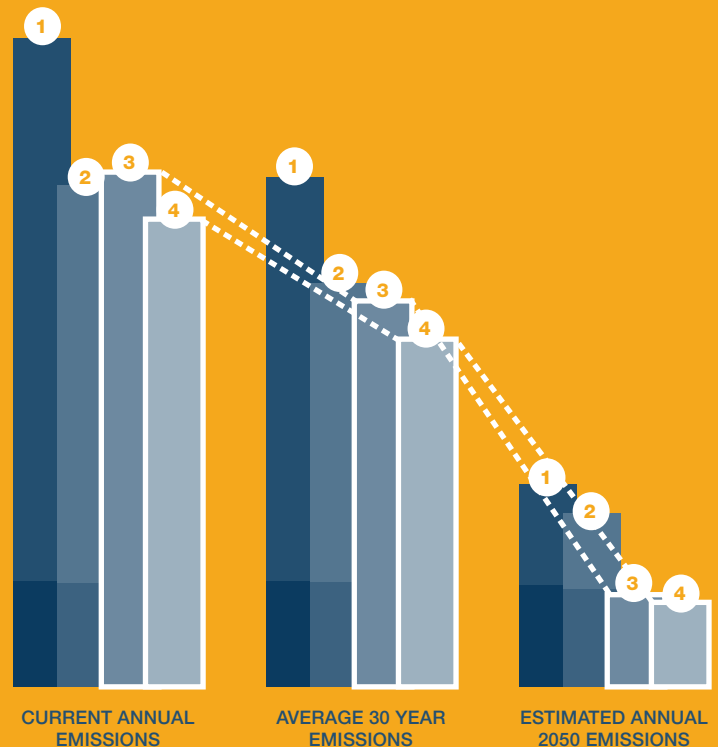
Carbon emissions for a commercial office building in Southern California

If California is successful in its projections and rates of decarbonization then the electric grid will inevitably get cleaner as time goes on. Considering these projections we can look at which strategy choices have the best carbon reduction as the grid gets cleaner.

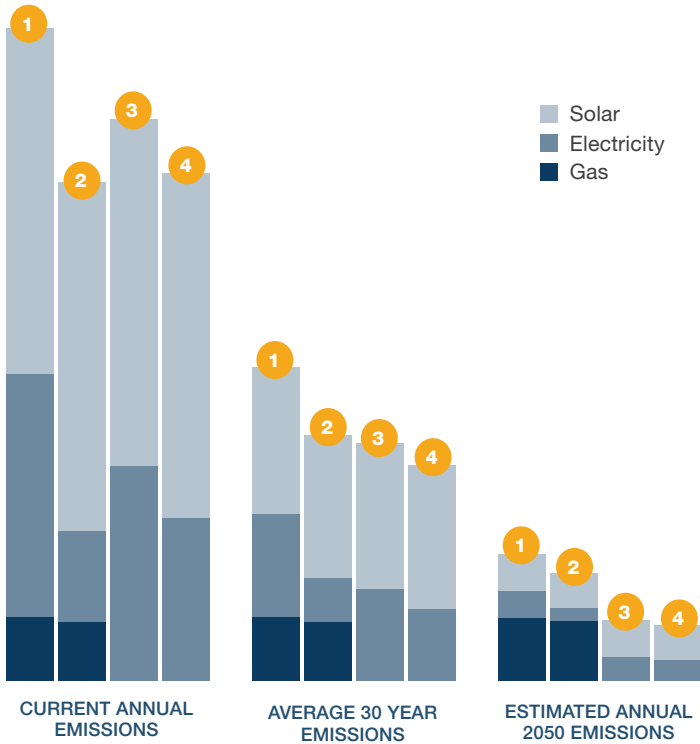
The first set of bars display where we are today:

- 1 First bar indicates a building that is built to **today's code without adopting any carbon reduction strategies**.
- 2 Second bar is for **conventional gas systems**.
- 3 Third bar is for **air source heat pumps (ASHPs)**.
- 4 Fourth bar indicates **ground coupled heat pumps (GCHPs)** with heat pump water heater.

As time goes on and the grid gets cleaner it is apparent that higher carbon reduction strategies (like the air source heat pump and heat pump water heaters) provide the greatest carbon emissions over time and will become more efficient as the grid becomes cleaner.



Carbon emissions with the addition of solar for a commercial office building in Southern California



The third chart displays how the addition of solar on 75 percent of the roof surface interacts with different systems over time. Interestingly enough the carbon reduction we see now from the addition of solar are diminished as the grid become cleaner over time.

The first set of bars display where we are today:

- 1 First bar indicates **baseline** level.
- 2 Second bar is **natural gas systems**.
- 3 Third bar is for **all electric systems**.
- 4 Fourth bar is for **all electric heat pump water heater systems**.

While solar is still a key strategy, you will see diminishing returns as the grid gets cleaner. On its own, solar will not get this building to net zero carbon.

Electrifying mechanical systems remain an important carbon reduction strategy that will future proof your building for years to come.



Contact us today to enroll and build resiliency into your project.

✉ ceda@willdan.com

📍 CaliforniaEDA.com



CEDA is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E) and supported by the state's other investor-owned utilities, (IOUs), under the auspices of the California Public Utilities commission. Program funds, including any funds utilized for rebates or incentives, will be allocated on a first-come, first-served basis until such funds are no longer available. This program may be modified or terminated without prior notice. Customers who choose to participate in this program are not obligated to purchase any additional goods or services offered by Willdan or any other third party. The selection, purchase, and ownership of goods and/or services are the sole responsibility of customer. None of the IOUs make any warranty, whether express or implied, including the warranty of merchantability or fitness for a particular purpose, of goods or services selected by customer. None of the IOUs endorse, qualify, or guarantee the work of Willdan or any other third party. Eligibility requirements apply; see the program conditions for details.