



K-12 CARBON FOOTPRINT

The California Energy Design Assistance Program can help you decarbonize your education facility.

California's electric grid is transitioning to cleaner energy. To reduce the carbon footprint of your education facility, 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 education facilities:



Electrify heating systems using heat pumps or variable refrigerant flow systems. Consider ground coupling where viable.



Increase envelop performance to minimize conditioning loads

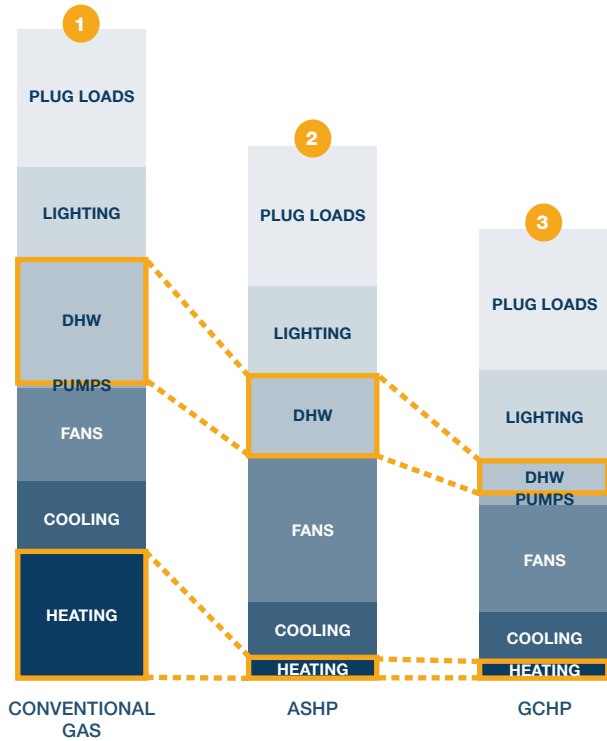


Utilize refrigerants with low global warming potential



Electrify water heating systems
heat pump water heaters

2026 carbon emissions by building system end uses for an education facility in Northern California



This chart details a typical education facility in Northern 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 emissions in the heating and service water heating end uses.
- 2 Second bar shows the results if an **air source heat pump (ASHP) and electric water heater** was used instead of the conventional gas systems while keeping all other inputs the same. There is a significant reduction in heating as compared to the conventional gas system along with a reduction in the carbon impact of the service water heating.
- 3 Third bar shows a further reduction when using a **ground coupled heat pump (GCHP)** system along with heat pump water heaters for the service water.

Electrification of heating and service water end uses can promote a reduction in carbon emissions. Reduction of plug loads and electric light usage are also important carbon reduction strategies for an education facility.

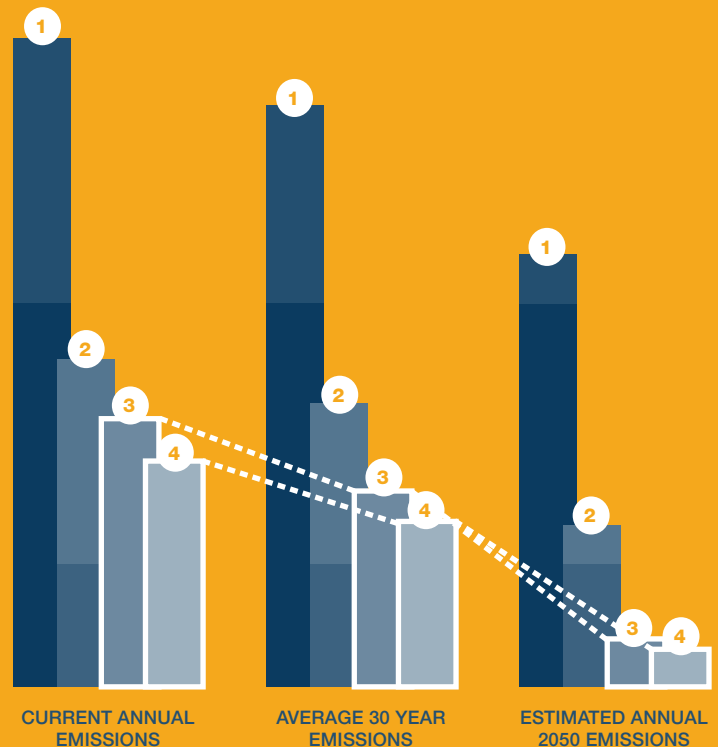
Carbon emissions for an education facility in Northern California

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.

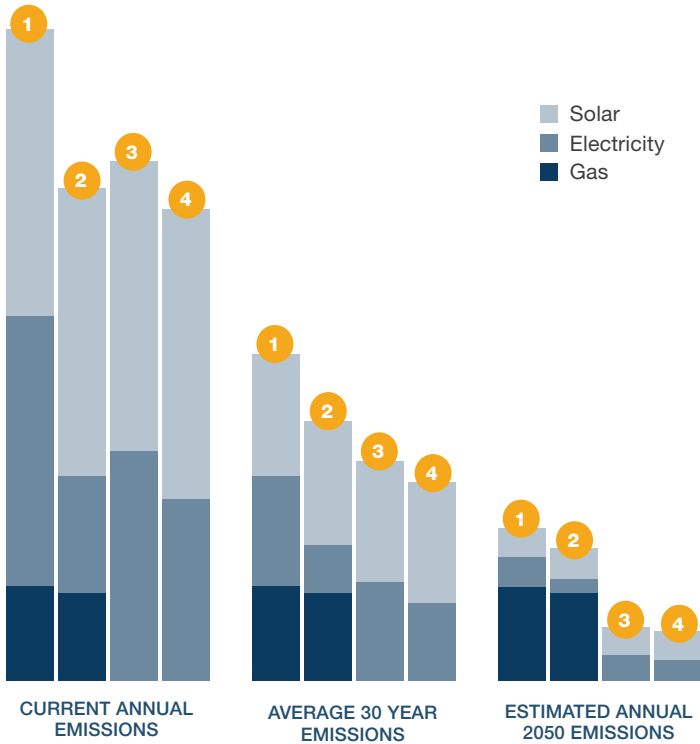
The first set of bars display where we are today:

- 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)** with electric service water heating.
- 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 an education facility in Northern 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 are 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.

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📍 CaliforniaEDA.com



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