Building Electrification FAQs

The What and the Why of Electrification:

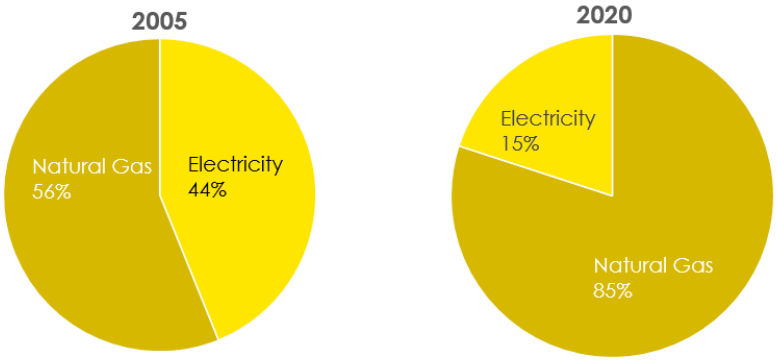
What is building electrification?

Building electrification refers to the use of electricity instead of fossil fuels to power appliances like furnaces, water heaters, and cooking appliances in buildings and homes. Today's electric appliances often include induction or heat pump technology. When these electric appliances are run on renewable energy, they result in less greenhouse gas emissions and eliminate the combustion of gasses in the home which results in better indoor air quality.

Why electrify buildings?

Electrifying buildings improves indoor air quality and reduces greenhouse gas emissions. The use of electricity in buildings has already decreased emissions due to high renewable energy standards, local solar installations, and energy efficiency efforts. However, as the electric grid becomes cleaner, emissions in buildings have shifted away from natural gas (also referred to as "gas" herein). Studies indicate that gas not only produces emissions when burned, but also leaks from stoves, pipes, and fittings. To meet climate goals and enhance indoor air quality, it is crucial to prioritize transitioning away from gas.

Figure 1. 2005 Versus 2020 Marin Countywide Building Emissions by Source 2005 greenhouse gas emissions pie chart



How does natural gas affect indoor air quality?

Removing the indoor burning of gas will enhance indoor air quality and promote better health. Burning natural gas has been found to release unhealthy levels of pollutants like nitrogen dioxide (NO2), carbon monoxide (CO), and formaldehyde (HCHO), which can lead to respiratory issues, increased risk of childhood asthma, and worsened cardiovascular health in vulnerable, disadvantaged, and already burdened populations.

Is California banning the sale of gas appliances?

Not now and not all. However, by 2030 CARB is planning to ban the sale of furnace and water heating appliances within California. Regionally the air district NOx rule 9-4 and 9-6, has banned gas water heating and space heating starting in 2027.

What are Cities and Towns doing to help electrify buildings?

Local Marin Jurisdictions are taking the lead. Most are putting forth energy and green building requirements enforced through their local building code. However, requirements are not a comprehensive solution to electrifying. Federal, State, utility, and local jurisdictions are providing incentives, programs, and rebates to help residences and businesses to make the transition to an all-electric future while prioritizing disadvantaged populations:

1. The Federal government provides tax incentives through the Inflation Reduction Act.
2. The State provides incentives, programs, and a qualified contractor list to help residences reduce upfront costs for installing energy efficiency measures (i.e. insulation), heat pump water and space heaters, and induction ranges through The Switch is On.
3. Locally, the County provides rebates for gas-to-electric changes and service panel upgrades across all Cities and Towns through Electrify Marin. In addition, MCE has a variety of customer programs and offerings to transition such as instant rebates for purchased or leased cars or EV Charging Rebates for Multifamily Property Owners, among others.
4. Lastly, through State, Regional, and Community programs and grants, Marin jurisdictions in partnership with regional partners are working to train and prepare the workforce to implement electrification projects.

For Residents:

What types of systems are ready to be electrified in buildings?

All, every type of home appliance or mechanical system you can think of. This includes furnaces, water heaters, cooking appliances, washers, dryers, fireplaces, pools, hot tubs, and EV charging equipment, among others.

Will you take my gas stove away?

No. **There is no requirement to do so.** In regards to the electrification plan, it expresses a roadmap to transition away from gas.

What is an induction stove/cooktop and how does it compare to gas?

An induction stove or cooktop is different from traditional electric resistance or gas stoves. It operates using induction technology, similar to an electric kettle that rapidly boils water. Unlike older electric resistance coil cooktops, modern induction cooktops are highly responsive, fast, and efficient. It is ~80% more efficient at delivering heat to pans compared to gas stoves. Induction cooktops direct more energy directly to the pans, heating them up faster and allowing for quick temperature adjustments. They are known for their responsiveness and speed, even outperforming gas cooktops. Many renowned restaurants, such as The French Laundry, use induction cooktops, and more chefs are opting to switch from gas to induction. Gas cooktops involve burning gas right in your home. They have been found to emit toxic fumes (i.e., carbon monoxide, formaldehyde and other harmful pollutants) in the home leading to poor indoor air quality.

Is electricity more expensive than natural gas?

Yes, electricity can be more expensive than natural gas on a dollar-per-energy used basis, depending on where you live. However, high-efficiency electric appliances like heat pumps and induction systems use less energy and perform better than gas appliances.

For instance, heat pump water heaters consume less energy than conventional ones and offer the flexibility to preheat water during times when electricity costs are lower, storing it for use during peak times when prices are higher. Heat pump water heaters also have a longer lifespan of around 13-15 years, compared to conventional models that typically need replacement every 8-12 years.

Moreover, it's important to consider the electric rate-setting process when discussing this topic. In Marin County, for example, MCE (Marin Clean Energy) sets its generation rates with specific objectives and customer considerations in mind:

- **Rate stability:** Minimize rate changes to lessen the impact on customer bills.
- **Customer understanding:** Keep rates simple, transparent, and easily understandable for customers.
- **Equity among customers:** Justify rate differences based on variations in usage characteristics, cost of service, or both.
- **Efficiency**: Encourage conservation and efficient electricity use through rates, such as promoting off-peak vehicle charging or time-of-use load shifting.

Will installing all-electric appliances cost me more?

Yes and no. It depends on the scope of your comparison. The cost of installing all-electric appliances can vary depending on the comparison you make. While the upfront costs may be higher, all-electric appliances can be cost-effective in the long run. Consider the following:

- Modern electric induction and heat pump appliances are more energy-efficient than natural gas as well as traditional electrical coil/resistance appliances. They use less energy, resulting in lower operating costs.
- All-electric appliances can provide energy savings along with rebates and incentives available (such as up to $4,800 in Marin County) that help reduce the initial capital costs.
- The value of all-electric appliances goes beyond just the costs seen on your utility bill. It includes considering rebates and incentives that lower capital costs, reduced costs over the equipment's lifespan, and the societal and public health benefits of using cleaner energy sources.
- Installing a heat pump for space heating also provides the added benefit of air conditioning at no additional cost.

How does PG&E's shift to time of use (TOU) rates affect electrification?

TOU rates can be advantageous for customers and have a positive impact on electrification.

Under an all-electric scenario, customers gain flexibility in managing costs based on the time of day. By shifting energy use to off-peak hours, customers can lower their bills despite overall electricity usage increase, offering more control over expenses compared to previous tiered rates.

TOU pricing also benefits the grid by encouraging off-peak electricity usage when more renewable energy is available. Utilizing excess solar energy during daytime off-peak hours through major appliances and electric vehicle charging helps keep bills low.

It's important to remember that each household's energy usage is unique. Visit PG&E's TOU Rate Plans for Residential Customers to find the best rate for your specific needs. Note that rate plan changes must be made through PG&E

Reliability and Resilience:

Can the electric grid handle increased demand if all homes and businesses go all-electric?

With the proper policy, investments and planning by the State and utilities, the electric grid can handle increased electricity demand if all households and businesses go all-electric. State and local authorities have planned and prepared to ensure grid capacity meets the transition.

Electrification in Marin County will happen gradually with new construction, allowing the grid to adjust over time. The grid's capacity depends on peak demand, typically driven by air conditioning in hot summers. During other seasons, there's available capacity to handle the extra demand. The increased demand from electrification, mainly for heating appliances, will occur mostly in winter when there's excess grid capacity. Learn more on how electrification could also help stabilize the grid as more renewables come online.

CAISO released a 20-Year Transmission Outlook report outlining steps to meet clean energy goals. MCE and PG&E actively support electrification through customer programs and training. They forecast load impacts and adjust energy procurement accordingly. MCE is prepared for the all-electric future and has published an information flier on their readiness.

What happens to all-electric homes during power shut-offs and outages? Will homes be stuck without power?

Mostly no. California is actively working on improving the reliability of its grid due to recent challenges with shutdowns and its clean energy goals.

PG&E in Marin County has implemented measures like vegetation management and sectionalizing devices to reduce potential outages. While power outages cannot be eliminated entirely, these actions help mitigate their impact.

It's worth noting that natural disasters and emergencies can also affect the gas system, leading to shutdowns. A restoration study completed for the City of San Francisco in 2020 found that the electrical grid typically takes days to weeks while restoring the natural gas infrastructure can take up to six months due to testing and for crews to restore service to each individual connection.

MCE, a local utility, supports building electrification and has launched an Energy Storage Program to deploy customer-sited battery storage systems. These systems provide backup power during outages, reduce greenhouse gas emissions and costs, and prioritize vulnerable customers. The program utilizes incentives from CPUC's Self-Generation Incentive Program (SGIP) and funding from MCE's Resiliency Fund. Battery and solar backup systems, like microgrids, offer energy reliability and financial benefits.

For Builders and Contractors:

Is the building community prepared for an all-electric building code?

Yes and no. The building community is familiar with electric appliances and all-electric buildings. Architects, contractors, green building practitioners, and developers have been aware of them for years.

However, some may lack knowledge of technical aspects, installation, and incentives. Residential builders may have less experience compared to commercial developers. To bridge this gap and provide resources, the State offers free support to contractors and businesses through the TECH Clean California initiative. It offers market incentives, workforce education, and training for heat pump technology in residential replacement projects. The building community must prepare for the transition to an all-electric California. Starting January 2023, new construction must include at least one heat pump for space or water heating.

Are there specific regulations for building electrification?

Yes. State building codes require minimum building energy efficiency standards through Title 24 part 6. The State also requires other green building standards through Title 24 part 11 or CALGreen including EV infrastructure and water and material conservation requirements, among others. Recently updated standards signal the desire to transition away from gas. It also requires certain electrification measures and prepares the building stock to be electric ready.

Local jurisdictions such as Cities and Towns in Marin, may choose to adopt these minimum standards or go above and beyond the State in pursuit of reducing the harmful impacts to climate and public health. Most Marin jurisdictions have chosen to go above and beyond State minimum standards. Please visit your jurisdiction's website or contact your building official or sustainability coordinator/planner to better understand requirements specific to your community.

What electric heating and cooling systems can be used in buildings? (Redwood Energy)

Heat pumps can be used in buildings as a source of electric heating and cooling. Check out Redwood Energy for more information on heat pumps as well as energy modeling resources.

How can I educate clients about the benefits of building electrification and what incentives or rebates are available?

Check out The Switch is On which provides information, resources, and tools to support homeowners and renters to electrify their homes. These tools include ways to improve

indoor air quality and safety, ways to reduce your energy bill, energy-efficient appliances for your home, and more. There are also resources for contractors to receive training, marketing materials, and support.

Are there training programs for contractors working on electrification projects?

Yes, there are a few resources that can help contractors learn about electrification and installation of electrical appliances. TECH Clean California Knowledge Hub helps by providing pilot activities, technical assistance, and training. PG&E's Pacific Energy Center has many great resources and training for contractors and to learn about electric projects. BayREN Training Events hosts training and webinars for contractors around different electrification topics.

How can I ensure proper installation and performance of electric appliances and systems?

Always refer to manufacturer's specifications when installing appliances and other electrical equipment. When applicable, obtain a permit from your local building department and schedule a final inspection to ensure your project is completed safely.

Can you provide examples of successful electrification projects?

Yes, you can check out Green Building Home Tours where they post virtual tours of Marin County homes. The tours explore what these homeowners are doing in Marin to improve air quality, generate clean energy, save energy, and water, and move toward a safer, healthier, greener, and more resilient future. Also, check out these Case Studies from San Mateo where they take a deep dive into what it would cost to electrify homes.