MENLO SPARK

Gassed Out

How Building Electrification Now Means a Healthy, Prosperous Menlo Park

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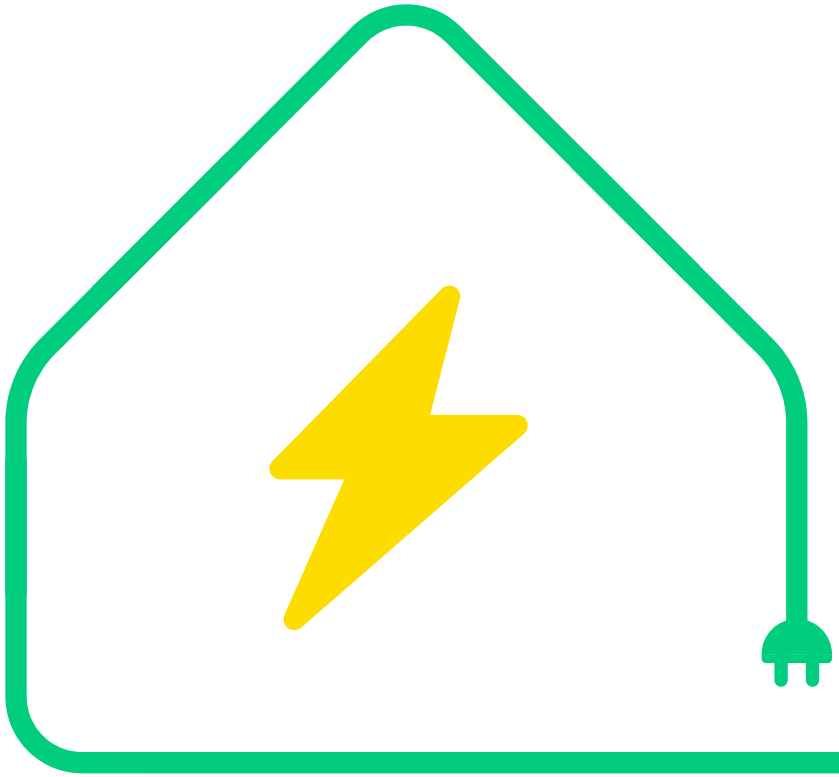

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Executive Summary

Menlo Park has a once-in-a-lifetime opportunity to chart its path to achieve all-electric buildings — an outcome that will ensure residents are healthier, our community is more resilient in the face of climate change and wildfire power disruptions, and residents save money.

Acting now allows the City of Menlo Park to make the transition efficiently and fairly for all residents, including renters. Waiting means that mandates could be imposed with timelines that may make the transition more difficult and less equitable.

This report outlines the pathway to a clean, healthy, prosperous community through the transition to all-electric buildings.

Why electrify buildings?

Menlo Park was one of the first cities in the nation to require that all new buildings constructed as of January 2020 be heated and powered by electricity, not natural gas. Using electricity over natural gas in new construction results in immediate and long-term cost savings which will only become more pronounced over time. For example, new homes that are all-electric save an average of $10,000 in construction costs relative to the same homes built with gas heating and appliances.

Now is an opportunity to support the transition of existing buildings to all-electric. For nearly every existing building, this means moving from natural gas to electricity in heating, water heaters, stoves and clothes dryers. For some structures, it also means upgrading the electric system to be able to use more electricity to power these appliances.

The benefits of electrification for existing buildings are the same for newer buildings and fall into three categories:

Improved Health & Safety:

- Methane is the primary ingredient of natural gas. It is a potent climate pollutant contributing almost 40% of the carbon pollution in Menlo Park. Burning methane gas creates an array of pollutants including carcinogens like formaldehyde that can lead to increased asthma and respiratory disease, as well as cardiovascular and cognitive impacts. **Children in homes with methane gas stoves are 42% more likely to develop asthma.**
- The incomplete combustion of methane gas can produce carbon monoxide, an odorless and invisible gas that can be fatal in high quantities and lead to additional health issues. This is the reason for carbon monoxide detectors in homes to prevent accidents from indoor methane gas use. Nationwide, over 400 people die and more than 14,000 are severely sickened by home exposure to methane and carbon monoxide each year.

- In most cases, the likelihood and severity of methane and carbon monoxide gas exposure increases with the age of the appliance or a lack of maintenance. These issues are most common in lower-income and rental housing and often disproportionately impact people of color.

Cost Savings

With current incentives, and if financed over time and combined with solar power, **there is no additional cost to convert gas to electric in most existing homes**. Most electric appliances do not cost more than their gas counterparts:

- **Appliances:** Electric dryers and cooking appliances are comparable in price to their gas counterparts. With smart design choices, there are savings in going electric.
- **Water Heating:** Heat pump electric water heaters are generally $1,000 to $2,000 more per household than comparable gas models. However, homeowners save money with Peninsula Clean Energy's $2,500 rebate for heat pump water heaters, which more than covers the extra cost.
- **Heating and Cooling:** Heat pump heating can cost twice as much as a gas furnace but also provides cooling, which is now a growing necessity in Menlo Park due to rising peak temperatures. Compared to a traditional gas furnace and air conditioner, the purchase of an electric HVAC replacement saves $3,000. Also, at least $1,000 or more in BayREN rebates are available.
- **Utility Costs:** Electrifying both heating (HVAC) and water heating can save $100-$400 per year on utility bills.
- **Comfort & Convenience:** In addition to utility bill savings, newer appliances can add convenience, functionality, performance and enjoyment. For example, many new users of electric induction cooktops love the precise controls and cool-to-the-touch surface when no longer in use — so much that they say they never want to return to cooking with gas.
- **Barriers for Renters:** Renters and people of color often bear the brunt of high operating costs because property owners have to pay the capital costs but would not benefit from reduced utility bills. As a result, property owners are less likely to invest early in turning over the old, inefficient appliances.

Community Benefits and Resilience

- Replacing gas heating and appliances with electric models eliminates the risk of pressurized and combustible fuel pipes inside the home. With half of all home fires related to gas use, all-electric homes are much safer.
- During power outages, modern gas appliances do not work because they are electronically controlled. In addition, when electric and gas service is shut off due to earthquakes or wildfires, gas service can take much longer to restore, typically one week or longer, compared to electric power that is typically restored in a few days.
- Another benefit of all-electric buildings is that the addition of solar panels combined with battery energy storage provides savings on utility bills as well as resilience, ensuring necessary power use can continue for days or longer during power outages.
- Electrifying homes also provides cooling protection during heat waves, which are now more frequent as a result of climate change. Electric "heat pump" heaters are able to provide heating and cooling from the same device. By electrifying homes, residents without existing AC units or centralized cooling

fold the inevitable costs of those cooling appliances into the cost of electrification. This is especially important as we experience longer wildfire seasons with hazardous air quality from smoke, which makes it impossible to open windows to cool down during the hottest part of the year.

- Finally, in Menlo Park, natural gas pipelines are aging and in need of major repairs and upkeep. Investing in this new infrastructure when the path of the future is electricity will have enormous and unnecessary costs. For example, to prevent dangerous leaks and fires, the utility is undertaking a massive tree removal program along major gas pipelines in the city to protect against root invasion. This will take out hundreds of trees, many of them large heritage trees that cannot be easily replaced.

If these are the benefits, what are the barriers?

There are several challenges with switching to all-electric operation of existing buildings. However, this report details solutions that are in the works.

Challenge 1: The initial cost of electric heating and water heating can be slightly higher than gas counterparts, although that cost gap is decreasing.

Solution: With current rebates for water heaters, the rapidly falling costs of electric heating, andmore accessible and affordable financing, the switch is estimated to be cost neutral.

Challenge 2: Qualified installers for electric products are currently in short supply. As a result, it can be difficult to find or mark up project costs due to lack of availability.

Solution: Peninsula Clean Energy, PG&E and other local partners are providing free training and incentives for qualified installers as well as making it easier for the public to vet and hire contractors. As more homes switch to all-electric and demand for experienced contractors increases, this problem will subside.

Challenge 3: In some instances, particularly in older homes or where the existing wiring has safety issues, the increased energy load from the new electric appliances could require electrical system upgrades, which can cost $5,000 or more.

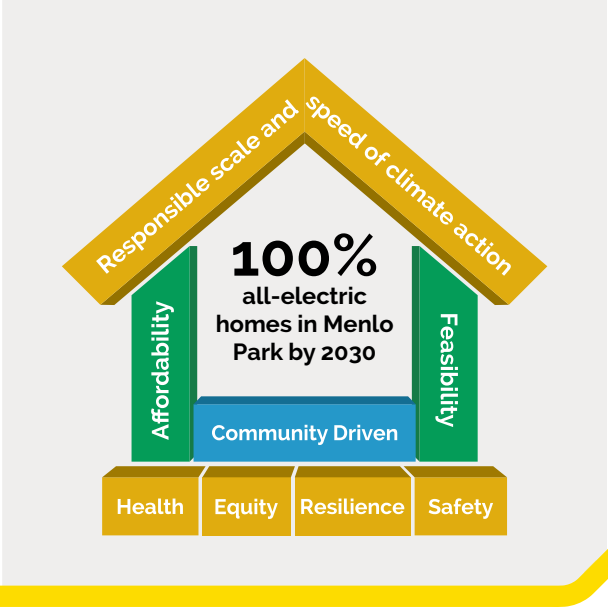
Solution: As long as the electrical wiring is safe, these upgrades can almost always be avoided with thoughtful choices of efficient products and load sharing devices. For those who must make the electrical upgrades, rebates and financial assistance are available from Peninsula Clean Energy.

The path forward

To reap these benefits, the path forward is for the City of Menlo Park to set a clear standard and then implement a timeline while developing financing programs and incentive programs for installations to allow every Menlo Park resident and building owner to make the transition cost-effectively.

A good transition program will entail:

- **Equity:** All measures will support racial equity and inclusivity.
- **Affordability:** No households will be left behind or financially harmed.
- **Community-driven:** All measures will be informed and shaped by community voices in a robust engagement process.
- **Feasible:** Homeowners will get the assistance they need to make the transition successful.
- **Health, safety & resilience first:** Measures that deliver these co-benefits will be prioritized.
- **Responsible:** Action to reduce climate pollution at the scale and speed necessary to address the climate crisis will be a priority.



Peninsula Clean Energy (PCE) and local and regional agencies have created a strong foundation of support programs for electrification including accessible financing, financial incentives, technical support, contractor trainings, and public outreach.

The pathway to affordable and equitable electrification in Menlo Park is this:

1. Low-income households in Menlo Park could fully electrify over the next 10 years with assistance through a turnkey program that PCE is piloting this year. With an investment of $3 million per year, which could come from the Utility User Tax (UUT), the 1400 households in Menlo Park currently receiving bill assistance would be covered. *Note: The UUT would raise an additional $3 million per year if the city proceeds with the full voter-approved levels, which all but low-income customers contribute to.*

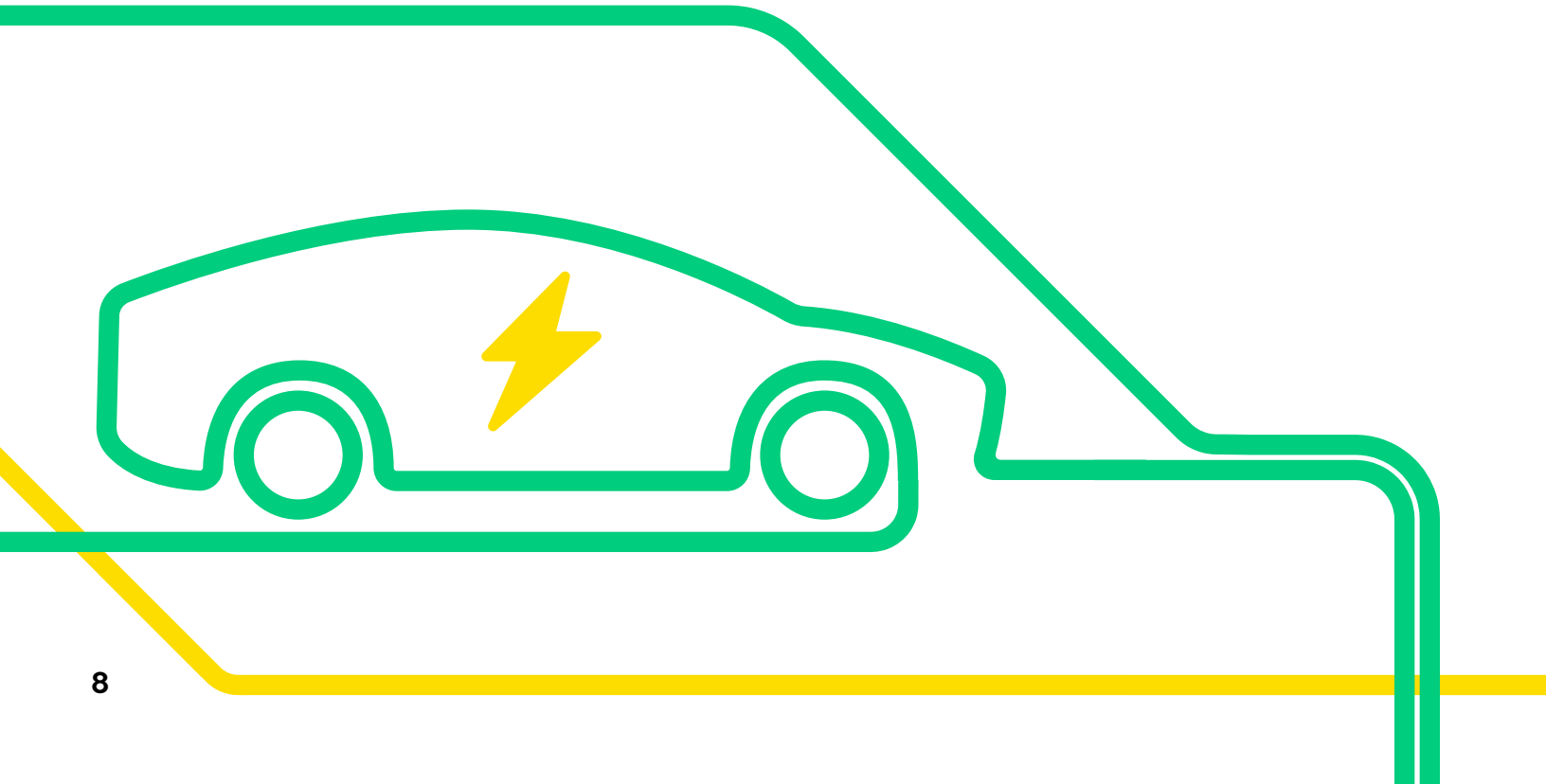
2. Moderate-income households will have access to extremely easy and affordable financing for electric heating and appliances through a new program called "On-Bill Financing." This new program, offered by PCE and expected to launch this year, will provide zero interest loans incorporated in utility bills. Combined with existing rebates, this affordable program will avoid upfront costs of electrification, while keeping utility bills low with efficient new appliances.

3. More affluent households can access generous rebates that together with market rate financing — as well as home solar systems — make electrification a money-saver over time.

The path forward for the City of Menlo Park can build on this foundation to accelerate a switch from gas to electric with the following steps:

- Adopt a **Reach Code 2.0** measure which (1) requires all projects seeking building permits to use only electric heating and appliances and (2) requires all air conditioner installations to include heating capability, in addition to cooling. This measure should be adopted in 2022, alongside the tri-annual building code update, and set to take effect in January 2023.
- In addition, the City of Menlo Park could assist home- and building-owners making the switch through the following:
  - Provide **streamlined permitting** that cuts costs and includes support materials about available incentives, contractors, and technical resources for electric appliances.
  - Collaborate with Peninsula Clean Energy to provide **discount direct-install services** for emergency water heater and heater replacements, focusing on low-income households initially, and with the potential for a community-wide program.
  - **Invest recovery funds** in electric cooling for low-income households that currently lack air conditioning.
  - Ensure **free 24-7 technical support** is available to assist residents on electrification.
  - Partner with local nonprofits to do **community engagement** on the benefits of replacing gas.

The opportunity is now. Our community will benefit greatly from the switch to all-electric buildings. We have a clear pathway to a clean, healthy, prosperous community with this transition.



Introduction & Context Setting

Reasons for Electrification

A rapid transition away from fossil fuel use is required to avoid the very worst and irreversible impacts of climate change. In Menlo Park, more than one-third of carbon emissions (that contribute to climate change) come from homes and buildings, largely due to methane gas used for heating and water heating. The true impact of gas — a fossil fuel — may be much higher because, when considering the lifecycle of the fuel, including leaks, it has exceptionally high carbon emissions.1

Although the devastating increase in catastrophic wildfires throughout California has raised the public's awareness of the immediate impacts of climate change, the depth of the climate crisis is much worse than commonly understood and demands urgent action. In 2018, the Intergovernmental Panel on Climate Change (IPCC) concluded that we must dramatically reduce greenhouse gas (GHG) emissions by 2030 through rapid, far-reaching and unprecedented measures.[2] Since that report was issued, we have seen greater impacts from climate change than anticipated.[3] Current trends in carbon emissions and lack of action show that we are heading to twice the rate of warming that the Paris Climate Accord sought to contain.

Natural gas is not at all natural. It is a fossil fuel, comprised mainly of methane gas.

There is no doubt that California and Menlo Park are already living with the dangerous consequences of climate change, including a devastating five-fold increase of wildfires.[4] 2020 was tied with 2016 as the hottest year on record, and was also the worst wildfire season ever.[5] Wildfires burned over 4 million acres in California in 2020 with five of the largest wildfires on record, costing over $18 billion.[6] Smoke from wildfires led to more hazardous air quality in Menlo Park and the Bay Area compared to any other place in the world at the height of the wildfire season last year; smoke now accounts for half of all fine particulate pollution in the Western U.S., having nearly doubled over the last decade.[7]

Menlo Park communities face severe flooding, more intense heat waves and extreme weather disruptions. In the next 50 years, approximately $1.3 billion of property in Belle Haven, including hundreds of homes, are at risk of flooding due to sea level rise caused by climate change.[8]

Cities and counties are recognizing how important going fossil-free is to community health, safety and a stable climate future. Over the past few years, more than 45 different local policies have been adopted in California requiring or favoring all-electric new construction. Now is the time to turn to existing homes and buildings to improve air quality, health, and safety in addition to phasing out climate-damaging fossil fuel use.

Many incentive programs for home electrification already exist and have helped develop the local market for electric products and skilled installers. However, the urgency of the climate consequences that we are already feeling indicate that bolder strategies are necessary to scale and implement at the speed our community needs. The continued use of fossil natural gas in buildings in our City is incompatible with the aggressive action needed to stave off the worst effects of climate change on our own residents.

"[T]he climate crisis has already been solved. We already have all the facts and solutions. All we have to do is to wake up and change."

—Greta Thunberg, Climate activist

The Kids Are Not Alright:

Why today's youth are setting down their beer and books to fight for climate action

As the impacts of climate change intensify over time, children and young people will face the worst effects. Rising to this challenge, young people all over the world have begun to fight back on an unprecedented scale.

Fridays for Future is a global climate strike movement that started in August 2018, when 15-year-old Greta Thunberg began a school strike for climate. Since her initial solo protest outside the Swedish Parliament demanding urgent action on the climate crisis, she has led thousands of students on school strikes in Europe, Australia and the U.S. Their call for action sparked an international movement, inspiring millions of people to take action on the climate crisis with events spanning more than 200 countries.

The Sunrise Movement is a youth movement to stop climate change and create millions of good jobs in the process. For the past five years, they have been growing their ranks — with a chapter in the Bay Area — to make climate change an urgent priority across America, end fossil fuel use, support progressive leaders, and promote the Green New Deal. Students and youth from Menlo Park have also become active fighting and educating about climate change, through the Silicon Valley Youth Climate Strike, the San Mateo County Youth Commission, and Sunrise Silicon Valley.

Sources: *#FridaysForFuture* https://fridaysforfuture.org/what-we-do/who-we-are/ https://www.sunrisemovement.org https://www.unicef.org/environment-and-climate-change/youth-action

A history of Climate Leadership in Menlo Park

Menlo Park is distinctly well suited to lead on climate actions like electrification due to the city's past successful efforts, engaged and innovative residents, and ambitious timeline for Climate Action. Since the city pioneered a new approach to all-electric new construction standards, the so-called "reach codes" have inspired action across several dozen cities (see box). With its highly engaged residents and unique resources in the heart of Silicon Valley, Menlo Park can be a true leader in sustainability and climate action. Menlo Park has a history of bold climate goals beginning with its first Climate Action Plan in 2009, and in 2013, with its very ambitious for that time goal of 27% greenhouse gas (GHG) reduction goal by 2025, relative to 2005 levels.

While the overall climate impact of Menlo Park's communitywide carbon emissions are very small, our community has opted to act as a leader in implementing innovative solutions, due to our opportunity to exert a high degree of leverage in San Mateo County, Silicon Valley and statewide. Our advocacy for a commitment to 100% carbon-free electricity during the establishment of Peninsula Clean Energy (PCE) was instrumental in influencing the direction for our county, and 100% carbon-free has now been attained. Similarly, our community's adoption of carbon-free Reach Codes for all new construction has influenced similar measures in several dozen communities throughout California. We are poised to lead again in hopes of inspiring comparable action by many others.

In 2020, Menlo Park made history as the first city in California to adopt a goal of zero carbon by 2030. The city's new Climate Action Plan lays out an ambitious roadmap of measures to achieve 90% GHG reductions and 10% carbon removal.[9] Building electrification was chosen as one of six high priority core measures to jumpstart progress towards the zero carbon by 2030 goal.

All-Electric Reach Code Paves the Way for Existing Buildings to go Electric

In 2019, Menlo Park adopted the first Reach Code that required all-electric new construction instead of the previous approach of incentives. This innovative approach, which was not a ban on gas use, proved easier to implement and more effective at minimizing gas use than previous incentive-based reach codes. It has been so successful that dozens of cities have since followed this approach, making it the prevailing policy among the 46 cities and counties that currently restrict gas use in new construction. Surveys of 9 cities implementing reach codes have shown a successful implementation rate with more than 90 percent of new projects going all-electric.[10] The widespread success of these reach codes has brought the concept of going all-electric into the mainstream, helping to develop the market of electric products available locally and improving the proficiency of local contractors and installers with electric devices.

Benefits of Electrification

Replacing gas use in homes with highly efficient electric heating and appliances has many benefits beyond energy savings and pollution reductions, including cost savings, improved air quality, safety and resiliency.

Potential energy cost savings

Electrification increases appliance efficiency and can save residents money on utility bills, especially if paired with solar panels. Utility bills for efficient all-electric homes can be up to $800 per year less than for comparable homes that use fossil fuels due to recent rapid gains in electric appliance efficiency.[11] Utility bills are one of the top uses of payday loans in the U.S., with annual interest rates as high as 400% and an average repayment period of five months.[12] Replacing gas appliances with electric appliances also gives homeowners the opportunity to lower their bills with solar power: the average repayment period for solar panel costs is 8 years, much less than the warrantied 25 year lifespan of the solar panels and inverter, **producing a net savings three times greater than the installation cost.**[13]

Improved indoor and outdoor air quality

The substantial public health risks associated with gas-burning pollution can be avoided entirely by switching to an all-electric home. This brings substantial equity benefits as well, since methane gas pollution disproportionately impacts low-income communities and communities of color and can be devastating for respiratory health, particularly in younger children.

Methane gas use inside of buildings in our region releases nearly three times as much air pollution — measured as "NOx" — as all cars, SUVs and pick-up trucks in the area, and over eight times more than the pollution from from power plants.[14] Energy use in buildings is now the leading cause of premature death from combustion emissions in California (particulate matter and ozone).[15] UCLA researchers estimate that if we electrify all of the fossil fuel appliances in the San Francisco Bay Area, we could avoid over 300 respiratory illnesses, save over 130 lives, and save $1.2 billion in healthcare costs — every year.[16]

Children in homes with gas stoves are 42% more likely to develop asthma than those with electric stoves, an illness that kills ten Americans a day and costs on average $3,266 per year for medications.[17] In addition, home chefs using gas stoves have twice the risk of lung and heart disease, and are three times as likely to need asthma medication as people cooking on electric stoves.[18] These health impacts are tied to the many pollutants released when gas is burned, such as nitrogen dioxide, cancer-causing formaldehyde and acetaldehyde, and ultra-fine particulates.[19] Gas stoves and other gas appliances are also dangerous due to their release of carbon monoxide, an odorless gas that kills 400 people a year in the U.S. and sends 50,000 people to the emergency room.[20]

These health impacts disproportionately harm low-income communities and communities of color — communities that already experience higher rates of asthma, which makes them particularly vulnerable to negative health impacts from NOx pollution.[21] For example, Black Americans are three times more likely to suffer from asthma than the general population.[22] People of color also more often live in homes with higher occupant density, smaller size, and poor ventilation — all factors that contribute to higher pollution levels and greater health risk. It is essential to alleviate the health and cost burden on these communities by supporting their transition to zero-NOx appliances.

Research from the Lawrence Berkeley National Laboratory and Stanford University demonstrates that **when natural gas is burned without proper ventilation, gas cooking can generate levels of CO and NO2 inside of homes that exceeds federal and state air quality standards.**[23] Smaller residences and those without range hoods are at a heightened risk of experiencing unhealthy indoor air quality during cooking.

Increased Resiliency

Electrification improves community resiliency by providing much-needed cooling along with heating from the same heat pump device. These heat pumps that automatically include air-conditioning can help prepare the community for future heatwave readiness needs. An all-electric home also facilitates affordable energy storage that can provide essential back-up power during emergency scenarios and power grid outages.

Together with solar electric panels, **batteries are the ideal way to not only save money on utility bills with an all-electric home, but also ensure that reliable power will always be available**. Vehicle-to-home charging also gives the possibility of delivering even more power to a home through the electric car battery in an emergency scenario.

Battery system prices have dropped 87% over the last decade, from $1100 per kWh in 2010 to $156 per kWh in 2019, driving rapid international growth in affordable electric vehicles and home batteries.[24] Home batteries can be modest and scaled for a reduced set of power needs during outages, or large so that homes can be taken "off-grid" altogether. Home batteries are now so common that a Yeti battery power pack is available as an alternative to a home generator at Home Depot.[25] Most, if not all, of the priority electrical needs of a home can be met with a home solar energy system combined with a battery (even on the shortest day of the year, when the sun's strength is typically one fifth of the summertime peak).

Modern electric heating with heat pumps — the same technology used by refrigerators — dually provide cooling from the same device. Households replacing gas furnaces with electric heat pumps will substantially benefit from the added cooling that these devices provide. As the climate warms, air conditioning systems will become essential in Menlo Park. The number of extreme heat days in Menlo Park is expected to rise 30% between now and 2030, and the number of warm nights is predicted to rise 133% from 12 days to 28 days between 2020 and 2030.[26] Furthermore, as we experience more wildfires due to climate change, the smoke and resulting unhealthy air quality will prevent residents of Menlo Park from opening windows to cool off during the hottest times of the year.[27] Combining an efficient electric heat pump HVAC system with a strong air filter, as well as efficiency improvements like weatherstripping that seals leaks, can provide significant protection from wildfire smoke during fires as well as cooling on extreme heat days.[28]

Accessible Electric Vehicle Charging

As the popularity of electric vehicles (EVs) grows and our need to phase out gasoline use increases in order to avert the grave consequences of climate change, the necessity and demand to incorporate electric car charging in homes and buildings will also increase. According to the California Energy Commission, 29% of all newly registered vehicles in Menlo Park were electric cars (or hybrid electric) in 2020 — 3 times the California average. This shows that Menlo Park residents are acting to electrify faster than just about anywhere else. All-electric homes can easily accommodate EV charging, even on a small electrical panel, by using smart load sharing devices, such as Neo Charge or EVduty. [29]

Increased Safety

Eliminating gas use in homes dramatically improves safety by avoiding risks of carbon monoxide poisoning, increased home fire risks and accidents related to gas infrastructure. For example, carbon monoxide monitors are no longer needed when there is no combustion (burning fuels) inside, and the risk of fires and accidents are dramatically reduced. In the U.S., accidents in the natural gas pipeline system occur nearly every day.[30] Ongoing safety hazards of gas use in Menlo Park are compounded by our vulnerability to earthquakes and the aging infrastructure of our gas pipelines. Up to half of all fires after earthquakes are attributed to leaking or damaged gas pipes.[31] Aging pipelines are not just more damage prone during earthquakes--their structural integrity degrades over time. This was evident during the 2010 San Bruno gas pipeline explosion that killed eight people and destroyed 38 homes.[32]

Effects on Equity and Jobs

Electrification can help close the equity gap in utility bills, which are disproportionately burdensome for low-income and BIPOC community members, and can stimulate economic growth through job creation.

Prioritizing electrification of older, inefficient homes can improve the quality of housing and affordability in Menlo Park. Households of color and low-income families are more likely to live in older, inefficient homes, which create a much higher energy burden and require a larger share of their income to cover utility bills.(33) Converting old and inefficient homes from gas to electric use will provide substantial savings on energy bills, as well as the health, safety and resilience benefits described above.

The transition to all-electric homes and buildings in Menlo Park will require highly skilled trades workers to replace appliances, upgrade electrical wiring, install solar panels and batteries, as well as weatherize and conduct other efficiency improvements — creating many new jobs for the local economy in the process. A 2019 UCLA study projected over 64,000 new jobs created as a result of electrifying and retrofitting California's 14 million homes and over 8 billion square feet of commercial buildings, with three out of every five of those jobs being skilled, higher-paying jobs.[34]

Impact of natural gas lines on trees in Menlo Park

The required maintenance of gas pipelines has led to the threat of removal of thousands of trees in Menlo Park, including almost 100 heritage trees.[35] Following the 2010 explosion of a gas pipeline in San Bruno, PG&E's Community Pipeline Safety Initiative has sought to increase the reliability and safety of gas pipelines, necessitating the removal or trimming of many trees throughout the state.[36] Tree roots near gas pipelines pose a public safety concern as they risk causing gas leaks or damage the exterior coating of gas pipelines.

Equitable & Affordable Building Electrification[37]

Why Equity & Affordability are a Priority

Electrification provides an opportunity to rethink and reform policies to make our homes healthier, safer, more sustainable and affordable, and to improve equity. At the same time, there is the need to avoid a deepening equity divide by encouraging wealthier households to electrify immediately while taking more time to assist low- and middle-income households, thereby prolonging their exposure to and risk from unhealthy methane gas use. In addition to sustained health hazards, costs are likely to significantly increase for gas customers as those with the means to make the switch to electric move off the gas system for financial, health, and environmental reasons and fewer customers remain. As this trend continues, gas customers who face barriers to electrification will need assistance to move to cleaner electric appliances and shield them from the rising cost of gas. We can overcome this by proactively investing in and prioritizing electrification in communities of color that have historically been marginalized.

"Building Electrification is "not just a technological solution to climate... [it] works at the intersection of environmental, economic, and social justice."

—Emerald Cities Collaborative and NAACP, as part of the Building Electrification Equity Project [38]

Protecting Renters

Roughly 40% of households in Menlo Park rent their homes and there is a strong need to protect them from displacement and ensure that electrification efforts do not worsen or exacerbate displacement, gentrification, or access to affordable housing.[39] While tenants will benefit from electric upgrades, we must ensure that policies are in place to prevent landlords from pushing out renters with steep increases in rent to recoup costs or perceived increases in property value. Fortunately some policies are already in place to protect renters, such as Assembly Bill 1482, the Tenant Protection Act of 2019, which caps annual rent increases and provides just cause eviction protections.[40]

Identifying the Needs & Community Engagement

The Greenlining Institute created an Equitable Building Electrification Framework to address the engagement opportunities and challenges that electrification presents for low-income communities.[41] This five-step framework serves as a guide on how to ensure the engagement process is equitable and supports the goals of resiliency, high quality local jobs, and making housing safer and more affordable. In summary, the five steps are:

STEP 1: Assess the communities' needs

STEP 2: Establish community-led decision-making

STEP 3: Develop metrics and a plan for tracking

STEP 4: Ensure funding and program leveraging

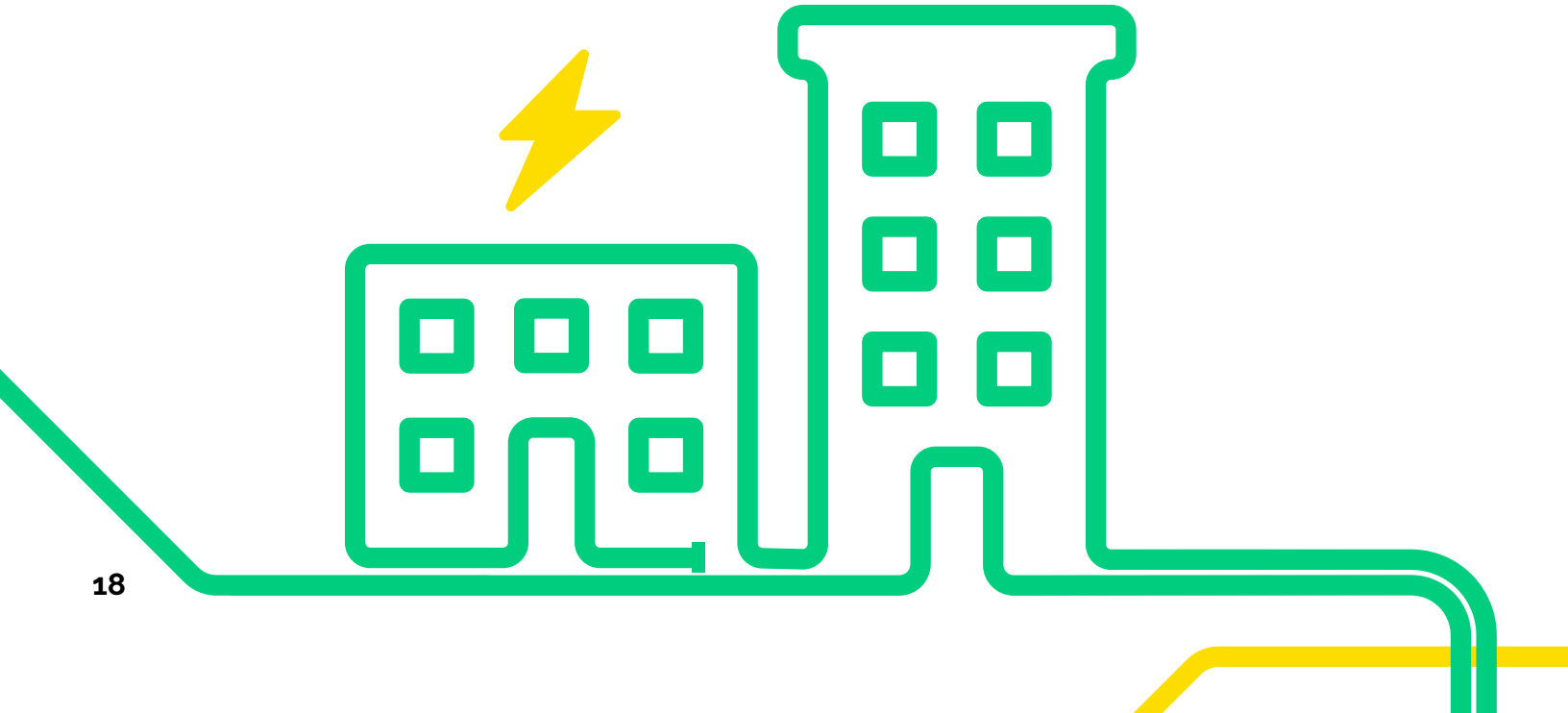
STEP 5: Improve outcomes

The full in-depth and expansive framework can be found at the organization's website (greenlining.org), and, if employed in Menlo Park, can provide the city's electrification process better opportunities for inclusivity, equity and better outcomes for all.

Equity Guardrails[42]

The Cities of San Francisco, Berkeley, and Los Angeles conducted an extensive community engagement process around electrification. Feedback resulting from these engagement processes emphasized that city building decarbonization policies need to be coupled with well-designed programmatic investments to ensure that renters, low-income neighborhoods, vulnerable businesses and others are able to reap the full benefits of building decarbonization. Community concerns emerged about potential increased costs, the risk of gentrification and displacement, and the potential for negative equity impacts. The following "Equity Guardrails" were established in response to those concerns.

- **Access to Health and Safety Benefits:** Ensure marginalized communities and others most impacted by climate change have equitable access to health, safety, and comfort benefits from electrification, such as cleaner air and cooling for hot days.
- **Access to Economic Benefits:** Ensure all community members have equitable access to affordable funding and financing mechanisms, and to "high-road" job opportunities.
- **Maximize Ease of Installation:** Ensure that incentives and programs for the community provide meaningful support to renters, owners, and marginalized community members to simplify the process and minimize the burdens of installing electric appliances by a fairly paid and well-trained workforce. For example, many rebate programs require residents to pay up-front costs and get reimbursed later, but this model does not work for many, including low-income households.
- **Promote Housing Affordability and Anti-Displacement:** Ensure upgrades don't displace renters or over-burden homeowners. Programs should support housing production, preservation of housing, and tenant protections (known as the 3 Ps).



The Cost of Phasing Out Gas from Our Homes

Summary of overall cost estimates (from leading studies)

With a well designed approach and careful product selection, there is no additional cost to convert gas to electric in most existing homes. Even high-end electric appliances pay back their costs over time, if financed and combined with solar power. In fact, a recent California Public Utilities Commission report found that to avoid increases in energy bills, customers will need to transition to all electric homes.43 The report also found that electrification retrofits provide substantial energy cost savings because heat pump Heating Ventilation and Air Conditioning (HVAC) units and water heaters available today use between one-third and one-quarter of the energy of their gas appliance counterparts.[44] Electrifying both HVAC & water heating can lead to $100-$400 or more in savings per year.[45]

Most electric appliances do not cost more than their gas counterparts, with 2 key exceptions, which already have local rebates available to address the difference in cost.

1. Electric heat pump water heaters can cost $1,000-$2,000 per household more than gas.[46]
   Solution: Peninsula Clean Energy (PCE) offers $2,500 in rebates to cover this cost.

2. Heat pump heaters can cost twice as much as a gas furnace, but also provides cooling, which is now much needed in Menlo Park.[47]
   Solution: At least $1,000 or more in rebates are available, and financing can help cover these costs. Also, compared to the combination of a traditional gas furnace & AC, an electric HVAC replacement saves $3,000.[48]

Electric cookstoves and clothes dryers are generally comparable in cost to gas stoves and dryers, although some specialty models, such as induction stoves, can be slightly more expensive. With cost conscious appliance choices, **electrification can be done on a tight budget**. For example, a comfortable, high-quality electric lifestyle can cost less than $2,000 total with a True Induction range ($140), an Oster oven ($160), a Whynter portable heat pump ($440) and a DIY "retrofit ready" heat pump water heater from Rheem ($1200).[49] The overall cost of converting a gas furnace, water heater, dryer, and cooktop to electric using lower-cost options is roughly $14,400 compared to $11,700 - a difference of $2,700 that is easily made up for by current rebates and incentives available that are discussed below.[50]

Lower Cost Scenario Retrofit Costs ($):	Gas Replacement	Electric Replacement
Cooktop	990	740
Dryer	590	530
HVAC	8,590	8,560
Water Heater	1,520	4,530

Resources to help You Go All-Electric

General Education

California is moving quickly to help electrify our building stock, as are many national and worldwide organizations.

1. SwitchIsOn.org is a California public education campaign on the benefits of going all-electric.
2. Sacramento Municipal Utility District Online Resources has introductory videos on electrification topics including cooking, batteries, heat pumps and EVs.
3. Calculate your entire carbon footprint with this simple tool from Berkeley.
4. The BrightAction.app web tool helps you calculate your GHG impact today and then track your progress from taking actions. Local versions include rebates and programs. Click on the Clean Energy Home button here to see representative actions.
5. The Campaign for Fossil Free Buildings in Silicon Valley includes several links to reports on the health and environmental impacts of natural gas use and many other resources.
6. Visit Silicon Valley Clean Energy's eHub for information about how to electrify your home.

Detailed "How To" Guidance

1. Redwood Energy's Pocket Guide to All-Electric Retrofits of Single Family Homes. This resource includes everything from electric BBQs to snowblowers!
2. Nate the House Whisperer's free online Electrify Everything course. Detailed & excellent.
3. Redwood Energy's "Electrification 101" how-to videos about induction stoves, water heaters, pool heaters, saunas, outdoor amenities, wiring, etc.
4. City of Palo Alto's Heat Pump Water Heater pages covers education and installation issues.
5. Demystifying Heat Pump Water Heaters from the New Shade of Green blog.
6. Notes from DIY Heat Pump Water Heater installation experiences: general pointers here, example with cold air redirection here, and Rheem installation example here.

Local Resources

Many local companies and organizations are offering various types of electrification assistance in our area.

1. Rebates and programs from SV Clean Energy, Peninsula Clean Energy, and Palo Alto Utilities.
2. The Electric Home Ambassador Program matches residents who are interested in going electric with an experienced electric home-owner through this form.
3. Silicon Valley Clean Energy has a contractor list on their Heat Pump Water Heater page.
4. Peninsula Clean Energy's All Electric Home resources are here.
5. BayRen has a contractor list on their page.
6. SMUD's contractor network page to help identify installers in their area (Sacramento).
7. Home Electrification consultants EmeraldECO in Redwood City, ElectrifyMyHome or A-1guaranteed.com in Fairfield can help with EV chargers too.
8. Bay Area induction cooktop loaner programs can be used by residents interested in trying them out before making the switch.

Source: Carbon Free Silicon Valley, www.CarbonFreeSV.org,
https://docs.google.com/document/d/1pxmhb4TReLWsdh3OixOMxEnNFNtsn88M0HmZcQXTv0g/edit?usp=sharing

Electric panel cost considerations

In older homes or those in need of safety improvements, electrical wiring and panel upgrades may be needed. Electrical panel upgrades can add $2,000 to $4,000 in capital costs for some older homes.[51] **Electric panel capacity upgrades can almost always be avoided** by using load sharing devices to allow full electrification on a 100 amp panel.[52] Several new technologies may also reduce costs and avoid need to upgrade electric panels:[53]

1. New 120 volt heat pump water heater models can plug into existing home circuits without a panel upgrade.
2. New 240 volt high performance heat pump models have lower electric operating costs.
3. Smart circuit splitters and sharing enables two loads to share a circuit, alternating.
4. Programmable subpanels manage coincident power to stay within a 100 amp panel limit.

When panel upgrades are needed, PCE offers $750 to upsize panels to 200A, but will offer $1,500 for upsizing smaller panels to 100A (to encourage efficient products).[54]

Current financial support programs

Many incentives already exist to offset the cost differential between electric and gas appliances across the district.[55] In most cases, incentives, rebates and tax credits can be layered for maximum cost savings. In Menlo Park, available discounts for electrification include PG&E discounts, rebates through PCE, and a regional agency called BayREN, as well as federal tax credits:[56]

- PG&E offers deep discounts and up to $500 in rebates on some heat pump models, when ordered directly through their online marketplace.
- $2,500 rebates are available for heat pump water heaters replacing gas models.
- $1,000 rebates are available for heat pump heating (and cooling) systems.
- $300 rebates are available for electric induction ranges.
- $300 rebates are available for heat pump dryers.
- Federal Residential Energy Efficiency Tax Credits are available up to $500 for water heaters, heat pumps, air conditioners, and efficiency improvements (e.g. insulation, windows, roofs).

Other agencies offer discounts on heat pump water heaters replacing gas water heaters as a means of reducing peak energy use (or "demand response"). For example, Sonoma Clean Power partnered with GridSavvy to offer a $5 per month bill credit on top of appliance discounts for customers that enroll in the demand response program.[57]

Building blocks to ensure savings with electrification (new approaches, pilot programs & gaps to be filled)

One of the most effective programs to ensure affordable and equitable electrification is **direct installation** of electric appliances in combination with energy efficiency improvements, which are free of charge for low-income customers who are already enrolled in utility bill assistance programs.[58] PCE is launching a **Low-Income Healthy Homes and Electrification Program** in Fall 2021, offering "turn-key" home upgrades that provide both energy efficiency and electrification at no cost to low- income residents in San Mateo County.[59] The firm, Richard Heath & Associates (RHA), will work with local nonprofit El Concilio to serve 200 homes in San Mateo County with up to $8,000 in benefits per home.

The Sacramento Municipal Utility District (SMUD) is also helping low-income customers by embedding electrification in its existing low-income energy efficiency program.[60] Roughly 80% of homes in the program receive electric heat pump heaters. **This "Direct Install" program has cut costs in half for installations of heat pump water heaters and heaters** through the use of guaranteed installs provided by several contractors that avoid the soft costs of marketing and allow for bulk purchasing of equipment. *(See figure comparing a low-income direct install program with market rate installations based on data collected from SMUD's rebate program).*[61]

Utility-run Direct Install programs don't just dramatically cut costs, they streamline the electric replacement process for homeowners by pairing them with skilled contractors and electric equipment that is ready-to-go without advanced planning. For example, Carbon Free Palo Alto has proposed a **BE Smart program for utilities that offers a concierge service** to facilitate the installation of heat pump space and water heating for customers, including evaluation, permitting, selection, installation, inspections and ongoing service.[62]

In addition to the direct-install programs, some nonprofits and companies are employing innovative models and technologies to develop additional programs to fill gaps and bolster savings. These include:

- **BlocPower** retrofits old apartment buildings with efficient heat pumps, often paired with solar arrays, to dramatically increase comfort and reduce energy bills and pollution.[63] They use proprietary software for analysis, leasing, project management, and monitoring of clean energy projects that save customers between 20-70% on annual energy costs.[64]

- **thirdACT** is a local company that uses innovative financing from donor-advised funds to retrofit older homes.[65] They recently launched a project in the West Adams area of Los Angeles to turn 100 old homes net-zero energy with solar, efficiency upgrades, and all-electric heating and appliances. They are now interested in a similar project in Belle Haven.

- **SunWork, GRID alternatives, Rebuilding Together, and Habitat for Humanity** provide individual programs and partnerships for free or discounted home upgrades for qualifying low-income households.

    - **SunWork** installs solar panels at a significantly reduced cost for homes with already small electricity bills, with the purpose of reducing those costs further. [66]

- **GRID alternative**'s Energy For All program installs solar panels cost-free for low and moderate income homeowners by connecting participants with programs that cover the full cost of installation, including the Public Utility Commission's Disadvantaged Communities – Single-Family Solar Homes program.[67]
- **Rebuilding Together** Peninsula assists homeowners in San Mateo County under qualifying income levels with home repairs, including heating repairs and electrical fixes; they collaborate with GRID Alternatives and Habitat for Humanity to layer on clean energy in their projects.[68]
- **Habitat for Humanity** runs a Neighborhood Revitalization Program offering critical home repairs for homes in Belle Haven.[69] They have also partnered with PG&E to create the Better Together Solar Habitat program to provide funding for solar panels for low-income families.[70]

"If you want to do something about climate change, your home is among the most important places to look."
—Donnel Baird, CEO BlocPower

Contractor Training & Technical Assistance

When cities began adopting reach codes for all-electric new construction, many developers stated that they did not know how to design all-electric buildings, nor did their contractors. Further, many residents attempting to replace gas appliances with electric models have reported a significant challenge with finding contractors who are experienced with electric heat pumps and appliances. **To address the lack of available contractors for electric appliances and assist developers, PCE, in collaboration with Silicon Valley Clean Energy, launched a program with over a dozen experts providing free technical assistance to developers on how to build all-electric, and training for contractors.**[71] To date, technical assistance has been provided to 36 private and affordable housing developers. They have held four technical assistance "round tables" for developers and two contractor training sessions. As a result of the contractor trainings, San Mateo County now has five local contractors enrolled in the BayREN program offering electric appliance installations and rebates, and 17 contractors based in other counties that also serve customers in Menlo Park.

There are a number of tools to help home and building owners find and connect with skilled contractors, who can install electric appliances. The Clean Energy Connection has put together a searchable online database of California contractors with positive customer references and at least 2.5 Stars on Yelp, which is free for public use.[72] The contractor list includes experts in heat pump water heaters, heat pumps for space heating, electric appliances, electric vehicle chargers, solar arrays, and battery storage. In addition, The Switch is On has a contractor look-up tool on their website.[73] Several local contractors offer full service and highly skilled whole-home electrification, such as Electrify My Home and emeraldECO.

Public Outreach & Assistance

Many local community choice energy providers and utilities now have programs to help customers navigate a transition from gas to electric appliances with technical and financing assistance.

For example, Silicon Valley Clean Energy (SVCE) provides an "**eHub**" online informational resource that shows customers how to "save money and protect the earth" by using clean electricity to power appliances and cars.[74] SVCE recently adopted a **Building Decarbonization Joint Action Plan** for programs supporting local policies to accelerate a switch from gas to electric in existing homes and buildings.[75] PCE has begun to offer similar support for customers. In addition, **the HomeIntel program**, available for free for everyone in Menlo Park, also offers technical and personalized support to homeowners who are making the switch from gas to electric and improving energy efficiency.[76]

Public education and outreach to both contractors and consumers is key to transforming market incentives from favoring gas to electric appliances. **The Switch is On** — a project of the Building Decarbonization Coalition, in partnership with PCE and many utilities — helps Californians navigate the transition to 100% clean, electric appliances.[77]

The Fossil Free Buildings Campaign connects individuals looking to electrify home with other local 'ambassadors' who have already made the switch, through the **Electric Home Ambassador Program**.[78] The program offers free assistance with the challenges of switching to electric, such as providing local information on permitting, contractors, financing, good appliance choices, and other localized issues.

Funding and Financing Sources for Electrification Programs

On-bill financing (OBF) programs that bundle loan repayments for electrification and clean energy projects together with your monthly utility bill can be an excellent form of accessible financing to make the initial investment costs of going electric affordable.[79] Studies show that this type of financing can net a household savings of $90 per year or more in utility bill savings with electrification and over $500 per year in net savings when solar and energy efficiency upgrades are included.[80] Sonoma Clean Power launched an OBF program this year to help their customers make the switch from gas to electric.[81] This program allows up to $10,000 per customer in financing for energy efficiency and electrification projects at a 0% interest rate. Peninsula Clean Energy will consider launching a similar OBF program at its August 2021 board meeting.

Sources of local funding include:

- Menlo Park's **Utility User Tax** (UUT) could generate $3 million per year in additional revenue, if allowed to proceed at the approved rate (compared to recent years, when City Council has voted for a temporary reduction of the UUT).[82]
- Menlo Park anticipates $8.3 million in stimulus funding over the next two years from the **American Rescue Plan Act** (ARP), with more than $5 million of the funds yet to be programmed for use.[83]
- **Green Bonds** can be issued by local government authorities for climate and clean energy projects, though some restrictions may apply on how these funds are spent.[84]

Additional sources of funding for electrification include:

- California provides several funding **sources for building electrification**. A four-year pilot includes $53 million for the "TECH" decarbonization market transformation program. An additional $21 million is available for localized pilots, including low income and multifamily housing. This year, the IOU Energy Savings Assistance Program is slated to provide $400 million for direct-installations to improvise energy efficiency and potentially include heat pumps.[85]
- **BayREN**, in collaboration with AEA, offers a multifamily clean heating pilot for whole-building electrification, with incentives ranging from $1,000 for in-unit heat pumps to up to $15,000 for central heat pump water heating for low-income housing in disadvantaged communities.[86]
- The **California Low-Income Weatherization Program** (LIWP) provides incentives for energy efficiency measures in low-income households and multi-family housing. Over $60 million has been allocated to the Multi-Family Energy Efficiency and Renewables program from 2014 to 2022.[87]
- Over $200 Billion of **federal funding** for housing upgrades, including electrification among other things, is widely anticipated from the federal stimulus funding plans.[88]

Permit Streamlining

The cost of permitting new electric appliance installations can be relatively high and the process rigorous, deterring many from obtaining permits that ensure safe and effective installations. Drawing from the existing best practices for solar installation and EV charging permit streamlining, a recent report commissioned by Silicon Valley Clean Energy provides recommendations on how cities can improve the process, and leverage third-party organizations such as utilities for support and help encouraging electrification.[89] For instance, one of the many recommendations is to "leverage state-mandated expedited review requirements and resources," while another is to "evaluate permit fee structures to achieve parity between electric and natural gas equipment, or to favor electrification."

How to Electrify (the Policy Tools)

The many policy tools available to achieve a full scale transition from methane gas use to all-electric homes and buildings have been discussed and analyzed in detail in recent white papers and reports *(see, for example, TRC/PCE 2021, Brousseau 2021 San Francisco report, City of Berkeley 2021, Rewiring America 2021, Mast et.al for BDC 2021, Sierra Club 2019, BDC 2019).*[90] Here we discuss and recommend the policy tools that best support and accelerate electrification in Menlo Park. The path forward for the City of Menlo Park to accelerate a switch from gas to electric includes the following steps.

Building on Reach Codes

With the success of the 2019 Reach Code requiring all new construction in Menlo Park to be all-electric, the most effective and expedient way to improve on and expand this measure is with a "**Reach Code 2.0**" measure that includes equipment replacements in existing buildings. This policy would (1) require all projects seeking building permits to use only electric heating and appliances and (2) require all air conditioner installations to include heating capability in addition to cooling. This measure should be adopted in 2022, alongside the tri-annual building code update, and be set to take effect in January 2023. The Reach Code 2.0 should also eliminate any unnecessary exemptions considered in the previous code cycle, when the concept of electrification through a reach code was new.

There are several precedents supporting the use of a reach code to cover equipment replacements in existing buildings. Menlo Park's reach code already covers renovations of existing homes and buildings that apply to more than 75 percent of the property. In Burlingame, that reach code treats renovations of 50 percent or more of a property as if those projects are new construction, applying all-electric standards. The City of Piedmont adopted a reach code that requires all home renovations of $25,000 or more to choose additional energy efficiency or electrification measures.[91] Half Moon Bay is the first city to consider a reach code that incorporates an all-electric requirement for all permitted equipment replacements in existing buildings.[92] Work is also currently underway in the cities of San Francisco and Palo Alto develop requirements for all-electric equipment at the time of replacement in existing buildings.

As many households and businesses add new air conditioners or replace old cooling devices to cope with the increasing frequency and intensity of heat waves, this is also an important opportunity to replace gas heating. That is because an air conditioner is essentially a heat pump, and with a reversing valve, the same device can also provide efficient heating. In fact, according to U.S. Department of Energy projections, heat pumps are only roughly one fifth of all AC shipments, yet they have a lifetime economic benefit of up to 4 times a standard AC unit that cannot provide heating.[93]

Note about Time of Sale: *Several Bay Area cities, such as Berkeley and San Francisco have time-of-sale clean energy requirements that may be amended to prohibit gas.*[94] *However, this approach would not achieve significant gas replacement in Menlo Park, if the city proceeds with an updated reach code. Reach codes that require electric equipment for all permitted replacements of gas equipment would accomplish the same outcome as the vast majority of property transfers that would be covered by a Time-of-Sale policy requiring all-electric equipment.*

Accelerating Replacements

Requiring electric appliances at the time of their replacement is an extremely important step to prevent new fossil fuel devices from perpetuating use of gas. By itself, however, it will not be enough for Menlo Park to meet its 2030 climate goal.[95] While most gas appliances are likely to be replaced in the next ten years, creating a natural opportunity for low-cost electric replacements, gas furnaces can last for 20 years or longer.

With that in mind, there is still a pathway to electrify almost all homes and buildings in Menlo Park by 2030. First, it is noteworthy that 20 percent of home heating in Menlo Park is already electric, according to census data.[96] To address equity, we strongly recommend that Low-income households in Menlo Park receive full assistance through a turnkey program that PCE is piloting this year help CARE customers electrify. With an investment of $3 million per year, which could come from the Utility User Tax (UUT), the 1,000 to 1,400 households in Menlo Park currently receiving bill assistance could be covered through the PCE turnkey program by 2030.

Considering that half of gas furnaces may need to be replaced by 2030, roughly ten percent of households (CARE customers) are recommended to receive full electric upgrades in the next ten years, and a good number of households will add air conditioners that can also provide heat (no longer needing to run their existing gas furnace), that leaves less than one third of households in need of some added incentives or assistance to replace gas furnaces early. This could be achieved by expanding direct install programs from low-income customers to be community-wide, through a program such as BE Smart, discussed earlier.

The City of Menlo Park could assist home- and building-owners making the switch through the following support programs and actions:

- Collaborate with Peninsula Clean Energy to provide **discount direct-install** services for emergency water heater and heater replacements, focusing on low-income households initially with the potential for a community-wide program.
- **Invest recovery funds** in electric cooling for low-income households that currently lack air conditioning.
- Provide **streamlined permitting**, that cuts costs and includes support materials about available incentives, contractors, and technical resources for electric appliances.
- Ensure **free 24-7 technical support** is available to assist residents on electrification.
- Partner with local nonprofits to do **community engagement** on the benefits of replacing methane gas.

Electrification Tips

Electrifying a home doesn't have to be difficult. There are plenty of excellent equipment options on the market that deliver comfort at an affordable price, but because the local installer market in Silicon Valley is under-developed, customers can be steered down the wrong path, resulting in bad experiences, or may be dissuaded from electrifying altogether. Below is a list of lessons learned, pitfalls to avoid and best practices gathered from homeowners who have experienced switching to electric, particularly for home heating.

1. Don't be dissuaded from making the switch to electric. If a contractor tries to talk you out of it, they aren't the right contractor for your job.
2. If a contractor tells you that you need to upsize your electric panel in order to electrify, stop and ask questions. Odds are, you don't actually need that 200-amp electric panel to fully electrify your life: car, heat, water heating, cooking, clothes drying. You just need to make good choices and get advice from an electrification expert. With a well thought-out plan - and potentially some load-sharing devices - it's entirely possible to go fully electric and live large on a 100-amp panel.
3. Develop a plan for full electrification before swapping out your first gas appliance. This should take about an hour of an expert's time, enables you to proactively complete the required wiring updates before a device fails and helps you avoid painting yourself into a corner with an electrical panel upgrade down the line that could have been avoided.
4. If circuit breaker space is limited, choose a Mitsubishi heat pump HVAC system or similar, which only requires one circuit for both the outdoor air compressor and indoor air units.
5. Choose a heat pump HVAC system with low "minimum rated circuit amps," for example, a Mitsubishi 36,000 BTU heat pump HVAC with 17 minimum rated circuit amps. Units like this will fit on a single 20-amp circuit in your electrical panel.
6. Don't be tempted to add resistance heat "strips" to your heat pump HVAC system. These significantly increase the electricity required from your electrical panel, add cost to your winter bills, and you don't need them in the Bay Area because our winters are so mild.
7. If you have a centrally ducted furnace and your ducts are in decent shape, opt for a centrally ducted heat pump HVAC system like this Mitsubishi SUZ/SVZ combo. Some contractors don't know about these and if you tell them you want a heat pump, they will try to sell you a ductless "mini-split" heat pump system, which can be much more expensive due to the extensive work required to run refrigerant fluid pipes throughout your house. If you have decent ducts, skip the ductless systems. Use your ducts!
8. If you have multiple furnaces, consider replacing them with a single big outdoor heat pump compressor unit, which can deliver heat to up to 8 different zones in your home with small refrigerant lines that can go places that heating ducts can't go.
9. Adding insulation and other energy efficiency improvements are a guaranteed way to save money on your utility bills. This will also allow you to use a smaller and less costly HVAC system and stay comfortable.
10. Avoid 30-amp heat pump water heaters. They use up too much amperage on your electric panel. Go with an efficient 15-amp heat pump water heater or, even better, a 120-volt heat pump water heater, which sips electricity.
11. Oversize your water heater when converting from gas to a heat pump. E.g., if you now have a 40-gallon tank in gas, move up one size to a 50-gallon tank for a heat pump version. The added storage allows for slower, more efficient water heating.
12. Use circuit-sharing devices like NeoCharge to save electric panel space and avoid upsizing your utility service. Combine two EV chargers onto one 30-amp circuit, or combine your induction cooktop and your Heat Pump Water Heater on one circuit.
13. Avoid installing 50-amp outlets for charging your EV. It's overkill, unless you drive hundreds of miles a day on a regular basis or already have an extremely large electric utility service. If you're trying to save panel space and generally drive less than 80 miles a day, a 15-amp 240-volt outlet or charger is plenty.
14. Consider replacing your gas stove with an electric induction stove. You can try it out with a cheap single-burner induction cooktop.
15. Consider a combined washer dryer to replace your gas dryer. This condensing LG unit saves space, not only in the laundry room but also on your electric panel.

Source: Josie Gaillard and Tom Kabat

Closing

Over the past decade a growing movement has come together around the need to rapidly replace methane gas with clean, efficient electric energy in our homes and buildings. Even utilities are coming around to support this transition. For instance, Pacific Gas & Electric, the main utility serving Menlo Park and most of Northern California, supports a move to all-electric buildings, and acknowledges that gas use will need to decline significantly in order to meet California's requirement to reduce economy-wide carbon emissions to zero by 2045.[97]

Heat, drought, and fire are connected, and have intensified as human-caused emissions of greenhouse gases have raised average temperatures two degrees Fahrenheit since 1900. We are living through these impacts of climate change right now – not mid-century, as some earlier predictions cautioned. Scientists note that climate change is playing an increasing role in the earlier fire seasons, the deadly heat waves and the severe droughts.[98] June 2021 was the hottest in North America's recorded history, resulting in the deaths of several hundred people.[99]

The global warming-induced megadrought in the Western U.S. is now threatening crops and increasing the potential for dustbowl conditions as early as 2027 in California.[100] In 2015, for example, the drought cost roughly $2.7 billion and 20,000 agricultural jobs were lost in California.[101]

In 2018, the IPCC issued a seminal report showing that global carbon emissions must be reduced by 45 percent by 2030, and that up to 1,000 Gt CO2e must be removed from the atmosphere in order to achieve net-zero emissions by 2050 and stay under 1.5°C of warming. However, new studies show that these pollution cuts are not enough; if we do not achieve more progress cutting carbon, we are likely to pass 1.5°C dangerous warming by 2030, 10 years earlier than the UN IPCC projected.[102]

"The path to keeping warming inside of 1.5 degrees Celsius depends on electrifying our homes and making clean, electric machines the most affordable and convenient for consumers to purchase when the time comes to replace our appliances. Doing this will save the planet, but it will also save every household money on their utility bills, create 25 million jobs across our communities, and make our homes healthier and safer." - Rewiring America co-founder and former OPower founder Alex Laskey.

The time is now to invest in rapid and large-scale carbon reductions. Climate inaction or delay costs trillions of dollars, with severe impacts to health, the economy, and our way of life. However, if we invest big today--for example, investing $47 billion per year in California beginning now compared to $110 billion per year starting in 2030--this would save almost 15 percent of GDP.[103] In fact, the Federal Reserve cautions that banks must consider climate risks when funding future projects, noting $150 billion in damages from 2018 CA wildfires.[104] In addition, recent studies about the economic benefits of climate investments estimate that a $80 billion investment in California will generate roughly 725,000 jobs, and investments in clean energy generate more than twice the jobs as in the fossil fuel sector.[105] Current California emissions reduction goals – if fulfilled - would yield an estimated $21 billion in economic and other benefits.[106]

The opportunity to bolster the economy and health of our community while avoiding the worst impacts of climate change is now. By pursuing ambitious action on building electrification throughout Menlo Park, our community will benefit greatly. We have a clear pathway to a clean, healthy, prosperous community with this transition.

APPENDIX A: Menlo Park Household Demographics

Total households		15,106
Owned vs rented	**Owned units**	61%
	Rented units	39%
Age of home	**> 10 years**	4%
	10-40 years	16%
	40-80 years	71%
	80+ years	9%
Size of housing units	**Single Family**	70%
	Small Multi-family (2-9 units)	17%
	Large Multi-family (10+ units)	12%
Heating Fuel used in home	**Utility gas**	77%
	Electricity	20%
	Propane	1%
	Other or no fuel	2%
Household Income	**< $ 100,000**	32%
	$100,000 - $200,000	22%
	> $ 200,000	46%
Qualify for low-income utility assistance	**7% of Menlo Park utility customers** or about 1059 active accounts of households are enrolled in California Alternate Rates for Energy Program (CARE) or Family Electric Rate Assistance (FERA) utility discount programs, for which they qualify by being under the threshold of annual income per number of household members.	

Note: *Estimates from the chart above for housing demographics — including household income, housing fuel, type of home, total households, and household age — are based on these randomized surveys, which are created with a sample size from the ACS 2019 Census data of selected 1,415 addresses and interviewed 1,016 households in Menlo Park. Further information about this sample and sampling methods can be found at census table B98001 which notes that unweighted housing sample, or on the census website.*

Menlo Park Household Demographics chart references

Peninsula Clean Energy. "Bill Relief Credit for CARE/FERA Customers." PCE Board Meeting, Online, March 26, 2020. https://www.peninsulacleanenergy.com/wp-content/uploads/2020/03/00-FINAL-Board-COMBINED-Master-Presentation-3-26-20-1.pdf

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U.S. Census Bureau (2019). Physical housing characteristics for occupied housing units, 2019 American Community Survey 5-year estimates subject table S2504. Retrieved from https://data.census.gov/cedsci/table?q=S2504&g=1600000US0646870&tid=ACSST5Y2019.S2504&hidePreview=true&moe=true

Sources:

1. A 2018 study found 60% higher methane (the chemical known as "natural" gas) levels than documented by U.S. EPA: https://science.sciencemag.org/content/361/6398/186
Huge amounts of methane leaking from U.S. oil fields. This new study of methane escaping from the Permian found roughly 3.7% leaking, where many experts believe that gas is more damaging to climate than coal if the methane emission rate is greater than 2.7%.
A new Stanford study finds that methane leaks from gas water heaters are three times higher than previously understood.

2. https://www.ipcc.ch/sr15/ *Also see:*
WRI blog for a roundup of the landmark reports of 2018 & a comparison of climate impacts in a 1.5 deg.C v. 2 deg.C world:
https://www.wri.org/blog/2018/12/2018-year-climate-extremes
Tong et. al, Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target, Nature, August 2019, https://doi.org/10.1038/s41586-019-1364-3

3. For example, the 2019-2020 Australian wildfire that destroyed over 10,000 buildings and killed at least 34 people, and a massive global bleaching event for coral reefs impacting hundreds of millions of low income people who rely on fisheries for their food or livelihoods.
See: A roundup on the latest global reports showing a worsened outlook than previously understood, including an estimated 3-5 degrees C of likely warming by the end of the century, here:
https://docs.google.com/document/d/1-LHZe9kFhLymXE7CaVZmgQTx8VEfbGKAVOSK_x4TcDo/edit?usp=sharing
This WRI blog discusses the state of international climate negotiations as of COP25 and what is required moving ahead:
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