BUILDING ELECTRIFICATION AND AFFORDABLE HOUSING STUDY

LWVSNM Affordable Housing Committee

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I. Introduction

There is a clean energy revolution underway in the United States to transition from reliance on fossil fuels to more renewable and efficient energy. The goal is to reduce greenhouse gas (GHG) emissions and mitigate its impact on a warming planet and climate-linked extreme weather. New Mexico is considered a leader in the clean energy transition with a renewable portfolio standard mandating that public utilities deliver 100% zero-carbon electricity by 2045.[1] El Paso Electric, which serves southern New Mexico, currently produces close to 50% of its electricity from zero-carbon and renewable energy sources.[2]

Buildings that rely on fossil fuels, like natural gas and coal, are a significant source of GHG emissions nationwide, in New Mexico and the City of Las Cruces.[3] These emissions are reduced when buildings convert to technologies that use electricity. Building electrification is a promising decarbonization strategy because:

- electricity is on a path to being generated with clean energy resources,
- viable and energy-efficient building electrification technologies are available that use less energy. These energy savings can usually, although not always, save households money over the long term, and
- substantial subsidies are available from federal and state agencies for homeowners to shift to such technologies or implement home energy efficiency upgrades. (The Inflation Reduction Act of 2022, alone, authorizes $8.8 billion in rebates for home energy efficiency and electrification projects.)[4]

It is well-known that low-to-moderate income households spend a larger portion of their income on energy costs. They are also more vulnerable to being disconnected from utility services and are the first to experience the adverse impacts of extreme weather. Since these households have less income and are usually renters or own older housing stock, they are likely to experience barriers to benefiting from or adopting building electrification technologies.

In addition, some studies predict that low-to-moderate income households that continue to rely on gas for heating will disproportionately carry the financial burden for "stranded assets" or indebted investments that the utility companies have made in gas utility distribution systems. As more buildings electrify, the infrastructure costs of gas utility systems will be spread across fewer customers resulting in higher utility rates.[5]

This paper proposes to help LWVSNM membership decide if we should incorporate building electrification into our affordable housing position. Since 2012, we have supported efforts to increase the availability of safe, decent, and sanitary affordable housing for low-to-moderate income households.[6] The clean-energy transition requires us to ensure our position is up-to-date

with the moving landscape of building electrification and energy efficiency in affordable housing.

II. What is building electrification?

Building electrification is the conversion of buildings from reliance on non-renewable fossil fuels and energy-inefficient technologies to electric technology that uses renewable energy sources. Fossil fuels like coal, natural gas, and propane are considered non-renewable because they are finite and take millions of years to become usable to us. Energy-inefficient electrical technology involves appliances or systems that use more electrical energy than necessary to perform a particular task or provide a specific service.

The goal is to replace our reliance on fossil fuels and energy inefficient electric technologies with energy-efficient electrification technology for lighting, heating, cooling, cooking and, with growing acceptability, transportation. Building electrification technologies do that by using electricity as the primary energy source to perform the various functions we do in our homes or commercial buildings. Other complementary technologies include on-site solar photovoltaic, smart energy controls, and weatherization.

Table 1 is a list of the different building energy technologies utilized in our current building stock for lighting, heating, cooling, cooking and driving.

Table 1: Different Types of Building Technologies	
Energy-inefficient electric technology	**Energy-efficient electrification technology**
Electric resistance heating	High efficiency heat pump
Incandescent light bulbs	LED lighting product (Light Emitting Diode)
Electric resistance water heater	Heat pump water heater
Fossil fuel technology	**Energy-efficient electrification technology**
Gas or propane furnace	Ducted air source heat pump or ductless heat pump mini-split
Gas or propane hot water heater	Heat pump water heater
Gas or propane stove and range	Induction stove
Filling station which sells gasoline to power a car with an internal combustion engine	Standard 120-volt outlet or a Level 2 Home EV charger to power a car with a rechargeable lithium-ion battery

III. Why is building electrification technology beneficial?

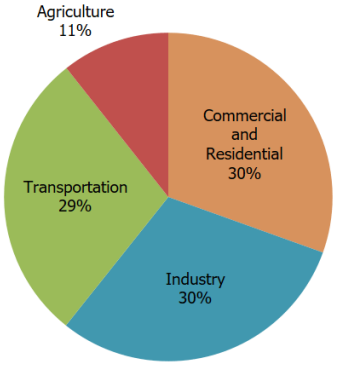
There are several benefits from transitioning to energy efficient building electrification technologies. They include: 1) a reduction in energy use; 2) a reduction in GHG emissions; 3) improved health and safety; and 4) energy equity for low to moderate income households.

Commercial and residential buildings generate 30% of the total U.S. greenhouse gas emissions when you include the electricity directly consumed in the building.[7] (Figure 1) This is equal to

the GHG emissions from industry, long considered the highest emitters of carbon dioxide, methane, and nitrous oxide.

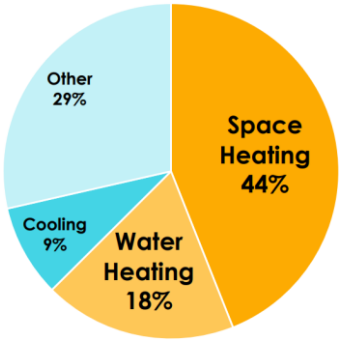
Few American families probably realize that they are consuming significantly more energy during the winter months when heating their homes and water, typical daily activities for us. Figure 2 shows that space heating, like our living rooms, is the largest U.S. average household energy use (44%) followed by heating water (18%). Combined, they account for 62% of the average household energy usage. In the Southwest, a larger percentage of our average energy use goes towards cooling.

Figure 1: Total U.S. Greenhouse Gas Emissions
by Economic Sector and Electricity End-Use



U.S. Environmental Protection Agency (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021

Figure 2: U.S. Average Household Energy Usage



BEI Building Electrification Institute (2021)

Building electrification technology is more energy efficient than fossil fuel or energy inefficient technologies. For example, high efficiency electric heat pumps, which provide both heating and cooling, are four times more energy efficient than traditional heating equipment.[9] Similarly, heat pump water heaters are more energy efficient than gas or electric resistance water heaters.[10]

Since energy efficient appliances use less energy, they produce less GHG emissions. A 2022 analysis found that heat pumps, whether for heating and cooling space or water, reduce carbon emissions by one-half or more.[11] These GHG emissions will continue to decline as more electricity is generated with carbon free (nuclear) and/or renewable energy (solar, and wind) sources. New Mexico, a leader in the clean energy transition, mandates that public utilities deliver 100% zero-carbon electricity by 2045.[12]

Health and safety are also improved when these technologies are in place. Unless properly vented to the outdoors, gas combustion from gas stoves and gas furnaces emits air pollutants like carbon monoxide,[13] nitrogen dioxide and benzene. Carbon monoxide is harmful to humans and nitrogen dioxide has been associated with an increase in childhood asthma.[14] Also, benzene is a known human carcinogen.[15] Additionally, natural gas furnace equipment, pipeline leaks or breaks are a source of house or other building fires.

Perhaps the most important benefit, though, is energy equity. When housing that is affordable to low-and-moderate income families incorporates the latest electrification technologies, such families can afford and access building electrification technologies and their associated benefits. Building electrification technologies require less energy to maintain a comfortable living environment, reduce GHG emissions and, in many cases, lower utility bills. All-electric affordable housing ensures everyone participates in the clean energy transition, including those who can least afford it.

IV. What are the concerns associated with transitioning to building electrification technology?

There are four common concerns that come with transitioning to these technologies: 1) costs for upgrades, installation, and operation; 2) the affordability of and access to building electrification technology for low-to-moderate income households; (3) impact on the electric grid; and 4) availability of a skilled workforce to install and maintain them.

Costs for installation, retrofits, and operation: All-electric *new* homes are usually less expensive to build than a mixed-fuel home (electric + gas).[16] High efficiency heat pump installation costs are far less than installing an electric air conditioner and gas furnace, which perform the same functions in a home. It is more costly because installing a gas furnace requires factoring in costs for laying the pipe for the gas and connecting to the utility company's pipeline system.[17]

In single-family home retrofits, these building electrification technologies can be incorporated when it is time to replace energy-inefficient or fossil fuel technology. Home audits or "wellness checks" may be needed to determine the most appropriate and cost-effective upgrades. Poor quality, older homes may need to be weatherized in order to ensure that energy savings will be realized after upgrades.

In the case of retrofits, higher upfront capital costs for building electrification technology are offset by the significant increase in federal, state and public utility rebates and tax credits.[18] (For example, see Table 2.[19])

Table 2: Heat Pump rebates

Income Level	IRA Rebate	El Paso Electric ****** Rebate	Rebate Totals ****	NM Sustainable Building Tax Credit	Tax Credit 25c*
Low	$8000	16-17.9 SEER- $100 per ton 18+ SEER- $175 per ton	$8300	$2000	$2000
Moderate	50% up to $8,000	16-17.9 SEER- $100 per ton 18+ SEER- $175 per ton	50% (up to $8000) + $300	$1000	$2000
Above Moderate	$0	16-17.9 SEER- $100 per ton 18+ SEER- $175 per ton	$300	$1000	$2000
Contractor	$8000***	16-17.9 SEER- $100 per ton 18+ SEER- $175 per ton	$8300	Based on square footage	30% up to $2000

This table does not include Tax Credit 179dD Energy Efficient Commercial Building Deduction; for more information on this tax credit, please visit Rewiringamerica.org
*30% of appliance capped at $2000; capped amount shared with heat pump tax credit, visit Rewiringamerica.org
** Must meet Department of Energy's Zero Energy Ready Home
***Guidance in the rule making from Department of Energy will be provided on confirming how contractors can revive the low-to-moderate-income rebates.
****Rebate totals are based on a 3 ton HP; Total amount can change based on the model purchased.
*****This rebate is only for residential home owners.

City of Las Cruces

Additionally, over time, this upfront capital cost may be recaptured as families or landlords pay lower utility bills due to the combined energy savings from "fuel switching" from gas to electricity. Table 3 and Table 4.[20]

Table 3: Combined energy savings from replacing an air conditioner and gas furnace with a heat pump		
Description	**Energy (kWh)**	**Energy (therms)**
Cooling Savings of HP over AC	**670**	*23*
Heating Usage: Gas Furnace	*26899*	**918**
Heating Usage: Heat Pump	**5874**	*200*
Total Savings = Cooling Savings + Gas Usage - HP Usage	21695	740

Table 4: Combined energy savings from replacing an evaporative cooler and gas furnace with a heat pump		
Description	**Energy (kWh)**	**Energy (therms)**
Cost of AC over Evaporative Cooler	**3056**	*104*
Cooling Savings of HP over AC	**670**	*23*
Heating Usage: Gas	*26898*	**918**
Heating Usage: Heat Pump	**5874**	*200*
Total Savings = - Cost of AC + Cooling Savings + Gas Usage - HP Usage	18637	845

In some, but not all circumstances, these energy savings translate into lower utility bills. For example, if you replace an air conditioner and gas furnace with a heat pump, your annual utility costs would decrease by $414.65 annually under current prices for gas and electricity.[21] However, if you replace an evaporative cooler and gas furnace with a heat pump, your annual utility costs could increase between $12.00 to $124.00 under current prices for gas and electricity.[22] This is because air conditioners use two to four times more electricity than evaporative coolers.[23]

However, evaporative coolers have other trade-offs that warrant consideration in deciding whether to shift to air conditioners. Evaporative coolers use ten times more water than air conditioners, a concern for a water scarce region like ours.[24] Also, evaporative coolers are not as effective at cooling a house as an air conditioner,[25] a drawback which carries greater weight as the duration, frequency and severity of extreme heat events is on the rise with climate change.[26]

Affordability of and access to building electrification technology by low-to-moderate income households: Lack of income, credit and home-ownership limit disadvantaged communities' access to building electrification technologies. Many of the early clean energy-related incentives, and subsidies were only available to higher-income, homeowners with federal income tax liability.

Low-to-moderate households who are renters face additional challenges to benefiting from building electrification technologies. There are concerns that multi-family building retrofits can displace renters if landlords pass-through substantial upgrade costs to renters. The increased rent may make the apartment or home unaffordable to low-to-moderate income families, causing them to move or become homeless.[27]

This issue can be addressed through intentionally designed policies, strategies and actions that achieve energy equity for all residents.

Impact on the electric grid: In southern New Mexico, the area's current peak use of electricity is during hot summer days and the infrastructure is in place to meet that demand.[28] Heat pumps use a little less energy to cool a house than an air conditioner, so fuel-switching from gas furnace and air conditioner to a heat pump would not increase energy demands during peak use.[29]

Transitioning to electric vehicles would also not increase peak demand since home-charging can be done at night when electricity is plentiful. However, transitioning from evaporative coolers to air conditioning would likely increase the load on the electric system at times of peak demand perhaps necessitating a larger grid. Demand management may mitigate the need for a larger grid if consumers shift use of electricity to off peak hours.

For example, El Paso Electric offers reduced rates to customers who curtail energy consumption during periods of peak system load. Their Whole House/Service Electric Vehicle Rate Rider Incentive offers extremely low rates to customers during super off-peak hours for charging electric vehicles and running smart appliances, like dishwashers and water heaters.[30]

Skilled workforce and workforce training: For early adopters, who on average have higher incomes and try new technologies before others, the existing skilled workforce is sufficient to meet demand. Community colleges, governmental entities and private industry are rapidly ramping up programs to train energy auditors, traditional HVAC installers, and plumbers on the new technologies that will be essential in this rapidly expanding arena.

V. How are Las Cruces' Lower Income Neighborhoods Effected?

Low-to-moderate income households experience the adverse impacts of climate change, and its associated extreme weather events, first and more severely. The benefits of building electrification technology, including energy efficiency, lower utility bills and effective cooling, could help mitigate those impacts. But, lack of income, credit and home ownership are barriers to access and affordability of building electrification technology.

The City of Las Cruces Sustainability Office has found[31] that:

- Lower income neighborhoods in Las Cruces experience temperatures up to 10 degrees higher than other areas in Las Cruces due to a higher urban heat effect;
- More than 50% of low-income customers rely on evaporative coolers. (While the average cooling bill for evaporative coolers is almost a quarter of the cost of an average cooling bill for AC, these coolers are not as effective at cooling a house, especially in high temperatures.)

- Almost 10,000 households in Las Cruces experience a high level of energy burden, spending over 6% of their income on utility bills instead of the typical 3% like most households.
- Around $5 million in new funding is needed to help reduce utility costs for our high-energy use burdened households.
- Low-to-moderate income homeowners may lack the necessary capital to invest in needed upgrades and maintenance needs, forcing deferred maintenance and a reliance on outdated systems.
- Rental properties, home to many low-to-moderate income householders, on average see a lower level of investment in improvement and retrofits and are generally less energy efficient.

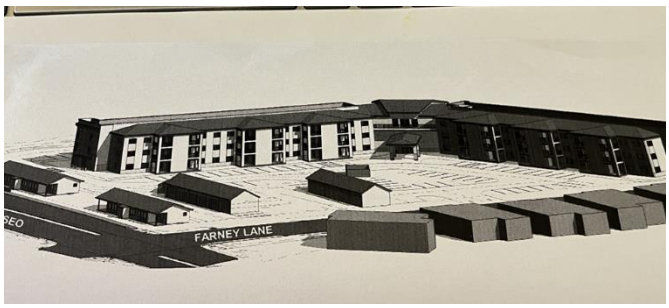
VI. Is all-electric affordable housing development being built in Las Cruces?

The clean energy revolution is finding its way to Las Cruces and demonstrates that building electrification, at least in new multi-family developments, is financially feasible for developers. It also means that low-to-moderate income residents can have lower utility bills. Currently, two affordable housing developments are in the final stages of development planning with construction anticipated in 2024.

Both developments will be 100% electric. As typical for affordable housing developments, the private developers have combined private and public funding to make the rents affordable to low-to-moderate income people. Both developers will be using trades contractors and suppliers from Las Cruces and El Paso, continuing to build our local workforce's expertise in all electric construction.

Pedrena Apartments:[32] Thomas Development Company (TDC) and its non-profit partner, Northwest Integrity Housing Company, both headquartered in Boise ID, are preparing to begin building in January 2024. The development is located at 801 E. Farney at the intersection of El Paseo and Farney near Las Cruces High School. It is an 80-unit senior apartment complex with 44 one-bedroom and 36 two-bedroom apartments. According to TDC, the development will cost about $25 million and requires a mix of federal, state, local, and private funds. In addition to being all electric, it will have solar panels and 80 electrical vehicle charging stations. Seniors, 55 years old and above, are eligible to live in the development with incomes up to 60 percent of area median income[33] or about $35,760.

Pedrena Senior Apartments



The Peachtree Canyon Apartments: [34] Thomas Development Group (TDG) and its non-profit partner, New Mexico Housing and Community Development Corporation, are building an affordable multifamily development in the Peachtree Hills Road area. The 144-unit development will have 72 one-bedroom apartments, 60 two-bedroom apartments and 12 three-bedroom apartments. All units will be restricted to families below 60% of area median income and will give preference to active and retired military. TDG estimates the development will cost almost $30 million. In addition to being all electric, the development incorporates green energy efficient design principles.

Peachtree Canyon Apartments

VII. Does transitioning to building electrification technology align with League policies?

Last year, the League of Women Voters of the United States (LWVUS) identified a few key areas where local league action can make a critical difference in curbing global climate change. Increasing energy efficiency in buildings through electrification is one key area.[35]

The LWVUS provided a list of top ten actions and processes to reduce GHG emissions, many of which are already underway in Las Cruces and New Mexico or can be undertaken here. These include:

- Publishing transition plans and accelerating transition to 100% renewable energy in city-owned utilities.
- Requiring all-electric energy in new residential and multi-family residential construction.
- Creating incentives for retrofitting privately owned buildings, encouraging renewable energy sources and energy efficiency.
- Offering community solar programs, enabling renters and low-income people to enjoy the benefits of solar and other renewable energy.
- Offering incentives and rebates for electric vehicles and electric appliance purchases.
- Linking GHG reduction to workforce development.
- Connecting GHG reduction to affordable housing and utility bills.
- Incorporating GHG emission reduction into building codes.

LWV of New Mexico also has a position on climate change that authorizes the support of policies and incentives to reduce GHG emissions by promoting greater energy efficiency. [36] Another state league position on environmental justice supports linking government programs, policies and activities that promote equity and fair treatment, accessibility and protection for all residents regardless of income.[37]

These positions and recommendations support an amendment to the LWVSNM Affordable Housing position, which connects building electrification technology with affordable housing. Such an amendment embodies and embraces our national and state league positions.

VIII. What opportunities exist to advocate for these changes?

Based on our research, we think there will be future opportunities to educate, advocate and take action in support of policies and programs that link affordable housing and building electrification technology. For example:

- Participating in the design and implementation of the Las Cruces Utility's gas utility energy transition plan.
- Adopting state and local building electrification standards for new construction and retrofits.
- Designing and implementing Community Solar Programs in Southern New Mexico.[38]
- Linking GHG reduction plans, programs and policies to affordable housing and utility bills.[39]
- Connecting GHG reduction plans for affordable housing to workforce training and employment of youth, unemployed and underemployed area residents to skills needed for solar installation, retrofit of buildings and other GHG reducing actions.
- Participating in the design and implementation of the Department of Energy Buildings Up grant with the City's Sustainability Office. The purpose of the grant is to support the transformation of existing buildings into more energy-efficient and clean energy-ready homes, commercial spaces, and communities.

IX. What is the process for amending our affordable housing position?

We propose to take the following steps:

1. The Affordable Housing Committee proposes to conduct unit meetings, asking LWVSNM members to reach a consensus on the role, if any, building electrification technology can play in increasing safe, decent, and affordable housing in Las Cruces.

2. If consensus is reached, the committee will request membership's approval to amend the LWVSNM's existing Affordable Housing Position at our April 2024 Annual Meeting. The proposed amendment would read as follows (highlighted in bolded, italicized, red):

   The League of Women Voters of Greater Las Cruces supports current and future efforts to increase the availability of safe, decent, and affordable housing for moderate- and low-income households through the following actions:

   - Support policies ***and programs*** that link ***building electrification technology*****,** transportation, land use and affordable housing.

X. Conclusion

GHG emissions are driving global warming.[40] Thirty percent of our country's total GHG emissions come from commercial and residential buildings. Within our homes, heating water and our living space accounts for over 60% of the energy we use. Building electrification technology is available to do this more efficiently while curbing GHG emission. This is the case in New Mexico where more electricity will be generated with carbon free (nuclear) and/or renewable energy (solar, and wind) over time.

But there are benefits and concerns with converting households to building electrification technology. The benefits mean improved energy efficiency, reduced GHG emissions, improved health and safety for Americans and, in many, if not most cases, lower utility bills. Concerns about the cost of installation, retrofits, and operation, housing affordability, overloading the electrical grid, and the availability of a skilled workforce to install and maintain the new technology warrant consideration by the LWVSNM.

We should recognize too, that federal, state and local governments are putting policies and programs into place, regulating and incentivizing household conversion, which aim to mitigate the impact of climate change for all residents regardless of income. They are also working to train and educate a workforce to ensure the conversion has the workers needed to make it successful and sustainable.

At least two new, all-electric, affordable multi-family residential developments are underway in Las Cruces. This is evidence that such developments have a market, are financially feasible, and doable. National and state league positions on climate change and environmental justice support increasing energy efficiency through building electrification in all households regardless of income. The clean energy revolution mentioned in the first paragraph is happening across our country, throughout our state, in our city and in our own organization.

We request that LWVSNM members reach consensus on amending the local affordable housing position to allow the affordable housing committee to support policies or programs that link affordable housing and building electrification technology.

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