

Mr. Keith Lambert  
Director, Bureau of Construction Codes  
Michigan Department of Licensing and Regulatory Affairs  
611 W Ottawa St.  
Lansing, MI 48933

Re: Michigan's 2021 Energy Conservation Code Adoption

Dear Director Lambert,

The undersigned organizations write in support of the inclusion of effective energy efficiency and electrification provisions in the update of Michigan's energy conservation code. These provisions will lower utility costs for Michigan residents and businesses, improve indoor air quality and protect public health, create new jobs in the state, and significantly reduce climate impacts from the building sector.

### **Building Codes are Critical to Combating Climate Change**

Buildings account for approximately 20% percent of direct carbon dioxide emissions in Michigan and about 56% of greater level of lifecycle greenhouse gas (GHG) emissions<sup>1</sup>. Nationally, buildings contribute 40% of greenhouse gas emissions factoring in emissions from the electricity they use. No climate strategy will be successful if it fails to include provisions that target reducing and eliminating building sector emissions.

To meet Governor Whitmer's climate goals and decarbonize our building stock, Michigan must increase the efficiency of our buildings and move toward all-electric appliances powered by more utility-scale and onsite renewable energy. A cost-effective and essential starting point to building decarbonization in Michigan would be ensuring that all new buildings are highly efficient and all-electric to the greatest extent possible. Building new inefficient and conventional gas dependent buildings today would effectively "lock in" emissions far into the future or mean the new construction would require an immediate or near term retrofit in order to reduce GHG emissions in line with Governor Whitmer's 2050 carbon neutrality goal.<sup>2</sup>

Electric heating is not new to Michigan. Today approximately 10% of Michigan households heat their homes with electricity<sup>3</sup>. Unfortunately, most of these homes are using antiquated electric heating technology. Electric heat pump technology has dramatically improved over the last few decades, giving contractors and building owners access to highly efficient electric heating and cooling technologies. Even accounting for reduced efficiency in extreme cold weather, modern air source heat pumps are more than twice as efficient as gas furnaces.<sup>4</sup> If Michigan were to replace all residential electric resistance furnaces with variable speed heat pumps, statewide residential electricity consumption could be reduced by 1,428 GWh.<sup>5</sup>

An analysis conducted by the Sierra Club demonstrates that, while states with more ambitious clean energy deployment benefit the most, advanced electric appliances like heat pumps installed today will reduce greenhouse gas emissions in every state over the next 10 years of

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<sup>1</sup> <https://www.eia.gov/environment/emissions/state/>

<sup>2</sup> US Climate Alliance Building Decarbonization roadmap

<sup>3</sup> 2019 American Housing Survey

<sup>4</sup> <https://rmi.org/its-time-to-incentivize-residential-heat-pumps/>

<sup>5</sup> <https://resstock.nrel.gov/factsheets/MI>

the appliance's life.<sup>6</sup> Another analysis by RMI (formerly known as Rocky Mountain Institute)<sup>7</sup> showed that, as of 2020, replacing a gas furnace with a heat pump will reduce carbon emissions in 99 percent of US households, including Michigan.<sup>8</sup>

Michigan has a fairly minimal amount of renewable energy powering our grid right now. But with Governor Whitmer's strong climate goals and carbon reduction commitments from Michigan's utilities, we expect the amount of renewable energy powering our grid, and thus powering all-electric homes, to increase dramatically over the next 10 years. DTE and Consumers, the two largest IOUs in the state, pledged to reach net-zero carbon emissions by 2050 and 2040, respectively.<sup>9</sup> <sup>10</sup> Those commitments are bolstered by the economic realities that renewable electric generation is now less expensive to build than coal or gas plants.<sup>11</sup>

To reach our climate goals, Michigan must rely on efficient all-electric buildings powered by renewable energy.

### **Effective Building Codes are a Key Way to Protect Public Health**

Construction methods and building appliances have direct links to community health and safety. We spend 90 percent of our time indoors where there is little to no regulation of air quality and often, indoor air can be more polluted than outdoor air. In many instances, our building codes are one of the only tools we have to improve indoor air quality and ensure buildings are safe, healthy environments.

Gas appliances, like gas stoves, are a primary source of combustion pollution inside the home, especially when unvented. Cooking on gas stoves can spike emissions of nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO) to levels that would violate outdoor pollution standards. In fact, in comparison to homes with electric stoves, homes with gas stoves can have 50 to 400 percent higher average NO<sub>2</sub> concentrations.<sup>12</sup>

Children are at higher risk for the impacts of poor air quality due to their activity levels and increased respiratory rates, ratio of body area to lung surface area, and immaturity of lung development. In a meta-analysis analyzing the connections between gas stoves and childhood asthma, the connection was clear: children in homes with gas stoves have a 42 percent increased risk of asthma symptoms and a 24 percent increased risk of being diagnosed with asthma by a doctor than children living in homes with electric stove.<sup>13</sup>

Not only does cooking with gas stoves impact our children more than adults, it also disproportionately impacts our lower socioeconomic status residents and frontline communities

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<sup>6</sup><https://www.sierraclub.org/articles/2020/04/new-analysis-heat-pumps-slow-climate-change-every-corner-country>

<sup>7</sup> <https://rmi.org/about/>

<sup>8</sup> <https://rmi.org/its-time-to-incentivize-residential-heat-pumps/>

<sup>9</sup> <https://dtecleanenergy.com>

<sup>10</sup><https://www.consumersenergy.com/news-releases/news-release-details/2020/02/24/16/03/consumers-energy-commits-to-net-zero-carbon-emissions-takes-stand-for-the-planet>

<sup>11</sup><https://www.forbes.com/sites/energyinnovation/2020/01/21/renewable-energy-prices-hit-record-lows-how-can-utilities-benefit-from-unstoppable-solar-and-wind/?sh=47a32b402c84>

<sup>12</sup><https://rmi.org/insight/gas-stoves-pollution-health/#:~:text=Health%20Effects%20from%20Gas%20Stove%20Pollution&text=Gas%20stoves%2C%20particularly%20when%20unvented.exacerbating%20respiratory%20conditions%20like%20asthma.>

<sup>13</sup> <https://academic.oup.com/ije/article/42/6/1724/737113>

because they often live in smaller spaces, with higher occupancy rates, and decreased ventilation making for poorer indoor air quality.

Additionally, when gas appliances are vented outside they can have negative impacts on outdoor air quality, in particular leading to the formation of harmful ground level ozone pollution otherwise known as smog. A recent study from the Harvard Chang School of Public Health shows that in Michigan in 2017, air pollution from burning fuels in buildings lead to an estimated 841 early deaths and \$9.419 billion in health impact costs.<sup>14</sup>

Moving towards all-electric appliances in our buildings is a critical measure to reduce air pollution and protect public health.

### **Robust Efficiency Measures in Building Codes Improve Comfort, Ensure Resilience and Emergency Preparedness while Saving Residents and Businesses Money**

Providing a comfortable and healthy interior environment is one of the core functions of buildings. However, buildings must be airtight and well insulated to provide an efficient, comfortable indoor environment. An efficient building-shell is a key mechanism for improving the comfort of the building for the occupant and meeting the occupant's needs and preferences by providing greater control and reducing unwanted temperature variations.

Building envelope improvements are also a key mechanism to protect residents against the extreme weather events we are already experiencing due to climate change.<sup>15 16</sup> Effective insulation and air sealing can provide essential "hours of safety"<sup>17</sup> during severe weather events and power outages, resulting in critical extra days before the onset of life-threatening conditions from extreme temperatures.<sup>18</sup> This aspect of greater efficiency is called "passive survivability" and provides an important health and safety rationale for stronger energy codes.

Energy efficiency measures, especially deep energy efficiency to address the building's shell, are the best way to save residents money on their utility bills and are an essential element of housing affordability. After rent/mortgage payments and property taxes, energy bills are the largest component of home costs. A recent analysis by mortgage industry and energy industry experts showed that utility costs add about 25% to housing costs, with utility costs averaging \$226/month. More revealing is the fact that when utility costs are added to housing costs, 35% of U.S. markets become unaffordable to average wage earners.<sup>19</sup> Efficiency is an even larger factor in housing affordability for retirees and lower to moderate-income households, who are disproportionately impacted by higher energy burdens, which has a multiplier effect by reducing available income for other living expenses or emergencies.

Improving a building's shell is most easy and cost effective when the building is being constructed or undergoing a major renovation because renovations to wrap the exterior of an existing building and reduce thermal bridging often necessitate removing existing siding. The more we can build highly efficient homes and businesses from the start, the more we ensure the improvement of the lives of people in buildings and increase the affordability of buildings for our

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<sup>14</sup> <https://rmi.org/health-air-quality-impacts-of-buildings-emissions#MI>

<sup>15</sup> <https://journals.ametsoc.org/view/journals/bams/95/3/bams-d-12-00162.1.xml>

<sup>16</sup> <https://e360.yale.edu/digest/extreme-weather-events-have-increased-significantly-in-the-last-20-years>

<sup>17</sup> <https://rmi.org/insight/hours-of-safety-in-cold-weather/>

<sup>18</sup> <https://www.urbangreencouncil.org/babyitscoldinside>

<sup>19</sup> <https://www.attomdata.com/news/company-news/power-conversion/>

residents and businesses. According to NREL's ResStock tool, envelope measures such as drill-and-fill wall cavity insulation, basement wall insulation, insulated wall sheathing, and air sealing could save \$1,026 per household in Michigan.<sup>20</sup>

The 2021 residential edition of the International Energy Conservation Code (IECC) represents a 12% improvement in efficiency compared to the 2015 code, which closely mirrors Michigan's current code. Much of those savings come from improvements in envelope requirements. As compared to the current Michigan Uniform Energy Code, homes built to the 2021 IECC will have more efficient thermal envelopes, improved mechanical system efficiency, improved lighting, and other cost-effective improvements that will reduce monthly utility bills. Likewise, commercial buildings constructed to the requirements of the 2021 IECC will have improved envelopes, improved lighting efficiency, updated mechanical system requirements, and other improvements that will help occupants remain healthy and comfortable while reducing operating costs.

### **Electrification of New Construction is Affordable and Cost-Effective**

An analysis conducted by RMI shows that across different climate zones all-electric new construction is more economical to build than a home with gas appliances, regardless of location.<sup>21</sup> These cost savings largely come from reductions in upfront costs of the device, installation, and gas interconnection. By constructing homes and businesses with highly efficient heat pump technology powered by increasingly clean electricity, Michigan can help families save money on monthly energy bills.

RMI's analysis also showed that there are significant energy savings with the heat pump space and water heater over corresponding gas appliances, resulting in a lower annual utility cost for the all-electric home in most cities—up to 9 percent lower in Minneapolis, which was the city in the analysis most similar to Michigan in climate.

### **Robust Building Energy Codes Support Michigan Jobs and Economic Investment**

Prior to COVID-19, Michigan's clean energy sector supported more than 125,000 jobs, with 68 percent of those jobs in the energy efficiency sector. According to a report by the Clean Energy Trust and Environmental Entrepreneurs (E2) these jobs are spread throughout the state in cities like Detroit (55,470) and Grand Rapids (10,560), and rural areas (24,950). During the first three months of the pandemic Michigan lost over 30,000 clean energy jobs.<sup>22</sup> By adopting building codes that include critical energy efficiency and electrification provisions we can help build this sector back and grow it going forward.

In a recent Rewiring America report on impacts of electrification on all 50 states, they found that electrification alone would create 7,500 installation jobs in Michigan. Nationwide, it would further generate 223,800 additional installation jobs, 80,000 manufacturing jobs that Michigan could benefit from, and 800,000 indirect and induced jobs, including in Michigan. These are jobs that cannot be automated or offshored — as electricians, plumbers, and solar installers, as well as in manufacturing, finance, and other indirect sectors<sup>23</sup>. Furthermore, upgrades and improved standards for new buildings act as investments in the future of Michigan communities and create a foundation for other community economic investment and rejuvenation.

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<sup>20</sup> <https://resstock.nrel.gov/factsheets/MI>

<sup>21</sup> <https://rmi.org/insight/the-new-economics-of-electrifying-buildings>

<sup>22</sup> <https://www.cleanjobsmidwest.com/state/michigan>

<sup>23</sup> <https://www.rewiringamerica.org/bringing-infrastructure-home>

## **Support Michigan's Auto Industry**

The transition to electric vehicles (EVs) is well underway. Developments in global markets are driving increased EV adoption, but Michigan's big three are also working to maintain their leadership in the automotive industry by embracing the transition to EVs. For example, General Motors recently announced it would be all electric by 2035.<sup>24</sup>

Unlike gas powered vehicles, electric vehicles can be charged at home, and most trips the average driver takes can be covered by at home charging. Work-place charging will also increasingly become important to support the transition of corporate, municipal, and state fleets to electric and to facilitate longer work commutes so that employees can take advantage of their vehicles being parked for long periods of time during the work day.

A major barrier to the transition to EVs is the lack of charging infrastructure at homes and businesses and the potential need for extensive electrical upgrades to a building to install the charger and accommodate the increased electric load. It is more cost-effective to ensure a building is "EV ready" when it is being built or undergoing major renovations. Including EV ready provisions in the residential and commercial building codes will ensure Michiganders are ready for the switch to EVs and can support our auto industry's future growth.

## **Ensuring Michigan's Energy Conservation Codes Secure these Benefits for Michiganders**

The building energy conservation code adoption process is one of the most critical ways that decision-makers have to improve our building stock to the benefit of Michiganders and our economy. Building codes ensure that new construction and major renovation projects are better and safer. They also influence what products are readily available on the market for contractors and help standardize construction practices across the industry even in projects where codes don't apply.

Given the importance of the energy conservation codes to our health, our climate, our economy, and our overall well being, we strongly encourage LARA to start our code update with the most recent and most efficient model codes- the 2021 IECC residential and commercial model codes. We also make the following recommendations:

### *1. Building Envelope and Efficiency*

The first step in creating a more energy efficient building is to maximize the efficiency of the building envelope. An energy efficient envelope reduces the size of heating and cooling equipment (saving energy and money), and increases the resilience of a dwelling. A home with a robust envelope maintains its temperature longer in the case of loss of power and it increases the comfort and safety of people living inside the home.

An energy efficient envelope means that walls, roofs and floors have robust levels of insulation and air sealing. Homes and businesses with efficient envelopes will not experience large temperature swings or thermal drafts effectively reducing the energy use and costs for the building. The following provisions ensure an efficient building envelope.

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<sup>24</sup><https://www.nbcnews.com/business/autos/gm-go-all-electric-2035-phase-out-gas-diesel-engines-n12560>  
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*Residential:*

- Improve air sealing requirement in the model 2021 IECC to 2ACH50; this higher level of air sealing will benefit residents by increasing the efficiency of their homes and can be accomplished without significant additional cost.
- Keep requirement for mandatory air leakage testing.
- Maintain insulation and continuous insulation layer requirements from the 2021 IECC, including ceiling insulation at R-60, basement wall insulation at R15 continuous or R19 cavity, wall insulation at R13+10 continuous exterior insulation or R0+20, and slab Insulation at R10.
- Amend the wall insulation prescription path of R20+5 to make it R20+7; this would fix the moisture issue that arises in colder climates like Michigan by thickening the exterior insulation.

*Commercial:*

- Introduce requirements in the energy code to begin to reduce thermal bridging which can drastically affect the performance of the building envelope
- Improve efficacy of lighting and dehumidification systems in horticultural applications, an extremely cost effective way to improve the efficiency of Michigan's growing cannabis industry.
- Establish a limit to trade-offs of envelope components for buildings using the performance pathway so that the envelope is adequately efficient for the life of the building.

*2. Electrification, Renewables and Climate Change*

To meet Michigan's climate neutrality goals, our buildings must be all-electric, electric vehicle compatible, powered by renewable electricity, and grid-interactive. As stated above, building electrification is not only good for public health but is also affordable and cost-effective. Ensuring our buildings are electric vehicle ready will also support Michigan's auto-industry and enable cost-effective low-carbon transportation. The time to ensure that all new buildings are compatible with Michigan's climate goals is now.

The following provisions in the energy code will ensure the transition to electrification, renewable energy, and demand response is as affordable as possible by requiring new buildings to be electric-ready, EV-ready, solar-ready, and integrated with the grid.

*Residential:*

- Electric-ready
- EV readiness
- Solar readiness
- Battery storage readiness
- Demand response water heaters and thermostats

We also strongly encourage LARA to adopt the current net zero and renewables appendix as a statewide optional stretch code. Local governments have climate goals of their own and it is critical that they be given the ability to enforce net zero and renewable provisions where that makes sense for their local communities.

*Commercial:*

- Electric-ready

- EV Readiness
- Nominal amounts of solar (0.25W/sf) requirement
- Demand response water heaters and thermostats
- Storage readiness

### 3. *Public Health*

On average, Americans spend 90% of their time indoors, meaning indoor air quality has a major impact on our health. COVID-19 demonstrated clearly the importance of effective ventilation as a means of protecting our health. The combustion of fossil fuels inside homes and businesses also increases the need for ventilation systems. However, any increase in ventilation also increases energy use, so requirements for ventilation of fossil appliances should be offset with additional efficiency measures. Adding the following provisions to the energy codes will drastically improve indoor air quality and protect public health while also keeping energy costs low.

#### *Residential:*

- Require stricter gas stove ventilation standards
- Third party gas leak testing
- Higher levels of energy efficiency when gas appliances are used to offset the higher energy usage from ventilation
- Require balanced ventilation

#### *Commercial:*

- Require dedicated outdoor air systems, a more efficient ventilation method that delivers improved indoor air quality, for certain buildings

c.c.:

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