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# REQUEST FOR CODE AMENDMENT

| | |
|---|---|
| Requesting Agency/Person: Utah Clean Energy/Salt Lake City | Date: August 05, 2021 |
| Street Address: 1014 E. 2nd Ave. | |
| City, State, Zip Salt Lake City, UT 84103 | |
| Contact Person: Thomas Kessinger | Phone: 801-518-8185 |
| Code to be Amended: (Include edition) 2021 Int'l Energy Conservation Code (the energy portion of the 2021 IRC) | |
| Section: Sections R103, R105, R202, R401, R402, R403, R404, R405, R406 | |
| Section Title: Multiple | |

AMENDMENT: Electric Ready Homes Amendment

Type proposed amendment in rule change form. (Using strikeout on portions being removed and underline on all new wording.)

1. Include the entire section you wish to amend.
2. Attach additional sheets if necessary.

See Appendix 1 - Redlined Text of Amendment in underline and strikeout.

| Purpose of or Reason for the amendment: |
|---|
| See sections I and II of the attached Memorandum In Support of the Joint Application to Amend the 2021 IECC. |
| Cost or Savings Impact of Amendment: |
| See section III of the attached Memorandum In Support of the Joint Application to Amend the 2021 IECC. |
| Compliance Costs for Affected Persons (APerson@ means any individual, partnership, corporation, association, governmental entity, or public or private organization of any character other than an agency.) (You must break out the impact cost to State Budget, Local Government and you must state aggregate cost to other persons {cost per person times number of persons affected}): |
| See section IV of the attached Memorandum In Support of the Joint Application to Amend the 2021 IECC. |

| Signatures: | Date: |
|---|---|
| Thomas Kessinger<br>Thomas Kessinger<br>Beneficial Electrification Program Mgr.<br>Utah Clean Energy | August 05, 2021 |
| Kenneth W. Anderson 08/05/2021<br>Ken Anderson<br>Building Official<br>Salt Lake City | |

**For Division Use:**

| Date Received: | |
|---|---|
| **Committee Action:**<br>☐ Approved ☐ Denied<br>☐ Approved with revisions<br>☐ Referred to:<br>☐ Tabled | **UBC Commission Decision for Hearing:**<br>☐ Approved for hearing ☐ Denied<br>☐ Approved with revisions<br>☐ Referred to:<br>☐ Tabled |
| Date Filed: | Public Hearing Date: |
| **UBC Commission Decision for Adoption:**<br>☐ Approved ☐ Denied<br>☐ Approved with revisions<br>☐ Referred to:<br>☐ Tabled | Effective Date: |

# IECC - Residential Provisions (Electric-Ready)

## Chapter 1 – Scope and Administration

### R103 CONSTRUCTION DOCUMENTS

**Revise text as follows:**

**R103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documented are permitted to be submitted when approved by the code official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment herein governed. Details shall include the following as applicable:

6. Mechanical and service water heating systems and equipment types, sizes, fuel sources and efficiencies.

*Fuel sources are a critical piece of code compliance enforcement for the full implementation of this code overlay. Clear identification on the construction documents will allow for easier code compliance review and inspections. Inclusion of fuel sources is most critical in areas where there are multiple fuels available such as fuel oil, propane, and natural gas, as the equipment type alone may not provide this information.*

**Add new text as follows:**

**R103.2.4 Electrification system.** The construction documents shall provide details for additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.

*Current 2021 IECC language does not include specific requirements for electrical systems on construction documents for residential construction. Given the importance of the electrical system in an electric-ready building, including an explicit requirement in the construction documents will allow for easier implementation and enforcement of the requirements on code compliance plan review staff.*

### R105 INSPECTIONS

**Add new text as follows:**

**R105.2.5 Electrical rough-in inspection.** Inspections at electrical rough-in shall verify compliance as required by the code and the approved plans and specifications as to the locations, distribution, and capacity of the electrical system.

*Current 2021 IECC inspections do not require dedicated electrical inspections.*

**Revise numbering as follows:**

**~~R105.2.5~~ R105.2.6 Final inspection.**

## Chapter 2 – Definitions

### R202 GENERAL DEFINITIONS

**Add new definitions as follows:**

**APPLIANCE.** A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

*Definition for appliance is mirrored from 2021 IMC to be useful in defining combustion equipment.*

**COMBUSTION EQUIPMENT.** Any *equipment* or *appliance* used for space heating, *service water heating*, cooking, clothes drying, or lighting that uses *fuel gas* or *fuel oil*.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Plug-in hybrid electric vehicles are electric vehicles having a second source of motive power. Off-road, self-propelled electric mobile equipment, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats and the like, are not considered electric vehicles.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** The conductors, including the ungrounded, grounded, and equipment grounding conductors and the *electric vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

*Definitions for EV and EVSE are mirrored from NEC-2020 to be useful in defining requirements for electric vehicle infrastructure.*

**EQUIPMENT.** Piping, ducts, vents, control devices and other components of systems other than appliances that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

*Definition for equipment is mirrored from 2021 IMC to be useful in defining combustion equipment.*

**EV-READY SPACE.** A parking space that is provided with an electrical circuit capable of supporting an installed *EVSE.*

*The definition of EV Ready space has been updated to be descriptive rather than prescriptive and serves as a single definition replacing previous definitions of EVSE, EV-capable, and EV-ready spaces to allow for consistent use of the definitions and deferring requirements to be set in the body of the text. This allows the requirements match the specific requirements and needs of the adopting jurisdiction for EV Ready Spaces to be tailored for different EV charging scenarios (charging at different building types, parking types, residential types, business types, times of day, etc.) as well as different levels of penetration of EV charging spaces in a parking facility. This definition is aligned with proposals and amendments from the 2024 IBC development cycle.*

**FUEL GAS.** A natural gas, manufactured gas, liquified petroleum gas or a mixture of these.

*Definition for fuel gas is mirrored from 2021 IMC to be useful in defining combustion equipment.*

**FUEL OIL.** Kerosene or any hydrocarbon oil having a flash point not less than 100°F (38°C).

*Definition for fuel oil is mirrored from 2021 IMC to be useful in defining combustion equipment.*

## Chapter 4 – Residential Energy Efficiency

### R401 GENERAL

**Revise text as follows:**

**R401.3 Certificate.** A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certification shall indicate the following:

4. The types, sizes, fuel sources, and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters.

8. The fuel sources for cooking and clothes drying equipment.

9. Where combustion equipment is installed, the certificate shall indicate information on the installation of additional electric infrastructure including which *equipment* and/or *appliances* include additional electric infrastructure, capacity reserved on the electrical service panel for replacement of each piece of combustion *equipment* and/or *appliance.*

*Revisions to this section incorporate critical elements of electrification to be clearly identified to the original homeowner/building owner and any subsequent owners to allow for easier mechanical swaps to electrical equipment. By including on the certificate, the information is more likely to remain in the building for future owners.*

### R402 BUILDING THERMAL ENVELOPE

**Revise text as follows:**

**R402.1 General.** The building thermal envelope shall comply with the requirements of Sections R402.1.1 through R402.1.5.

**Exceptions:**

1. The following low-energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope assemblies* complying with this section shall be exempt from the building thermal envelope provisions of Section R402.

1.1 Those containing no *combustion equipment* with a peak design rate of energy usage less than 3.4 Btu/h·ft2 (10.7 W/m2) or 1.0 watt/ft2 of floor area for space conditioning purposes.
1.2 Those containing no *combustion equipment* that do not contain *conditioned space*.

*Low energy buildings are currently exempt from thermal envelope requirements. This revision applies the same intention of low greenhouse gas impact that was given to low energy use impact when these building types were exempted.*

## R404 ELECTRICAL POWER AND LIGHTING SYSTEMS

**Add new text as follows:**

**R404.5 Electric vehicle charging infrastructure (EVCI).** Electric infrastructure for the current and future charging of *electric vehicles* shall be installed in accordance with this section. *EV ready spaces* are permitted to be counted toward meeting minimum parking requirements.

**R404.5.1 One- and two- family dwellings and townhouses.** One- and two-family dwellings and townhouses with a dedicated attached or detached garage or on-site parking spaces and new detached garages shall be provided with one *EV-ready space* per *dwelling unit. The branch circuit shall meet the following requirements:*

*1. A minimum capacity of 9.6 kVA*

*2. Terminates at a junction box or receptacle located within 3 feet (914 mm) of the parking space and labelled "For electric vehicle charging", and*

*3. The electrical panel directory shall designate the branch circuit as "For electric vehicle charging".*

*Tailored requirements for single-family and multifamily housing have been included. Single-family homes, where the occupants will choose the specific EVSE that meets their EV charging needs, are required to have one parking space with an EV Ready space that is sized to accommodate the most common EVSE on the market. The requirements for EV charging infrastructure for multifamily buildings are referenced to the commercial requirements as those are more appropriate for EV charging in parking lots. The required capacity for the branch circuit for the EV Ready space is the equivalent of a 240V, 40A circuit and is expressed in kVA as that is the standard metric for capacity or "apparent power" in electrical infrastructure.*

**R404.5.2 Group R occupancies.** Parking facilities serving Group R-2, R-3 and R-4 occupancies shall be provided with electric vehicle charging infrastructure in accordance with Table R404.5.2.1 based on the total number of parking spaces and rounded up to the nearest whole number. Where more than one parking facility is provided on a building site, the number of parking spaces required shall be calculated separately for each parking facility. EV spaces shall be uniformly distributed in the parking facility.

**Exception:** In parking garages, the conduit required for *EV capable spaces* may be omitted provided the parking garage electrical service has no less than 1.8 kVA of additional reserved capacity per *EV capable space.*

*The EV charging infrastructure requirements have been tailored to different charging scenarios. EV Ready spaces are utilized in residential occupancies where EV owners are more likely to choose specific EVSEs with features that meet their personal, long-term needs. The minimum capacity of those EV Ready spaces has been set at Level 1 charging in order to maximize access to EV charging:*

1. *Residential park times are generally much longer which makes Level 1 charging more feasible.*
2. *All EVs come with at least a Level 1 charger, eliminating the need for EV owners to invest in additional equipment to charge at their homes.*
3. *Level 1 charging minimizes the cost of enabling EV charging at a parking space, allowing for the maximization of the number of EV spaces, which maximizes access to charging.*

*EVSE spaces are required for commercial parking lots where shorter parking times are typical and Level 2 or 3 parking is more appropriate. Additionally, while the car connection side of Level 2 EVSE are standard, the grid connection side is not, so utilizing EVSE rather than EV Ready spaces maximizes the utility of parking spaces in commercial lots that have more transient parking.*

*The exception is added to allow capacity to be substituted for conduit in parking garages. EVCI retrofits have different cost considerations in parking garages compared to surface parking lots. Parking garage retrofits do not require retrenching, so the conduit in EV capable spaces does not come with the same future avoided costs.*

**TABLE R404.5.2.1**
**ELECTRIC VEHICLE CHARGING INFRASTRUCTURE REQUIREMENTS**

| **OCCUPANCY** | ***EVSE SPACES*** | ***EV READY SPACES*** | ***EV CAPABLE SPACES*** |
|---|---|---|---|
| R-2 Occupancy | NA | 100%[a] | NA |
| R-3 and R-4 Occupancies | 10% | NA | 40% |

a. Or one *EV ready space* per *dwelling unit.*

*The percentages in Table R404.5.2.1 can be adjusted to tailor the requirements for the specific market needs of a jurisdiction. However, the EV Capable space requirements included for all commercial lots recognize that future needs for EV charging will be much greater than they are now. EV capable spaces avoid the significant cost of parking lot re-trenching, which is one of the largest single costs of EVCI retrofits but only a minor investment in new construction.*

**R405.2.1 EV Capable Spaces.** *EV Capable Spaces* shall be provided with electrical infrastructure that meets the following requirements:

1. Conduit that is continuous between a junction box or outlet located within 3 feet (914 mm) of the parking space and an electrical panel serving the area of the parking space.

2. The electrical panel to which the conduit connects shall have sufficient dedicated physical space for a dedicated dual-pole, 40-amp breaker.

3. The conduit shall be sized and rated to accommodate a 40-amp, 208/240-volt branch circuit and have a minimum nominal trade size of 1 inch.

4. The electrical junction box and the electrical panel directory entry for the dedicated space in the electrical panel shall have labels stating "For future *electric vehicle* charging".

*The requirements for EV Capable spaces ensure a low-cost path to retrofitting the spaces with EVSE in the future. One of the most significant costs to upgrading parking lots for EVCI is the retrenching of the lot for electrical wiring runs. These requirements ensure that the wiring can be easily run through conduit to spaces without retrenching.*

**R405.2.2 EV Ready Spaces.** The branch circuit serving *EV Ready Spaces* shall meet the following requirements:

1. Wiring capable of supporting a 40-amp, 208/240-volt circuit.

2. Terminates at an outlet or junction box located within 3 feet (914 mm) of the parking space.

3. A minimum capacity of 1.8 kVA.

4. The electrical panel directory shall designate the branch circuit as "For electric vehicle charging" and the junction box or receptacle shall be labelled "For electric vehicle charging."

*The approach for multifamily can be characterized as "upgradeable Level 1 charging." This approach balances objectives for equity, controlling first costs and future upgradeability. The wiring requirement ensures that the wiring is capable of supporting Level 2 charging, but the circuit capacity requirements can be met by a branch circuit that supports only Level 1 charging. All EVs come with at least a Level 1 charger, so this approach maximizes the number of EV spaces for which charging is immediately available without incurring the higher upfront costs of full Level 2 EVSE at every space. This is an important equity consideration since access to charging is one of the larger barriers to EV use for multifamily tenants. The oversized wiring ensures that these spaces can be upgraded to load managed Level 2 charging in the future and that the building has sufficient capacity for a reasonable minimum level of simultaneous charging.*

**R405.2.2 EVSE Spaces.** The *EVSE* serving *EVSE spaces* shall meet the following requirements:

1. Capable of supplying not less than 6.2 kW to an electric vehicle.

   **Exception:** An automated load management system may be used to reduce the total electrical capacity required by EVSE spaces provided that all EVSE spaces are capable of simultaneously charging at a minimum rate of 1.4 kW.

2. Located within 3 feet (914 mm) of the *EVSE space*.

*The charging rate for an EVSE space is set at 6.2 kW. This is equivalent to a 30A/208V EVSE. 30 and 32A chargers are the most common Level 2 chargers and the highest capacity chargers that can be installed on a 40A branch circuit. kW is used as the metric to indicate total power delivered rather than the specific combination of Volts and Amps.*

### Add new text as follows:

**R404.6 Additional electric infrastructure.** *Combustion equipment* shall be installed in accordance with this section.

*The following sections ensure that gas equipment can be more easily and cost-effectively retrofit with electric equipment in the future. This language is based on the approach adopted in the electrification reach codes adopted by various California cities. It combines the best elements from those reach codes and adapts them to the I-Code format.*

**R404.6.2 Combustion water heating.** Water heaters shall be installed in accordance with the following:

1. A dedicated 240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 3 feet (914 mm) from the water heater and be accessible to the water heater with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Heat Pump Water Heater" and be electrically isolated.
2. A condensate drain that is no more than 2 inches (51 mm) higher than the base of the installed water heater and allows natural draining without pump assistance shall be installed within 3 feet (914 mm) of the water heater.
3. The water heater shall be installed in a space with minimum dimensions of 3 feet (914 mm) by 3 feet (914 mm) by 7 feet (2134 mm) high.
4. The water heater shall be installed in a space with a minimum volume of 700 cubic feet (20,000 L) or the equivalent of one 16-inch (406 mm) by 24-inch (610 mm) grill to a heated space and one 8-inch (203 mm) duct of no more than 10 feet (3048 mm) in length for cool exhaust air.

*The addition of this section provides a series of requirements that ensure that the building can accommodate a HPWH in the future. Requirement 1 ensures that there is a branch circuit ready to support the future installation of a HPWH. Requirement 2 ensures that the condensate generated by a HPWH compressor can be easily drained away. Requirement 3 ensures that the water heater location is physically large enough to accommodate HPWHs that are frequently wider and/or taller than code-minimum gas water heaters. Requirement 4 ensures that a future HPWH has access to sufficient air volume to effectively operate.*

**R404.6.3 Combustion space heating.** Where a building has combustion equipment for space heating, the building shall be provided with a designated exterior location(s) in accordance with the following:

1. Natural drainage for condensate from cooling equipment operation or a condensate drain located within 3 feet (914 mm), and
2. A dedicated branch circuit in compliance with IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with R403.7 and terminating within 3 feet (914 mm) of the location with no obstructions. Both ends of the branch circuit shall be labeled "For Future Heat Pump Space Heater."

**Exception:** Where an electrical circuit in compliance with IRC Section E3702.11 exists for space cooling equipment.

*IRC Section E3702.11 sets the requirement for sizing a branch circuit serving a heat pump and relies on the size of the actual equipment to be installed. Since there is not an actual equipment size to reference and equipment size can vary depending on the size of the home and the climate, the section references Section R403.7 to establish the size of the heat pump equipment that would be required for the specific home.*

**R404.6.4 Combustion clothes drying.** A dedicated 240-volt branch circuit with a minimum capacity of 30 amps shall terminate within 6 feet (1829 mm) of natural gas clothes dryers and shall be accessible with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Electric Clothes Drying" and be electrically isolated.

**R404.6.5 Combustion cooking.** A dedicated 240-Volt, 40A branch circuit shall terminate within 6 feet (1829 mm) of natural gas ranges, cooktops and ovens and be accessible with no obstructions. Both ends of the branch circuit shall be labeled with the words "For Future Electric Range" and be electrically isolated.

*IRC Section E3702.9.1 requires a 240V/40A branch circuit for a standard 8.75 kVA or larger electric residential range and has been used as the basis for the sizing of the branch circuit. Six feet is cited per requirements from IRC Section E3901.5 requiring appliance receptacles to be within 6 feet of the intended appliance.*

**R404.6.6 Other combustion equipment.** *Combustion equipment* and end-uses not covered by Sections R404.6.2-5 shall be provided with a branch circuit sized for an electric *appliance*, *equipment* or end use with an equivalent capacity that terminates within 6 feet (1829 mm) of the *appliance* or *equipment*.

## SECTION 406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

**Revise table as follows:**

**TABLE R406.2 REQUIREMENTS FOR ENERGY RATING INDEX**

| SECTION [a] | TITLE |
|---|---|
| Electrical Power and Lighting Systems | |
| R404.1 | Lighting equipment |
| R404.2 | Interior lighting controls |
| R404.5 | Electric vehicle charging infrastructure |
| R404.6 | Additional electric infrastructure |
| R406.3 | Building thermal envelope |

*The ERI mandatory requirements table has been modified to include the new requirements for, electric vehicle charging, and electric infrastructure as mandatory elements of the code amendments.*

To: Thom Peterson, Chair of the Utah Uniform Building Code Commission (UBCC)
From: Thomas Kessinger, J.D., Utah Clean Energy (UCE)
Re: Memorandum in Support of UCEs and Salt Lake City's (SLC) Joint Application to Include Electric Ready Provisions in the State Building Code.
Date: November 4, 2021

# MEMORANDUM

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This Memorandum supports UCE's and SLC's joint application to amend the residential provisions 2021 Int'l Energy Conservation Code (IECC) and Chapter 11 of the 2021 Int'l Residential Code (collectively referred to herein as the "2021 IECC")[1] to include electric readiness provisions in new single-family and low-rise multi-family construction (the "Application").

First, this Memorandum discusses why reviewing the Application concurrently with the updated 2021 IECC provisions streamlines the important work at the UBCC and the Legislature. Second, it summarizes the electric ready provisions and explains how their adoption (1) empowers homeowners to adopt electric appliances at their own pace, (2) creates value for homeowners through decreased retrofit costs, (3) decreases pollution indoors and out, and (4) supports our communities in electrifying vehicles and home appliances.

The following section explains that the electric ready provisions make switching to electric appliances more affordable and concludes that the slight incremental costs associated with the amendment can be outweighed by energy savings realized through the adoption of the 2021 IECC. Next, it discusses why the electric-ready amendment does not impact State or local building department budgets**.** This Memorandum concludes with a brief overview of the support

[1] *See*, 2021 IRC, Chapter 11 at N1101.1. Note that Chapter 11 of the IRC "parallels the text" of the residential provisions of the 2021 IECC and Chapter 11 IRC. In essence they are the same texts.

our application has received from businesses and local governments, and why the UBCC and its Mechanical Advisory Committee (MAC) should recommend the proposed amendment for adoption to the State Legislature.

## I. The Application Builds on the UBCCs Current Review of the 2021 IECC.

The State Construction Codes and Fire Act requires the UBCC to review the various codes on a rolling basis and submit a report to the Legislature's Business and Labor Interim Committee that includes "whether the UBCC recommends the Legislature adopt the update with any modifications; and describes the costs and benefits of each recommended change in the update or any modification."[2] The Legislature intentionally extended the deadline of the 2021 IECC report to 2022 to allow more time to review updated codes during this review cycle.[3]

Importantly, the 2021 IECC is just one of many codes that the UBCC must review. Given that the UBCC is already tasked with reviewing the 2021 IECC this year, UCE and SLC filed the Application during this 2021 review cycle to avoid the need for additional meetings by the UBCC advisory committees. The next opportunity for a concurrent review will not be for approximately 6 more years and the pace of electrification of our homes and buildings is expected to increase.[4] Now is the time to act on the Application and make it simpler for Utah consumers to cost-effectively adopt efficient electric appliances in the future when they choose.

## II. An Electric Ready Building Code Empowers Homeowners to Use Electric Appliances.

This section explains what the proposed amendment requires before explaining the key benefits of moving to an electric-ready code. At its core, the proposed electric-ready provisions

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[2] Utah Code § 15A-1-204(4).
[3] S.B. 33 (2021), available at https://le.utah.gov/~2021/bills/static/SB0033.html.
[4] *See generally*, *The Coming Electrification of the North American Economy*, The Brattle Group, available at https://wiresgroup.com/wp-content/uploads/2020/05/2019-03-06-Brattle-Group-The-Coming-Electrification-of-the-NA-Economy.pdf/

require sufficient panel capacity, wiring, and outlets for the following uses: (1) space heating, (2) water heating, (3) vehicle charging, (4) clothes drying, and (5) cooking.

The proposed amendment **does not** require the installation of any specific appliances. Likewise, there is nothing that prevents the use of a gas appliance in new construction, instead, homeowners can choose the technologies they are most comfortable with. Moreover, the proposed amendment makes it easier for a homeowner to **use existing incentives** offered by utilities.[5] Increasingly, these incentives are offered as coupons at the point of purchase.[6] By ensuring the appropriate infrastructure is in place, the electric-ready provisions empower homeowners who choose to adopt efficient electric appliances to make the switch conveniently and **at their own pace**.

In addition, there are three key reasons why the electric-ready amendment makes economic and practical sense including (1) the cost-premium associated with retrofits, (2) the air quality benefits indoors and out, and (3) the need to be ready for the switch to electric transportation.

The electric-ready amendment makes economic sense. Installing this infrastructure after the home is built can be up to **4 times** as expensive as including the cost during construction.[7] Many appliances are only replaced when they fail, and we depend on these appliances for our health and safety. Higher retrofit costs discourage homeowners from adopting electric appliances because they are saddled with high costs to cut through drywall (and subsequently repair, finish,

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[5] *See, e.g.*, *Wattsmart Homes*, Rocky Mountain Power, available at https://www.wattsmarthomes.com/plumbing-and-water-heating/homeowners/.

[6] *See id.* at https://www.wattsmarthomes.com/plumbing-and-water-heating/homeowners/heat-pump-water-heaters/UT ("For your convenience, we also offer up to a $550 coupon that you can use at participating Lowe's, in store or online. No application necessary.")

[7] The retrofit premium for a single family home is approximately 4.2 times the cost of including it in the new construction. For low-rise multi-family the retrofit premium is approximately 2.7 times the new-build cost.

and paint the drywall), run additional wiring and install outlets, and possibly upgrade panel capacity. By ensuring homes are electric-ready when constructed, we can set homeowners up for an easy and money-saving transition to an electric appliance when replacing an appliance.

From a health perspective, adopting the electric-ready amendment can reduce both indoor and outdoor air pollution. "Area sources" of emissions, which include our homes and buildings, account for 40% of emissions in the valley.[8] As a matter of public policy, Utahns **consistently rank** poor air quality as one of their highest concerns and priority areas for action and policy solutions. Seven counties in Utah are currently under increased scrutiny by the EPA for failing to achieve air quality standards.[9] The 2020 "State of the Air Report" from the American Lung Association again ranked the Salt Lake City-Provo-Orem region among the worst 5% of U.S. metro regions in terms of both poor ozone days and 24-hour particulate pollution.[10] The residential building code presents a tremendous opportunity to improve health outcomes and protect the air quality in our shared airshed.

Moreover, we spend 90% of our time indoors—homes with gas ranges and ovens lead to a **24-42% increased risk** of cases of childhood asthma.[11] Interestingly, indoor air pollution can be much higher than the legal limits for outdoor air. This is due primarily to gas stoves that contribute to pollutants such as particulate matter (PM 2.5), nitrogen oxides (NOx), and carbon monoxide (CO) among others when combusted indoors. As the United States Environmental Protection Agency noted, homes with gas cooking appliances have approximately **50% to over**

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[8] *See e.g.*, *Understanding Utah's Air Quality*, Utah Department of Environmental Quality, Division of Air Quality (May 2019), available at https://deq.utah.gov/communication/news/featured/understanding-utahs-air-quality.

[9] *See Retrospective 179B(b) Demonstration for Utah's Northern Wasatch Front Ozone Nonattainment Area*, Utah Department of Environmental Quality, Division of Air Quality (May 2021), available at https://documents.deq.utah.gov/air-quality/planning/air-quality-policy/DAQ-2021-005764.pdf (seeking relief from reclassification to a higher nonattainment classification)

[10] Available at https://www.lung.org/research/sota.

[11] *Gas Stoves: Health and Air Quality Impacts and Solutions*, RMI (2020), available at https://rmi.org/insight/gas-stoves-pollution-health/.

**400% higher** NOx pollution concentrations compared to homes with electric cooking appliances.[12] As previously noted, while our proposed amendment would not require electric cooking equipment, it makes it simpler and more affordable for Utahns to choose electric cooking equipment in the future, and therefore benefit from improved indoor air quality.

In addition, on-road transportation creates the bulk of outdoor air quality pollutants in Utah. According to research from the Southwest Energy Efficiency Project and UCE, electric vehicles (EVs) reduce volatile organic compounds by 99%, sulfur oxides by 98%, NOx by 90%, and particulate matter up to 81% in the airshed relative to a new average gasoline engine.[13] Providing easy access to home EV charging incentivizes the adoption of EVs which reduces overall tailpipe emissions.

Finally, and specific to transportation, we know that almost **80%** of EV charging will take place at home.[14] As Utah continues to grow, we need to prepare for the adoption of EVs.[15] Ensuring access to home charging sets our communities up for success and allows for continued, sustainable growth.

## III. <u>The Amendment Saves Homeowners from Undergoing Expensive Retrofits When Adopting Electric Appliances.</u>

The proposed amendment is cost effective and substantially mitigates future retrofit costs associated with electrical capacity, wiring, and related components. Cost estimates are provided in the table below and reflect a **retrofit cost premium of 267% to 416%** for upgrading to

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[12] *Id.*

[13] *The Potential for Electric Vehicles to Reduce Vehicle Emissions and Provide Economic Benefits in the Wasatch Front*, Southwest Energy Efficiency Project and Utah Clean Energy (2017), available at https://www.swenergy.org/data/sites/1/media/documents/publications/documents/2017_EV_Emissions_Update_Wasatch_Front_Jan-2017.pdf.

[14] *See Electric Vehicle Charging for Residential and Commercial Energy Codes*, Pacific Northwest Nat'l Laboratory, (July 2021) at Figure 5, available at https://www.energycodes.gov/sites/default/files/2021-07/TechBrief_EV_Charging_July2021.pdf.

[15] According to a recent study published by Utah State University and prepared for Rocky Mountain Power, by 2026 it is expected that at least 64,000 of cars in Utah will be EVs, by 2031 that increases to over 234,000.

electric readiness in the future if these elements are not incorporated upfront as part of new construction.

The cost of the proposed amendment is estimated at $925 for single-family homes, two-family dwellings, and townhomes, and $1,350 for other low-rise multifamily properties. This equates to a **$4.13 per month** monthly mortgage increase for a single-family property and $5.87 per month for a multifamily property, assuming a 30-year mortgaged amount of $450,000 at 3.25% interest.

This slight incremental cost allows consumers to save money on their energy consumption. For example, the operational cost savings of owning an EV is much greater than the overall cost of providing electric readiness for residential properties. According to American Automobile Association (AAA), an EV will save roughly $1,039 per year ($86 / month) in total fuel and maintenance costs compared to a comparable gasoline vehicle.[16] Recent research from Bloomberg New Energy Finance on battery costs suggests EVs could reach upfront cost parity with gasoline vehicles by the early-to-mid 2020s, **before the next code review cycle**.[17] With 80% of EV charging taking place at home—ensuring new homes in Utah are constructed to be electric-ready offers tremendous value to households who adopt an EV.

It is important to include electric readiness in our building code now because Utah is the fastest-growing state in the country.[18] Over the past 10 years, an average of 14,136 new single-family homes have been built each year in the state of Utah.[19] This proposed amendment

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[16] *See*, *Electric cars only cost slightly more to own than gas-powered ones*, American Automobile Association (2020), available at https://www.ace.aaa.com/automotive/advocacy/true-cost-of-electric-vehicle-ownership.html.
[17] *EVs Could Soon Cost Same as Gas Cars Thanks to Lower Battery Costs*, Car and Driver (2020), available at https://www.caranddriver.com/news/a34992832/battery-price-drop-2023/
[18] *Utah is the fastest growing state, according to new census data*, KUTV News (April 2021), available at https://kutv.com/news/local/utah-is-the-fastest-growing-state-according-to-new-census-data
[19] *See generally*, *Ivory-Boyer Construction Report and Database*, University of Utah, Kem C. Gardner Policy Institute, available at https://gardner.utah.edu/economics/ivory-boyer-construction-database. This includes detached 10,430 single-family homes per year, 3,462 condo/townhomes per year, and 244 duplex units per year.

represents an opportunity to "future proof" Utah homes against more costly retrofits. Assuming a similar rate of new residential construction each year, these proposed amendments will avoid approximately $54 million per year or about $544 million between 2023 - 2032 of retrofit costs.[20]

The table on the following page details the upfront financial investment in electric readiness alongside much higher costs to add electric readiness as part of a retrofit. In many instances, there may not be additional upfront costs incurred when a contractor is already installing an electric appliance for these end uses. A least-cost compliance pathway could result in upfront cost savings for this approach when associated gas infrastructure is avoided.

[20] This estimate does not account for low-rise multi-family property types not reflected in the Ivory-Boyer Construction report and it also assumes that households will pursue a future retrofit to allow for electric appliances and EV charging.

| Electric Ready Cost Estimates - New Construction | | | | |
|---|---|---|---|---|
| **Property Type** | **Single Family** *(Includes Two-Family Dwellings and Townhomes)* | | **Low-Rise Multifamily** | |
| **Install Point** | **Upfront** | **Retrofit** | **Upfront** | **Retrofit** |
| **EV Ready*** | $325 | $1,325 | $750 | $2,300 |
| **Space Heating**** | $0 | $0 | $0 | $0 |
| **Water Heating** | $300 | $450 | $300 | $450 |
| **Kitchen Range** | $300 | $700 | $300 | $700 |
| **Clothes Dryer***** | $0 | $0 | $0 | $0 |
| **Electrical Panel****** | $0 | $2,300 | $0 | $1,500 |
| **TOTALS** | $925 | $4,775 | $1,350 | $4,950 |
| **Electric Ready New Construction** | **$925** | | **$1,350** | |
| **Retrofit Premium - Additional Cost** | **$3,850 (416%)** | | **$3,600 (267%)** | |
| **NOTES** | All estimates are based on providing electrical capacity, wiring, and related electrical components as defined in the code application. Cost estimates were identified based on a review of pre-existing literature on electric readiness along with consideration of input from contractors and building experts in Utah. Actual costs will depend on site-specific conditions and design and in some instances no upfront cost premium will be incurred for electric readiness where electric equipment is already being selected by the contractor. Electric appliance selection is anticipated to lead to upfront cost savings where gas piping and related infrastructure are avoided.<br><br>* The low-rise multifamily EV Ready estimate assumes one parking stall per housing unit. Economies of scale are anticipated depending on parking stall totals and configuration.<br>** Numerous sources indicated that there would be no premium for providing electric readiness for space heating where central air conditioning or comparable space cooling was being installed.<br>*** There is no additional incurred cost for an electric clothes dryer as local sources indicated this is being installed as an industry standard.<br>**** Electrical panel capacity additions, where relevant, were included in each end use for upfront costs and therefore no additional costs are reflected on this line for new construction. However, industry experts indicated that retrofitting all energy end uses to be electric ready in the future could uniquely create a need to upgrade a pre-existing electrical panel when additional panel capacity was not efficiently planned upfront and as electricity end uses change over time. | | | |

While preparing our cost estimates, we learned that many provisions are already commonly included in new residential construction. Electrical wiring and capacity for clothes drying, space heating, and cooking are already commonplace in many new homes. In addition, some builders like Ivory Homes make their garages EV-ready. Therefore, we believe that the cost estimates represented here are conservative.

In sum, providing electric readiness for residential appliances improves the ability of households to cost-effectively select these options in the future and take advantage of the full range of available technologies. This opportunity can be pursued much more cost-effectively while avoiding invasive retrofits when electrical capacity and wiring are installed upfront for each appliance.

## IV. The Amendment Does Not Increase Costs to the State or Local Building Departments.

There is no impact on the State budget or a local building department budget. Building codes are implemented by homebuilders and enforced by local building departments. Any indirect impact on local building departments is de minimis because they already inspect these same locations in each home.

For a detailed discussion on the incremental cost of compliance and their associated savings for homeowners see above.

## V. The Application Received Broad Stakeholder Support From Businesses and Local Communities.

Before filing this application, UCE presented the concept to various stakeholders, including private industry, local government leaders, and community organizations. In general, we received broad support for this application including numerous local government and private

sector community members.[21] Importantly, Salt Lake City Building Services is a co-applicant and is in support of the application to help ease the transition to a rapid shift in electrification consistent with its goals to reduce pollution and support improved air quality.

## VI. Conclusion

We request that the UBCC review and consider this application during the current 2021 code review cycle. Based upon the positive cost-effectiveness of new construction, the current state of electric-ready elements in current construction, we believe that UBCC is in the best position to take action to save homeowners money and help keep our air clean. We recommend that the UBCC transmit a positive recommendation of the proposed amendment to the Utah Legislature's Business and Labor Interim Committee and urge their adoption of the electric-ready amendment proposed here. This amendment is a critical step forward to empower homeowners and unlock long-term financial savings and air quality improvements as households take advantage of modern technologies.

Respectfully,

Thomas Kessinger

Thomas Kessinger, J.D.
Beneficial Electrification Program Manager
Utah Clean Energy

[21] *See*, Letter of Support, Appendix 1, included with this Application.

November 4, 2021

Chairman Peterson
Uniform Building Code Commission
160 East 300 South
Salt Lake City, Utah 84111

*Letter from Community Leaders to the UBCC in Support of Utah Clean Energy's and Salt Lake City's Joint Application to Incorporate Electric Readiness Provisions into the 2021 IECC*

Chairman Peterson and Members of the Uniform Building Code Commission:

On behalf of the signatories below, we offer our support for Utah Clean Energy's and Salt Lake City's joint application to amend the residential 2021 International Energy Conservation Code (IECC) to include electric-ready provisions.

"Electric readiness" empowers consumer choice in five key areas: home cooking, space heating, water heating, clothes drying, and electric vehicle ownership. The application *does not* require the installation of specific appliances—rather it empowers and protects consumer choice by making it simpler and much less expensive to install electric appliances in the future. Incorporating electric readiness into new construction allows homeowners, builders, and communities to budget for the electrification of homes and protects families from being burdened with costly retrofits to install electric appliances. Local analysis has found that making single-family homes "electric-ready" is **over 4 times less expensive** than retrofitting homes for electric-readiness after the fact.[1]

Electric readiness makes our communities safer. For example, recent research shows that the combustion of fossil fuels, such as natural gas, for cooking in our homes leads to negative health outcomes for families and communities.[2] The burning of fossil fuels indoors creates pollution linked to higher rates of asthma in children and other respiratory and cardiological illnesses in adults. In addition, these are the same pollutants that when emitted into our atmosphere contribute to poor outdoor air quality. "Area source" emissions, which includes our homes and buildings, are expected to become the dominant category of local air emissions by 2024.[3] Efficient use of electricity, which is increasingly being generated by pollution-free energy sources, like solar and wind power, represents a huge win for Utah communities. By making it easier to adopt electric appliances homeowners will protect Utah families and help conserve our airshed.

[1] For more information see Utah Clean Energy's and Salt Lake City's memorandum about the proposed amendment.
[2] *See* https://www.epa.gov/indoor-air-quality-iaq/sources-combustion-products, see also https://rmi.org/indoor-air-pollution-the-link-between-climate-and-health/.
[3] Utah Division of Air Quality as reported by Heather May, The Salt Lake Tribune (2019): https://www.sltrib.com/news/environment/2019/08/26/homes-are-big-part-air/

Our communities need to be prepared for the transition from fossil fuel combustion to electricity, including at-home EV charging, 80% of which is expected to take place at home.[4] Amending Utah's residential energy code with electric-ready provisions enhances consumer choice and sets our communities up for improved affordability when residents choose to use electric appliances. Rather than burden homeowners with prohibitively expensive and time-consuming retrofits, the proposed electric-ready energy code amendment will help ensure our communities are ready for future installations of at-home EV chargers, high-efficiency heat pumps, and electric ranges/ovens, and dryers.

The adoption of an electric-ready code during the 2021 code cycle is the logical next step in the modernization of our communities—there is no need to wait an additional six years for the next residential code cycle. Over the past few years, a number of all-electric buildings have been completed along the Wasatch Front by leading general contractors and each was more affordable than using a combination of gas and electric appliances. Moving to an electric-ready building code incentivizes all contractors, not just those comfortable with modern building technology, to be more productive with the same amount of capital.

In addition, the shift to electric-readiness unlocks tremendous value for utility customers. This value comes from the increased use of the electricity distribution grid while maintaining the same fixed costs. In essence, when we use the same utility infrastructure to serve more homes it can create downward pressure on utility rates, helping to keep Utah's electricity rates low for Utah businesses and families.[5] The adoption of electric readiness standards is the first step to unlocking that potential value to customers.

In summary, adopting the proposed electric-ready code amendments will future proof new residential construction so that homeowners aren't burdened with costly retrofits when installing an electric appliance in the future. Incorporating electric readiness into new construction will catalyze adoption of new clean air technologies and empower consumer choice. Adoption of the electric-ready code provisions will make it easier for Utahns to adopt combustion-free technologies and protect both indoor and outdoor air quality, while increasing the value of our utility system.

We urge you to approve the request to amend the residential 2021 International Energy Conservation Code, currently being reviewed for adoption in Utah, to include electric-ready provisions.

Thank you for your consideration of the proposed electric-ready energy code amendment.

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[4] See https://www.energy.gov/eere/electricvehicles/charging-home

[5] *See*, Eric Cutter et al., Energy+Environment Economics, Distribution Grid Cost Impacts Driven by Transportation Electrification, available at, https://www.ethree.com/wp-content/uploads/2021/06/GridLab_2035-Transportation-Dist-Cost.pdf, *see also e.g.*, Order No. 88997 at 43, Public Service Commission of Maryland, https://dms.psc.sc.gov/Attachments/Matter/8243954b-ffc4-4bb7-bbae-ff617c568b89 (agreeing in principle that "pairing EV adoption and EV charging with intelligent rate design can improve electric distribution system utilization and create downward pressure on rates through load management and system peak reduction.")

Respectfully submitted on behalf of the undersigned,

**Matt Abbot**
Director of Sustainability
Giv Group

**Shellie Barrus**
Executive Director
Habitat for Humanity of Summit and Wasatch Counties

**Andy Beerman, Mayor**
Park City

**Angela Choberka**
Ogden City Council Member

**Holly Daines, Mayor**
Logan City

**Jeff Drury**
Midway City Council Member

**Jeremy Farner**
Associate Professor and Building Design & Construction Program Coordinator,
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**Bryson C. Garbett**
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**Don Jarvis**
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**Mike Johnston**
Heber City Council Member

**Ravi Malhotra**
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**Moab City Council**

**Michael Peterson, Mayor**
Cottonwood Heights

**Kelleen Potter, Mayor**
Heber City

**Glenn Wright, Chair**
Summit County Council