Introduction

House Bill 22-1362.

In 2022, the General Assembly of the State of Colorado passed House Bill 22-1362\(^1\) (House Bill or state statute), requiring the Colorado Energy Office (CEO) and Department of Local Affairs (DOLA) to appoint an energy code board (the board) charged with developing a model electric and solar ready code (model code) for adoption by counties, municipalities, and state agencies in Colorado.

The board is composed of representatives from key stakeholder groups from across the State and throughout the building and design process, including building engineers, building code experts, renewable energy and energy efficiency experts, environmental advocates, home builders, trades representatives, affordable housing experts, and jurisdictional representatives from urban and rural communities. An executive committee was also appointed by CEO and DOLA per the requirements of the House Bill.

The model code sets the minimum requirements for each element within the model code. Jurisdictions are able to adopt and enforce the model code or any alternative code that achieves equivalent or better performance than the model code.

**Definitions from the State Statute**

The House Bill defined several key terms that bound the board to a set of baseline requirements for the model code. The key terms defined by the House Bill include the following. Please see the text of the House Bill for the full list of terms and definitions.\(^2\)

- Electric ready
- EV capable
- EV ready
- EV supply equipment (EVSE)
- Mixed fuel building
- Provisions for electric service capacity
- Solar ready

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\(^1\) [House Bill 22-1362](#)

\(^2\) Section 1(1) of HB22-1362, CRS 24-38.5-401(1)
HOUSE BILL CODE ELEMENT REQUIREMENTS
The House Bill also outlined requirements for the three primary sections of the model code: electric ready, solar ready, and electric vehicle (EV) ready. The board was charged with articulating the specifics regarding the code elements within these three main sections and developing a process for certain buildings to apply for waivers from the code requirements.3

Required elements for each code section differed by building type and size; the House Bill distinguished requirements by residential buildings, commercial and multifamily buildings under 10,000 square feet (sq. ft.), and commercial and multifamily buildings at or over 10,000 sq. ft. The board had discretion under the House Bill’s code development process to determine the specifics of each code section’s requirements for each building type.

For a full account of the bill’s requirements, please see the text of the House Bill.

ELECTRIC READY CODE REQUIREMENTS
The House Bill required mixed-fuel residential homes and mixed-fuel commercial and multifamily buildings under 10,000 sq. ft. to be built electric ready. Commercial and multifamily buildings at or above 10,000 sq. ft. are required to provide dedicated electric panel space, electrical wire, electrical receptacles, and adequate panel capacity for electric-readiness.

SOLAR READY CODE REQUIREMENTS
The House Bill required all residential homes and commercial and multifamily buildings of all sizes to be built solar ready.

ELECTRIC VEHICLE READY CODE REQUIREMENTS
The House Bill required all residential homes be built EV ready or EV capable, leaving the board with the responsibility to determine which would be appropriate for Coloradans. For commercial and multifamily buildings of all sizes, the House Bill required parking facilities to supply EV ready, EV capable, & EVSE installed spaces with provisions for electrical service capacity in 20% or more of the vehicle parking spaces.

WAIVERS
All residential and commercial buildings are eligible for a waiver from the model code requirements in the case of a declared natural disaster or other circumstance as declared by the authority having jurisdiction (AHJ). Commercial buildings at or above 10,000 sq. ft.

3 Section 1(5) of HB22-1362, CRS 24-38.5-401(5)
are also eligible for a waiver if the project developer can demonstrate that the costs incurred as a result of compliance with the model code impose a **substantial cost differential** on a project. A substantial cost differential is defined by the House Bill as “one percent or greater of the total mechanical, electrical, and plumbing construction costs on the project”. The board was tasked with developing a methodology for determining whether or not a project has reached a substantial cost differential and developing a process by which local building departments should waive requirements of the model code to reduce the cost differential. This waiver section was included as a means to minimize costs to builders, building owners, and developers, but jurisdictions may opt to omit the waiver section from their codes and apply all requirements of this model code to all projects. This would be considered a strengthening amendment, as it would apply the requirements to projects that otherwise may not have had to comply with all requirements of the model code.
Table 1. Key code elements required by the House Bill by building type and size.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Solar Ready</th>
<th>EV Ready</th>
<th>Electric Ready</th>
<th>Waiver Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>Required</td>
<td>EV ready or EV capable.</td>
<td>Electric ready for mixed-fuel homes.</td>
<td>Natural disaster waiver.</td>
</tr>
<tr>
<td>Commercial &amp; Multi-Family &lt;10,000 sq. ft.</td>
<td>Required</td>
<td>EV ready, EV capable, &amp; EVSE installed with provisions for electrical service capacity in 20% or more of the vehicle parking spaces.</td>
<td>Electric ready for mixed-fuel buildings.</td>
<td>Natural disaster waiver.</td>
</tr>
</tbody>
</table>
| Commercial & Multi-Family >10,000 sq. ft. | Required    | EV ready, EV capable, & EVSE installed with provisions for electrical service capacity in 20% or more of the vehicle parking spaces. | Provide dedicated electric panel space, electrical wire, electrical receptacles, and adequate panel capacity. | a) Natural disaster waiver. 
   b) A standard methodology for determining when compliance reaches a substantial cost differential. 
   c) An evidence-based uniform process to allow a project to request a waiver. |

Validating Factors from the House Bill:
The board was charged with developing a model code that enables **Residential and Small Commercial & Multi-Family buildings** to be converted to high efficiency electric space and water heating equipment and appliances at the lowest possible cost to building owners and in consideration of home affordability.

Similarly, for **Large Commercial & Multi-Family buildings**, the board was required to take into account the cost-effectiveness of pre-wiring for future efficient electric equipment and the ability to determine what wiring and receptacle locations would be needed.
**HOUSE BILL MODEL CODE DEVELOPMENT PROCESS REQUIREMENTS**

The Directors of the CEO and DOLA appointed members of the board by October 1, 2022, ensuring geographic diversity and representation from each of the three major climate zones in the State.

The board was required to approve each element of the model electric ready and solar ready code by a two-thirds majority (14 members) of all members by April 1, 2023. After this date, elements of the model code that did not receive a two-thirds majority were then passed onto the executive committee. The executive committee was required to vote only on those elements that failed to pass the board by May 15, 2023. The executive committee votes required a simple majority (three members) to pass any outstanding code element.

**Part 1: Energy Code Board Overview & Process**

**Introduction to the Energy Code Board.**

The board included the following members. Listed next to each board member is the role that each member fulfilled, per the House Bill requirements. Members are listed in the order that their role appeared in the House Bill.

**CEO APPOINTEES**

- **Will Toor**, Director of the CEO.*
  - Adam Berry, the CEO director’s designee.
- **Ron Flax**, representing an urban county of the State, and a building official.*
- **Jason MacMillan**, representing a rural municipality of the State.
- **Chris Menges**, representing an environmental or sustainability group.
- **Kim Wheels**, representing an environmental or sustainability group.
- **Carolyn Elam**, a solar power expert.
- **Kristen Taddonio**, an energy efficiency expert.
- **Elizabeth Gillmor**, a professional engineer with experience working on systems for buildings.
- **Mary Wiener**, representing an electric, gas, or a combined electric and gas utility.

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4 Section 1(8)(a) of HB22–1362, CRS 24–38.5–401(8)(a)
5 Section 1(8)(b) of HB22–1362, CRS 24–38.5–401(8)(b)
6 Section 1(8)(d) of HB22–1362, CRS 24–38.5–401(8)(d)
7 Section 1(3) of HB22–1362, CRS 24–38.5–401(3)
• *Note: Mary left the board in January after she transitioned positions.*
• Rob Buchanan, replaced Mary Wiener in the role of the electric, gas, or combined utility representative.

- Kevin Eronimous, an architect.
- Brad Smith, a building energy code expert.*

**DOLA Appointees**

- Rick Garcia, Director of the DOLA.*
  - Maulid (Mo) Miskell, the DOLA director’s designee.
- Don Suppes, representing a rural county of the State.
- Tim Pate, representing an urban municipality of the State, and a building official.*
- Aaron Martinez, representing a for-rent nonprofit builder who serves populations with incomes under 80% of an area’s median income.
- Lauren DeBell, representing a nonprofit for-sale builder.
- Zachary Esquibel, holds an electrical license, plumbing license, or professional credential in the mechanical trades.
- Sean Wyatt, holds an electrical license, plumbing license, or professional credential in the mechanical trades and is a member of a labor organization.
- Andrew Harris, representing a statewide organization for home building professionals.
- Cody Davis, building operation expertise.
- Tom Riead, a contractor who provides mechanical, electrical, or plumbing services or represents a statewide association that represents mechanical, electrical, or plumbing contractors.

*Appointed as an Executive Committee member.

**Summary of Energy Code Board Meetings, Major Milestones, and Timeline.**

The board convened in October 2022 and commenced a series of 15 total meetings through March 2023 to deliberate and vote on a final model code for statewide adoption. A third-party facilitation consultant and technical consultant were hired to conduct meetings, draft model code language, and ensure the board met its statutory deadline for creating the model code.
For further detail on the contents of each board meeting, all meeting materials including meeting agendas, presentations, minutes, and livestreamed meeting recordings, are available online on the CEO’s energy code board website.8

**Review and Discussion of Code Elements**

Board Meetings #1–4 covered a comprehensive review of all solar ready, EV ready, and electrification codes adopted across Colorado. In the next set of meetings, Meetings #5–9, the board discussed specific code elements for each of the three main code sections outlined in the statute – solar ready, EV ready, and electric ready – and provided direction to the consultant team on the specific elements that should be included in the first code drafts. The board debated how each element should be written to achieve fairness across the State, consider technological obstacles, and ensure cost-effectiveness and affordability. In these discussions, cost-effectiveness was primarily considered as the balancing of upfront costs to make mixed-fuel homes and buildings solar ready, EV ready, and electric ready and the retrofit costs of installing solar, electric appliances, and EV charging in the future without readiness provisions in place.

**Drafting Process**

After these meetings, the consultant provided a draft code language package for each section of the model code for board members to review. Between the regularly scheduled board meetings, the board reviewed the code package drafts and suggested edits for full board discussion in the following meetings. At Meetings #10–12, the board reviewed and discussed the suggested edits from board members, then made preliminary decisions on those edits via a straw poll process. The straw polls were nonbinding, simple majority polls (simple majority of the full board, or 11 members) on each suggested edit to provide direction to the consultant team on the edits to include in the model code.

The results of these straw polls were incorporated into the next iterations of the draft code language. A preliminary draft code package was prepared by the consultant team following the straw poll processes. This draft was shared with the public ahead of Meeting #13, where members of the public provided comments and testimony to the board on the draft code package. Following the public comment meeting, the board discussed feedback from members of the public on the preliminary draft, then proposed new edits to the draft in response. The board then reviewed, deliberated, and straw polled these edits at Meeting #14.

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8[Energy Code Board website](#)
**Final Energy Code Board Votes**

After the final round of edits following the public comment session, the board received a full draft code package for review. The 15th and final energy code board meeting was hosted on March 31, 2023 to conduct final votes on every individual code element. All elements that did not receive a two-thirds majority approval from the board were compiled and sent to the executive committee members in preparation for finalizing the model code.

**Executive Committee Discussion and Votes**

The executive committee was made up of 5 members of the full board. This committee convened three times to review all code elements that did not receive supporting votes from a full two-thirds majority of the energy code board during Meeting #15. Following a similar process as the full board, the executive committee reviewed the code elements that were not approved by the board, and deliberated on changes or removals for each of the code elements to address concerns raised by the full board. Live editing of the code elements was followed by straw polling in the first two executive committee meetings to work towards consensus for the final code package. Finally, the executive committee conducted official votes on all code elements under their charge. Once this voting was completed, the model code package was finalized.

**Public Comment Opportunities Through Code Development**

Throughout the meeting process, the CEO hosted two open portals on their energy code board webpage for members of the public to provide comments or code proposals. These submissions were reviewed at the beginning of each board meeting, and the board was provided time at each meeting to bring up comments or code proposals with the full board for discussion.

In addition to the open comment forms hosted by the CEO, the board hosted a meeting dedicated to public comment to allow members of the public to share their comments live. This meeting, Meeting #13, offered each meeting registrant a maximum of five (5) minutes with the board to share their comment.

Following the public comment meeting, board members had the opportunity to draft and submit amendment proposals based on the public’s input that were deliberated and straw polled for incorporation into the final code package.
**Final Code Package and Report**

Following the board and executive committee meetings, the consultant finalized the model electric ready and solar ready code package. The code package includes an explanatory version of the model code, which provides notes on the board’s intent with certain code elements and directions for an AHJ in adopting the model code.

**Part 2: Explanatory Notes on Intent and Adoption**

The model electric and solar ready code includes a number of code elements that underwent significant discussion and deliberation by the board. The following section aims to contextualize the board’s decision-making process and clarify their intent for these code elements in order to support Colorado communities in their adoption and implementation of the model code.

**Elements That Impact the Full Model Code Package.**

**Scope and Major Renovations and Additions**

The House Bill requires adopting jurisdictions to apply this code to all “new construction” of, and “major renovations and additions” to, commercial and residential buildings. However, the House Bill did not define “major renovation and addition” for the purposes of the model code. It was thus interpreted that the board, while not required to, could choose to give direction to AHJs on defining a “major renovation and addition” as part of the model code. The board decided, for the purposes of compliance with the model code, to allow each AHJ to determine their own definition of “major renovations and additions.” The jurisdictional definition would then determine how the requirements of the code applied to such projects in their jurisdiction.

During the final board vote, all but one of the scope sections (Sections RE301.1 in Chapter 3; RS401.1 and CS401.1 in Chapter 4; and RV501.1 and CV501.1 in Chapter 5) failed to reach a two-thirds majority consensus. The failed votes and subsequent board discussion indicated the board’s intent to allow the executive committee to revise the language from “new construction” to “new buildings” to maintain consistency with the language used in the administrative chapter of the model code, as well as other codes.

During executive committee review of these scope sections, it was again brought forward that the House Bill required AHJs to apply the model code requirements to both new construction and “major renovations and additions” to commercial and residential buildings. The executive committee members determined that, although the full board
opted not to define “major renovations and additions” in the body of the code, these terms should be included, but left undefined, in the model code scope. The intent is to clarify the need for AHJs to define major renovations and additions to which the model code requirements would apply during their adoption of the model code.

Ultimately, the executive committee agreed on two changes to each scope section noted above. The first change updated the language to “new buildings” to maintain consistency with the Chapter 1 Section 101.2 Scope, assist with AHJ enforcement, and align with the intent expressed by the full board. The second change added language to direct AHJs to apply the requirements of those sections both to “new buildings” and to “major renovations and additions”, instead of just “new buildings.”

**Implementation Note: Each AHJ must define “major renovations and additions” when adopting the model code.** AHJs have full discretion to define what renovations and additions constitute “major renovations” and “major additions”, but all renovations and additions that fall under the jurisdictional definition must comply in full with the model code.

**Defining Residential and Commercial Buildings**
The board voted to include definitions of “residential buildings” and “commercial buildings”, which differ from the definitions included in the IECC, and align the subsections of Chapter 1 Section 101.4 Applicability with these definitions. The code requirements that emerged from the board’s discussions suggested that R-occupancies would be most easily and efficiently covered under the commercial buildings definition, as key considerations, such as usage behaviors, energy load, and construction process, most closely resembled those of other commercial buildings.

The definition of “residential buildings” aligns with the International Residential Code definition and includes all one- and two-family dwellings and townhomes. The definition of “commercial buildings” aligns with the International Building Code definition and includes all building types that are not covered under “residential buildings.”

**Variance and Waivers**
The House Bill required the board to include a waiver process for buildings impacted by declared natural disasters and a waiver request process for a builder, building owner, or developer of a commercial building greater than 10,000 sq. ft. that incurs a substantial cost.
differential\(^9\) by meeting the code requirements. The board was left with the discretion to design the specifics of these processes.

For the substantial cost differential waiver, Sections 102.1.1 Commercial Buildings 10,000 sq. ft. or Greater and 102.2 Substantial Cost Differential Waiver, the board’s key decision points included whether or not to allow the AHJ to waive all of the code requirements for buildings that could successfully demonstrate a substantial cost differential, and how such demonstration of a substantial cost differential in waiver requests should be validated. The majority of board members agreed most elements of the model code would not incur a significant cost; therefore the board chose to allow AHJs to exempt buildings from only some of the model code requirements. The model code permits AHJs to waive requirements of the model code for a project up until the cost to comply with the remaining code requirements equals less than one percent of the project’s total mechanical, electrical, and plumbing construction costs, including materials and labor.

**Implementation Note:** For both the natural disaster variance, described in Chapter 1 Section 102.1.2 Buildings Impacted by a Natural Disaster, and the substantial cost differential variance, AHJs must determine the specific implementation process for granting the waivers. The AHJ must also identify what documentation is needed to demonstrate the substantial cost differential. The natural disaster waiver may be granted on a case by case basis. As noted in the introduction, the variance and waiver sections were included, per state statute, as a means to minimize costs to builders, building owners, and developers in complying with the model code. However, jurisdictions may opt to omit the waiver section from their codes and apply all the requirements of the model code to all projects.

**Chapter 3 Electric Ready.**

**Future Electric Equipment**
The board developed and voted on a definition of “future electric equipment.” The definition captures their intent to ensure adequate physical space, electrical panel space, and electrical wiring is provided for all equipment necessary to support the conversion of combustion equipment to all-electric equivalents. From a physical space perspective, the board assumed that, in some cases, the future all-electric appliance would directly replace the location of the original/existing combustion equipment. *Chapter 3 Sections*

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\(^9\) Section 1(5)(c)(II)(A) of HB22-1362, CRS 24-38.5-401(5)(c)(II)(A)
RE302.2 Combustion Equipment, CE302.2 Commercial Buildings Less than 10,000 sq. ft. and all R-Occupancies, and CE302.3 Commercial Buildings 10,000 sq. ft. or Greater require reservation of additional physical space and electrical panel space because some all-electric systems, particularly those for space heating and water heating, need supplementary equipment such as air handlers, electric resistance backup coil, condensing units, and other equipment that are not necessary for combustion equipment.

**Commercial Buildings Over 10,000 sq. ft.**
For large commercial buildings, the requirements for electric-readiness were written to incorporate greater flexibility, acknowledging the challenge in predicting the needs of future large-scale electric technologies that may not yet exist to serve large commercial buildings. Learning from other Colorado communities with existing electric ready standards, the board determined the most cost-effective and flexible way to support future electric equipment in large buildings is to remove requirements for running wire and installing receptacles, allowing developers to install conduit and junction boxes only. This helps avoid the potential for creating stranded costs in unusable wiring or receptacles that would force developers to replace or remove the pre-installed electrical infrastructure.

However, these same communities also reported to the board that large commercial buildings face significant physical space constraints in efforts to electrify, namely for the additional transformers needed to accommodate greater electrical loads. To remove this barrier, the board agreed that large commercial buildings must retain physical space for future electric service equipment.

**Core and Shell / Tenant Finishes**
Core and shell buildings are buildings in which the outer structure is constructed first, with the intent that commercial tenants will subsequently move in and adapt spaces to their needs (e.g., vendors at a mall). Specific to provisions in *Chapter 3 Electric Ready*, the board expressed concern over burdening core and shell developers with all elements of electric readiness when they may not know at the time of design what equipment, appliances, electrical infrastructure, or electrical loads will ultimately be installed. The board agreed on a more cost-effective approach that shares the electric ready requirements between the core and shell developers and the first tenants to move into a core and shell building.

As a result, the board developed definitions for “core and shell” and “first tenant finish” and included subsection *Chapter 3 CE301.1 First Tenant Finishes* that captures their intent. This section requires first tenant finishes to meet the electric ready requirements of the model.
code before being issued a certificate of occupancy. By sharing these responsibilities, the model code reduces costs for the core and shell, while allowing the first tenant to tailor the electric ready infrastructure to their specific energy needs.

**Implementation Note:** Core and shell buildings must comply with Chapter 4 Solar Ready and Chapter 5 EV Ready of the model code when built.

**Chapter 4 Solar Ready.**

This chapter was modeled closely on the 2021 IECC Appendix RB Solar Ready Provisions and the 2021 IECC Appendix CB Solar Ready Provisions with a few key exceptions as detailed below.

**Solar Ready Zone**
The board altered the first exception in Chapter 4 Section RS402.1 General to specify that the on-site renewable energy system must provide electricity to the particular dwelling unit in order for a new residential project to qualify for the exception and bypass the solar ready zone requirements. The intent behind this change was to ensure that any dwelling unit developer that pursues the exception for on-site renewable energy instead of solar-readiness must install a solar photovoltaic (PV) system or other renewable energy system that offsets a substantial amount of the dwelling’s electricity consumption rather than a system that may provide minimal power to an isolated area of the property. Dwelling units that do not meet this requirement will still need to comply with the solar ready provision to ensure future tenants or owners can have a solar system that directly offsets their on-site electricity use.

On the commercial side, the board similarly adapted the first exception to Chapter 4 Section CS402.1 General to require projects to achieve a minimum on-site solar PV output capacity to qualify for that particular exemption from the solar ready zone requirements. The board added a second criteria to this exception, allowing solar arrays not directly installed on the building’s roof but somewhere on the building premises or parking lot to count towards the exemption, so long as it meets the size and output requirements. These two components were intended to provide commercial buildings flexibility with site design while ensuring the spirit of the solar ready requirements is met through adequate energy production.
RESIDENTIAL SOLAR READY ZONE AREAS
The board rearranged Chapter 4 Section RS402.3 Solar-Ready Zone Area to pull out townhouses as an exception from the language governing single family homes and require minimum solar-ready zones on a per-townhouse unit basis rather than the townhouse as a whole. The intent of this change was to ensure that each townhouse would be provided with its own solar ready zone as opposed to sharing a solar ready zone with other townhouses in the same building.

ROOF LOAD DOCUMENTATION
In Chapter 4 Section CS402.5 Roof Loads and Documentation, the board opted to remove the minimum pounds per square footage requirement from the 2021 IECC Commercial Solar Ready Appendix. Board members noted that some solar arrays may not require this, and that existing roofs not designed specifically with solar-readiness could often still accommodate solar arrays. The requirement was perceived to impose unnecessary costs and burdens on engineers and lead to over-engineered roofs.

INTERCONNECTION PATHWAYS
Board discussions and public comments on identifying interconnection pathways on construction drawings for solar readiness revealed that solar installers often prefer not to follow designated interconnection pathways noted on construction documents when installing conduit from the roof to the electrical panel. Many installers instead opt to route conduit on the exterior of the building. The adapted Chapter 4 Sections RS402.7 and CS402.6 Interconnection Pathway require that construction documents merely show a potential pathway for routing electrical wire to the roof to provide an option for solar installers, and indicate on the construction documents that it is just one of many potential pathways.

CAPPED ROOF PENETRATION SLEEVE
From conversations with experienced solar installers, referenced above, board members understood that running conduit along the exterior of a structure to connect a solar array to the building’s electrical panel is common practice. In such situations, the capped roof penetration sleeve becomes a stranded expense, so the board decided to exclude from the model code the requirement for a capped roof penetration sleeve that is included in the 2021 IECC Commercial and Residential Solar Ready Appendix.

ELECTRICAL ENERGY STORAGE SYSTEM-READY AREA
The provision of the 2021 IECC Commercial Solar Ready Appendix requiring an energy storage system-ready area was not a statutory requirement in the House Bill. Therefore
the board indicated initially it may be useful as a recommended code element. The board wanted to recognize the importance of energy storage to the clean energy transition and to electric grid resilience and reliability. However, subsequent discussions on the specifics of the language revealed that the suggested space sizing requirements did not necessarily reflect actual battery sizing options and was ultimately outside the scope of this model code. The board subsequently voted to exclude this language.

**CONSTRUCTION DOCUMENT CERTIFICATE**

Many board members emphasized that requiring both a certificate and a set of approved construction documents felt redundant and burdensome. However, the board noted that current and future homeowners or tenants may still find the certificate helpful in understanding what solar technologies their building or dwelling unit is capable of supporting.

The executive committee reviewed this code element and agreed to require it for residential buildings but remove the language requiring that a builder or registered design professional provide the certificate. The executive committee determined that code officials would struggle to enforce it for commercial buildings, thus creating a different requirement in the commercial solar ready section of the model code. Finally, the executive committee outlined the key items that the permanent certificate should contain, including the following:

- The location, image or descriptive text, of the solar ready zone.
- The total size of the solar ready zone in square feet.
- The structural design loads for the roof dead load and the roof live load.
- The “potential pathway”, image or descriptive text, for the conduit and wire to be run from the electrical panel to the solar ready zone.
- The total electrical panel reserved space set aside for future solar PV.

**SOLAR PANEL CAPACITY**

Parts 3 and 4 of the Chapter 4 Solar Ready code section were developed to ensure all buildings, regardless of design or roof area, can easily add a variety of solar power generation technologies. The board intended to incorporate flexibility with respect to new technology and building performance, acknowledging the potential for future, more efficient solar photovoltaic technologies that could produce the same energy output while using less space. Secondly, the board hoped to enable building owners to install solar panels on their property via ground mounts, regardless of any roof design constraints. Part
3 and Part 4 of Chapter 4 require all residential and commercial buildings to reserve electrical panel space for future solar installations, even if the building is exempt from the solar ready provisions.

**Chapter 5 EV Ready.**

**EV Capable Light Space Type**
As the board weighed upfront costs against retrofit costs for EV readiness infrastructure, it was determined that the largest retrofit expense would come from tearing up existing parking lots and rearranging building layouts to run new electrical conduit and provide additional electric service capacity for future EV chargers. As a result, the board developed a new EV space type designed to just require conduit and the physical space for future electrical service equipment needed to support EV chargers. This was done to enable buildings to meet future EV charging demand cost-effectively, with maximum flexibility and minimal upfront cost.

The EV capable light spaces do not count towards the statutory requirements for the minimum 20% of space types, as they do not meet the statutory requirement of providing electrical service capacity. An EV capable, EV ready, or EVSE installed space may each be used as a substitute for an EV capable light space, but EV capable light spaces may not be used to substitute for any other EV space type.

**Commercial Building Space Quantity and Allocation**
The House Bill charged the board with determining how many EV capable, EV ready, and/or EVSE installed parking spaces (all categories are referred to as, “EV space types”) that commercial building projects would be required to provide, and it required a minimum of 20% of total parking spaces be assigned as an EV space type. The board’s decisions had to balance upfront costs, future retrofit costs, and future EV charging demand. As context during the board’s discussion meeting, the CEO shared with the board the State’s goal, detailed in the 2023 Colorado EV Plan, to have nearly 100% of light-duty passenger vehicles on the road be electric by 2050.10

The board generally agreed that the percentage or amount of EV capable, EV ready, and/or EVSE installed parking spaces should depend on the building type. First, the board observed that most people prefer to charge their EVs at home. That meant that R-2 occupancies might expect the greatest demand for EV charging, while most other

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10[2023 Colorado Electric Vehicle Plan](#)
commercial building types would likely see more short term EV charging. Therefore, the board created higher space type allocation requirements for R-2 occupancies, which intend to reflect the immediate and expected needs for EV charging in multifamily buildings. The minimum required number of EV space types, including EV capable light, is 60% of the total parking spaces for R-2 occupancies with greater than 10 parking spaces, while the minimum required number of EV space types, including EV capable light, is 30% of total parking spaces for all other commercial buildings with greater than 10 parking spaces.

Next, the board recognized the cost burden that buildings with smaller parking facilities may face in meeting EV readiness requirements. As a result, the board unified around reducing EV space type quantity requirements for smaller parking lots and removed requirements for EVSE installed spaces in these lots. The board and executive committee ultimately required commercial buildings with 10 or fewer parking spaces to provide a minimum of two EV ready spaces and R-2 occupancies with 10 or fewer parking spaces to provide a minimum of 35% of total parking spaces as one of the EV space types.

Additional considerations that the board and executive committee weighed in their deliberations over space type quantity and allocation include accessibility of parking spaces with EVSE and risk of theft of copper wire for EV ready spaces.

**SPACE TYPE SUBSTITUTION ALLOWANCES**
The board voted to allow any extra space types of higher stringency to count towards the minimum requirements of a space type of lower stringency on a one to one substitution. For example, extra EV ready spaces that go beyond the code minimum may be used to cover EV capable or EV capable light space requirements.

In addition, the board agreed that commercial buildings and R-2 occupancies could substitute any EV space type requirement with the installation of direct current fast chargers (DCFC), as long as the parking facility maintained the minimum quantity of EV readiness spaces required by code. The board designated different substitution ratios for the two distinct building categories. R-2 occupancies may substitute a DCFC charger for up to 5 EV space types. All other commercial buildings may substitute a DCFC charger for up to 10 EV space types. The rationale for the difference in substitution ratios is that residents of R-2 occupancies are more likely to charge their EVs overnight and can tolerate longer charging times, while visitors to other commercial buildings would benefit from shorter DCFC charging times.
Implementation Note: AHJs may opt to adopt codes with stricter EV readiness requirements such as adopting higher minimum percentages for EV capable light, EV capable, EV ready, and/or EVSE installed parking spaces for any building type.

Part 3: Notes on Adoption

The House Bill requirements for adoption of the model electric ready and solar ready code will enter into effect on July 1, 2023. After July 1, 2023 a municipality, county, or state agency that updates any of their building codes must adopt this model code, or a code equivalent to or stronger than the model code, in addition to the 2021 International Energy Conservation Code (IECC). AHJs may adapt the model code in order to fit into their current building code framework as long as they do not weaken any provisions of the model code, and may amend the model code to increase the stringency of the requirements if they so choose. AHJs should review the explanatory version of the code package when reviewing the code for adoption. Any AHJs that wish to retain their current building codes do not need to adopt this model code, nor do AHJs that currently do not maintain a building code.

The 2023 Colorado legislative session delivered a House Bill that clarifies the adoption timing requirements for the model code and the 2021 IECC, and expands the applicability of the EV power transfer infrastructure requirements for multifamily buildings into the state electrical code. House Bill 23-1233, which was signed into law on May 23, 2023, allows a jurisdiction that adopts the state electrical code or plumbing code concurrently with the state to have until June 30, 2026 to adopt the model code and the 2021 IECC, if they do not update any other building codes after July 1, 2023. House Bill 23-1233 also directs the State Electrical Board to require compliance with the EV Power Transfer Infrastructure requirements for new and substantially renovated multifamily buildings (R-2 occupancies) in the model code in order to obtain an electrical permit, beginning March 1, 2024.