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Comments on 2025 Title 24 part 6 Energy Code

Additional submitted attachment is included below.

To whom it may concern,

As the 2025 code cycle is reaching the point of formal drafting and Express Terms in the next few months, I thought it would be prudent to highlight some elements that I hope that the Commission is, or will take into consideration in code development. My comments will largely be in the context of single-family code development, though some of this is applicable to to non-residential as well.

What does energy efficiency mean in the Energy Transition?
The 2025 hourly Long-Term Systemwide Cost multipliers (LSC) that underpin Title 24 Performance asset evaluations are manifesting a shift *away* from emphasizing peak cooling season grid constraints and costs. A cursory review of the multipliers shows peak events all across the year instead, which when combined with updated weather data, results in a significant rebalancing of the compliance game away from space cooling. Since the 2001 Energy Crisis, TDV's emphasized peak cooling and the design and construction industry has built supply chains, as well as design and construction intuitions around meeting that compliance test. As we forge ahead in the energy transition, the State's grid infrastructure will still likely face peak cooling constraints for the near and medium term, and I worry that this rebalancing of LSC multipliers, while necessary in our transition, may come at the expense of cooling efficiency unless we consider additional compliance tests and/or other policy interventions.

I believe I can vaguely understand and appreciate the policy challenge we're confronted with here; I'm reminded of the famously quoted (overquoted?) Wayne Gretzky—*"A great hockey player plays where the puck is going to be."* Policy has to define new and renovated building stock for where the grid is going to be 5-10 years from now, as well as 30-50 years from now, but with the added challenge that unlike a hockey player and puck, the evolutionary path of the grid is somewhat dependent on that same building stock.

It suffices to say that in the next 30-50 years as we adapt to global weirding, we'll continue to have peak cooling challenges, and we'll also perhaps have peaking heating constraints with respect to renewables during the darker stormy winters. And so our building stock should also be designed for both peaks. Eventually, I think it will be prudent to craft compliance tests for both space heating and space cooling, in additional to our *overall* compliance tests that we currently have for all regulated loads. Exactly what those tests are is an interesting question, and I'll posit two for consideration

- Peak Cooling Energy– this would be an evaluation of peak cooling site energy between standard and proposed designs applied to Performance projects throughout the State across a specific time period—perhaps a design 'week' or perhaps the whole cooling season.
    - While heating energy could in theory be evaluated in this manner, I'm not sure how to do this in a fuel-neutral manner. Natural gas and propane obviously don't have the same 'grid' constraints as electricity (though as fallout from Aliso Canyon shows us, they can still be critically constrained)
- Hours of Safety: This would be an evaluation of the Proposed and Standard design with respect to how many hours the building would be at a 'safe' indoor temperature during a grid outage without significant health consequences due to heat or cold stress. I think of this as a compliance test for PSPS events and the like.

Thinking more broadly about other strategies to sharpen out performance modeling and compliance tools to better equip our building stock for the future grid:

Load Calculations: Proper sizing of HVAC equipment in residential projects has long been a code requirement, but is poorly enforced by PE's and BI's (Plans Examiners and Building Inspectors). It could/should also be in theory enforced by the market, but given the information asymmetry, it effectively isn't, and so this represents a significant market failure. HVAC sizing will be increasingly important with electrification, and especially with the backup heating elements which could trigger spikes in power draw exactly when the grid would least tolerate it. I am pleased to see the CASE report which codifies sizing limits and parameters that are currently wholly lacking in code. Furthermore, I am pleased to see some attention on backup element equipment and controls, which are otherwise only lightly regulated in part 6. I encourage the Commission to peruse these proposals and consider incorporation. I'm still in the process of reviewing them myself and thinking ahead about possible compliance problems. The CASE team in charge of this was well equipped with that insight, so I think those questions were thoroughly considered.

Energy modeling detail:
Fundamentally, I believe that designing a home for optimal heating and cooling efficiencies does not need to be a zero-sum game. That isn't to say that performance algorithms are *currently* zero-sum between heating and cooling, but I believe as we move forward, they can be further evolved to further reduce their tradeoff factor. But this may involve some challenging questions for compliance and verification, and further interrogating the asset/occupant divide in efficiency evaluations. I'll mention some ideas here, which aren't without their problems and challenges.

- **Heat Pump modeling:** I saw the recent proposal for detailed VCHP modeling using NEEP database. I think this is a highly welcome evolution to incorporate more accurate modeling of heat pumps in our compliance engine. I still see the current VCHP modeling algorithms as a convenient placeholder until this category of systems can be better characterized in physics modeling. More important in the 'credit' these systems current receive is that there are appropriate compliance signals for better and worse systems.
- **Materials and Assemblies in Residential modeling:** Currently, residential performance modeling is arbitrarily constrained in the ruleset in its materials and assemblies. As an example, it is not possible to model a brick as a façade with appropriate thermal and physical characteristics. Many of these materials are available in the Non-residential side and I don't see any technical reason why they couldn't be implemented in the residential side within the CSE engine (and thus the reason for their exclusion is non-technical). These materials, especially with their mass characteristics, can have a significant effect on the overall physics modeling of the structure, for better or for worse… I believe it's imperative that we continue to sharpen the compliance ruleset to allow proposed design energy model to better match the design documents.
- **Cool Walls:** We have cool roofs, and CRRC also manages a database of cool 'wall' materials and coatings. Cursory modeling of building reflectance demonstrates significant reductions in cooling energy using these kinds of materials.
- **Ventilation Cooling fans:** Current algorithms impose significant discount factors on whole house ventilation cooling systems to reflect likelihood and duration of use. Perhaps these are necessary and prudent to some extent, but current discounts relegate this useful cooling technology to near irrelevance in compliance. In addition to a 'peak cooling' metric described earlier, I believe it's worth reconsidering how to reduce the discounts on this technology, either by reevaluating the philosophy behind those discounts, or by defining technological approaches that directly address those concerns (such as more building automation).

- **Window shading:** In my training in passive solar design (as well as Passive House), I was taught that buildings are generally a kind of thermal photodiode, where we let light in through glazing systems, and then we can design to building to effectively retain that heat. During cooling seasons, we can design systems to prevent that solar gain altogether. Fixed overhangs and sidefins are a simple approach, but are at best designed for climate averages, and not weather. Moving forward, we increasingly need buildings that can be responsive to peak *weather* events. I can understand the asset/occupant behavior divide in energy code development, but I would urge a revisit here with respect to operable shading here on glazing as it has a profound effect on reducing the current tension between peak heating and cooling.

PV and Batteries

I'll take the opportunity to mention something that I is already readily apparent to the Commission—the economics of solar PV and batteries are evolving rapidly, and code requirements for PV should be the least antagonistic to those economics as possible. At the core of this is a bit of a policy thicket—we have 16 sets of LSC multipliers for each electricity for single family residential (one for each CZ), but we have many more rate choices for each utility and region within that utility that have a large effect on economics with respect to the new Net Billing Tariffs. It may be prudent to make the PV sizing requirements conservative enough to maximize self-utilization and thereby maintain cost-effectiveness in most projects and rate options.

Certification for energy professionals and expansion of 3rd party verifications

In a more perfect world, PE's and BI's would be fluent with Energy Code to effectively enforce it. Alas, it is more often the case that we find enforcement to be lackluster.

Energy code has long dealt with the low-hanging fruit of 'simple' efficiency—i.e. more insulation, better windows, etc. and is now confronting a margin of 'smart' efficiency that is more complex to implement. As code requirements become more detailed and nuanced, I wonder how these elements will be enforced, and I worry that enforcement will handicap the evolutions we would like to have to facilitate the energy transition.

Here are some ideas that I've posed to building officials (via my local ICC chapter):

- 3rd party plancheck of part 6 compliance forms and modeling. Thorough plancheck of these forms (and even input models) can go a long way in achieving robust compliance in the field.
- Encouraging municipalities to require certifications/accreditations of documentation authors for new construction projects.
    - This could be requiring Certified Energy Analyst certification (as well as other possible accreditations) for some categories of projects for permit submittal.
    - Trained documentation authors can go a long way in preventing unforced errors in compliance.

Lastly—I'd like to touch on field verifications. As Commissioner McAllister has mentioned in his comments, 3rd-party verification will continue to be essential in the buildings of the future. As the commission is bolstering its oversite of this industry, I hope this comes with a commensurate expansion of efficiency credits and verification work that they can perform. We have by no means come close to exhausting the efficiency potential of our buildings, but marginal improvements are more likely to require specialized training to test and verify in the field, and thus a robust HERS industry.

--Luke Morton

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