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Optimize for climate change; engineered natual ventilation; filter access

I am sending a Word file with my comments because the links do not seem to work in the PDF version. Please let me know if this works for you.

Additional submitted attachment is included below.

TO: California Energy Commission

FROM: Thomas J. Phillips, Healthy Building Research, Davis, California

DATE: June 23, 2017

SUBJECT: Comment on CEC's June 6, 2017 Workshop on Indoor Air Quality, 2019 Zero Net Energy Residential Standards, Docket No. 17-BSTD-01

Thank you for the opportunity to comment on the California Energy Commission Staff Workshop on 2019 Zero Net Energy (ZNE) Residential Standards on June 6, 2017. The staff's efforts to protect the indoor environmental quality of buildings are much appreciated.

Please consider the following comments:

1. **In conducting your life cycle analyses, evaluate passive designs that optimize reductions in carbon emissions and in costs while maintaining comfortable indoor temperatures, at intervals through the end of the century under business as usual climate projections**.

This will provide decision makers and the public the information needed to develop building standards that protect the environment and provide healthy and comfortable buildings that do not rely mainly on mechanical air conditioning.

This approach responds to the 2013 report of the California Climate Action Team, Preparing California for Extreme Heat: Guidance and Recommendations to:

> a) Review and incorporate changes as appropriate, to state and local regulations, codes and industry practices for buildings, land use and design elements to identify opportunities to accelerate the adoption of cooling strategies for both indoor and outdoor environments (p. 10, Recommendation 1); and
>
> b) Evaluate strategies that could provide protection against heat and air pollution to vulnerable populations that are not based on energy intensive air conditioning (p. 17, Recommendation 4).

For an example of this optimization approach, see the modeling study of Boston and Washington, DC apartments by Glassman and Reinhart (2013). Their study showed how a building façade could be optimized for different time periods and for the overall time period, by adjusting the window area, roof overhang length, and insulation levels (Figure 1). The long-term optimizations justified bigger initial expenses, and the carbon and cost optimizations converged by 2080.

Other examples of new, low carbon buildings designed to avoid overheating in the future are found in the Design for Future Climate (D4FC) project, including the Bicester NW 500-home development and projects for other building types. Options were also analyzed to facilitate phasing in of adaptation measures over time.

2. **Require any building relying on natural ventilation to have the natural ventilation engineered to meet design goals, and to have back up exhaust ventilation for stagnant or low wind speed conditions.**

This approach is necessary to ensure that a building is adequate ventilated under nearly all conditions. Effective natural ventilation is also necessary in order to optimize the effectiveness of ventilative cooling, as is the provision of exposed surfaces of thermal mass. The engineering of natural ventilation is recommended in the Whole Building Design Guide (National Institute of Building Sciences, 2016), and it is an environmental quality requirement for the Collaborative for High Performance Schools certification (CHPS, 2014. CHPS California Criteria).

3. **Require easy access to air filter banks to facilitate inspection and maintenance.**

Good access to filters is required in ASHRAE 62, but it is a common problem in buildings (see Offerman study of new single family homes). It is a growing problem as our elderly population grows.

I did not find this requirement yet in the Title 24 proposed revisions. If it is included by reference to ASHRAE 62, it should also be listed specifically for design review and building inspection requirements.

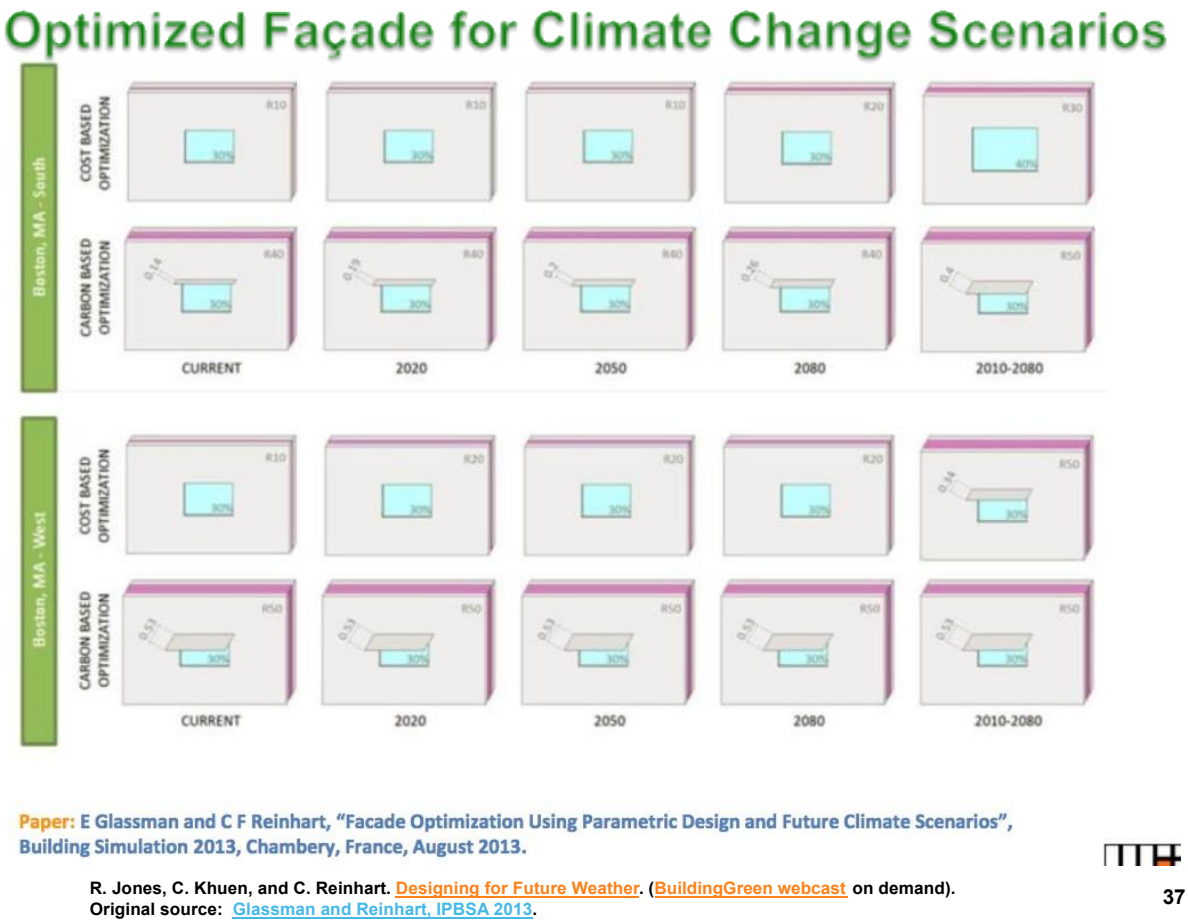
4. **Include recommendations for adapting existing buildings to extreme heat from climate change.**

This is especially important for existing buildings, which are often the most vulnerable to overheating, and which emit a large portion of California's GHGs. Many low cost adaptation measures could be included in building retrofits, remodels, and weatherization programs. Remodels and additions addressed under the new construction building standards are a good opportunity to take climate action to meet California's goals for improving energy efficiency in existing homes.

Sincerely,
Thomas J. Phillips
Healthy Building Research
Davis, CA

Attachment: Figure 1

Figure 1: Carbon and cost optimization of a building façade for climate change.
Source: E Glassman and C F Reinhart, "Facade Optimization Using Parametric Design and Future Climate Scenarios", Proceedings of Building Simulation 2013, Chambery , France, August 2013. Paper.



Paper: E Glassman and C F Reinhart, "Facade Optimization Using Parametric Design and Future Climate Scenarios", Building Simulation 2013, Chambery, France, August 2013.

R. Jones, C. Khuen, and C. Reinhart. Designing for Future Weather. (BuildingGreen webcast on demand).
Original source: Glassman and Reinhart, IPBSA 2013.

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