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Arup _ Comments on 2022 Update to Title 24, Part 6

Additional submitted attachment is included below.

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Our ref
File ref

ARUP

Commissioner Andrew McAllister
California Energy Commission
1516 9th St.
Sacramento, CA 95814

560 Mission Street
Suite 700
San Francisco 94105
United States of America
t +1 415 957 9445
f +1 415 957 9096
cole.roberts@arup.com
www.arup.com

November 29, 2019

Dear Commissioner McAllister

2022 California Energy Code Update – Comment Letter

Arup is excited to see the steps that the California Energy Commission is taking in the Title 24 development process to bring emission reductions to the fore of the compliance calculation process. Arup supports the EDR1 and EDR2 approach proposed by Commission staff.

The science behind Title 24 remains a critical lever for the State of California in cost effectively reducing building sector greenhouse gas emissions driving global warming. In a challenging feedback loop, the science of climate change is itself impacting Title 24 as a result of the climate dependencies of building performance. Arup believes greater opportunity exists to bridge climate science with Title 24 effectiveness.

Arup is pleased to see that the weather files used for both CASE analyses and for compliance calculations will be updated to more recent reference years, better matching the changes in climate that the world is already seeing. Based on presentations at the Commission, we understand that the CEC has not yet chosen to use projected weather data to reflect the climate that science has concluded is likely to occur in the future.

While there is uncertainty about the exact climatic conditions that will occur in California's 16 climate zones 20 to 30 years hence, science has concluded that the weather will very likely average warmer and more extreme than recent historic records. Arup encourages that the Energy Commission incorporate best practices in projected weather files for its analysis purposes, incorporating scientific projections of the likely future climate that buildings will experience. There are established peer reviewed methods to use future climate models to generate future TMY/EPW weather files for the purpose of building energy simulation. These methods have been in use now for over a decade in well over 100 global locations, including many locations throughout California. The WeatherShift datasets developed by Argos Analytics and Arup is just one such approach.

The WeatherShift datasets manage climatic variability in future-shifted EPW weather files by 1) incorporating a range of different global climate models with the option to incorporate regional climate models, and 2) maintaining the reference year climatic signature so relative analysis can be carried out compared to a historic year. WeatherShift allows researchers and energy modelers to

select a shifted dataset along percentiles tied to the inherent spread of fourteen climate models and two selected emissions pathways (RCP) established by the Intergovernmental Panel on Climate Change. The resulting 14x2 model spread is almost certainly a more accurate estimate of climatic conditions buildings will experience in California than is historical data.

To properly evaluate the cost effectiveness of new systems that the State may choose to require in buildings under the 2022 Standards, we encourage the Energy Commission to use such “bookended” future climate weather files to understand the likely upper and lower bands of cost-effectiveness for the updated Title 24 regulations.

To properly evaluate code compliance, we encourage using either the recent historical weather files or a single future climate adjusted weather file, potentially 15 years out (~2040) at the midpoint of the 30-year analysis period used for all envelope measures and many HVAC systems.

If additional insight is desired prior to adoption, Arup encourages the 2022 cycle be used as an opportunity to examine the implications of future weather file data in parallel with analysis efforts underway. To the State’s benefit, there are 6+ years of practice derived methodologies that are already in use by the building modeling and building science research communities. Those methods could be readily adapted to the Commission’s purposes should you decide to base your analysis on California’s expected weather conditions, rather than the conditions of the past.

While we think that using future climate adjusted weather files is quickly becoming best practice, particularly for an analysis as important as Title 24 development, we also understand that the Energy Commission has an enormous number of issues to consider and incorporate into its Title 24 development process. If bandwidth issues alone necessitate use of historic datasets, we understand the inherent resource limitations.

Thank you again for your leadership and the leadership of your staff in producing some of the most effective and thoughtful building energy efficiency regulations in the world.

Yours sincerely

A handwritten signature in cursive script that reads "Cole Roberts".

Cole Roberts, PE
Americas Energy Business Leader | WeatherShift Project Director