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California Air Resources Board
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Ms. Johnson:

Thank you for the opportunity to comment on the economic analysis plan for updating the AB 32 Scoping Plan to meet the 2030 target. The following comments raise some important issues regarding non-energy co-benefits of GHG reductions in buildings, especially for disadvantaged communities, and regarding affordable housing. These co-benefits provide further support for reducing GHG emissions from building construction and operation, and will help California meet the mandates of SB 535 to invest cap and trade funds in disadvantaged communities.

1. **The economic and health impact models used to update the scoping plan should include public health and social co-benefits from improvements in building energy efficiency, beyond the benefits of improved outdoor air quality and GHG reduction.** Based on the materials posted for the January 15, 2016 workshop on the economic analysis plan, the economic model presented does not appear to address the health and social co-benefits of improved energy efficiency of buildings, such as low-income home weatherization and other energy efficiency measures for existing buildings. (p. 6 at http://www.arb.ca.gov/cc/scopingplan/meetings/1142016/e3pathways.pdf).

The co-benefits of home weatherization can be substantial, especially for low-income households, and should be factored into the economic and public and worker health analysis. These co-benefits include not only reductions in outdoor air pollution and GHG emissions, but also improvements in health, safety, indoor air quality, thermal comfort, social benefits, and reduced peak demand on the power grid. Regarding expected increases in extreme precipitaiton due to climate change, another co-benefit may be the reduction of indoor mold problems and the resultant health impacts on asthma patients. For single-family homes, the value of these co-benefits has been estimated at anywhere from 50% to 300% of energy cost savings.

Economic analyses of the federal Clean Power Plan by EPA and others have concluded that, based on the reduction of outdoor air pollution alone, building energy efficiency improvements are one the most cost-effective paths to GHG reduction. As you know, the Clean Power Plan includes an incentive for weatherization of low-income multifamily homes.

2. **A range of scenarios for improving building energy efficiency should be evaluated to determine what is cost effective over the life cycle of the buildings, and what additional investments should be made.** The proposed economic model does not appear to consider that residential buildings will be weatherized -- zero replacement is assumed over 35 years. (p. 43 http://www.arb.ca.gov/cc/scopingplan/meetings/1142016/e3pathways.pdf).

3. **The economic, energy, and air quality models used for the Scoping Plan should include the expected increases in heat and humidity, especially during heat waves.** The climate changes will increase peak and average cooling demands and also decrease grid efficiency and reliability. Significant increases in the number of heat waves in California are predicted by the 2020's and 2030's, and the emergence cliamte warming in California beyond its hottest season of the late 20th century is predicted by the 2030s. Building designers in the EU and North America have used future climate data to evaluate the performance of buildings and infrastructure over the lifecycle of the projects. FEMA now requires states to consider future climate changes in developing hazard mitigation plans for weather-related disasters.

4. **Home energy improvements also provide financial co-benefits to households, building owners, and communities that should be included in the economic model.** These co-benefits include improved resilience to weather disasters and power outages, increased equity, and reduced risk of loan defaults.

I have also provided some references below, in rough order of their discussion in the text above.

Please contact me if you have any questions.

Sincerely,

Tom

Thomas J. Phillips
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