January 12, 2022
To: California Air Resources Board
From: Muriel Strand, P.E.
Re: Comments on Building Decarbonization for the Scoping Plan 2022 Update

Thanks to Title 24, California enjoys the benefits of decades of energy-efficient design and construction, one reason that GHG emissions from the built environment are substantially less than those from motor vehicles.

While electrification is a prominent proposed solution for replacing fossil fuel appliances, there are other measures that deserve prior attention. Older buildings and rental housing are two categories that would greatly benefit from various conservation retrofits and renovations, such as double-pane windows, added insulation and passive solar retrofits. Conservation measures should come first, as they will reduce demand for any kind of energy source. Prioritization of various retrofit and conservation measures should be based on a 'triple accounting' system, where goods and services are labeled with 'prices' of embedded kwhr and GHG emissions as well as dollars. Also, it would be helpful if the time, energy and materials required for any project were accounted separately so as to clarify analysis of the trade-offs among human work, motor work, and available resources.

In many cases, residents of older buildings and rental units earn limited incomes which are insufficient to fund such retrofits. While existing government funding can help with such expenses, there are many such buildings and thus many potential green blue-collar jobs that merit meaningful support. Beyond that, we need policies that provide very inexpensive alternatives for low-income people to enjoy both economic security and low energy use. Currently, most of us live and work in ways that depend on cheap fossil fuel energy; we must develop and implement substantially different patterns of living and working that are far more thrifty and that depend only on steady-state ecological resources. Lastly, deferred maintenance is typically more often the rule than the exception. So attentive maintenance of any infrastructure or technology is an element of thrift too often neglected, leading to unwelcome effects on operations, energy efficiency, emissions, and equipment durability.

One policy which should improve the jobs-housing balance would be to require employers to internalize certain costs which they have succeeded in externalizing; for example, a requirement to pay workers for their commute time at the same rate workers are paid when on the job. Another policy that could support low-income Californians would be to define and approve carbon credits for specific individual conservation measures such as housing that represents less than a certain living area per person, or for replacing motorized appliances with muscle-powered appliances. Similarly, programs that subsidize replacing fossil fuel equipment with electrical equipment must also subsidize human-powered equipment. For example, when SMUD was paying homeowners to not use their AC at certain times of day, I was ineligible for any such subsidy for not using the AC I didn't have. For some reason, SMUD subsidized only electric replacements for gasoline lawnmowers; manual mowers were neglected.

Because fossil fuels provide physical energy, I have long focused my analysis on our basic physical needs: clean air and water, healthy food, cooking, comfy shelter, and plenty of sleep and exercise. This clarity facilitates plans and policies that can take shortcuts past various unnecessary appliances such as leafblowers and indeed motor vehicles themselves. Fussing about

the efficiency of this or that device is too shortsighted when we need to revise our whole societal technological structure to most directly use human muscles to achieve those basic needs. Consumer education is essential for supporting thrifty choices. EROEI can be assessed on a global level. For a deeper discussion of this perspective, see: https://www.researchgate.net/publication/333581837_Is_it_true_that_'Small_Is_Beautiful'

Building codes at all levels, including Title 24, need in-depth review and revision to incorporate provisions and procedures for permitting sustainable designs such as composting privies, adobe, and onsite water storage. Practices such as insulation retrofits and passive solar design should be automatically considered at the first stage of project planning, before investment decisions are made. In fact, the state's architect licensing exam should include a substantial section on passive solar design. LEED has a problem in that the powerful passive solar design concept is fragmented into 5-10 items appearing separately, and is not visible as the potential integrated energy saving concept it is.

HOAs should not be allowed to ban clotheslines and other sorts of traditional practices including vegetable gardens and hens. Parcels should not be zoned 'agricultural-residential' unless they are actually agricultural.

Plans for building decarbonization should look beyond the envelopes of individual houses and apartments, and consider the configurations of neighborhoods, towns, farms, land uses, and regional activities. We need plans and policies for reversing the separation of rural and urban areas, by reducing the maximum allowable farm size, and we need plans for providing traditional transitions between towns to farms rather than the abrupt boundary walls seen around new suburban sprawl. Federal law, which limits farms receiving irrigation water from federal water projects to a maximum of 160 acres, should be enforced.

Growing numbers of homeless people demonstrate the need for more thrifty, affordable housing. Research has repeatedly shown that housing the homeless is typically cheaper than all the government spending that's often wasted on having police sweep them from place to place and/or arrest them and send them to jail and then to court, on emergency room visits, on increased social services, etc. While existing analyses don't address the fossil fuel used for these activities, that aspect also needs attention.

Decarbonization of nonresidential buildings is also important. Industrial facilities such as food processing, jails, prisons, hospitals, clinics and server farms are all specialized structures that warrant individual attention as to the sustainability of their operational purpose as well as their energy usage, efficiency and GHG emissions.

Currently, Climate Action Plans are not enforceable except perhaps very indirectly through local elections. Would they be effective if everyone made a New Year's resolution? What would be the right things to resolve to do? The right way to do them? Many of the individual actions that are suggested to consumers seem like rearranging the deck chairs on the Titanic; we need organized societal policies for a 180-degree change in course. There are many ways that the costs of energy inefficiency and GHG emissions are externalized; these costs must be internalized and accounted where they belong. Allowing such externalities to continue is tantamount to fossil fuel addiction codependency.

What are the sustainable jobs of the future? So far, the policy discussion seems to be about PV, windmill, and battery installation, but not so much about the energy and resources required to manufacture, transport, install, and recycle them when they have worn out. Moreover we would be foolish to assume that the jobs we are accustomed to will be the jobs of the future, since the former are generally jobs that belong to a fossil fuel system. Identifying those future sustainable, humapower jobs is crucial to understanding the most overall energy efficient configuration of future land use planning.

What is the minimum list of human-powered tasks and jobs that suffice to provide for the basic needs of the people who are performing them, as a function of group size and acreage per person? Until we know what the future jobs are, and where it makes sense to perform them, we won't have a clear idea what transportation patterns and conveyances will be most thrifty and appropriate. And of course, all sustainable jobs will be 'high-road' jobs because all work that is ecologically sustainable and contributes directly to meeting basic needs will be respected and valued.

The presentation during the workshop about cooking with a gas stove seemed to me to exaggerate the health dangers of the typical emissions of NO2 and PM from gas ranges. Unless people often have all burners on high and are also deep fat frying, I'm having trouble believing that cooks are really putting themselves and their families at risk. As well, restaurants are usually required to install and use robust hoods and exhaust fans. I heard staff claim during the workshop that induction range cooking is a superior technique, but I didn't hear a convincing explanation. Nonetheless, I predict that electric *ovens* are an easy sell; stoves with gas ranges and electric ovens are available for consumer purchase.

It's certainly true that installing new natural gas piping requires more energy and materials than electrical wiring, for carrying equal amounts of power. However, affection for gas ranges seems tenacious, and could be satisfied by using canisters such as are sometimes used by those living far from the grid. Since it's the leakage of methane that's most of concern, where is methane leakage most likely to come from? Which methane control measures offer the best ROI?