KeepOregonCool
Oregon Global Warming Commission

MEMORANDUM

TO	Commission Members and Stakeholders
FROM	Angus Duncan, Chair
SUBJECT	DRAFT 2020 Built Environment GHG Emissions Reduction Options
DATE	December 6, 2019

Below is a first draft of potential Commission recommended actions to the Oregon Governor and Legislature to accelerate reduction of greenhouse gas (GHG) emissions in Oregon's Built Environment sector, and drive them downward toward State emissions reduction goals. The OGWC has received presentations, reviewed the literature (including local government carbon plans) and consulted with qualified observers and practitioners to consider what significant changes Oregon might consider going forward to reduce greenhouse gas (GHG) emissions in this sector. The Commission will deliberate on these, will consider additions and subtractions proposed by stakeholders, and will seek to arrive at a Built Environment GHG emissions agenda of next measures for Oregon.

These recommendations will build upon the Roadmap to 2020 Report provided the Governor and Legislature from the 2010 OGWC. In many cases they will repeat some of the ten-year-old recommendations from that earlier Report where little or no progress has been made over a decade's passing.

DRAFT 2020 Built Environment Emissions Recommendations

The OGWC has received presentations, reviewed the literature (including local government carbon plans) and consulted with qualified observers and practitioners to consider what significant changes Oregon might consider going forward to reduce greenhouse gas (GHG) emissions from Oregon's Built Environment sector.

First, some essential factoids

- The "built environment" – residential, commercial and industrial buildings (but not the production processes) comprise 35% to 40% of GHG emissions nationally; and about a third of Oregon's emissions.
- Some 80% of the buildings that will be using energy in 2050 are already in place today; and every new building built to standards that do not reflect our carbon emergency will hamper our ability to reach 2050 goals – and more importantly, our 2030 and 2040 goals.

- Physical limitations to retrofitting an existing building – existing structure, insulation values of walls and windows, Heat, Cooling and Ventilation (HVAC) delivery system and so on – will make retrofits to "net zero carbon" (NZC) values more costly and less likely to be achieved than a new structure designed to those value from inception.
- A "net zero emissions" building code, put in place today, would still only define 20% of buildings in that far-off year. The longer we wait to adopt a NZC requirement, the fewer such buildings will populate our communities in 2050.
- As the electricity sheds its fossil fueled plants, buildings using grid-supplied power (or local renewables) will see carbon footprint reductions.
- As the vehicle fleet electrifies, emissions associated with transportation, buildings and the electrical grid all intersect. The more efficiently this happens, the more carbon- and cost-efficient the solutions should be.
- If natural gas service continues to be extended to more buildings without commensurate decarbonization of the gas supply, carbon footprint reductions for those buildings will not be attained.

Cost v. Value Calculations

Oregon, like other jurisdictions, will also need to come to terms with "cost" vs. "value" questions. Costs of zero carbon designed buildings may often be competitive with standard designs. Whether they are or not, two other considerations should enter into the calculation/value calculation. First, life cycle costs – including fuel and operations costs – should be calculated along with "first cost" of construction. This is often difficult when structures are built for immediate sale, so the builder will not realize operations savings against building costs. A related issue is with structures used for rentals, where the renter pays the energy costs and the owner has less incentive to lower those costs by building (or retrofitting) to high energy/carbon efficiency values.

The second consideration is how to reflect the societal value of a private investment decision to build to NZC (or to retrofit to high energy/carbon efficiency). Lower carbon emissions benefit society; so do lower airshed emissions from combustion of fossil fuels, advantaging public safety, public health, scenic visibility, community resiliency and other values we often do not fully embed in these private decisions. Incorporating a Social Cost of Carbon (SCC[1]) into the Life Cycle Cost calculation (for construction, operations and maintenance) could enable incrementally or substantially more carbon-efficient measures to be designed into new buildings or included in a retrofit. This still leaves the question how to allocate costs among utilities (and their customers), private sector interests that benefit, and the public (expressed through government investments, incentives and/or regulations).

[1] The "social costs of carbon" is a concept developed by federal agencies during the Obama Administration. It seeks to internalize in federal investment and regulatory decision-making the many costs of carbon accumulation in the earth's atmosphere that are captured under the rubric of climate change and its effects. Note that the federal agencies analyzed these costs using three different discount rates – 2.5%, 3% and 5%. The lower the rate, the more serious and costly are climate effects regarded. At 3%, the social cost of carbon in 2020 would have been calculated at ± $50 per ton. The Trump Administration adopted discount rates of 3% and 7%; the latter reduces the social cost of carbon down to ± $1 per ton.

Recommendations

[Codes and Standards]

1. **Establish a Building Carbon Intensity Standard**. Such a standard might be expressed as carbon emissions per square foot, or another metric. It could assume, for purposes of this calculation, that energy imported from the grid or pipeline (and so outside the ambit of the building's design and operations) starts as zero carbon. The standard should encompass the life cycle carbon emissions resulting from a building's construction (if data are available) and operations, and would include values for at least HVAC, lighting and hot water as applicable; also mechanical systems such as elevators; but not emissions from industrial processes (which should be limited also, but will often require more specialized metrics such as Best Available Technology (BAT) evaluations). Such a Standard could then be used in support of advisory, incentive or regulatory ways and means to reduce emissions, either at the building level (insulation; windows) or upstream (to evaluate standard lighting, HVAC and other equipment). A CIS could be established either statewide or at a local government level.

2. **Update Appliance/Plug Load Standards**. The State of Washington has added 17 new products to its state standards, based on data and recommendations from the Appliance Standards Awareness Project and the California Energy Commission. The State requires that new water heaters come "grid enabled" for shifting water heating demand to off-peak hours. Oregon should have appliance and plug-load standards no less stringent than (a) its neighbors south and north, and (b) what a life cycle cost analysis, including an SCC valuation, would support. Standards should be revised regularly, and as often as appropriate to reflect rapidly evolving energy use technologies.

3. **Set Carbon Code for New Construction.** Set Oregon building codes on a trajectory to *onsite* NZC construction by 2030 for all residential, commercial and industrial structures as a statewide rule[2]. New construction should include, as a code requirement, pre-plumbing for gray water recovery and pre-conduit installation for electric vehicle (EV) charging stations at each parking space as provided for in Governor Brown's Executive Order 17-20. We understand that achieving NZC status will require actions beyond the direct reach of building codes, and of building owners and managers, including a zero carbon electrical grid (and/or zero carbon Renewable Gas), net metering, and access to off-site renewable generation.

4. **Adopt Retrofit Building Carbon Code**. All pre-existing structures with an area of (20,000?) square feet or greater should make a periodic (five year?) showing of retrofitting all cost-effective (including SCC) measures and equipment. At point of sale or major (>50% by value or square footage) remodel, all pre-existing structures should retrofit all cost-effective (including SCC) measures and equipment. Code requirements would apply buildings with rental units. Code may stipulate NZC where feasible, or a Carbon Intensity Standard (CIS) in lieu of an

[2] An "onsite" NZC would assume imported energy arrived as zero carbon for calculation purposes. The calculation may also need to build on an existing methodology such as the Zero Carbon Calculator program used by Oregpon in the most recent code revisions. Such a standard might require certain exceptions for special structures where cost effectiveness, after SCC application, remains elusive; such structures should make a showing of minimum carbon emissions achieved.

individual cost-effectiveness test for different structures; the CIS should reflect a basic calculation, including the SCC, for a size/type of building.

5. **Create Exception to Statewide Code Uniformity for Large Jurisdictions**. Larger jurisdictions (≥ 50,000 population) should have the option of more stringent carbon code requirements, and/or a more accelerated compliance schedule. The State, in consultation with these jurisdictions and other stakeholders, may elect to allow a standard code and a second more stringent/accelerated code sought and agreed to by the larger jurisdictions and consistent across them.

6. **Industrial Energy-use Emissions**. Industrial loads that result in GHG emissions generally fall into two categories.

    a. Certain processes (e.g., aluminum reduction) have energy and emissions characteristics that are shared only with other companies in the same business. More efficient technologies specific to these processes emerge in response to industry demand and/or government requirements. Requirements to adopt such new technologies often use a Best Available Technology (BAT) standard to set expectations for industries to manage their pollution effects. A BAT requirement should be adopted by Oregon for managing and reducing industrial process GHG emissions.

    b. Other energy usage in industrial facilities involves widely shared technologies. Lighting, hot water, cooling, motors and transport vehicles are some of these. For GHG emissions from such uses, industrial polluters should be subject to standards and emissions reduction requirements common to such uses economy-wide.

[Policies and Outcomes]

7. **Utilities Should Design and Deploy SmartGrid-Enabled, Neighborhood-Located Microgrids**. Jurisdictions should work with serving electric, gas and telecommunications utilities to create smart local networks that can self-supply some utility services as a usual practice, and serve to insulate neighborhoods in emergencies where service from the larger grid(s) may be reduced or unavailable. Such grids may include smart demand management and distributed energy production and storage systems (electrical, gas or thermal) that can be controlled either from the larger grid or from within the microgrid. The localized resources should also enable telecommunications capabilities (e.g., powered cell towers) that would be available in such emergencies. Costs should be borne by beneficiaries to the extent possible, recovered in utility rates where warranted by net benefits to utility customers, with the balance borne by the State or local jurisdictions to reflect community-wide benefits (such as resiliency in public emergencies).

8. **Eliminate all coal-by-wire electricity imports into Oregon by NLT 2027**. Oregon already has a law (SB 1547, 2016) that will cut these supplies off by 2030. Subsequent cautions by global climate scientists underscore the urgency of moving more rapidly to close out fossil fuel combustion, with a strong preference to having achieved substantial global reductions by 2030. Advancing the SB 1547 goal by three years is a proportionate response that will facilitate more

rapid emissions reductions in the built environment emissions. Reductions in this sector will be all the more necessary given the still greater barriers to achieving reductions in other sectors (transportation) and in other nations, especially those with emerging economies.

[Ways and Means]

9. **<u>Allow Regulated Utilities to Provide, and Rate-base, Certain Additional Carbon-Reducing Products and Services to Customers</u>**. The State has agreed to allow electric utilities to directly deploy public EV charging stations and equipment. Studies suggest that such excursions beyond the usual market positioning of regulated utilities can have cost and/or operational benefits for the utility's customers, as well as contributing to reduced transportation carbon emissions. The OPUC should consider where there are other comparable opportunities. For example, an electric utility might finance, install, and provide a service contract to a customer installing a high efficiency electric heat pump (first costs and customer concerns about reliability and maintenance costs may otherwise discourage a least-carbon choice). A gas utility, while transitioning to zero-carbon gas supplies, might similarly provide its customers with thermal storage[3] systems to augment their furnaces. If warranted to reach least-carbon outcomes, a utility might be allowed to own the heat pump or thermal storage, selling heat and cooling (BTU's) to the customer (possibly in a lease-to-own arrangement). Part of the value to the utility's other customers could be acquired in the form of central grid management (dispatch) of the home/business energy facility (with customer override). Alternately, a customer-owner might agree to sell certain on-call services (e.g., load cycling to flatten demand peaks) back to the utility. This option assumes a level of smart-system control available to either the customer or the utility, or (preferably) both.

[3] Thermal storage might consist, at its simplest, in thermal mass (stone; bricks) incorporated into the building design or contained in domestic hot water systems subject to certain demand limitations. More challenging but also flexible systems might include oversized hot water storage with heat transfer capabilities to space heat; and/or ground-source heat pump systems that use constant ambient temperatures beneath the earth's surface as a storage medium that can be tapped by the heat pump for heating or cooling.