Proposed Energy Commission Resolution - Low Embodied Carbon Materials in Construction

Whereas,

there is scientific consensus regarding the reality of climate change and recognition that the emission of greenhouse gases from human activity and the construction and operation of the built environment are significant drivers of climate change; and

Whereas,

the Intergovernmental Panel on Climate Change (IPCC), an intergovernmental body of the United Nations that is dedicated to providing the world with an objective, scientific view of climate change, reported in 2013 that the last 30 years were the warmest since 1850 and likely the warmest in the past 1,400 years, and that the current decade is set to be the hottest on record; that carbon dioxide (CO2), methane, nitrous oxide, and other greenhouse gas (GHG) levels are at their highest levels in 800,000 years; and that global mean sea level rose 0.62 feet from 1901 to 2010 and continues to rise; and

Whereas,

the IPCC in 2018 detailed why it is imperative to limit global warming to 1.5 ºC, and rapid, widespread, and unprecedented worldwide changes are needed to meet this target; and

Whereas,

within the IPCC's 2018 report is the global carbon budget for a 67% probability of limiting global warming to 1.5˚C which, considering actual emissions since its issuance, now requires that CO2 emissions be reduced 65% by 2030, and to zero by 2040; and

Whereas,

the city of Ann Arbor is committed to reducing its anthropogenic contributions to climate change through the development of environmentally-minded policies, such as the A2Zero plan for carbon neutrality; and

Whereas,

embodied carbon refers to the carbon emissions generated as a result of the manufacturing and transportation of materials and products, and construction of an infrastructure project; embodied emissions can be significant in large projects such as buildings, roads and water treatment plants; and

Whereas,

embodied carbon accounts for about half of the total lifecycle carbon emissions of a new infrastructure project, and as operational emissions reduce from energy-efficiency actions, the relative importance of reducing embodied carbon will grow; and

Whereas,

Production, transportation, and construction of concrete and steel make up the most considerable portion of embodied carbon in the majority of infrastructure addressing the embodied emissions in these two materials can serve to address the issue of embodied emissions meaningfully; and

Whereas,

a 2020 McKinsey and Company analysis of the cement industry showed that it accounted for 7% of global CO_2 emissions, and a similar study of the steel industry showed that it accounted for 8% of global CO_2 emissions; and

Whereas,

concrete is the most widely used construction material in the world because of its low cost, strength, and durability, among other factors, and is a significant component of all building and infrastructure projects; and

Whereas,

Production of cement, the critical ingredient that gives the concrete its strength, creates up to seven percent of the world's annual carbon dioxide emissions, mainly through a chemical process called calcination and high energy input (produced mostly from the combustion of fossil fuels); and

Whereas,

Low embodied carbon concrete is defined as concrete that has been verified, as measured by a Global Warming Potential (GWP) metric, to embody lower carbon emissions as compared to the baseline embodied carbon emissions of conventional concrete; and

Whereas,

lowering the embodied carbon emissions from concrete can be achieved through diverse methods and processes, including but not limited to: (A) using less cement in concrete mixes; (B) replacing or substituting cement with supplementary cementitious materials (SCMs) such as fly ash, blast furnace slag, or ground glass pozzolan; (C) using locally produced cement and other concrete components resulting in reduced emissions from transport; and (D) the utilization and mineralization of carbon in concrete materials; and

Whereas,

the quality of concrete may be improved through these techniques, the higher cost compared to traditional methods is offset by a lower necessary quantity of low embodied carbon materials, and the use of low embodied concrete is established in the construction sector and has been successfully utilized for the construction of building and infrastructure projects by several municipalities; and

Whereas,

structural steel also makes up a large portion of embodied carbon in traditional structural construction; and

Whereas,

low embodied carbon steels are available through highly recycled steel content and production at electric arc furnace plants. Both of these options are locally available, do not present a significant cost increase, and can be specified in new construction; and

Whereas,

another option for reducing embodied emissions due to structural steel is by reducing the amount of steel through efficient design such as composite design where concrete and steel are designed in tandem to minimize steel usage; and

Whereas,

the annual benefits of the use of this concrete and steel in the State of Michigan, if universally adopted, would be the equivalent to the carbon sequestration of tens of thousands of acres of preserved forest; and

Whereas,

the Global CO_2 Initiative, a research center at the University of Michigan, has offered to collaborate with the City of Ann Arbor with the development of a resource guide, to be hosted by the City of Ann Arbor, that describes effective methods to calculate and reduce embodied emissions in building materials; and

Whereas,

a 2021 task force organized by AIA Huron Valley, Washtenaw Contractors Association, and the A2 2030 District developed recommendations to lower embodied carbon of steel and concrete that can be implemented both immediately and in the future in SE Michigan, which will be used to inform the resource guide; and

Whereas,

the City of Ann Arbor has the opportunity to be an innovator and leader in the State of Michigan in promoting the use of these technologies and other strategies to reduce embodied energy in the built environment; and

Whereas,

The Office of Sustainability and Innovation (OSI) has a clear responsibility to encourage, enable, and unleash the power of innovation in support of the A2Zero goals; and be it therefore

Resolved,

the Energy Commission requests Ann Arbor City Council to direct the City of Ann Arbor to strive to use, and encourage and promote other entities to use, low embodied building materials in building and infrastructure projects involving concrete and steel, where the utilization of these materials does not significantly increase the costs of or delay project completion, and where utilization does not compromise either construction integrity or public safety; and be it further

Resolved,

the promotion of low embodied carbon materials could include, but may not be limited to, identifying and highlighting local low embodied carbon concrete and steel product options, making embodied carbon educational materials more accessible, recognizing local projects utilizing low embodied carbon products, advancing other low embodied carbon strategies like the use of high recycled-material content materials and the use of Mass Timber/Cross-Laminated Timber when appropriate, and sharing Ann Arbor's resolution, resource guide, program successes and lessons learned with other towns and local governments in the state and region; and be it further

Resolved,

the Energy Commission requests Ann Arbor City Council to direct the City of Ann Arbor to engage in work encouraging the City Planning Department and Commission to urge owners, developers, and property users to reuse / repurpose existing buildings of meaningful size as a means of minimizing the

net total carbon footprint of construction while not obstructing new development with significant social or total lifecycle environmental benefits; and be it further

Resolved,

the Energy Commission requests Ann Arbor City Council to direct the City of Ann Arbor to update the A2Zero plan with an embodied carbon reduction action plan by YE FY22; and be it further

Resolved,

the Energy Commission requests Ann Arbor City Council to direct the City of Ann Arbor to lobby the state and other entities, such as the University of Michigan and the Washtenaw County Road Commission, to adopt low embodied-carbon strategies related to the built environment.