Frequently Asked Questions about the Executive Order 20-01 Zero Energy Building Requirement

What does the Executive Order state with regards to Zero Energy buildings?
Section 1.b. of the Executive Order states that "...[d]irectors shall ensure that all newly-constructed state-owned (including lease-purchase) buildings shall be designed to be zero energy or zero energy-capable, and include consideration of net-embodied carbon." The order is stated under "Emissions Reductions Initiatives," and the intent is to develop buildings that support the State's greenhouse gas (GHG) emissions reduction goals.

Which projects are required to be Zero Energy?
New buildings and major renovations in Pre-design or Design shall now pursue Zero Energy (ZE) or Zero Energy-Capable (ZE-C) goals. The Executive Order applies to Executive Agency projects that include those serviced by DSHS, WSDOT, DOC, DES, ECY, WSP, DVA, LNI, DOH, LCB, WSDA, COM and DNR. Each agency will decide what energy efficiency improvements are possible for projects that have already completed design or are currently starting construction. Higher education projects are encouraged to pursue ZE and ZE-C goals at their discretion.

What does it mean for a building to be "Zero Energy"?
A Zero Energy (ZE) building generates enough renewable energy on-site to completely fulfill the energy it consumes on an annual basis, as measured at the site. ZE buildings are designed to avoid the use of fossil fuels and other forms of combustion. ZE is typically accomplished by incorporating energy-efficient design strategies, specifying electric heating and cooling systems, and maximizing the space available for renewable energy systems (e.g., solar photovoltaic [PV] energy).

What does it mean for a building to be "Zero Energy-Capable"?
A Zero Energy-Capable (ZE-C) building is designed to achieve the same level of energy efficiency as a ZE building and is capable of achieving ZE when renewable energy is added in the future. Unique projects with higher process energy use (e.g., laboratories or healthcare facilities) that cannot satisfy all energy needs on-site should be designed to achieve the highest level of energy efficiency that is feasible. Buildings with physical constraints to pursuing full ZE may also choose to source renewable energy from off-site (e.g., wind and solar farms).

What is Net-Embodied Carbon?
Net-Embodied Carbon, or simply "Embodied Carbon", refers to the GHG emissions associated with extracting, manufacturing, transporting, and installing the materials used in a building project. State project teams should consider how to reduce these embodied emissions by selecting materials that are locally sourced, require less energy to produce and install, or inherently sequester carbon (e.g., wood). The embodied carbon of projects can also be positively affected by reducing the quantity of materials utilized, particularly in the foundation, structure, and enclosure of a building.

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What is the difference between "site energy" and "source energy"? Why do we not account for source energy in our ZE definition?

"Site energy" is the energy consumed by a building within its site boundary, as stated on utility bills or on-site meters. "Source energy" is the total energy consumed in delivering power to a building, which includes losses in generation and transmission. Source energy can sometimes be two to three times higher than site energy for the same building, depending on the energy source. State projects are expected to use site energy to assess ZE or ZE-C achievement as it measures the energy directly consumed by the building and is typically easier to understand by all team participants. Site energy also does not incentivize the use of one fuel or energy source over another.

Is building to Zero Energy or Zero Energy-Capable more expensive?

In some cases it is more expensive to construct a ZE or ZE-C building, but not always. Designing ZE and ZE-C buildings often require higher capital investments in building envelope and system controls so that savings can be realized in mechanical and electrical systems, including less renewable energy. The best opportunities to reduce first costs are in Pre-Design and Schematic Design when the building program and form can be optimized to take advantage of daylight or natural ventilation. Decisions made later in design will typically carry higher cost premiums. Recent cost studies have shown that ZE-C buildings may carry a 1-12% capital cost premium and ZE buildings can carry a 5-19% premium compared to conventional construction; highly integrated project teams have been able to nearly eliminate first cost premiums. Overall, ZE and ZE-C buildings are typically less expensive to build and operate over their lifetime (Total Lifecycle Cost) compared to conventional buildings.*

Do buildings in hotter and colder climates, such as Eastern Washington, use more energy?

Not necessarily. ZE and ZE-C buildings operate in every climate zone across the continental United States, including Eastern Washington. Climate is not a barrier, but it must be considered when selecting the most effective energy-saving strategies. In Eastern Washington, where higher temperatures and sun-hours are prevalent, design strategies will use building envelope strategies to control heat gain, losses, and optimization of solar-based renewable energy systems.

Can a Zero Energy building use natural gas?

Generally, No. In Washington, all-electric buildings typically have lower GHG emissions over their lifetime. Natural gas should be eliminated from building heating and cooling systems. Any use of combustion should be limited to special process uses that require high heat or direct flames (e.g., laboratory burners).

Can a ZE or ZE-C building be served by a campus steam loop (based on natural gas)?

Yes, they can. Any heating or cooling energy provided by a campus loop should be included in the energy budget that is offset by renewables to achieve a ZE target. Both ZE and ZE-C projects should incorporate energy efficiency strategies to help minimize the long-term demands on the campus loop. Consider how your ZE project fits into the long-term energy plan to transition the campus loop to all-electric and renewable energy.

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* https://www.bdcnetwork.com/study-quantifies-cost-premiums-net-zero-buildings