DOMICOLOGY AS A STEP TOWARDS DECARBONIZATION

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In the years since the landmark 2015 Paris climate conference, global climate resilience leaders and local activists alike have increasingly called into account our relationship with the built environment as a key point of intervention in reducing global warming via greenhouse gas (GHG) reductions. Conventionally, this has meant an emphasis on operational carbon – emissions expended via the energy generation processes that power our buildings. In one sense this is not surprising, as roughly 40% of global electricity consumption comes from building operations (Global Alliance for Buildings and Construction, 2018). One manifestation of this focus that we often see on the local level are programs and incentives aimed at encouraging weatherization, energy efficiency, the installation of solar panels, etc. -- all of which are undeniably valid steps towards decarbonization.

Organizations like Architecture 2030 – a nonprofit based in Santa Fe, New Mexico that focuses on "[rapidly transforming] the built environment from the major emitter of greenhouse gases to a central solution to the climate crisis" - are taking the conversation one step further. While the emphasis on operational carbon has resulted in substantial advances in building technologies, such as increasingly efficient solar collection, expansion of geothermal technology, newer and more advanced building envelopes systems that reduce energy bleed, this approach alone leaves a substantial amount of carbon 'on the table'. (Or perhaps 'in the walls').

The domicologists in the room will know where this is going – without properly accounting for the carbon embedded IN the structure itself (all energy expended to manufacture and build), we are overlooking one of the most profound contributions to global greenhouse gas emissions. As structures become increasingly efficient (in terms of operational carbon), the relative impact of embodied carbon only grows. The World Business Council for Sustainable Development (WBCSD) released a study in 2021 estimating

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that up to 50% of all carbon expenditures from structures come from embodied carbon (in this context, the carbon spent to manufacture materials and construct buildings). Even in aggregate this figure is astonishing – but it becomes even more compelling when you consider that these emissions are all expended within the first few weeks/months of the structure's life (whereas projected operational carbon accounts for the full lifecycle of the structure, literally decades into the future.)

The World Economic Forum in 2020 highlighted recent research showing that for the first time in the history of our planet, anthropogenic mass (mass resulting from human creation) outweighs – all biogenic mass (read flora/fauna) globally. This trend will only exponentially increase going forward. The American Institute of Architects (AIA) shows that the current global building floor area is about 2.4 trillion feet, and that by 2060 this figure is expected to double – **meaning that we will effectively be adding the equivalent of another New York City to the planet every 34 days for the next 40 years**. With this trajectory laid out for us, even the most energy-efficient design practices will not be enough to mitigate the impact of embodied structural carbon.

This brings us to the point that domicologists (and numerous other related professions) have been harping on for years – until we fully understand and account for the carbon embodied in structural materials, we are not using all the tools that we must to mitigate the impacts of human-caused greenhouse gas emissions on our planet. This quote from the Michigan Healthy Climate Plan released April 2022 captures this gap very well, "Emissions related to the built environment are primarily due to use of heating fuels such as natural gas, propane, and oil." (EGLE, 2022). Throughout this section of the report, there is no mention of embodied structural carbon or of deconstruction and material reuse (which voids entirely carbon expenditures associated with creating new building materials by substituting salvaged ones). There is mention of the benefits of using low-carbon materials such as Mass Timber – but unfortunately—no discussion of the reality that Mass Timber can be produced using wood reclaimed from older structures. [For more on this research see www.domicology.msu.edu] This is not to say that the MI Healthy Climate Plan is inaccurate – but instead that unfortunately, the approaches therein relating to the built environment overlook a key point of intervention.