Climate change presents built environment professionals with the design challenge of our times, requiring a two-pronged approach of sustainability (mitigation) and resilience (adaptation). As a result, the demand for related design expertise has mushroomed and is growing. As ad hoc evidence look to the rise of the seemingly mandatory sustainability section, page, or at least genuflection on the websites of most major building engineering and architecture firms. However, if covered at all in design education, sustainability is typically presented in emotional terms as a vague moral imperative, resilience as a heroic response to an abstract danger.

The reality is that sustainability and resilience are quantifiable variables that belong on the list with budget, codes, gravity and the rest of the design constraints that define the boundaries of every real-world project. Young design professionals need not only understand the theoretical dynamics of sustainable and resilient design, they must also
be fluent in practical workflows to deliver it. But how do we quantify sustainability and resilience? How can these quantities be modeled to inform an iterative design process? What is the role of innovation? How can we deliver the required increase in performance at market rates? In short, how can design education convey the timely, marketable, and existentially necessary skill of delivering practical sustainable and resilient designs?

This paper explores this question through the lens of two successful entries in the US DOE Solar Decathlon, an international student design/build competition. The Solar D is an excellent testing ground for this topic because students are tasked with designing, building, and operating an affordable, marketable, state of the art, narrative-driven project in a competition that defines success essentially as both quantifiable and subjective (juried) sustainability and resilience. Successes and lessons learned in the process of taking students from a blank page to a finished, operable, inhabitable prototype on both projects are outlined and analyzed toward defining a useful approach to teaching sustainable and resilient design that is applicable to undergraduate architecture design studios and engineering core design classes.

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Clarke Snell’s professional focus is the development and application of sustainable and resilient building systems toward a zero-resource architecture. Specifically, he applies research into low-tech, high performance materials, assemblies, and systems to the design and construction of small buildings and their micro-climates with the goal of repeatable and quantifiable reductions in project carbon footprint. He holds a Master of Architecture from the University of North Carolina Charlotte (UNCC) and has experience in construction as a builder and design as the principal of his own residential design and consulting firm. Clarke has written three books and numerous articles on alternatives to standard construction methodologies. He is currently an Industry Associate Professor in the Department of Civil, Environmental, and Ocean Engineering at Stevens Institute of Technology where he teaches design and works to develop and teach methodologies for merging engineering and architectural workflows for low energy building design. For more information, visit clarkesnell.com