Requirements for Acquired Building Science Skills (e.g., KSA's, Core Competencies)

The Joint Committee on Building Science Education, along with our partners in the US Department of Energy (DOE) and other academic organizations, recognizes the need to assess the building science proficiency of design and construction professionals and the effectiveness of curricula and teaching resources in developing that proficiency. The Joint Committee has posted a matrix on building science proficiency requirements for academic disciplines supporting the design/construction profession. DOE has published Building Science Education Guidelines. In Canada and Europe, there are certification requirements for Building Science proficiency. For example, the Ontario Building Envelope Enclosure Council provides a certification for a building science professional (http://obec.on.ca/BSSO/default.asp).

Also, a number of A/E firms have developed their own requirements. Below is an example of one engineering firm's preliminary (draft) list of requirements for a building science professional. This particular engineering firm designs, investigates, and rehabilitates structures and building enclosures. Other firms involved in different aspects of the planning, design, analysis, construction or renovation of quality, high performance residential, commercial and institutional buildings may have a different set of desired KSA's.

"For an individual to be prepared for the building science profession, the following skill set is desirable on top of the standard requirements for accreditation and licensure for architects and engineers:

- **An understanding and competency in building physics** (heat, air and moisture transfer, including an understanding and ability to evaluate heat flow under each heat transfer mechanism (conduction, convection and radiation), an understanding of air flow and moisture-laden and contaminant laden air transport and understanding of diffusive vapor transport, and an understanding of wetting and drying mechanisms (i.e. all of the necessary building physics fundamentals and theory -- building scientists should be capable of relating software results back to first principles).
- **Understanding of psychrometrics** and how to use the chart to understand the HVAC process as well as to determine all of the parameters of importance for building physics from the chart. They must also be able to calculate and identify critical dewpoint conditions.
- **Ability to run hygrothermal modeling tools** (like WUFI) and heat transfer analysis (THERM, HEAT and HEAT 3-D), and equally as important, translate the results and be able to explain the results as they apply to the real world.
- An **understanding of architecture, architectural engineering, structural engineering, building enclosure design, building technology, and aspects of the other building sciences** outside of building physics (lighting and daylighting, acoustics, fire and smoke control, blast and hardening of structures for security measures) and the interrelation to building physics.
- **Understanding of the four major building enclosure systems** and how they are interrelated and tie-ins between materials and systems for the rainwater management system (waterproofing and flashings), air barrier system, thermal barrier system, and diffusive vapor flow control systems, as well as how building physics relate to these systems.
- **Ability to draw design details** for residential and commercial structures, tie-ins, and explain how each layer of the system is engineered to deal with a certain aspect of building physics, and where the details have to compromise to accommodate the predominant feature needed (say water tightness).
- **Understanding of commercial and residential construction**, including concrete-framed, metal-framed (structural steel and light-gauge framing), and wood-framed structures.
- **Understanding of testing equipment/tool**s used on-site to test flow paths for air, water and thermal transfer, including water infiltration testing (spray rack and nozzle), pressure gauges, theatrical smoke, blower doors, temperature and relative humidity gauges, and data loggers along with an understanding of how to interpret the results of the tests
- **Understanding of HVAC interaction with the building enclosure**, the enclosures impact on lighting and daylighting choices, and the impact of varying percentages of fenestration.
- **Ability to analyze building performance**, including the ability to run a refined and more accurate energy model, understanding parameters like the effect of adjacent buildings, the effect of space versus occupancy in deciding how much space needs to be conditioned and lit, versus "dead" space, and potential impacts of climate change, all related and tied back into the fundamentals of building physics".