LABORATORY SUSTAINABILITY

Laboratories need to be flexible enough to accommodate the changing needs of research. This is not to say that the goals of lab flexibility and sustainability are necessarily at odds with one another or a flexible lab cannot be made to be more sustainable as it is a well-known fact that lab spaces consume a great deal of energy and some of greatest energy use in labs is driven by the airflow for fume hoods which are statistically only in use for under 10% of the time (even during working hours which are only 1/3 of the total hours in a day). The challenge is not to just design minimal lab systems that use less energy, the challenge is to design right-sized and scalable laboratory systems that run efficiently at whatever portion of their capacity is in use at a given point in time and also with adequate capacity to be able to respond to future unknown needs for the reasons described above.

The approach to improving Lab Sustainability most often focuses on the energy savings associated with the reduction of airflow to labs. The standards of 100 ft. per minute face velocity at fume hoods and of 6 air changes per hour in lab spaces have been around for a long time and although often challenged, are very difficult to actually reduce because they have significant regulatory standing that has proven very difficult to successfully change. However, even within those parameters, there are good practical and effective ways to reduce energy use in labs, make the most of the systems that are designed into the lab building and look for opportunities to make labs safer.

For the labs in the new Stanford ChEM-H/SNI building project, currently under design, the grad student desk areas were segregated from lab space while still being located acceptably close to the labs they relate to. As compared to labs in which the grad students are located at desks within the lab spaces, locating them out of the lab space shifted over 16,000 ASF, or approx. 16% of total lab space from needing to be treated as lab space to essentially becoming office space. Doing this not only reduced the airflow to 16,000 sf of space from lab standards to office standards, it also changed the finishes, furnishings and lighting from lab to office standards. Furthermore, this is a safer design as the grad student desks are located out of the lab space which has risks from hazardous materials and fumes. Combining the grad students from more than one PI into common grad student areas also supports better collaboration.

Other concepts for energy conservation and flexibility in lab design employed in the current Stanford ChEM-H/SNI building project included sharing of fume hoods in order to minimize the number of fume hoods for certain lab types and designing the lab HVAC systems to maximize fume hood capacity for the volume of airflow to the labs. The SNI (Stanford Neurosciences Institute) Labs in the building had a low initial/known need for fume hoods but, since most of the SNI researchers in the building will be recruited after the building is designed and/or constructed, there is uncertainty about the fume hood count that will be required in the future. The SNI part of the building was also designed with a shared fume hood room centrally located in each lab neighborhood where infrequent users of fume hoods could have convenient access to a fume hood. The fume hood rooms also included dedicated Chemical Storage cabinets for each lab group sharing use of the fume hood

so the chemicals they would likely use the fume hood for were conveniently stored in close proximity to the hood. Finally, the lab airflow system was designed with a general lab exhaust system instead of a dedicated fume hood exhaust system. Designing labs with a general lab exhaust system enables every CFM of lab airflow, required for the 6 air changes per hour or as driven by lab equipment heat, to potentially be used for fume hood airflow. Therefore, the SNI lab spaces were designed to have much greater fume hood capacity than what is initially being used but no extra energy or construction cost was expended was needed to design in that extra capacity. It just takes thinking ahead to know what labs need over time, what their most common issues are over time and designing to address those issues in the design of the building.

Sustainability for labs also includes reducing waste. Labs should be designed for flexibility so renovations are minimized because lab furnishings are reusable and interchangeable. Standardizing on a flexible laboratory furnishings system and a simple program for storing unused components in warehouse space for potential future use is not only a good sustainability practice but it also saves significant cost and time when lab reconfiguration is required.

LEED®

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The Stanford University, ChEM-H/SNI (Chemistry Engineering & Medicine for Human Health and Stanford Neuroscience Institute) project is a four-story research laboratory facility to support combined interdisciplinary research, 235,000 sf., is being built to LEED® Silver standards. UCSF's Helen Diller Family Cancer Research Building Cancer Research Lab and Vivarium Facility, at Mission Bay campus (163,000 sf.) is LEED® certified.

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