

# Green Building Research Laboratory

*An Oregon BEST Signature Research Facility*

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Mechanical and Materials Engineering  
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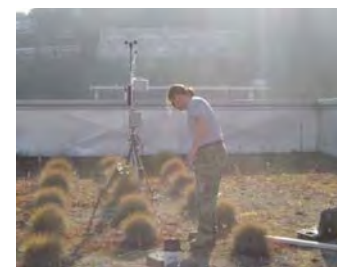
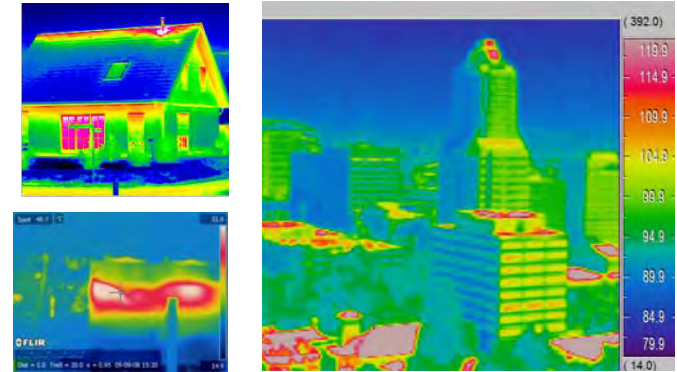
[www.greenbuilding.pdx.edu](http://www.greenbuilding.pdx.edu)

# The Green Building Research Laboratory (GBRL)

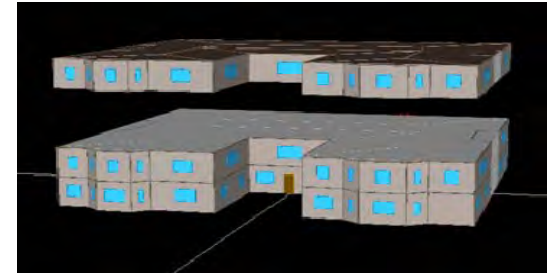
- GBRL Functions:
  - Fundamental research
  - Applied research supporting green building industry/community
  - Industry resource (testing and equipment loan)
  - Education (courses, seminars, intern programs)
- Laboratory capabilities:
  - Building envelopes (materials testing, system evaluation)
  - Whole building energy efficiency (modeling and monitoring)
  - Indoor environmental quality monitoring/testing
  - Building interactions with the outdoor environment
- Industry membership model (planned)
  - Levels of membership
  - Research advisory board

# Building envelopes (materials testing, system evaluation)

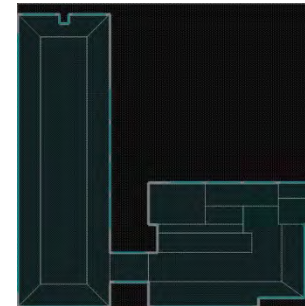
- Infrared thermography – assessing thermal performance of building envelopes, moisture problems, etc.
- Systems for assessing thermal, emissive, transmissive, and reflective properties of envelope & glazing materials
- Instrumentation for assessing performance of photovoltaic and green roof systems



# Whole building energy efficiency (modeling and monitoring)



- EnergyPlus and eQuest installed in lab and also in a classroom setting (24 workstations)



- Ventilation, infiltration and leak testing equipment

- Datalogging power analyzers and motor on/off loggers



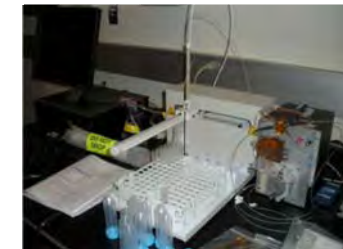
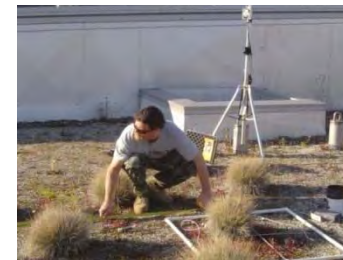
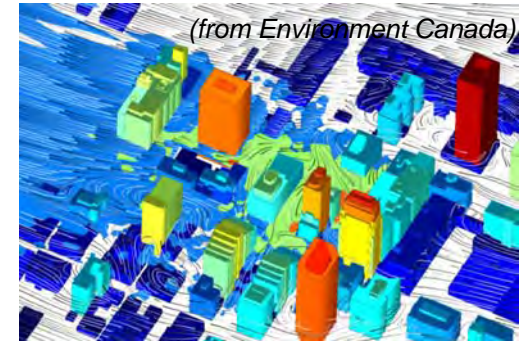
# Indoor environmental quality monitoring/testing

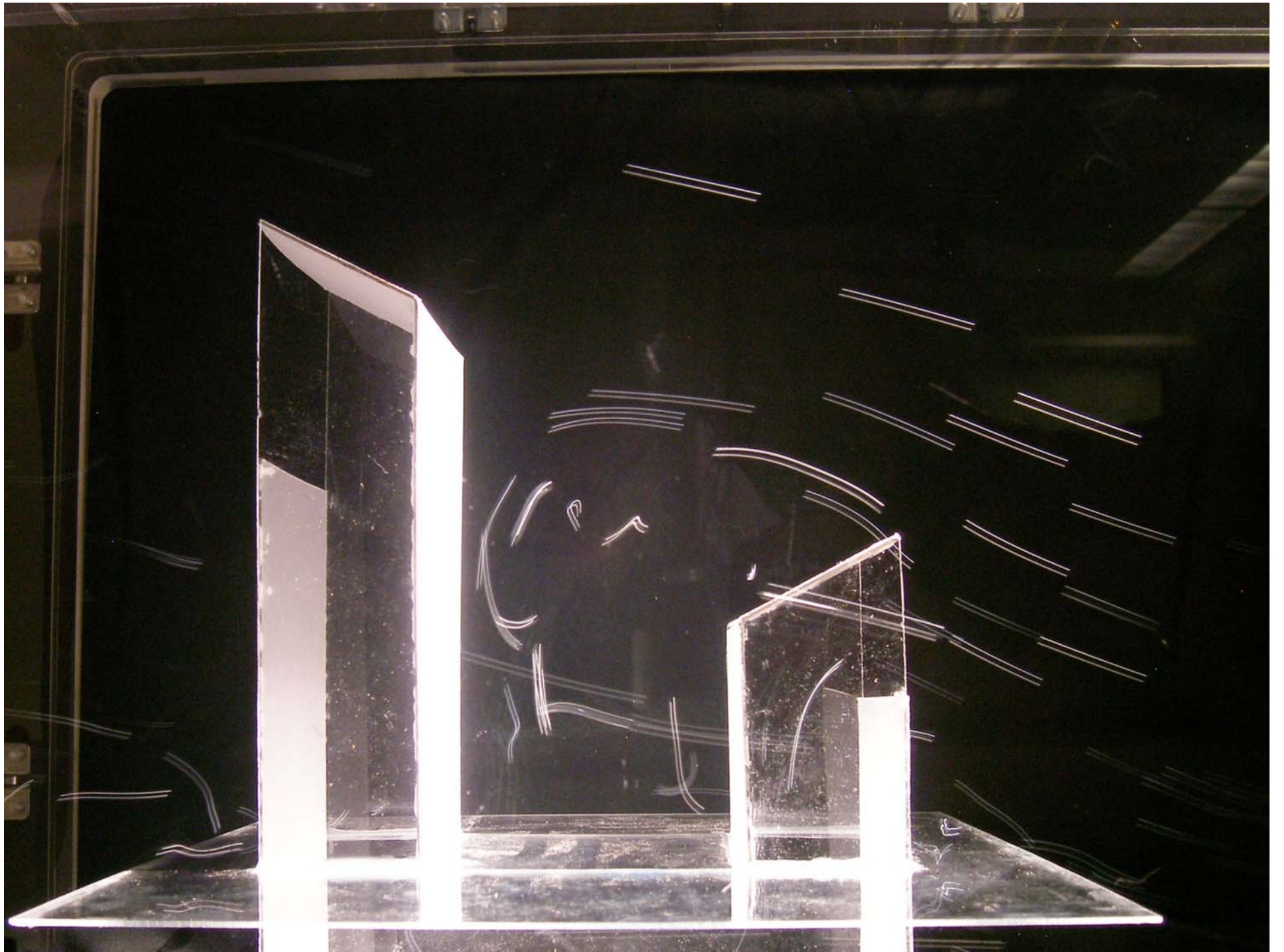
- Data logging capabilities for temperature, humidity, CO<sub>2</sub>, sound, and light
- Handheld indoor air quality sensors
- Available for student projects and for loan to industry partners



# Building interactions with the outdoor environment

- Computational Fluid Dynamics software (StarCCM) and an in-house atmospheric model enable simulations of air flow patterns within and external to buildings.
- Environmental sensors and weather stations for field measurements.
- Water quality testing for green roof runoff characterization





# GBRL – Next steps...

- Open house (today!)
- Bring in more faculty and build collaborations
  - New green building faculty positions at PSU (Arch & MechE.)
  - Expanding building science course offerings
- Seeking support for an annual operating budget
  - PSU CSP<sup>2</sup> , Oregon BEST, Federal support...
  - Industry membership model
- Start (continue) operations...
  - Supporting integrated PV-Green Roof study (NSF-funded)
  - Operable windows study (PSU Broadway building)
  - Green roof monitoring project (Southridge High School)
  - Testing phase change materials

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