Agenda

1. Overview of RA positions for Summer quarter
2. Energy Data 101
3. RA Project Preview
4. Q&A (by Zoom chat)
Environmental Frontiers (EF) creates collaborative research and educational opportunities focused on the intersection of environmental sustainability and urbanization, with the goal of giving students a scientific and practical understanding of sustainable urban development.

EFCampus provides a unique research opportunity for students to use campus data in projects assessing energy and environmental issues on campus. EFCampus brings together campus stakeholders – students, faculty, and staff – to explore practical and cost-effective solutions for reducing environmental impacts. EFCampus projects can be case studies for understanding a path to a more sustainable future, on campus and beyond.
EFCampus RA Positions

• Full-time in Summer Quarter, $5,000 stipend

• Work in teams on projects sponsored by Facilities

• Mentorship provided by MS engineer (Nilanjana Bhattacharya)

Proposed Schedule

*RA applications due March 26. RAs will be selected before start of Spring Quarter.

<table>
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<th>Week of Summer Qtr.</th>
<th>Activity</th>
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| Week 1              | • Meet with mentor to review project plan and objectives  
                      • Data training from Facilities Services |
| Weeks 2-6           | • Project work begins  
                      • Meet weekly with mentor  
                      • Data meetings with Facilities as needed |
| Week 7              | Progress review with full EF committee |
| Week 10             | Final project presentations |


EFCampus Projects

1. Evaluate the energy performance of UChicago laboratory buildings

2. Benchmark the performance of UChicago LEED certified buildings

3. Design a UChicago Sustainability App or Dashboard (including incorporating information currently included in the Sustainability Map)

4. Conduct a cost-benefit analysis for potential energy conservation measures to be implemented on campus

*RA’s will be assigned to one of these potential projects.*

*Indicate your project preference in the application.*
Campus Energy Basics
UChicago energy use
160 buildings
Electricity + natural gas, ~$40M/year
Energy basics

U.S. energy usage ~

1/3 natural gas
1/3 oil
1/6 coal
1/6 non-fossil

Electricity generation has roughly 30% efficiency on average in U.S.

“rejected energy” is largely waste heat of combustion – an inescapable loss

100 Quad/yr U.S. ~ 10,000 W/cap.

Estimated U.S. Energy Consumption in 2018: 101.2 Quads
Energy basics: numbers to know

• Your power usage as food
• U.S. average per cap. primary power usage
• ... primary power used for electricity
• ... x efficiency of conversion
• = U.S. average electricity usage
Energy basics: numbers to know

- Your power usage as food 100 W
- U.S. average per cap. primary power usage 10,000 W
- ... primary power used for electricity 3,000 W
- ... x efficiency of conversion x 0.3
- = U.S. average electricity usage 1,000 W\text{\textsubscript{elec.}}

UChicago per cap. power use: ~2300 W natural gas, ~1500 W\text{\textsubscript{elec}} electricity (2015 estimates)

→ lesson: universities are energy-intensive workplaces
Campus energy

Varies by building type

Labs, hospitals very high
Dormitories, offices low

High campus energy use is related to laboratory research!

“Source” energy use intensity (EUI) approximates the primary energy use by multiplying electricity by x3
Campus energy

Lab buildings also larger

Labs, hospitals dominate

UChicago energy use & costs
Campus energy

Lab buildings also larger
Labs, hospitals dominate
UChicago energy use & costs

Non-hospital mean values
Uchicago  Cornell
319  249  kbtu/ft²/yr

Savings if we become like Cornell:
~$4.6M/year  2015 estimates

Lesson: likely many good projects on campus
RDCEP energy visualizations

us.infrastructure.rdcep.org
us.sankey.rdcep.org

Lawrence Livermore energy Sankey charts:

https://flowcharts.llnl.gov/commodities/energy
EFCampus Project Preview
1. Evaluate the energy performance of UChicago laboratory buildings

Source: International Institute for Sustainable Labs (I2SL) [https://lbt.i2sl.org/buildings/charts](https://lbt.i2sl.org/buildings/charts).
2. Benchmark the performance of UChicago LEED certified buildings
3. Design a UChicago Sustainability App or Dashboard
4. Conduct a cost-benefit analysis for potential energy conservation measures

*Identify projects that provide net benefits that UChicago will then implement*
Q&A

• Sara Popenhagen, Facilities (Sustainability Manager)
• Brian Bozell, Facilities (Energy and Utilities Manager)
• Adam D’Ambrosio, Facilities (Energy Services Senior Director)
• Liz Moyer, Dept. of the Geophys. Sci. / RDCEP (Prof. / Director)
• Nilanjana Bhattacharya, Mansueto Institute (EFCampus Mentor)
• Diana Petty, Mansueto Institute (Associate Director)
• Sabina Shaikh, Program for the Global Environment (Director)

Reminder: Apply for EFCampus RA positions at https://bit.ly/3dquhTy, by Thursday, March 26