



AGRICULTURE, LAND USE FOOD & SEQUESTRATION

An enthusiastic group of faculty and staff from ACES, University Housing, and Facilities & Services, partnering with eco-conscious students who are focused on assisting the U of I campus in meeting its lofty iCAP goals for sustainability.

OBJECTIVES

1. Perform a comprehensive assessment of GHG emissions from agricultural operations, and develop a plan to reduce them, by the end of FY16.



Status:
In progress

- Submitted a proposal for hiring and funding a research tech to quantify the GHG emissions of the university's South Farms.
- Formed a consultation group focused on implementation strategies.
- Next Steps: Work with that consultation group to develop a plan to assess and reduce the GHG emission on South Farms.

2. Design and maintain campus landscapes in a more sustainable manner; expand the specification of sustainable plantings in campus landscape standards, and develop and implement a tree care plan by FY16 and an integrated pest management program by FY17.



Status:
In Progress

- Created a Pollinator Consultation Group to amend the approved plant list and guide for locations of plantings.
- Completed Tree Care Plan: <http://bit.ly/2dVsgQa>.
- New approved plant list will be released detailing more sustainable and non-invasive species planted on campus.
- Next Steps: Further meetings with Consultation Group.

3. Implement a project that examines the food service carbon footprint for Dining and other on-campus food vendors, while increasing local food procurement to 40% by FY25.



Status:
In Progress

Next Steps:

- Reach out to off-campus food vendors about calculating their food waste and buying local.
- Create page on the Housing Dining website detailing carbon impact of food.
- Educational fliers and signage as passive programming.



4. Increase carbon sequestration in campus soils by determining the sequestration value of existing plantings and identifying location for additional plantings, with a specific objective of converting at least 50 acres of U of I farmland to agroforestry by FY20.



Status:
In progress

- Explore opportunities for expanding current agroforestry holdings to achieve total of 50 acres.
- Assist with efforts for a campuswide tree survey to inventory existing tree stands and assess sequestration values.
- Next Step: Engage with Master Plan committee for areas to be converted.

5. Reduce nitrates in agricultural runoff and subsurface drainage by 50% from the FY15 baseline by FY22.



Status:
In Progress

- Delineated South Farms watershed to determine drainage outlet.
- Next Step: Working with graduate student(s) to sample runoff from South Farms for nitrate to establish a baseline.

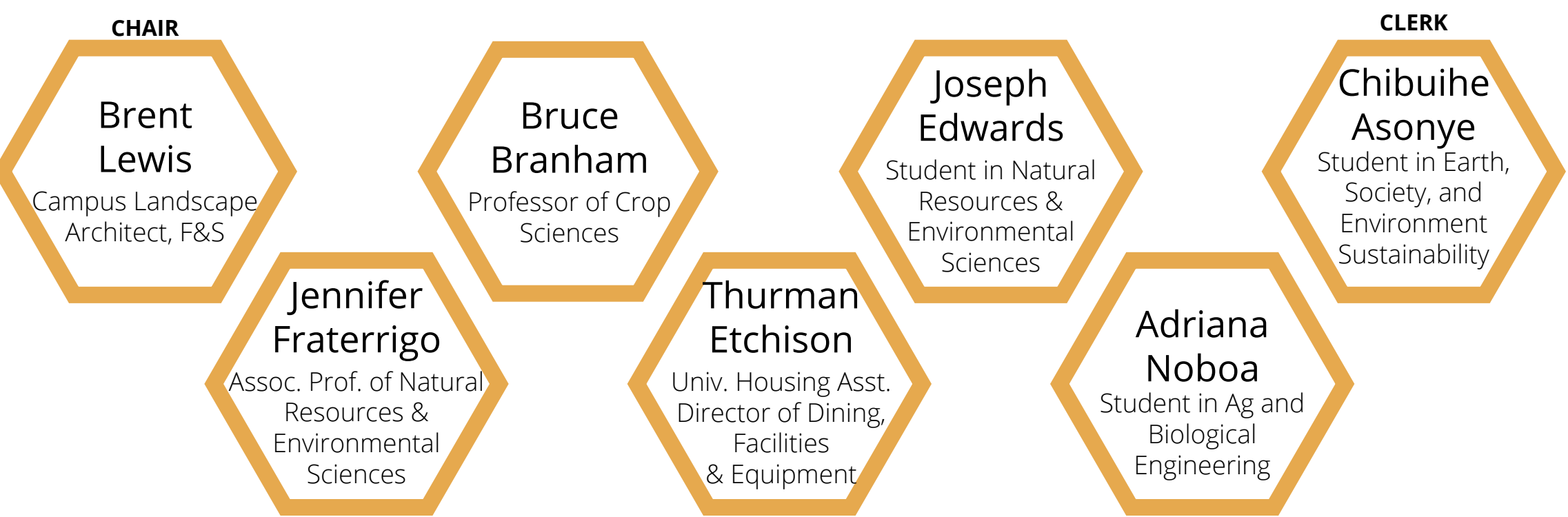
6. Incorporate sustainability principles more fully into the Campus Master Plan.



Status:
In Progress

- Campus Master Plan has feedback suggestion.
- Next Step: Participating in further discussion and providing feedback.

TEAM MEMBERS



ACKNOWLEDGEMENTS

We would like to acknowledge and thank our South Farms and Pollinators Consultation Groups for assisting us with developing and designing implementation strategies. We would also like to thank the College of Agriculture, Consumer, and Environmental Sciences for the constant support and encouragement in meeting the iCAP objectives.



ENERGY CONSERVATION & BUILDING STANDARDS

More than 80% of campus greenhouse gas emissions result from on-site combustion and grid electricity purchases that heat, cool, and provide electricity to campus buildings. Consequently, achieving our carbon neutrality goal will require a strong building energy conservation program, and this is considered top priority as it leads directly to both emission reduction and cost savings that can facilitate even further emission reductions. The ECBS SWATeam members recommend actions the Urbana-Champaign campus can take to best reduce building energy consumption.

OBJECTIVES

1. Maintain or reduce the campus gross square footage relative to the FY10 baseline.



Status:
Policy adopted. Implementation in progress

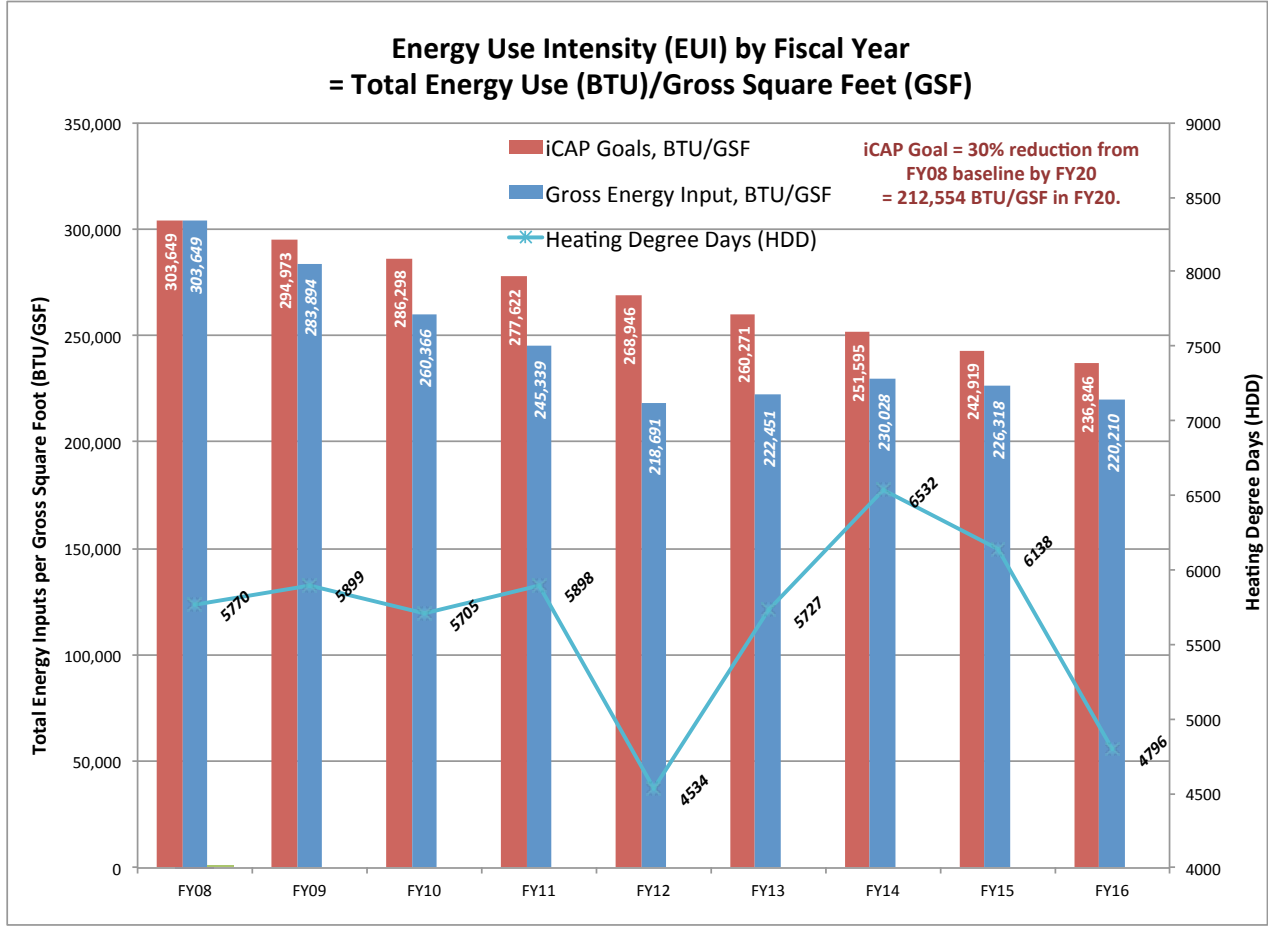
- In 2015, the Net Zero Space Growth Policy was approved and adopted into the Campus Administrative Manual. Effective July 1, 2015.
- Provost Office charged the Associate Director for Space Analysis, Jill Maxey, to track the Gross Square Footage of campus and the “Space Bank” amount.
- Space Bank has been used in FY16 and FY17 to approve the Design Center, a Memorial Stadium project, and some smaller-scale projects.
- We acknowledge that the overall process for keeping campus aligned with this important space reduction goal is still under discussion and will involve substantial changes in how we as a campus view and manage our space.

3. Strengthen centralized conservation efforts focusing on building systems to achieve a 30% reduction in total campus building energy use by FY20. This includes meeting the LED Campus commitment.



Status:
In progress

- Based upon the FY16 energy data, we have achieved a 27% energy reduction.
- ESCO projects are continuing. Retrocommissioning (RCx) proposed projects are being discussed at the Illini Union and Memorial Stadium. RCx accrued avoided utility costs totaling more than \$38 million in nine years of operation.
- Energy conservation efforts in campus labs, especially centered on fume hoods, are ongoing.
- More funding is needed to achieve more energy conservation.



2. Identify the highest achievable energy standards for new buildings and major renovation, and incorporate these into the campus facility standards by the end of FY16.



Status:
In Progress

- Adopted American Society of Heating, Refrigerating and Air-Conditioning Engineers’ (ASHRAE) 90.190.1-2013 energy standard — superseding the ASHRAE 90.1-2010 standards — for new construction.
- Will exceed energy savings that are specified in the most current LEED version by 8%.

4. Engage and incentivize the campus community in energy conservation, including a comprehensive energy campaign, with at least 50% of units participating by FY20.



Status:
In Progress

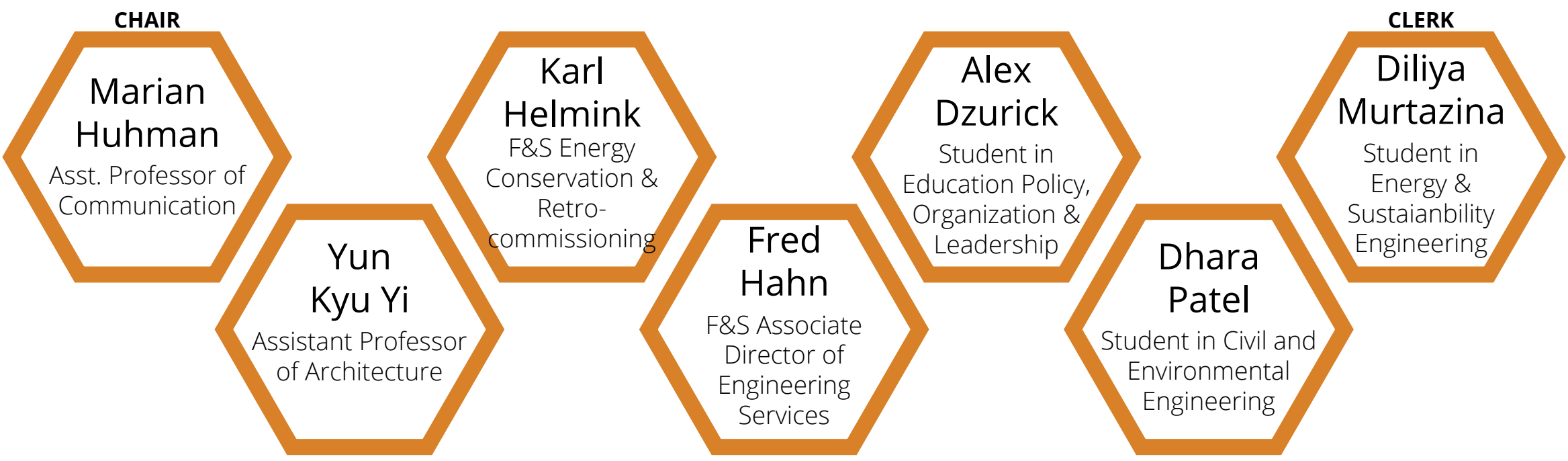
- Several initiatives underway focusing on student engagement — including Illini Lights Out and Eco-Olympics.
- Initiatives are continuing for staff and faculty engagement — Certified Green Office Program, Energy Conservation Incentive Program (ECIP).
- Forming a plan to work toward a Green Labs program that would focus on reducing energy consumption in labs (e.g. fume hoods, refrigeration).



Fume hood energy conservation. “Shut the Sash” pilot project.



TEAM MEMBERS



ACKNOWLEDGEMENTS

Jessica Tran, SWATeam consultation group community member 2015-2016
Paul Foote, Eco-Olympics Coordinator
Students: Natalie Pelekh (intern), Morgan Kaplan (intern), Sam Wilson (RA), and Olivia Yu, special project.




ENERGY GENERATION, PURCHASING & DISTRIBUTION

Energy is by far the largest contributor to the campus' emissions inventory. The iCAP focuses on a detailed strategy of building energy conservation, de-carbonizing generation systems, and the addition of renewable energy sources. This “conserve-and-load” approach is achievable, affordable, and implementable. The 2015 iCAP calls for a reduction in building energy use of 30 percent by FY20.

Progress on efforts to de-carbonize our energy generation systems is monitored by the Energy Generation, Purchasing and Distribution (EGEN) SWATeam.

OBJECTIVES


1. The EGEN SWATeam, in collaboration with Facilities & Services and topical Consultation Groups, will lead an exploration of options for 100% clean campus energy during FY16, and submit recommendations through campus sustainability process.



Status:
In progress

- A recommendation to hire a consultant to study feasibility of electrifying campus operations was submitted to the Illinois Climate Action Plan (iCAP) Working Group. Review is underway. A formal recommendation to the Sustainability Council is expected December 2016.
- Construction is underway to install a 200kW biomass boiler at the Energy Farm. This system will initially provide all heat for the greenhouse onsite, replacing current propane heating system. In the future, more buildings may be added to the boiler system.
- A team at the Illinois State Geological Survey (ISGS, a division of the Prairie Research Institute) led by Illinois Professor Yu-Feng Forrest Lin is conducting a series of detailed observations of the geothermal profile on campus — including high-resolution temperature profiling and thermal analysis. The team will drill to 330 ft and install a geothermal loop and fiberoptic cables. Results will help determine the feasibility of implementing goethermal systems on campus by identifying costs and possible challenges.
- A contract is in place to perform a heat recovery chiller (HRC) study to identify potential location(s) for HRCs on campus, and assess opportunities for one system to serve multiple buildings. Preliminary review and assessment is expected to begin October 2016.


3. Expand purchases of clean energy. By FY20, obtain at least 120,000 MWh per year and by FY25 at least 140,000 MWh per year from low-carbon energy sources.



Status:
In progress

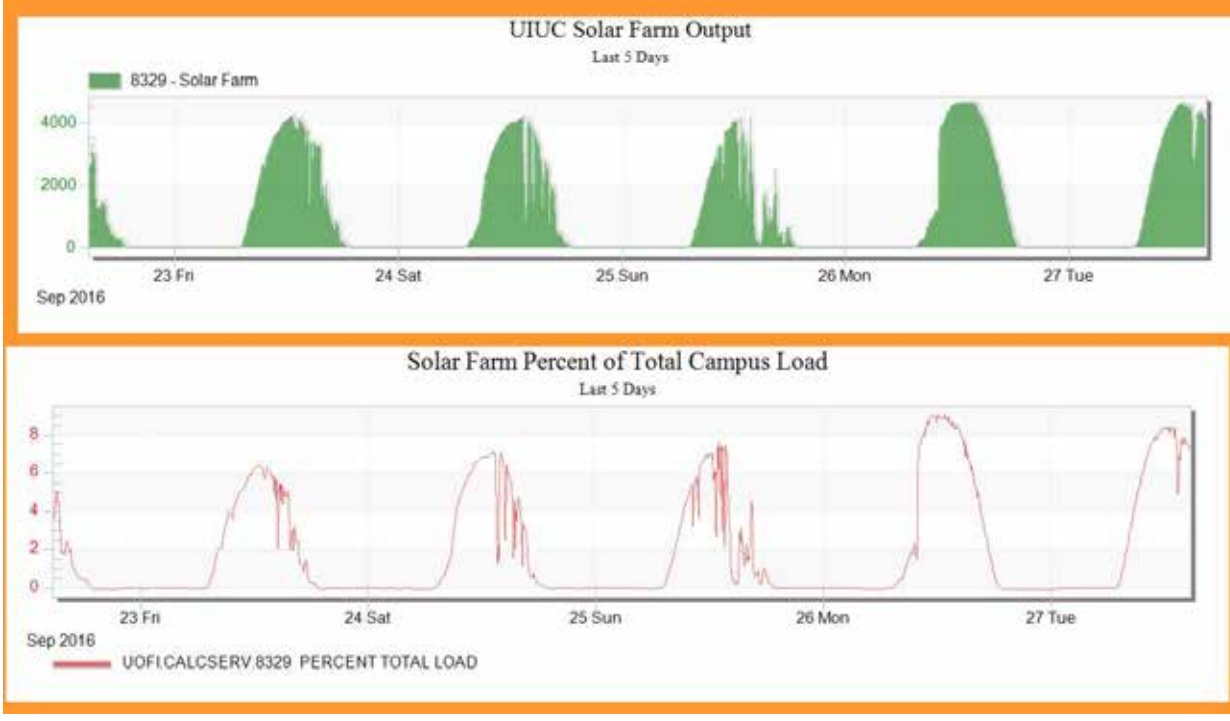
- Nearing the end of negotiations to enter into a power purchase agreement (PPA) for the purchase of approximately 25,000 MWh of wind power annually for 10 years.
- A recommendation was submitted to allow longer-term contracts for the purchase of renewable power. The Institute for Sustainability, Energy, and Environment (ISEE) is currently reviewing this request with campus legal counsel and Purchasing departments to determine feasible options and potential next steps.

2. Expand on-campus solar energy production. By FY20, produce at least 12,500 MWh/year, and by FY25 at least 25,000 MWh/year, from solar installations on campus property.




Status:
In progress

- Solar farm was put into operation in December 2015, and has produced 6,200 MWh of electricity.
- Total generation for on-campus solar in FY16 was 3,971 MWh/year. Existing installations — including Building Research Council (15kW), Business Instructional Facility (33kW), and Was-saja Hall (33kW) — are projected to produce 7,900 MWh/year in FY17.
- Several solar projects are in progress: 300kW system atop ECE Building (expected summer 2017); 1.2 MW system on North Campus Parking Deck (funding needs to be secured).
- Niharika Kishore, an Illinois masters student in Urban Planning, is working to identify locations for on-campus solar and is evaluating costs and benefits.



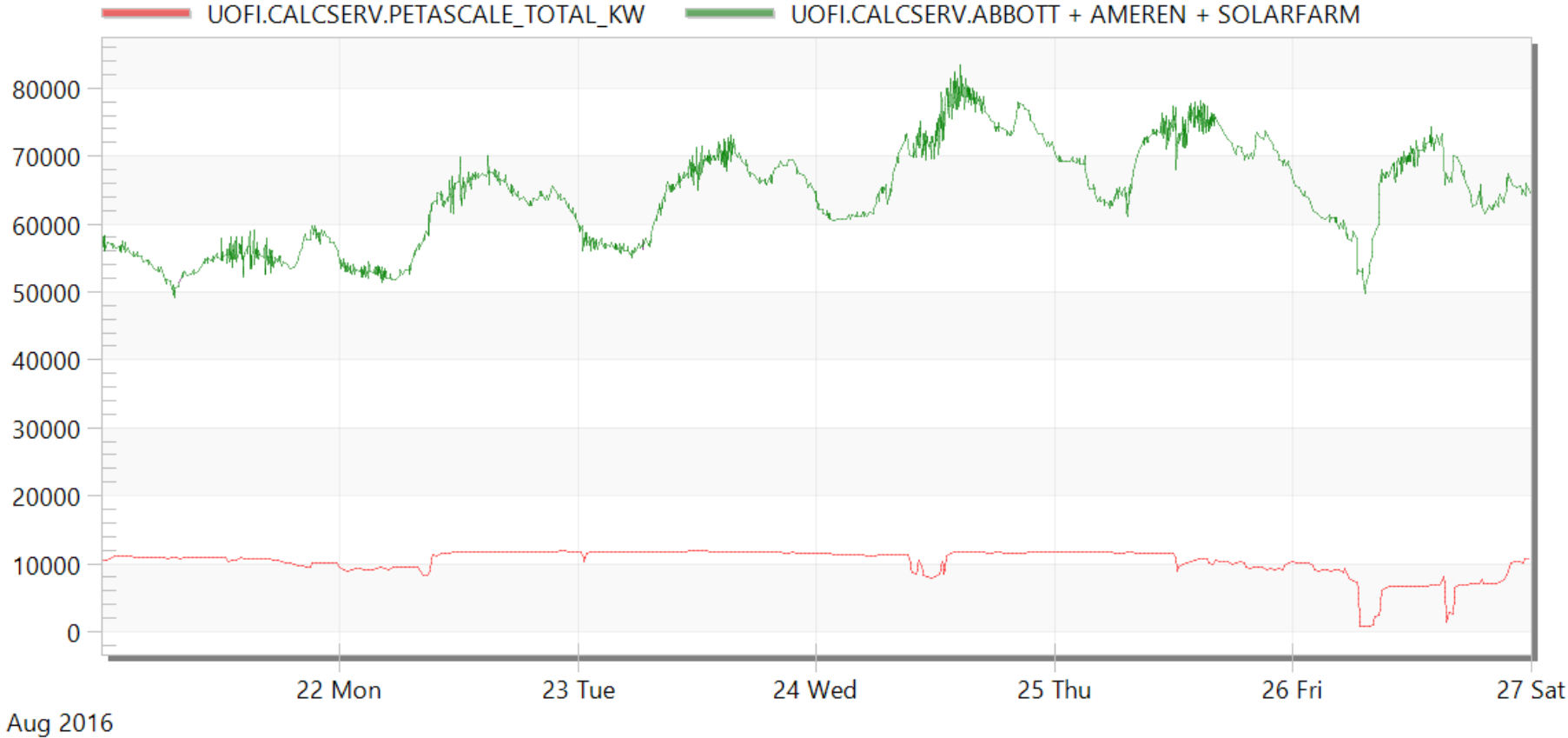
The top graph, titled 'UIUC Solar Farm Output', shows a green line representing output over time from September 2016 to late January 2017. The bottom graph, titled 'Solar Farm Percent of Total Campus Load', shows a red line representing the percentage of total campus load over the same period.

4. Offset all emissions from the National Petascale Computing Facility (and other successor facilities) by FY18.



Status:
In Progress

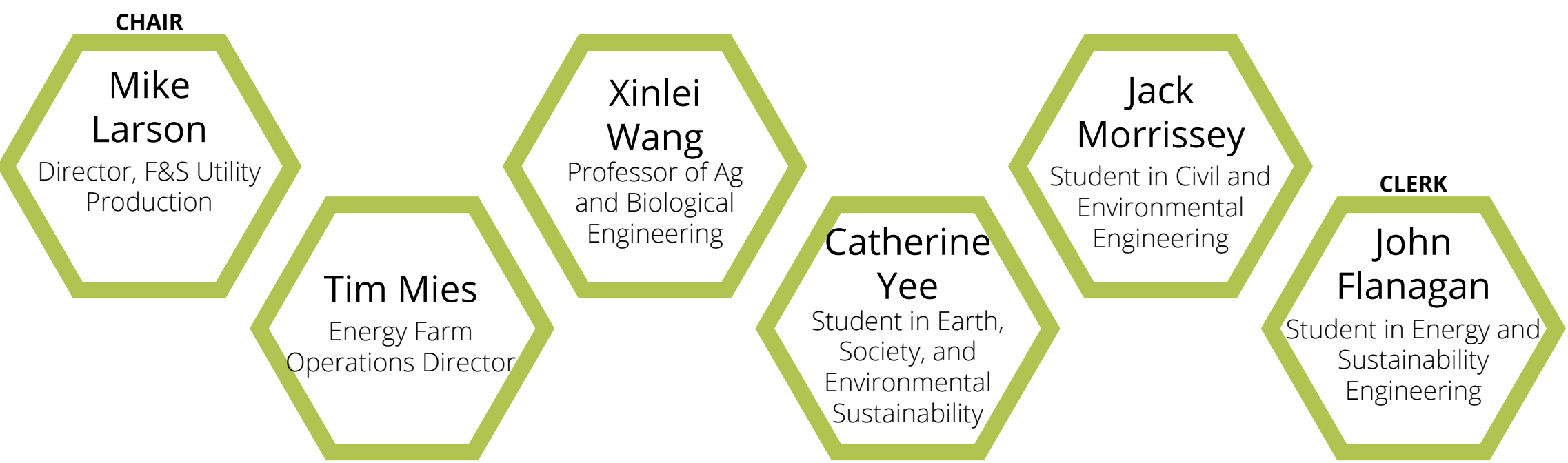
- iSEE's Director, Evan DeLucia, is reviewing this objective with the National Center for Supercomputing Applications.
- Graph at right depicts total campus electricity demand in green and total Petascale electricity demand in red.



The graph shows two data series: 'UOFLCALCSERV.PETASCALE_TOTAL_KW' (red line) and 'UOFLCALCSERV.ABBOTT + AMEREN + SOLARFARM' (green line). The green line shows significantly higher and more fluctuating demand than the red line.



TEAM MEMBERS



ACKNOWLEDGEMENTS

The EGEN SWATeam would like to recognize Professor Scott Willenbrock for his participation and leadership on our committee. Scott was a charter member of this team, and led our group for the duration of his tenure. Scott's leadership and participation in the group will be missed, and we wish him the best in his new position as a Pro-vost Fellow for Sustainability.



PURCHASING, WASTE & RECYCLING

This team is focused on how to best maintain and improve the University's purchasing, waste management, and recycling programs. The group will work to implement a Zero Waste movement (like that described in the iCAP), which will require a “whole system” approach to resource management that implicates purchasing, maximizes recycling, minimizes waste, reduces consumption, and ensures that products are made to be reused, repaired, or recycled back into the system. This system will reduce greenhouse gas emissions by saving energy by reducing energy consumption associated with extracting, processing, and transporting raw materials and waste, and through energy savings by reducing and eventually eliminating the need for landfills.

OBJECTIVES

1. By FY17, environmental standards will be applied to purchases of office paper, cleaning products, computers, other electronics, and freight/package delivery services. At least 50% of purchases in these categories will meet standards by FY20, and 75% by FY25.

 Status:
In progress

- Recommended that the University adopt policy on Using and Purchasing Paper, including maximizing recycled content by expectng a minimum 30% recycled content paper to be purchased by staff. Policy has not been adopted at the University level, but team is asking that policy request is reconsidered. Action at the campus level is being pursued.
- Next Steps: Issue formal recommendation to adopt 30% recycled paper policy at campus level. Continue discussion on green cleaning products and potential E-waste and battery recycling programs.

3. Utilize landfills with methane capture.

 Status:
Complete!

- Former SWATteam member Karin Hodgin Jones conducted study investigating greenhouse gas (GHG) emissions from local landfills. The study identified the auxiliary campus buildings contracting independent hauling vendors, estimated waste volumes produced by these facilities, and presented a methodology that may be used to correct campus reporting on carbon dioxide (CO₂) emissions associated with landfill use.
- Identified three auxiliary buildings not previously in Illinois Climate Action Plan (iCAP) reports: Biel-feldt Athletics Administration Building, Atkins Tennis Center, and Illini Union. Estimates for waste volume and CO₂ emissions were provided for these buildings in Hodgin Jones's report.
- Next Steps: (1) Make recommendation to campus buildings to continue or begin contract with vendors that haul to Brickyard Landfill, a disposal center in Danville, IL, whose methane capture strategy produces less CO₂ than other landfill options. (2) More thorough reporting on real and seasonally adjusted estimates of waste volumes from auxiliary buildings is needed to better estimate CO₂ emis-sions for the next iCAP revision.

Methane Recapture System Comparison		
Based on 2014 data reported to USEPA		
	Clinton Landfill	Brickyard Landfill
Methane Recapture System	LFG Flares	BES LFGTE Plant + LFG Flare
Methane Recaptured from BES LFGTE Plant	0.00 metric tons	3,414.50 metric tons
Methane Recaptured from LFG Flares	5,338.84 metric tons	774.90 metric tons
Total CO2 emissions reported	98,341.80 metric tons	19,411.70 metric tons

source: United States Environmental Protection Agency. (2015). BRICKYARD DISPOSAL LANDFILL reported data. Retrieved from <http://ghgdata.epa.gov/ghgp/service/html/2014?id=1007467&et=undefined>
Source: United States Environmental Protection Agency. (2015). CLINTON LANDFILL reported data. Retrieved from <http://ghgdata.epa.gov/ghgp/service/html/2014?id=1007467&et=undefined>

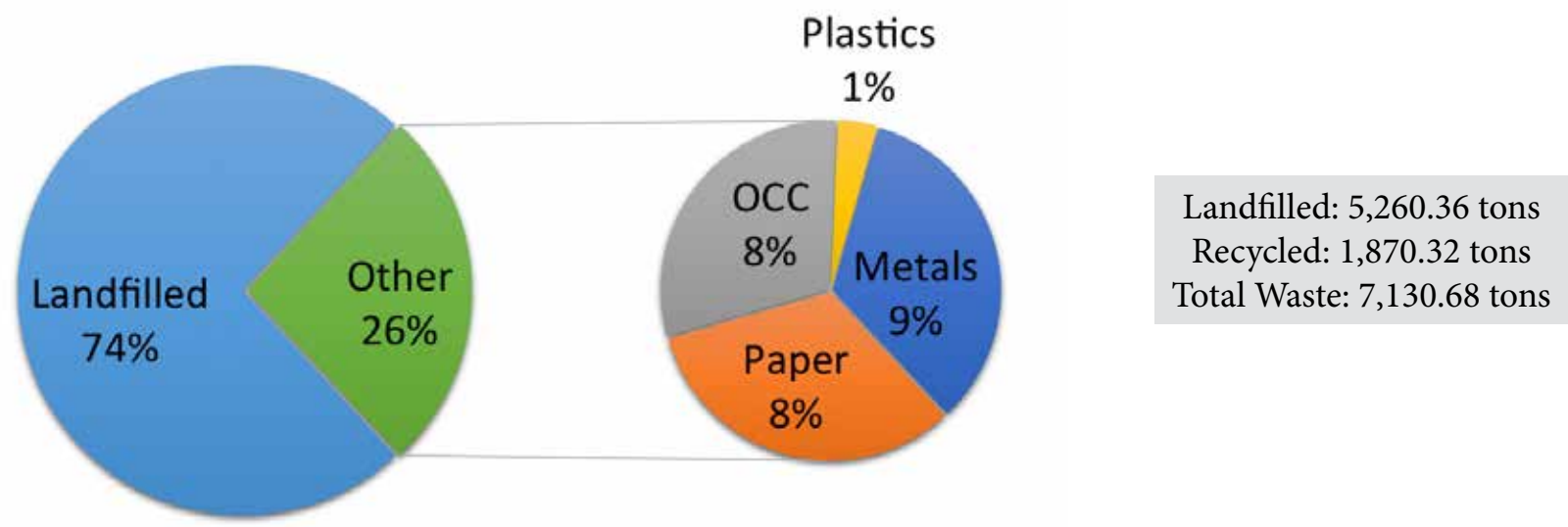
Table 2 Methane Recapture Systems for Brickyard and Clinton Landfills

2. Reduce municipal solid waste (MSW) going to landfills. Increase the diversion rate of MSW to 45% by FY20, 60% by FY25, and 80% by FY35, while also increasing the total diversion rate of campus waste to 90% by FY20 and 95% by FY 25.

 Status:
In progress

- Standardized labeling for recycling bins and increased receptacles on the Quad. As of April 2015, 20 new recycling bins were added to the Quad.
- Waste audits were conducted showing an effective diversion rate of 26% based on FY16 solid waste and recycling data. A report is completed, including recommendations for an increase in the number of recycled plastics, along with estimated cost savings.
- Collection programs for special waste streams expanded, introduced, or currently under consideration (e.g. nitrile gloves from dining halls and labs, expanded polystyrene, and expansion of Dump & Run for campus move out).

Waste Data from FY16



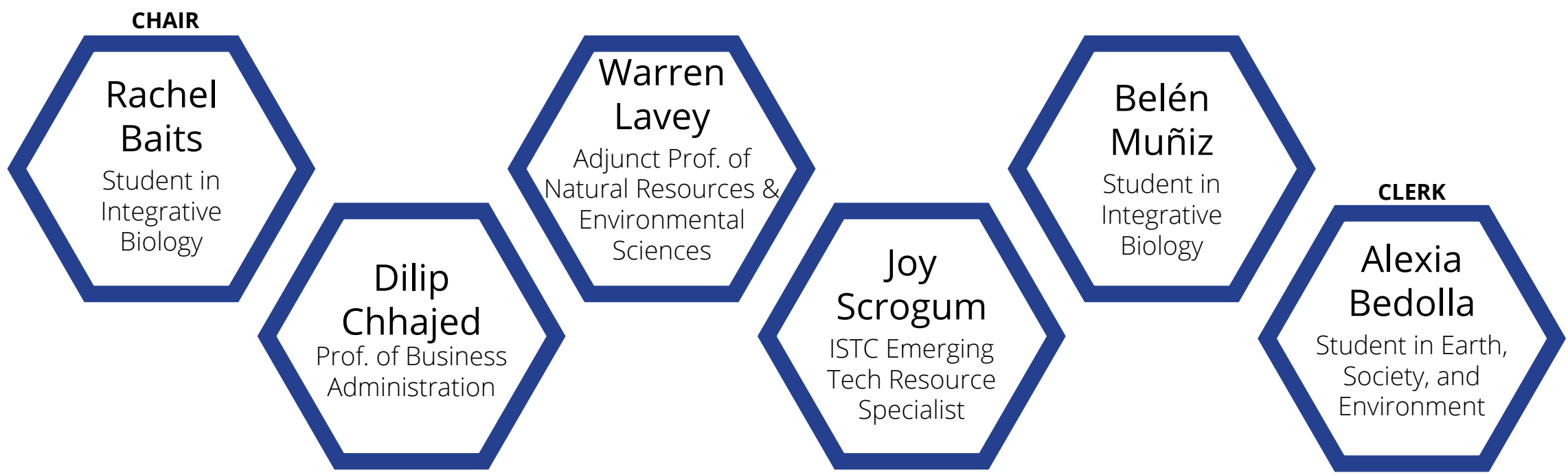
4. Appropriately staff Zero Waste efforts through the hiring of a full-time Zero Waste Coordinator.

 Status:
In Progress

- Requested staff position in Office of Business and Financial Services (OBFS) and University Facilities & Services. Zero Waste has been integrated into a full-time position in OBFS, and funding was received from the Student Sustainability Committee to hire a part-time Zero Waste Coordinator at F&S. A hire is in progress.
- Next Steps: Request funding for full-time coordinator in F&S.



TEAM MEMBERS



ACKNOWLEDGEMENTS

We would like to thank Bart Bartels and the entire Illinois Sustainable Technology Center (ISTC) Zero Waste Illinois Team, Karin Hodgin Jones, Tracy Osby, Morgan Johnston, Marcy Wright, Ben McCall, Matthew Snyder, Michael Olinger, and the entire F&S and OBFS teams.



TRANSPORTATION

The Transportation SWATeam is a team of faculty, staff, and students who work to advance the 2015 iCAP transportation objectives. The team forms recommendations to reduce the 10% of campus emissions that are attributable to transportation. We address air travel emissions, fleet emissions, single-occupancy vehicle usage, renewable fuels, and active transportation.

OBJECTIVES

1. Reduce air travel emissions from a new FY14 baseline by 25% by FY20, 50% by FY25, and 100% by FY30.



Status:
In progress

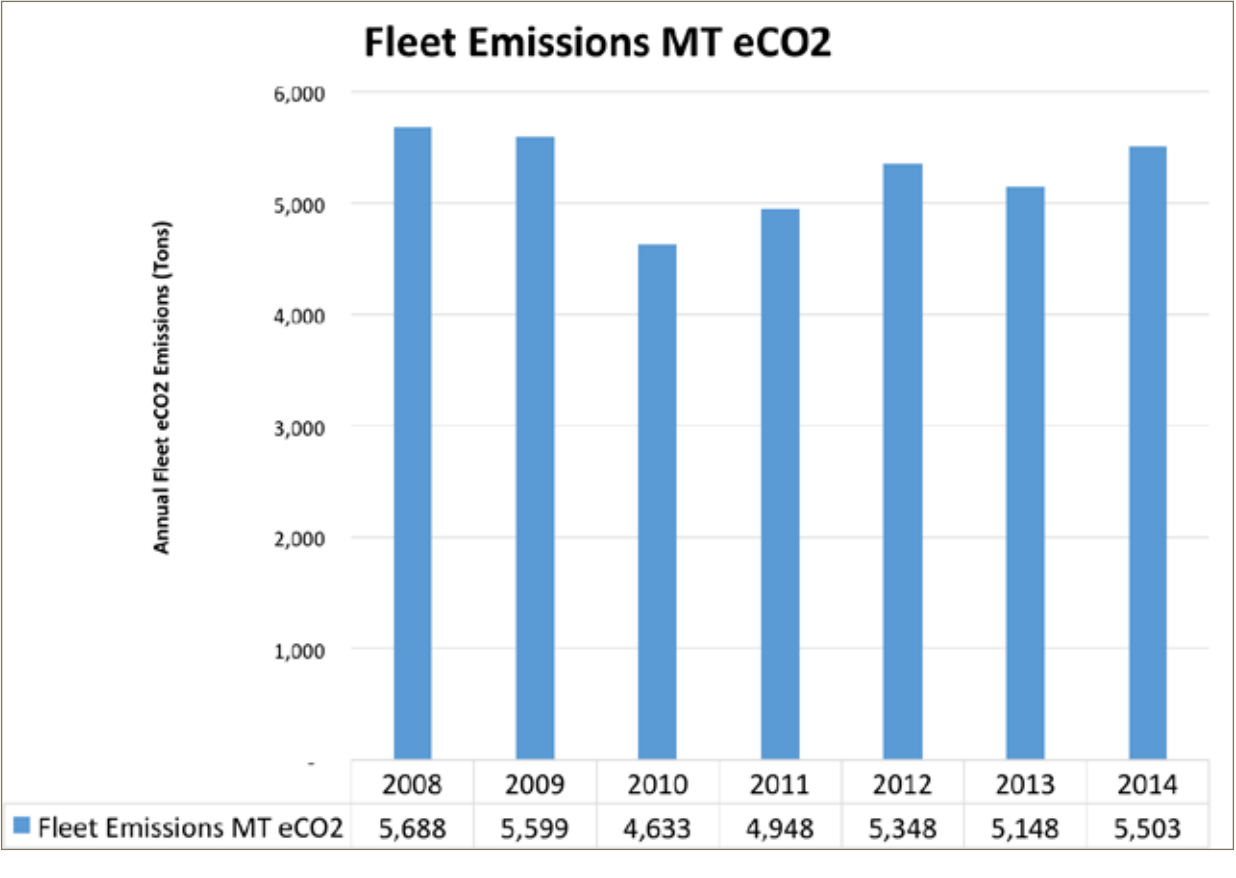
- Plan to reward departments that reduce their annual air travel emissions.
- Implementing Travel and Expense Management (TEM) system to track annual emissions.
- Educating campus community on air travel alternatives and improving infrastructure supporting online conferences and virtual meetings.
- Plan to purchase carbon offsets to support green infrastructure.

2. Reduce emission from the campus fleet by 20% by FY20.



Status:
Not Complete

- Plan to increase low-emission vehicles by 20% in the next five years.
- Plan to discourage idling of vehicles by installing idling tracker equipment.
- Promote use of alternative fuels.



3. Conduct a detailed study by the end of FY17 to develop scenarios for complete conversion of the campus fleet to renewable fuels.



Status:
In progress

- Conduct of feasibility study for converting the fleet to renewable fuels:
 - Creating a task force with faculty chair and campus representatives.
 - Will consider alternatives such as sustainably produced biodiesel, CNG from organic waste, and electricity from zero-carbon sources such as solar and wind.
- Propose conservative, moderate, and aggressive scenario strategies for GHG emission reduction and consider their financial and environmental impact.



TEAM MEMBERS

CHAIR

Yanfeng Ouyang
Assoc. Prof. of Civil and Environmental Engineering

Brian Farber
Executive Asst. to the Vice Chancellor for Student Affairs

Ankit Singhai
Student in Civil and Environmental Engineering

CLERK

Joshua Feldman
Student in Mechanical Engineering

Imad Al-Qadi
Prof. of Civil and Environmental Engineering

Peter Varney
F&S Director of Transportation & Automotive Services

Claire Dodinval
Student in Civil and Environmental Engineering

4. Reduce percentage of staff trips made using single-occupancy vehicles from 65% to 55% by FY20, 50% by FY25, and 45% by FY30.



Status:
In progress

- University Parking is planning a survey that will provide new mode-split data.
- Introducing faculty and staff to Champaign-Urbana Mass Transit District (MTD) through "It's Your MTD, Too" campaign.
- Wellness Center is encouraging walking through tours and assessments.
- A campus active transportation (biking, walking) website is under construction.



5. Implement the Campus Bike Plan on the schedule noted in that plan.



Status:
In Progress

- Full implementation of new campus bikeway facilities by FY25, bike parking at every core campus building, and bike rentals by FY20.
- Campus is recognized as a Bronze-level Bicycle Friendly University by the League of American Bicyclists.
- MCORE Project — \$42 million project to improve public infrastructure connecting campus and Champaign and Urbana downtowns.

6. Appropriately staff sustainable transportation efforts.



Status:
Complete!

- Lily Wilcock hired as Active Transportation Coordinator at F&S.
- Active Transportation Coordinator will collaborate closely with iSEE and the Transportation SWATeam.
- Successful implementation of transportation strategies requires additional staff time.

ACKNOWLEDGEMENTS

We express our thanks to our former team members Prof. Bumsoo Lee, Mr. Benjamin Cigelnik, Mr. Zhaodong Wang, and all others who helped the Transportation SWATeam in the past year to gather data, interpret data, initiate programs, write recommendations, etc.



WATER & STORMWATER

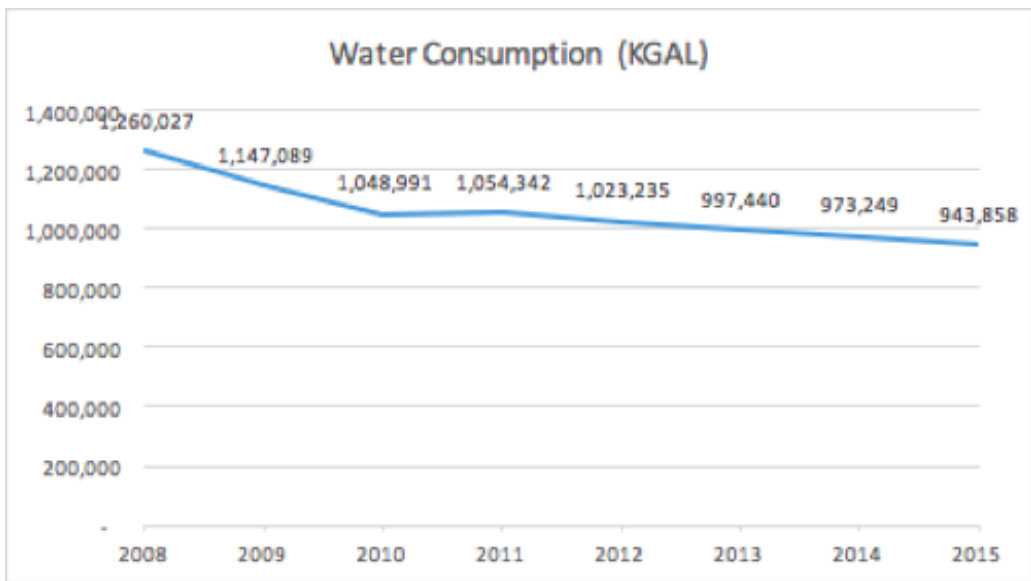
The University of Illinois has increased its water conservation efforts, with a potable water reduction target of 40 percent by 2025. Opportunities to utilize non-potable sources will be harnessed, including connecting the existing raw water system by 2020. Two goals are listed for campus water use: 1) reduce annual potable water use by 25% by FY20; and 2) capture and reuse 25% of campus stormwater by FY20. Rather than discharging stormwater, it could be used for irrigation across campus acreage, freeing up potable water for other campus uses. The campus will undertake a number of studies and pilot projects to better understand its water usage and plan for smarter consumption.

OBJECTIVES

1. Obtain and publicize more granular water use data by FY16, including water quantity and quality data where available.

 Status:
In progress

- Water quality report can be found at <http://bit.ly/2draeEf>.
- Granular data is available from University Facilities & Services upon request.
- Individual monthly readings for granular water use data take place at Business Instructional Facility. Commitments have been made to get continuous readings.



2. Improve the water efficiency of cooling towers by limiting the amount discharged to sewer to less than 20% of water intake for chiller plant towers, and less than 33% for stand-alone building towers, by FY20.

 Status:
Complete!

- A pilot study at the State Regional Office Building on south campus has investigated softening, high pH, and a silica treatment regime.
- Water softening is an alternative water treatment to manage dissolved salt left behind from evaporated water in cooling towers while reducing water consumption and ultimately reducing the water discharges to the sewer to zero.
- After implementation of an operational regime at the test building, the discharge to sewers was zero.

3. Perform a water audit to establish water conservation targets and determine upper limits for water demand by end-use, for incorporation into facilities standards by FY16.

 Status:
Not complete

- Project requires funding to be completed. Looking for interns to perform audits.
- F&S has done a month of metering at the Business Instructional Facility, and the study proved promising.
- According to the meter, the building took 169,000 gallons of water during a one-month period.



4. Inventory and benchmark campus' existing landscape performance by FY17.

 Status:
In progress

- Undergraduate 2015-16 SWATeam member Scott Douglas completed a report of inventory and benchmarking performance of two areas on the south side of Boneyard Creek.
- The report focused on water drainage into Boneyard Creek, areas of concern on campus for water runoff, and overall stormwater performance.
- The study concluded that campus will have to implement a variety of strategies that are substantially different than current management practices.

Total Quantities of campus surfaces that drain to Boneyard Creek

Total to Boneyard Creek			
Total	SF	Acres	Percent
Parking	3,810,222	87.47	12.6%
Service Drive	432,893	9.94	1.4%
Sidewalk	3,533,343	81.11	11.7%
Building	5,381,826	123.55	17.8%
Street	3,029,897	69.56	10.0%
Hardscape	16,188,182	371.63	53.6%
Unpaved	14,005,890	321.53	46.4%
Total area	30,194,072	693.16	

5. Through an open solicitation process, implement at least four pilot projects to showcase the potential of water and/or stormwater reuse by FY20, with the objective of implementing a broader program by FY25.

 Status:
Not Complete

- One project would be studying the continuous use of non-potable water for buildings like the Business Instructional Facility and incorporating water recycling criteria into design standards.
- A full inventory and benchmarking performance report needs to be completed to identify more feasible projects.

6. Investigate the water quality impacts of stormwater runoff and potential ways to reduce stormwater pollutant discharges by FY18.

 Status:
Not complete

- Potential for student projects to investigate impacts — especially at the Boneyard Creek, which is the only campus-area body of water that is classified as “impaired.”
- Next Steps: Encouraging further participation by students and staff to research particular areas.

TEAM MEMBERS

