**Resources for Chapter 4. Energy Generation, Distribution, and Purchasing**

## 2010 iCAP energy generation strategies:

* ‘Miscanthus giganteus’ boiler at Vet Med by FY11.
* Achieve 5% renewable sources for total campus energy by 2015. Can create public/private partnerships to facilitate shift and take advantage of federal and state tax incentives.
* Cease any major investment in coal-fired systems at Abbott.
* Install a wind turbine on South Farms by FY11, and 2 more if feasible.
* Install solar photovoltaic (PV) arrays on 250,000m2 of campus roofs, with a goal of 25MW peak generation capacity and 45million kwh of electricity. Move forward with solar cells on North Campus Parking Deck, consider all decks such as the one on Dorner Drive.
* Investigate the use of Biochar. - burn something, makes charcoal, bury it to sequester the carbon.
* Pilot methane capture project at Beef and Sheep Farm by 2015. All manure from South Farms should be converted to methane in a digester and routed to Abbott, and the byproduct can replace nitrogen and phosphorous fertilizer.
* Purchase additional carbon offsets locally. - make sure we do not double count (Additionality)
* Seek power contracts that include substantial contributions from renewable energy sources, and tie in the State of Illinois requirements and contracts
* Study, by December 2012, that examines campus energy generation and distribution systems, specifically elimination of coal use by 2017 and more efficient distribution of thermal energy (hot water distribution, regeneration, geothermal use). Explore waste-to-energy plants for electricity and steam generation.
* Upgrade Abbott to be able to burn biomass, like peers University of Iowa, University of Wisconsin at Madison, and EIU, to burn agricultural waste.

## FY13 summary of iCAP Progress:

Renewable Energy: The iCAP goals are 5% renewable electricity by FY15, 17.5% by FY20, and 25% by FY25. The iCAP also commits to “end coal usage at Abbott Power Plant by 2017.” It lists the following to do items (in italics), which have various statuses as described below.

* “Install at least three utility-scale wind turbines on the south campus, with a minimum of one to be installed by 2011” – This was attempted, and cancelled in 2011 by the Board of Trustees. The Wind Turbine on South Farms was originally suggested in 2003, by the Students for Environmental Concerns. The Illinois Clean Energy Community Foundation agreed to support the project with a $2M grant in 2005. In December 2008, Chancellor Herman cancelled the project due to campus funding issues. The following year, calendar year 2009, the faculty and staff at Illinois were furloughed, due to lack of campus funds for payroll. In 2010, the iCAP included the wind turbine project, and the grant from ICECF was extended. In spring 2011, all studies were complete, and funding was allocated to support a single utlity-scale wind turbine on the South Farms. The Board of Trustees subcommittee decided to disapprove the project, under pressure from the local community.
* “Increase the amount of solar photovoltaic and thermal projects.” and “Install solar photovoltaic (PV) arrays on 250,000 m2 of campus roofs, with a goal of 25 MW peak generation capacity and 45 million kwh of electricity.” In addition to the previously existing 33 kW array on the Business Instructional Facility, there are building projects which may incorporate roof top solar PV arrays, including residence halls, KCPA, and future LEED certified buildings. There are a few research related solar arrays, for example the 15 kW array at the Building Research Council, but these are not installed specifically to address the campus energy demand. For energy production purposes, the largest project is the forthcoming Solar Farm, with a capacity of 5.88 MW. Additionally, there is one solar thermal project, installed on the roof of the Activities and Recreation Center (ARC).
* “Purchase off-site green energy if on-site renewable projects are not sufficient to meet the [Illinois Renewable Portfolio Standards]” – Between FY10 and FY13, no renewable energy credits were purchased for campus. The wind turbine and solar efforts were pursued. With the low quantity of renewable energy currently generated on campus, the campus leadership is investigating options for purchasing renewable energy credits (RECs) for 5% of the anticipated electricity use in FY15 to meet the first iCAP renewables target.
* “Cease all investment that will enhance or increase the lifetime of the coal-fuelled systems at Abbott Power Plant” – To produce steam heat for campus, there are both coal fired boilers and natural gas fired boilers. With this recommendation from the 2010 iCAP, F&S focused on improvements to the natural gas boilers, rather than overhauling or replacing the coal boilers.
* “Commission a detailed study by 2012 that examines campus energy generation and distribution systems; specifically tasked with eliminating coal use and distributing thermal energy more efficiently (bot water distribution, regeneration, geothermal use).” – Master Plan for Energy Production and Distribution – F&S is working with a consultant and sub-consultants to develop a planning tool that will provide results for various potential energy use scenarios. The scenario tool can be used to evaluate potential energy use and production options for campus. This will allow for a cross-campus consensus to be built around the iCAP goals for renewables, coal use, space limitation, and energy conservation.
* “Upgrading Abbott Power Plant to be able to co-fire with biomass, possibly with a circulating fluidized bed boiler, must be given serious consideration.” – The potential for using biomass at Abbott has been examined from a few directions, including an evaluation of the cost and emissions impact of moving to biomass, based on the example of Eastern Illinois University. A biomass boiler was also pursued at the Vet Med complex, with funding from ICECF. However, this project lacked a reasonable methodology for the field to flame logistics, bringing the miscanthus from the fields at the Energy Farm on South Farms to the combined heat and power biomass boiler at Vet Med. Currently, in FY14, a project is in design to install a biomass boiler at the Energy Farm to heat the two-story greenhouse at that site.
* “Pilot methane capture project at Beef and Sheep Farm by 2015. All manure from South Farms should be converted to methane in a digester and routed to Abbott, and the byproduct can replace nitrogen and phosphorous fertilizer.” – A feasibility study for an Anaerobic Digester at the Beef and Sheep research facility was initiated in 2012. At the kick-off meeting for this study, it was determined that the Beef and Sheep facility manure is too inconsistent over time to be a reliable feedstock for an anaerobic digester. The study was therefore expanded to include all reasonably available animal waste, landscape waste, and food waste from campus. The most recent draft report from this study is currently under review.

## iCAP Portal energy generation projects:

1. [Master Plan for Energy Production and Distribution](https://icap.sustainability.illinois.edu/project/master-plan-energy-production-and-distribution)
	1. [SAIC projects](https://icap.sustainability.illinois.edu/project/saic-projects)
	2. [Stop Burning Coal at Abbott Power Plant](https://icap.sustainability.illinois.edu/project/stop-burning-coal-abbott-power-plant)
	3. [Smart Grid for Campus](https://icap.sustainability.illinois.edu/project/smart-grid-campus)
		1. [DDC Command Center](https://icap.sustainability.illinois.edu/project/ddc-command-center)
	4. [Use Renewable Energy](https://icap.sustainability.illinois.edu/project/use-renewable-energy)
		1. [Solar Energy on Campus](https://icap.sustainability.illinois.edu/project/solar-energy-campus)
			1. [Rooftop Solar PVs](https://icap.sustainability.illinois.edu/project/rooftop-solar-pvs)
			2. [Ground-mounted Solar](https://icap.sustainability.illinois.edu/project/ground-mounted-solar)
			3. [Solar on Parking](https://icap.sustainability.illinois.edu/project/solar-parking)
			4. [SSC Solar Feasibility Study](https://icap.sustainability.illinois.edu/project/ssc-solar-feasibility-study)
			5. [Solar Thermal at ARC](https://icap.sustainability.illinois.edu/project/solar-thermal-arc)
		2. [Wind Energy on Campus](https://icap.sustainability.illinois.edu/project/wind-energy-campus)
		3. [Geothermal on Campus](https://icap.sustainability.illinois.edu/project/geothermal-campus)
		4. [Methane Capture on Campus](https://icap.sustainability.illinois.edu/project/methane-capture-campus)
		5. [Biomass use on Campus](https://icap.sustainability.illinois.edu/project/biomass-use-campus)
		6. [Power Purchase Agreements for Clean Energy](https://icap.sustainability.illinois.edu/project/power-purchase-agreements-clean-energy)
			1. [Wind Power Purchase Agreement (PPA)](https://icap.sustainability.illinois.edu/project/wind-power-purchase-agreement-ppa)

## Questions from the STARS report:

The technical manual for STARS is online at <https://stars.aashe.org/pages/about/technical-manual.html>.

Our report is online at <https://stars.aashe.org/institutions/university-of-illinois-urbana-champaign-il/report/2013-07-31/>. The credit references listed below, are connected with the online report, except that the credits below are from the STARS 2.0 version, and the online report is version 1.2.

|  |  |
| --- | --- |
| **Credit** | **Reporting Field** |
| AC-8.1.7 | Is the institution utilizing the campus as a living laboratory in the area of Energy? |
| AC-8.1.8 | A brief description of how the institution is using the campus as a living laboratory for Energy and the positive outcomes associated with the work |
| OP-1.2.6 | Does the institution's GHG emissions inventory include all Scope 3 emissions from fuel- and energy-related activities not included in Scope 1 or Scope 2? |
| OP-2.3 | Has the institution completed an inventory of significant air emissions from stationary sources on campus? |
| OP-2.4 | A brief description of the methodology(ies) the institution used to complete its air emissions inventory |
| OP-2.6 | A brief description of the institution’s initiatives to minimize air pollutant emissions from stationary sources, including efforts made during the previous three years |
| OP-2.7 | The website URL where information about the institution’s outdoor air quality policies, guidelines or inventory is available |
| OP-8.11 | A brief description of any passive solar heating employed by the institution |
| OP-8.12 | A brief description of any ground-source heat pumps employed by the institution |
| OP-8.13 | A brief description of any cogeneration technologies employed by the institution |
| OP-9.1.1 | Total clean and renewable electricity generated on site during the performance year and for which the institution retains or has retired the associated environmental attributes (Option 1) |
| OP-9.1.2 | Non-electric renewable energy generated on-site, performance year (Option 2) |
| OP-9.1.3 | Total clean and renewable electricity generated by off-site projects that the institution catalyzed and for which the institution retains or has retired the associated environmental attributes (Option 3) |
| OP-9.1.4 | Total third-party certified RECs and similar renewable energy products purchased during the performance year (Option 4) |
| OP-9.2 | Total energy consumption, performance year |
| OP-9.3 | A brief description of on-site renewable electricity generating devices  |
| OP-9.4 | A brief description of on-site renewable non-electric energy devices |
| OP-9.5 | A brief description of off-site, institution-catalyzed, renewable electricity generating devices |
| OP-9.6 | A brief description of the RECs and/or similar renewable energy products |
| OP-9.7 | The website URL where information about the institution's renewable energy sources is available |
| PA-2.37 | Does the institution have formally adopted plans to advance sustainability in Energy? |
| PA-2.38 | Do the Energy plan(s) include measurable objectives? |
| PA-2.39 | A brief description of the plan(s) to advance sustainability in Energy |
| PA-2.40 | The measurable objectives, strategies and timeframes included in the Energy plan(s) |
| PA-2.41 | Accountable parties, offices or departments for the Energy plan(s) |