  **Illini Union**

Inter-Organizational
Communication

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| **DATE:** | 02/03/12 **(REVISED 2/20/12)** |
| **TO:** | Ed Slazinik, Mulu Ferede, McKenzie Beverage, Amy Sponsler, Tolulope Taiwo, Amy Allen, Eric Dyer |
| **FROM:** | David Guth |
| **SUBJECT:** | FY12-13 Sustainability Project Options |

1. **YEAR 1 (Spring FY12 – Fall FY13): Illini Union LL Hood/Exhaust Fan Conversion**

**to DDC (Direct Digital Control) and VAV (Variable Air Volume)**

* 1. **Background:** The Illini Union is undertaking a significant HVAC upgrades to the North Building Lower Level in its Phase I Infrastructure project and to the North Building Floors 1 – 4 in the Phase II Infrastructure project. While both of these projects address major deficiencies in the existing heating and cooling system infrastructure, a significant gap in HVAC backbone will still exist once these two projects are complete. The kitchens in the Lower level, both the main kitchen and vendor kitchens have constant volume exhaust fans/hoods. This creates a strong negative air flown in the building, particularly in the Lower Level. The Northwest stairwell acts as a conveyor of the conditioned air on the upper floors as it migrates to the basement and out the hood exhaust stacks.
	2. **Proposed Scope of Work:** Replace kitchen hoods and convert associated exhaust fans to DDC control and add Variable Frequency Drive (VFD) controllers to fan motors. This will modulate the hood exhaust flow based on cooling demand. This will reduce the average kitchen exhaust demand by 50%, or approximately 20,000 cfm. This would generate estimated **annual energy cost savings of $62,600, with a straight line payback of 2.4 years, and save the Union about 5% of its total energy consumption (conservatively estimated – see Appendix A for cost savings detail).** The following schedule outlines the exhaust fans and associated hoods proposed for conversion:

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| **Fan/Location** | **CFM Volume** | **CFM Reduction** | **Area Served** | **Probable FY13 Cost (Parts & Labor)** |
| **EF-3:****5th S Mech. Room** | **21,533** | **20,000** | **Main Kitchen, Chik-Fil-A** | **$26,500/Fan & Hood:** **$18,800 (VFD) + $7,700 (Hood Controls)****5 Hoods/exhausts: $132,500****10% Contingency: $ 13,250****Total Cost: $145,750\******\*Cost Range: $150,000 - $200,000*** ***Hood & Digital Control cost are parametric*** |
| **EF-21:****4th NE Mech. Room** |  **3,072** | **Sushi San, Crepe Delicious** |
| **EF-13A:****E. Mezz. Roof** |  **4,473** | **Rice Garden** |
| **EF-14:****Main Kitchen** |  **1,100** | **S’Barro’s** |
| **EF-12:****Bakery** |  **7,126** | **Bakery Hood** |
|  |
| **EF-8/9/10 (Alt. 1):****Bowling Mech. Rm.** | **Unk.** | **11,500** | **Bowling Lanes (Alternate: add timer to 3 exhaust fans)** | **3 Hoods/exhausts: $ 79,500****10% Contingency: $ 7,950****Total Cost: $ 87,450** |
| **EF-11 (Alt. 2):****Kitchen** |  **Unk.** | **Unk.** | **NE Locker Rooms** | **1 Hoods/exhausts: $ 26,500****10% Contingency: $ 2,650****Total Cost: $ 29,150**  |

* 1. **Benefits:**
		1. **This project should save the Union $62,604 annually\***. The project should reduce the following utility inputs as follows:
			1. Annual kilowatt consumption estimated to be reduced by 2%
			2. Annual steam consumption estimated to be reduced by 4%
			3. Annual chilled water consumption estimated to be reduced by 6%
		2. Over the life of the project (conservatively 3 years), the Retro-commissioning for the Lower Level hoods and exhaust fans should save **$187,812**, broken out on an annual basis:
			+ $12,521, or 158,292 kWH of electricity
			+ $20,868, or 1,052 cu/ft steam
			1. $29,215, or 2,267 Gallons of chilled water
			2. **Straight line payback = 2.4 Years**
	2. **Resources:** We propose to execute this project with the F&S Retro-commissioning (RCx) Group. This will bring both engineering resources and skilled labor to quickly analyze existing system and recommend/implement system optimizations.
	3. **Timeline:** We estimate 3 – 4 months to complete work due to complexities of phasing work around kitchen operations. Outages would need to be scheduled with the vendors and HFS in advance to minimize operational impacts.
1. **YEAR 1 (Spring FY12 – Fall FY13): LED Light Bulb Replacement**
	1. **Background**

The Union has replaced 4,500 of the 5,600 incandescent and T-12 fluorescent fixtures within the Union. Of the remaining 1,100 bulbs, these have been challenging to replace with CFLs due to either the bulb type/appearance, dimming requirements or specialty lighting applications (such as the Art Gallery track lights). However, with the accelerated development of new LED bulbs, we are reasonably confident that replacements can be made for these lamps.

* 1. **Proposed Scope of Work:**
		1. Replace remaining specialty incandescent & CFL bulbs with LEDs (candelabra, dimmable T-12s, HID, colored incandescent, halogen)
			1. Order samples for field testing & internal approvals
			2. Relamp candelabra and halogen bulbs (where applicable) 1:1 with approved LED units.
			3. Replace the Vending Room HID fixtures with new historic fixtures compatible with Colonial Room.
			4. Replace colored lighting in Ballroom with programmable/dimmable LED strips.
	2. **Benefits:** The lifespan of a typical LED bulb is 50 times that of an incandescent bulb and up to 8 times that of a CFL. This represents a large impact on facility maintenance labor. Many LEDs can be dimmed (unlike CFLs) and specialty versions can introduce the full spectrum of color. In addition, the color rendering and lighting output of LEDs has improved remarkably in the last 2-3 years.
		1. LED Replacement represents approximately 1/10th of the power consumption of incandescent bulbs.
		2. A typical LED uses **329 KWh/yr vs. 3285 KWh/yr per incandescent**
		3. A rough estimate of energy consumption savings is **3,251,600 KWh/year**, or **$256,976 annually**.
	3. **Locations:**
		1. Illini Union North Building
		2. Illini Union South Building
		3. Levis Center
	4. **Probable Cost:**
		1. **Parts:** 1,100 existing bulbs x Avg. LED Cost ($40/60W bulb): $44,000
		2. **Labor:** Building Engineering staff cost (installation) $ 1,500
		3. **Probable Cost:** **$45,500**
		4. **Project Contingency:** $ 4,500
		5. **Total Probable Project Cost:** **$50,000**
		6. **Exclusions:**
			1. Specialty fixtures have not been priced
			2. Cost also does not represent rebates from DCEO grants
	5. **Timing:**
		1. Bulb research, sample ordering and approval: 2 Months
		2. Ordering & replacement 2 Months