Spotlight on Sustainability: A Student Lab Theatre
FINAL REPORT

May 25, 2010
September 25, 2010, Revised

Project Goals

- Reduction in Power Usage: We intend to reduce the power draw of the space by as much as 40% through the use of new lighting technologies including LED and plasma sources.
- Education & Research: The project will reach departmental students, cross-campus groups, community groups, and national groups via a variety of outreach projects.

Implementation

Utilizing funds from the Student Sustainability Committee, the Armory Theatre was retro-fitted with a high-tech theatrical lighting system in the summer of 2009 with its first full use in September of 2009. The first production, *Moonchildren*, was a ground-breaking theatrical event that completely eliminated traditional incandescent and halogen lighting from the stage. The show, designed by David K. Warfel, was able to realize approximately 90% in energy savings for the theatrical lighting and eliminated "expendable" supplies including theatrical "gels," replacement lamps, and steel patterns or "gobos."

Outcomes

Following *Moonchildren*, approximately 15 additional student productions and departmental productions made use of the new system, including productions by the Inner Voices Social Issues Theatre group, Theatre of the Black Experience, The Armory Free Theatre Season, and even an international conference of African Women Writers. In addition to the productions, many courses utilized the Armory as their classroom, including Theatre 102, 104, 105, 106, 107, 170, 203, 212, 218, 400, and 418. Many of these courses had an integral production component, extending the impact of the system upgrade.

The project saved approximately 75% of the energy usage of the Stage Lighting System (the house lights were not replaced). This number was lower than expected due to the failure of several cutting-edge plasma fixtures. An estimated 2,281 kw/h were saved in 2009-2010, with the number expected to increase as the plasma replacements are integrated in 2010-2011.

National Recognition

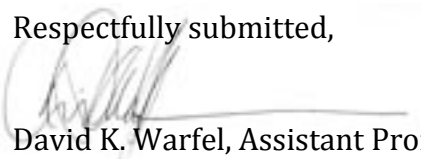
In addition to the very important local recognition through production and coursework, the project received local and national attention. *The News Gazette* ran our press release, and my article entitled *Eight Days to Enlightenment: A Designer Flirts with an Incandescent-Free World* was published in the January 2010 issue of *Lighting & Sound America*, a trade publication covering architectural and theatrical

lighting. I was subsequently invited to share the project at the United States Institute of Theatre Technology (USITT) National Conference in Kansas City, Missouri. As a panel member of *Greening the Theatre*, I shared the outcomes of the project with professionals from around the country. I will share the project at the 2010 American Association for Sustainability in Higher Education (AASHE) Conference in Denver, 2010.

Final Thoughts

As I shared in Kansas City, there was much to learn from the implementation of the Armory Theatre project. Perhaps one of the largest lessons learned is that "early adoption" of emergent technologies does not come without cost. Several of the key components, our plasma-light fixtures, began to fail shortly after installation. After investigation, it became clear that the units were shipped before the manufacturer had worked out all the bugs (thankfully, they are in the process of correcting our fixtures at no cost). Just as someone had to be the first to buy a hybrid car before many of us could buy a Prius, someone has to lead into uncharted territory if there will ever be room to follow. The Student Sustainability Committee is making the future possible right now, and right here at Illinois. For that I am grateful!!

Respectfully submitted,



David K. Warfel, Assistant Professor
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ADDITIONAL INFORMATION

Essential Equipment List

(4) Seachanger NEMO units (with 50 degree barrels)
180 Watt Plasma Lamp Theatrical Fixtures
(3) Altman SpectraPAR 100's
100 Watt LED Theatrical Fixtures
(16) Chauvet ColorPallettes
12 Watt LED Theatrical Fixtures
(6) Chauvet LED 200B Pars
12 Watt LED Theatrical Fixtures
(1) Dell Laptop (for Hog III PC)
Controller for LED and Plasma Lighting
(1) Dell 17" Monitor
(1) Hog III PC DMX Widget
Controller for LED and Plasma Lighting
(1) Hog III PC Programming Wing
Controller for LED and Plasma Lighting
(2) Dell DLP 2500 lumen projectors

2009-2010 Productions

- Energy savings measured against an incandescent/halogen standard of 238.4 kw/H per production.
- Energy savings went down as our plasma units failed. We now have replacement units and will see a resulting increase in energy savings.
- The Department of Theatre does not track the free performances, thus numbers of participants is estimated based on sampled data.

Moonchildren
Departmental Residency
Performances: 4
Directly Involved Students, Approximate: 18
Audience Students, Approximate: 95
Energy Savings: 196.34 kw/h, 82%

Man on a Ledge: A two-man show
October 23-24, 2009
Performances: 4
Directly Involved Students, Approximate: 6
Audience Students, Approximate: 105
Energy Savings: 193.536 kw/h, 81%

Gun/More Than They Watch for the Morning
October 30-31, 2009
Performances: 4
Directly Involved Students, Approximate: 8
Audience Students, Approximate: 105
Energy Savings: 193.536 kw/h, 81%

The First Celestial Adventure of Mr. Antipyrine, Fire Extinguisher

November 6-7, 2009
Performances: 4
Directly Involved Students, Approximate: 12
Audience Students, Approximate: 105
Energy Savings: 193.536 kw/h, 81%

Vampire Lesbians of Sodom
Resident Artist: Lena Dansdill (student)
November 13-14, 2009
Performances: 4
Directly Involved Students, Approximate: 12
Audience Students, Approximate: 115
Energy Savings: 161.376 kw/h, 68%

Hedwig and the Angry Inch
Resident Artist: Marty Scanlon (student)
December 11-12, 2009
Performances: 4
Directly Involved Students, Approximate: 17
Audience Students, Approximate: 135
Energy Savings: 161.376 kw/h, 68%

Cora's Place
Resident Artist: Mark West (student)
February 5-6, 2010
Performances: 4
Directly Involved Students, Approximate: 6
Audience Students, Approximate: 95
Energy Savings: 161.376 kw/h, 68%

Theatre of the Black Experience
Departmental Residency
May 5, 2010

Performances: 2
Directly Involved Students, Approximate: 14
Audience Students, Approximate: 85
Energy Savings: 178.225 kw/h, 75%

Verses that Hurt
Resident Artist: Grant Bowen (student)
Performances: 4
Directly Involved Students, Approximate: 12
Audience Students, Approximate: 95
Energy Savings: 161.376 kw/h, 68%

INNER Voices Social Issues Theatre
Departmental Residency
March 12-13, 2010
Performances: 4
Directly Involved Students, Approximate: 18
Audience Students, Approximate: 85
Energy Savings: 178.225 kw/h, 75%

African Theatre Festival
Departmental Residency
International Writers Festival
April 2-11, 2010
Performances: 4
Directly Involved Students, Approximate: 6
Audience Students, Approximate: 65
Energy Savings: 196.34 kw/h, 82%

Under Construction
Resident Artist: Dan Jakes (student)

April 16-17, 2010
Performances: 4
Directly Involved Students, Approximate: 8
Audience Students, Approximate: 105
Energy Savings: 161.376 kw/h, 68%

Columbinus
Resident Artist: Naomi Mark (student)
April 23-24, 2010
Performances: 4
Directly Involved Students, Approximate: 18
Audience Students, Approximate: 115
Energy Savings: 161.376 kw/h, 68%

See What I Wanna See
Resident Artist: Becky Brown (student)
April 30- May 1, 2010
Performances: 4
Directly Involved Students, Approximate: 12
Audience Students, Approximate: 110
Energy Savings: 161.376 kw/h, 68%

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Eight Days to Enlightenment

By: David K. Warfel

A designer flirts with an incandescent-free world

Moonchildren marks the first production at University of Illinois Champaign-Urbana without a single incandescent lamp or traditional dimmer, instead making use entirely of LED, plasma, fluorescent, and HID light sources. Set in a college apartment in 1965, *Moonchildren* provided the ultimate test of the new sources: Could we do a period-specific, realistic show without the incandescent bulb?

Oh no, you think; another green diatribe from a techno-boy. Let me set the record straight: My garage is full of genuine Lekolites, PAR 56s, birdies, and two-scene preset boards. I've run piano boards and carbon-arc followspots and wept when our five-scene manual preset board from 1969 was finally ripped out of our Studio Theatre two years ago. And there were a dozen moments during *Moonchildren* when all I wanted was a good white dimmable halogen lamp.

At the same time, I'm perpetually curious about new technologies and have been growing more interested in sustainability for the past few years. At one point, I was daydreaming about a future with less energy consumption on stage and I thought, why not now? So I wrote a small research grant and began examining and testing the technologies with an eye towards someday implementing a new system for a small theatre—but I didn't know how I was going to make it happen. Then a request for proposals, from our student sustainability committee, dropped into my inbox and—pardon the pun—it was like a lightbulb turning on! The "green movement" helped turn what I thought was just a dream into a reality—the first non-incandescent stage lighting I've ever created.

The setup

In the fall of 2008, I received a $6,500 grant from our college's Creative Research Awards to study "dramatic energy reduction in small theatres through emergent lighting sources." I enlisted two undergraduates, Nick Mugnaini and Austin Shapley, to help out with the research, which was carried out in the spring of 2009. The grant funded the purchase and rental

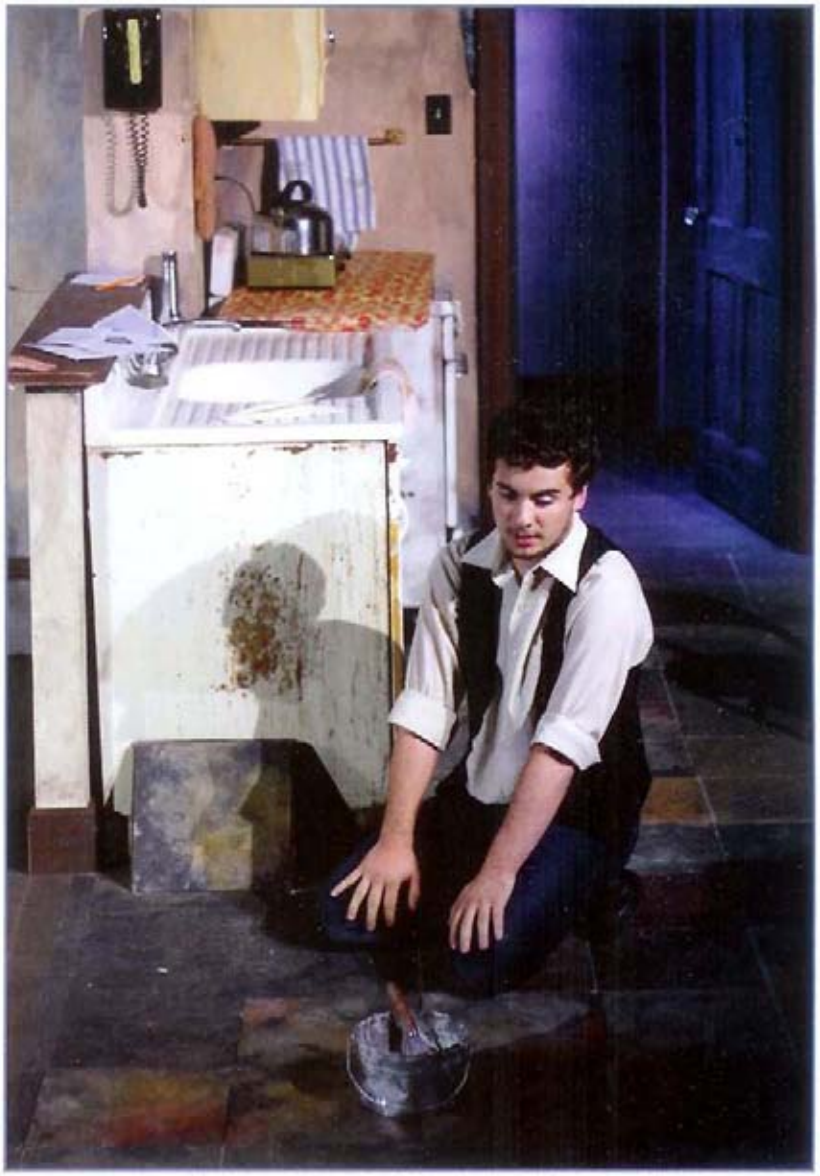
Note the strange pinkness in the center; this was later fixed by moving a Nemo

All Photos: David K. Warfel

of a variety of fixtures that we tested, including Philips Color Kinetics' ColorBlast and ColorBlaze LED units, Martin's Stagebar, and gear from Elation, American DJ, Chauvet, Altman, as well as Dell projectors. We looked at the different attributes of more than 20 units, created our own photometrics datasheets, and learned as much as we could. We made some discoveries—we really liked the inexpensive ColorPalette from Chauvet—but decided to do an installation to really test the new technologies.

The student sustainability committee collects a tiny fee from each student at Illinois to fund advanced initiatives in sustainability. With the input of my students and the knowledge gained from the CRA grant, I wrote a $65,000 grant to redo our smallest space, a 75-seat black box normally reserved for student productions, with a state-of-the-art lighting system. The original proposal also called for motorized blackout shades, fluorescent work lights, and new house lights. Eventually, I came to understand that the committee was interested in our proposal but didn't want to get involved with house improvements. I revised the proposal to $28,698, including only stage lighting equipment, and was awarded the grant. I then set out to order the gear and get ready for *Moonchildren*, the first show of the year.

I ordered four Seachanger Nemo units, a plasma source combined with a CMY color engine that uses ETC Source Four barrels, as our only true white-light source. I also ordered several Altman Spectra Pars, to test their addition of an amber LED to the traditional RGB mix. But, with less than $30,000 to spend, the remainder of our funds went to a High End Systems Hog 3PC system and a host of inexpensive Chauvet LED fixtures. Sure, the ColorBlast is amazing—but, with a 10' ceiling, it wasn't going to happen. I rounded out the order with a bucket of DMX cable and two Dell 2500-lumen DLP projectors. As the gear began to arrive, I read up on *Moonchildren*, did my script analysis and research, and started sweating bullets. Oh, and I enlisted Sean Wilson, an undergrad who could program the entire show before I found out how to patch on the Hog. Would it work?



The final moment is lit almost entirely by Nemos in open white, for a cold feeling.

What follows is a diary of my experience:

Day 1: September 18, 2009

Three of us work from 9am-7pm, unpacking, unpacking, and unpacking: All this energy-efficient lighting is hard on the environment when it's shipped from China or in giant packaging. We fill an entire dumpster and cardboard recycling station. It takes us all day to unpack, put plugs on (the Nemos take two!), address the new gear, test it, label it, and build safety cables (with keyed-alike padlocks for security).

The Nemos come with absolutely no instructions, no profile, no clamp, yoke, or barrel. We figure it out. They are ridiculously heavy machines, like a Source Four on steroids. Why not

The amber LEDs in the Altman units warm a monologue.

get a moving light, you might ask? The Nemos give a nice white. Also, one Chauvet unit has a bad power connection and cannot be used.

We unpack the DMX cable; there is a ton of it. Sean sets up the Hog III PC. I bought a cheap Dell laptop, an extra 17" monitor, and it works great with the system. Chris Wilham strikes the hanging plot, and steals C-clamps off everything we can find.

Day 2: September 19

We start to hang at 7am and have a working system by 11pm. The Nemos are quiet, but the dowser leaks about 2%, which is very visible in a small theatre. Adding a CMY blackout helps, but we worry about burning the flags. The Altman Spectra Par 100s fire up and are great. Between them and the Nemos, we'll have great front coverage. The Chauvet ColorPalettes all go in and give us about 6' of coverage at a 10' ceiling height. The complete lack of photometrics on this gear means we hang by instinct, trying out fixtures and then moving them around.

We do a massive DMX run, switching from five-pin to three-pin a few times. We definitely should have ordered an opto-splitter, as our whole rig is on one DMX line. It shows that I don't do this normally! There is a ton of leftover stage cable hanging on the racks. That's unusual!

To power all the gear, I've forced the ETC Unison rack to output 255 to all the circuits. You can only do this through the CPU, and it has to be getting a DMX signal before you can change options. Another note to self: If you're indeed cutting out the dimming, get non-dim hot-test modules for the rack. That will take the mystery out of power distro.

The system is finally up and running, beautifully. We have one DMX cable left over and two Chauvet Pars, which are really bright! We drive the painter nuts with our color testing. Every light in the rig so far has full CMY or RGB or RGBA mixing.

The ColorPalettes have no snoot, so everyone can count the LEDs. We might try to make rectangular top hats out of foamcore and gaff tape. Sean builds a few EFX that make it a" disco party. I'm listening to an '80s mix on my iPod, which seems slightly irreverent to the high-tech install.

Next up: practicals (all fluorescent) and projectors.

Day 3: September 20

I build two projector mounts to hang from the grid. Does anybody make a system like [Dataton's] Watchout that smaller theatres could actually afford? As it is, I'll likely run two MacBooks with Apple's Keynote—which offers some nice fades and build options for simple transitions. But where am I going to get two MacBooks?

Now it's off to Menards, the hardware store, to find materials for the

practicals—and to the hobby store for black foamcore. In this small town, however, I don't stand a prayer of finding black gaff tape on a Sunday morning. Good thing the Krannert store will be open tomorrow!

My assistant, Sean, shows up at 1pm to a noon call. Slept past noon? Clearly I'm getting old.

I paint the practicals (circline fluorescent—I could write a book on practicals, but I'll save that for another time) and get them up in the air.

I'm getting a little better at operating the Hog 3PC; in another couple of days, I'll be able to turn it on and bring up lights. Cueing? Not a chance...but tech seems to speed up the learning process.

We build paper cones/snoots for the Chauvet LED-PAR 200Bs and foamcore shields for the ColorPalettes. If Chauvet added a 6" barndoor/snoot and an amber LED and charged 300 bucks for these, I'd recommend buying a million of them. But let me reserve the final judgment until I've cued with them. The snoots are great—they really cut down on direct-view glare and help hide the fact that I'm lighting a 1960s apartment with hundreds of RGB LEDs.

I hang the projectors as well. At a couple hundred watts of HID, they're by far the highest wattage element in the theatre, and probably the darkest. Now I need to find some 25' VGA cables—that'll set me back.

I'm thinking I should have written another grant for Watchout, which I love...maybe next time?

Now I get to rest a few days, because the theatre is in use for classes. Another post-show challenge: helping all the other artists that use the theatre come to grips with the new technology.

Day 4: September 25

After a few days off, we're back in the space for onstage rehearsal and to prepare for tech. We get the fluorescent practicals adjusted for the scene designer, move one Nemo to get better coverage, and set up a ridiculously small tech table. A two-scene preset board would fit, but we've put the laptop, second monitor, programming wing, my laptop, and two portable DVD players on it.

During rehearsal, I do a couple of quick Keynote presentations and burn them using iDVD. Apple's stuff really is great if even I can use it. The DVDs go to my two DLP projectors, which only have 2,500 lumens but serve decently for gobos. Both portable DVD players—cheap-os—work well. The Keynote/DVD combo is flawless, playing through a transition and automatically pausing to wait for the next "cue." Tomorrow, I'll tweak them a bit before tech starts. And RCA cables are a lot cheaper than VGA!

We start lighting over rehearsal, playing with color and balance onstage. The Nemos are fantastic, perhaps because they're the only thing hanging that gets close to white. I'm going to miss my old favorites—the Source Four, a PAR can, and a birdie. If I had traditional gear, I could cue a beautiful show in about 30 minutes—but it would use a lot more energy!

The ColorPalettes are still doing well, though my 6' spacing leaves a few holes onstage. I think they'd be better with a little more throw, too, because the LEDs don't mix for a few feet out of the instruments—so you get a bit of rainbow on nearby scenery.

I haven't found a niche for the Altman Spectra Pars yet. They'd be fantastic saturated backlight if I could afford a dozen more, but, as a front fill, I'm not sure they'll get much use. The amber LED is nice if you're doing a sunset and want an R16 color, but I have yet to find anything close to white.

I keep raving about the Nemos, probably because I'm comparing them to RGB units. I can't hear any noise from them; also, they're smooth (though slow—no bumps or quick blackouts on these guys), and really bright: I douse to 40-50% for most of the show. If you need a low-energy long-lasting color-changing ellipsoidal, this might be your answer.

Day 5: September 26 — Tech #1

Those Nemos are really, really slow. Can't do any bumps with them, and the LED rise time is a million times faster—actually, a million times. So I can't do smooth fades, because the ColorPalettes kick on to 1-2%, and I can't do bumps because the Nemos take at least a full two seconds to fade. I hit my first major cueing block as we begin tech....

The amber LED in the Spectra Par is turning out to be very useful; thank goodness that 1) many of the scenes are ostensibly at sunset, and 2) I like R16 [Light Amber].

Whew! A hard day of tech. Still struggling with cueing/timing difficulties, but all the lights look great.

Day 6: September 27 Tech — #2

I'm still tearing my hair out regarding cueing, with slow, smooth Nemos, fast, jittery LEDs. The just don't play well together. But who can afford to light the whole show with Nemos? And my cheap LEDs—even the Altmans—have very ugly "whites."

The show comes together without a single incandescent lamp—even the practicals are circline and compact fluorescent. The latter might not be specific to 1965, but the audience can't see inside the refrigerator!

My cueing notes get smaller, and I add an Elation LED Par—left over from my research grant—to the rig to fill a hole. I'd love to have a few more ColorPalettes, and maybe two more Nemos for patterns.

Day 7: September 28 — Dress #1

I call Seachanger to inquire about the slow fade and light leakage, as it is finally Monday and I have a few minutes. I'm told they know about the slow fade. Apparently, the motors are capable of faster movement, but they

The addition of more frontlight from the Nemos balances the scene.

tend to burn out when run at full speed. They act surprised by the light leak, and promise to get back to me. Trust me, no designer is going to be happy with a fixture that dictates fade times; we like to control those ourselves, thank you.

The show is finally ready for an audience, and I'm ready for a nap. I took a few free minutes today to create a program insert explaining the practical benefits of plasma and LED lighting for the audience—an educational nod to the student sustainability committee, proverbial founders of the feast. Yep, we've saved a lot of watts, cut down our carbon footprint, and yielded a pretty decent show to boot. And just wait until the students do *Hedwig and the Angry Inch* [the next show in the theatre] with all this gear!

Day 8: September 29 — Invited Dress

It's been a fun ride. The show, honestly, looks pretty rough. I learned a lot, but that doesn't always translate into a good product! So, even though there is a paying audience tomorrow for opening night, I'm going to rehang some units to get better coverage. Moving a Nemo to a critical spot will give me white light where I can't seem to get it; there is a big spot on stage that is either pink or blue, depending on which LED units are projecting their "white" at a given moment.

We do a critique with students until midnight at a local coffee shop, and they offer some great insights and

suggestions. The non-lighting designers didn't notice that there were no incandescent lamps on stage—a great triumph, really. The lighting designers point out the color issues, but the cueing goes over pretty well, another triumph considering the irreconcilable differences between the LEDs and plasma units.

Afterwards, I realize: I think I need to re-hang the whole show. Now that I know the capabilities and shortfalls of each unit, I wish I could start over. I'd pull the ColorPalettes back from the space to get a better spread and white mix. I'd try frost on a lot of things. I'd spread the Nemos around and rely on only them for face light. I'd do more window projections. And I'd use the Altmans onstage or from the sides—never from the front!

Wrap-up

I decide, after much reflection, that I'm glad I did the show, even though I was constantly crying to go back to the "old ways," which are like a comfortable pair of well-worn shoes. Sure, the new ones might be great, but they're painful to break in! The Nemos have a great white, and the color engine is fantastic—but please, add a shutter! The Spectra Pars will be great for backlight and saturated color washes, and the amber is a nice addition, despite turning pink when any blue is added. The Chauvet units need a white LED and a snoot, but you simply can't complain about a unit that costs $250. The Hog 3PC works great, and was a relatively cheap way to handle all the new channels. Anything bigger than my rig would need a Super Widget, as our standard widget only outputs a single DMX universe.

I went into this project with a [mostly] open mind, and consequently made many discoveries. If it is possible to make a 1965 college apartment look good on stage using 2009 technologies, we can do anything—and we can do it without changing light bulbs and using dramatically less power. Our future will have to use less energy when we can. And our future might be right now.

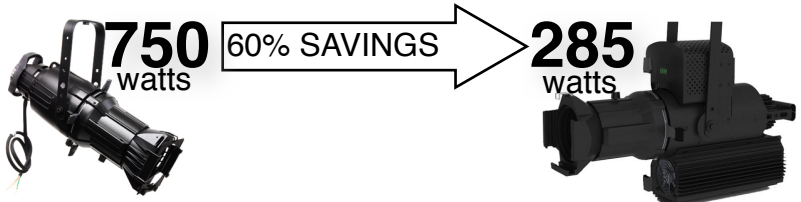
Moonchildren, by Michael Weller, was a production of the University of Illinois Department of Theatre n the Armory Theatre, Champaign, Illinois. It was directed by Ed Menta. The scenic design was Lino Toyos. The sound designer was Ben Jacobson. The costume designers were Keeley Goedart and Brittany Nolan. The stage manager was Becky Brown. The sound board op was Kevin Pelz.

The lighting rig included four Seachanger Nemos, three Altman Spectra Par 100s, 16 Chauvet ColorPalettes, six Chauvet LED-PAR 200Bs, one Dell laptop and monitor, one High End Systems Hog 3PC programming wing, and one Hog III PC DMX Widget.

student sustainability committee
university of illinois at urbana-champaign

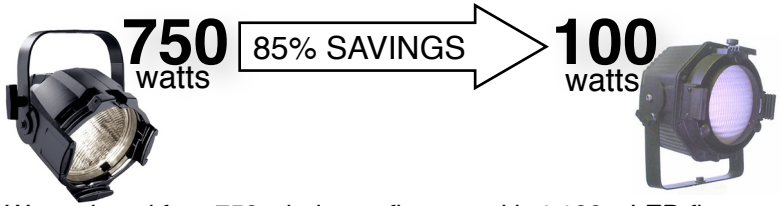
check out our new lighting!

(turn over for more information)

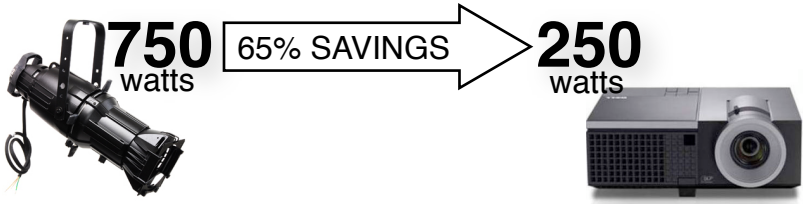


We replaced four 750w halogen fixtures with four 285w plasma fixtures. We saved 1,860 watts and gained infinite color control.

We replaced 16 500w halogen fixtures with 16 12w LED fixtures. We saved 7,808 watts and have no lamps to change.



We replaced four 750w halogen fixtures with 4 100w LED fixtures. We saved 2,600 watts and can choose any color by remote.



We replaced four 750w halogen fixtures with two 250 HID fixtures. We saved 2,000 watts and can choose any image to project.

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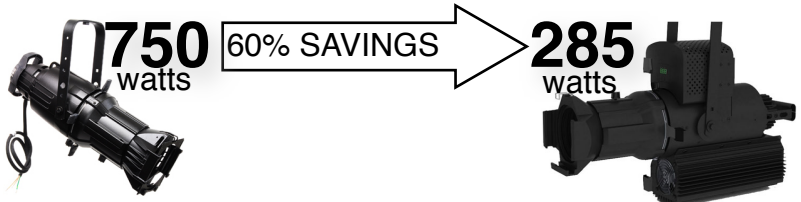

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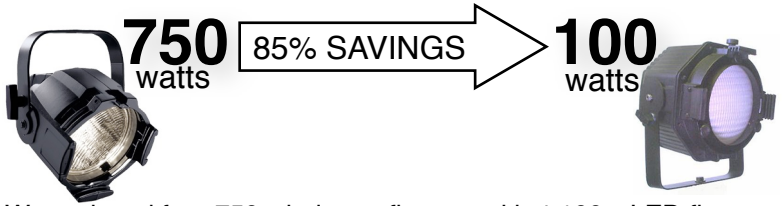

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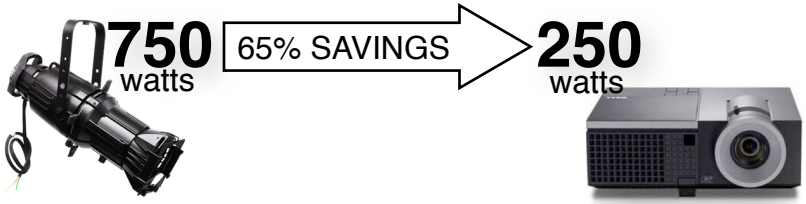

We replaced four 750w halogen fixtures with two 250 HID fixtures. We saved 2,000 watts and can choose any image to project.

student sustainability committee
university of illinois at urbana-champaign

Tonight you will witness our first production where the stage is illuminated without a single “standard” incandescent lamp. Thanks to the progressive Student Sustainability Committee, the Armory Theatre has been retrofitted with several dozen new state-of-the-art energy efficient lighting technologies that dramatically reduce the overall energy consumption of tonight’s performance. We’ll save 10,000 pounds of CO2 from entering the atmosphere while saving hundreds in energy costs. Read below for a description of what we put in storage- and what we have now!

Plasma Lights

These brand-new electrode-less lights create a nice white light using 60% less energy than the conventional halogen fixture. They last up to 15 times longer than traditional lamps, and the fixtures themselves offer a complete mix of colors- reducing the need for disposable plastic color filters.

LED Panels & Spotlights

We have several new LED (Light Emitting Diode) fixtures in use with 85-95% energy savings. The new fixtures have red, green, and blue LEDs and mix to thousands of colors. With up to 100,000 hours of use, we’ll never change the bulbs!

HID Projectors

Replacing high wattage “gobo” projectors are HID (High Intensity Discharge) projectors. Driven by a computer or DVD player, these units save us 65% of energy costs and allow us to project anything we choose- eliminating the steel patterns typically used for projection of trees, windows, etc.

For more information...

Please contact Professor David K. Warfel, dkwarfel@illinois.edu for more information. And be sure to tell your friends that you’ve witnessed an historic moment in theatre!

student sustainability committee
university of illinois at urbana-champaign

Tonight you will witness our first production where the stage is illuminated without a single “standard” incandescent lamp. Thanks to the progressive Student Sustainability Committee, the Armory Theatre has been retrofitted with several dozen new state-of-the-art energy efficient lighting technologies that dramatically reduce the overall energy consumption of tonight’s performance. We’ll save 10,000 pounds of CO2 from entering the atmosphere while saving hundreds in energy costs. Read below for a description of what we put in storage- and what we have now!

Plasma Lights

These brand-new electrode-less lights create a nice white light using 60% less energy than the conventional halogen fixture. They last up to 15 times longer than traditional lamps, and the fixtures themselves offer a complete mix of colors- reducing the need for disposable plastic color filters.

LED Panels & Spotlights

We have several new LED (Light Emitting Diode) fixtures in use with 85-95% energy savings. The new fixtures have red, green, and blue LEDs and mix to thousands of colors. With up to 100,000 hours of use, we’ll never change the bulbs!

HID Projectors

Replacing high wattage “gobo” projectors are HID (High Intensity Discharge) projectors. Driven by a computer or DVD player, these units save us 65% of energy costs and allow us to project anything we choose- eliminating the steel patterns typically used for projection of trees, windows, etc.

For more information...

Please contact Professor David K. Warfel, dkwarfel@illinois.edu for more information. And be sure to tell your friends that you’ve witnessed an historic moment in theatre!