



## Lighting/Controls and Motor/Drives Solutions: Application Specific

**Presentation by**  
Bob Kirby  
Co-Founder, Executive Vice President  
Groom Energy



DESIGN, ENGINEERING AND INSTALLATION OF RENEWABLE AND ENERGY EFFICIENCY TECHNOLOGIES

## Groom Energy - What We Do

### Solutions

- Energy Efficiency Upgrades**
  - Cogeneration
  - Control Systems
  - Data Center and UPS
  - Demand Charge Reduction
  - Demand Response
  - HVAC
  - LED and HIF Lighting
  - Motors and Compressors
  - Variable Frequency Drives
- Resource Efficiency Upgrades**
  - Domestic and Process Water
  - Waste
- Renewable Energy Systems**
  - Architectural Wind
  - Daylight Harvesting
  - Solar Photovoltaic
  - Solar Thermal





**Investment**

- Installed System Cost
- Rebates
- Grants
- Tax Incentives

**Savings**

- kWh, BTU
- Operating
- Maintenance

**Return**

- Payback
- Lifecycle
- Environmental

# Managing Utility Incentives Across the Country



# Our Approach and Our Customers

- Turnkey installer of energy efficiency and renewable energy projects
- Analysis, consulting, engineering and multi-region implementation of *both renewable and energy-efficiency* technologies across the US
- Affiliate of Groom Construction, a full-service commercial construction company

## Lighting Choices....?? Which fits your application...



Lens  
Chip  
Junction  
Submount  
Reflector  
Substrate





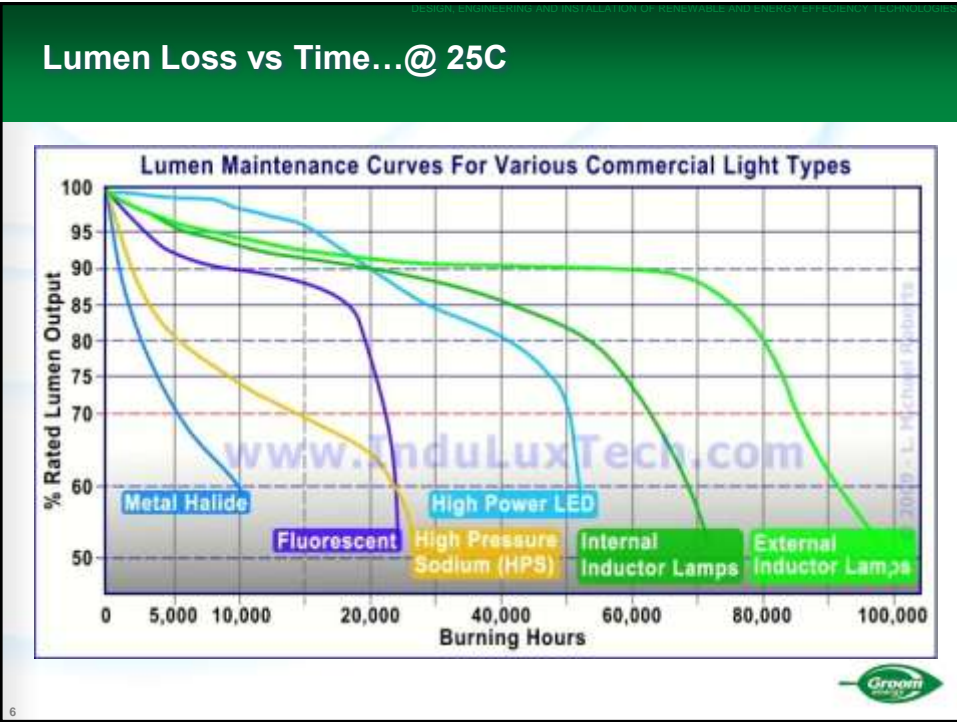


81% Energy Savings  
20% Energy Savings  
20% Energy Savings

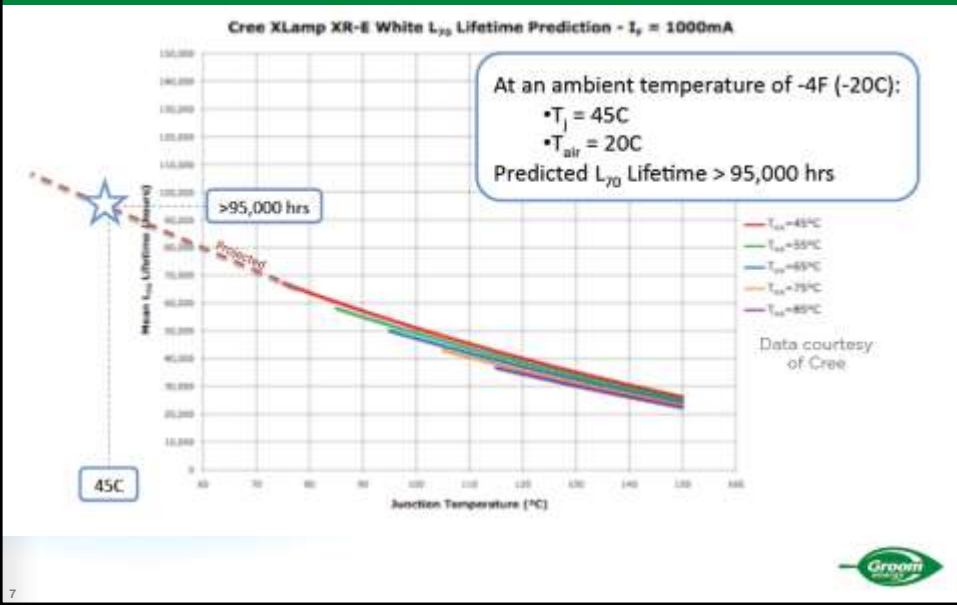




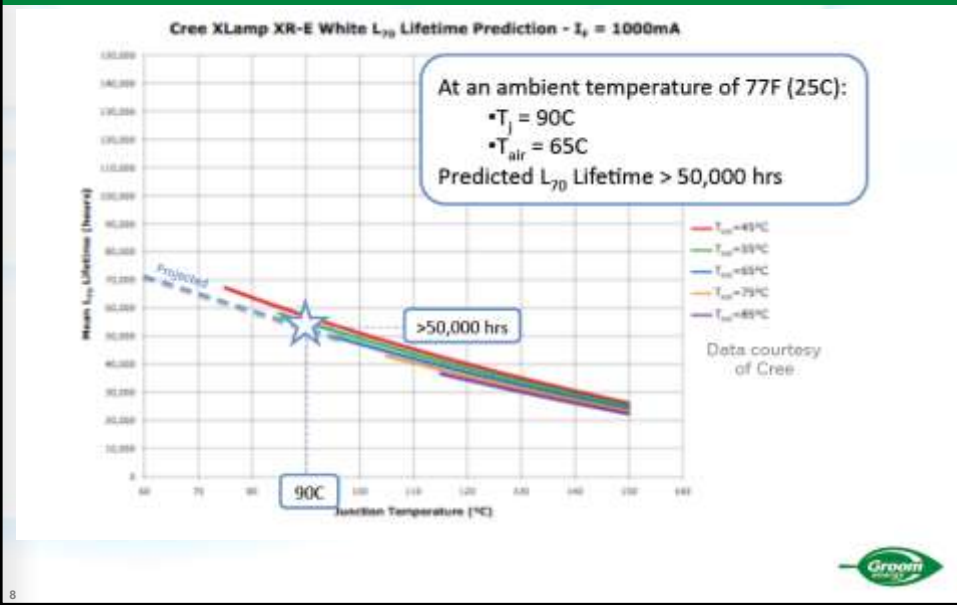
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## LED Extremely Long Life in Freezers... 100,000 hours of "on" time



## Ambient Temp Spaces ( 77F ) 50,000 Hours



# Long Life Fluorescent.. Rated 60,000 hours !



**73094 – F32T8SXLSPX35ECO**  
 GE Ecolux® Long Life T8 - Office; Long Life

- Super long life

Meets Federal Minimum Efficiency Standards  
 (E) Circle E

**GENERAL CHARACTERISTICS**

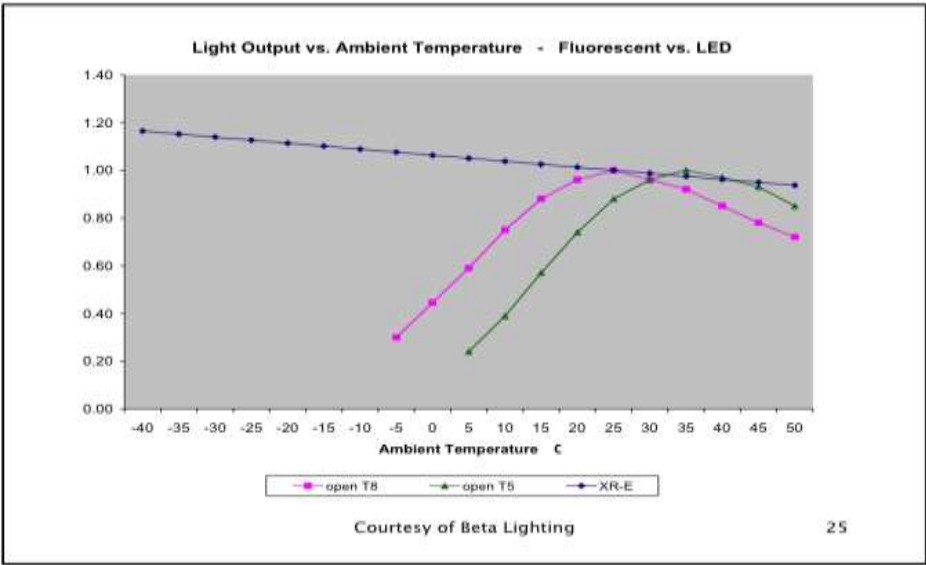
Lamp type	Linear Fluorescent - Straight Linear
Bulb	T8
Base	Medium Bi-Pin (G13)
Rated Life	55000 hrs
Rated Life (instant start) @ Time	31000.0 h @ 3.0 h 40000.0 h @ 12.0 h
Rated Life (rapid start) @ Time	55000.0 h @ 3.0 h 60000.0 h @ 12.0 h



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# LED vs Fluorescent in Cold Storage

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## Digital Lumens Intelligent Light Engine, High Bay 3 Bar

ILE-HB3



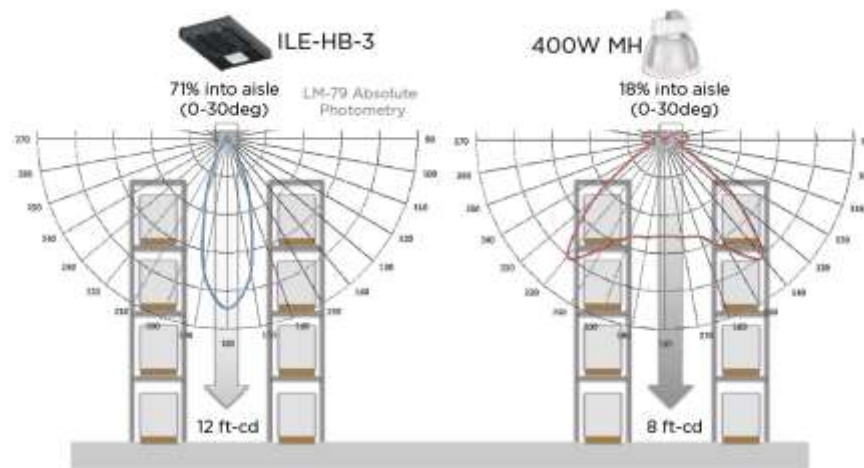
- High-Quality Light**
- Aimable light bars
  - Thermal design for long life
  - UL Listed
  - LM79, LM80 Test Reports available

- On-board Computer**
- Decision engine
  - Built-in networking
  - Built-in occupancy sensor
  - Open Sensor Bus
  - Real-time kWh



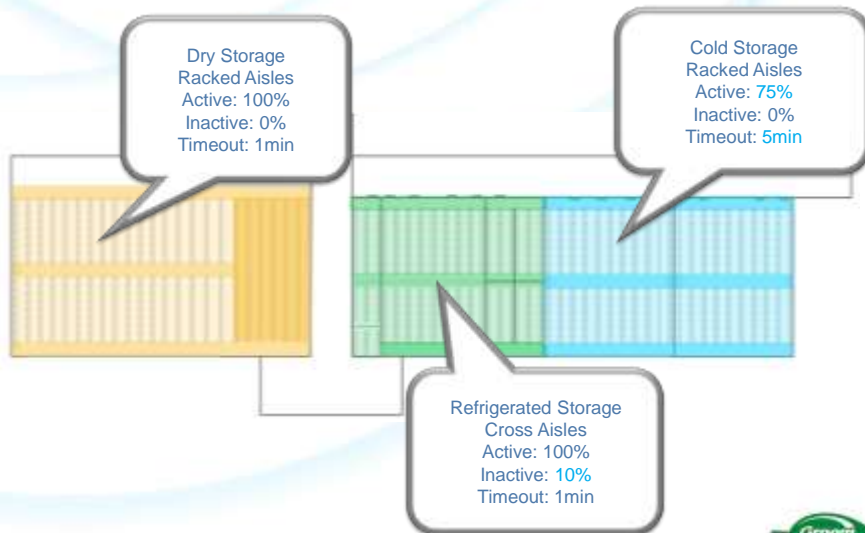
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## Control the Light Source for Savings

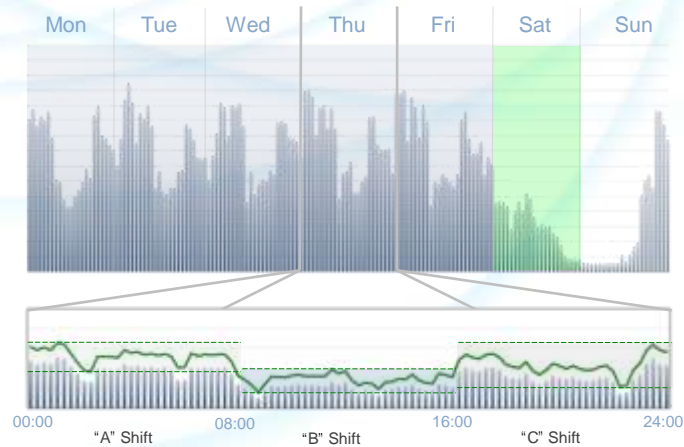


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## Advantage #1 Light Where It's Needed and How Much

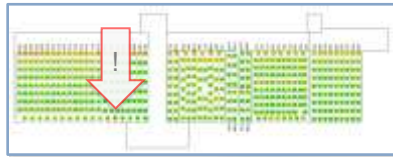


## Advantage #2 Light When It's Needed





### Advantage #3 Managing the Lighting Service



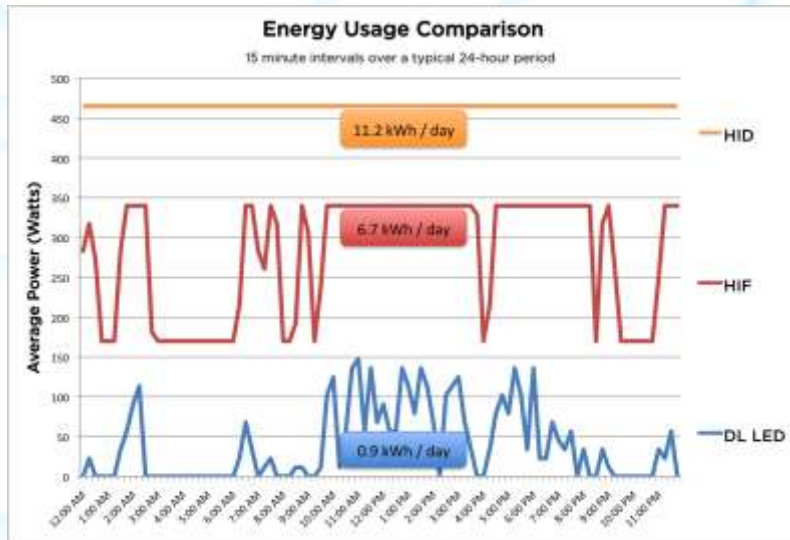
- Are the lights
- all operational?
  - properly configured?

- How much energy are we saving?
- facility-wide
  - by room
  - by zone

- Can we increase savings by adjusting
- light levels?
  - sensor behavior?
  - schedules?



### HID vs HIF vs LED Energy Consumption



## LED Freezer Projects So Far - 500 Million Cubic Feet






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## Percent Occupied (Lights are on)

 DIGITAL LUMENS LIGHTRULES
Welcome, DL Admin [Logout](#)

Dashboard
Configuration
Manual Control
Reporting
Administration


Occupancy - All Rooms  
11 Jan 07, 2011



Occupancy

[View Report](#)

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## On Board Metering (Average kWh Usage)



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## Results - Daily Energy Costs (107 fixtures, \$0.078/kWh)



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## Daily Cost Summary vs Technology 24/7 \$.078

<u># Fixtures</u>	<u>Fixture Type</u>	<u>Cost</u>
157	400 watt HPS	= \$ 137 /day
157	350 watt metal halide	= \$ 121 /day
157	221 watt 6-lamp T8 w/sensor	= \$ 54 /day
107	160 watt LED	= \$ 5.34 /day

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## Technology Comparison

### LED Technology

Net Cost: \$604,035  
 Project Return on Investment: 157%  
 Utility Incentive: \$500,000  
 10 Year Savings after Purchase: \$8,888,886

### 6L T5 HO Lighting Technology

Net Cost: \$303,605  
 Project Return on Investment: 119%  
 Utility Incentive: \$43,740  
 10 Year Savings after Purchase: \$3,010,328

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## Technology Comparison

### LED Technology

Net Cost: \$432,297

Project Return on Investment: 90%

Utility Incentive: \$110,066

10 Year Savings after Purchase: \$3,287,458

### 6L T5 HO Lighting Technology

Net Cost: \$199,381

Project Return on Investment: 82%

Utility Incentive: \$46,733

10 Year Savings after Purchase: \$1,268,097



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## Technology comparison

### LED Technology

Net Cost: \$1,106,758

Project Return on Investment: 95%

Utility Incentive: \$299,927

10 Year Savings after Purchase: \$8,288,785

### 6L T5 HO Lighting Technology

Net Cost: \$422,195

Project Return on Investment: 102%

Utility Incentive: \$107,824

10 Year Savings after Purchase: \$3,210,547



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## Opportunity:

### LED Technology

Net Cost: \$706,750

Project Return on Investment: 116%

Utility Incentive: \$100,000

10 Year Savings after Purchase: \$5,995,399



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## Technology Side by Side Aisles



4LT5 Demo: Avg. Foot-Candles

234 Watts      6.19

400W HPS: Avg. Foot-Candles

460 Watts      14.33

LED:            : Avg. Foot-Candles

160 Watts      15.72

400w HPS Annual Cost ea: \$402.96

6LT5 Annual Cost ea: \$ \$310.10

4LT5 Annual Cost ea: \$204.98

LED Annual Cost ea: \$21.02



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