LED Technology Trends

Interior Lighting

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INTERIOR LIGHTING

- Indoor Commercial
- Downlighting
- Industrial

Disclaimer

There are exceptions to every rule

INTERIOR LIGHTING

- Indoor Commercial
- Downlighting
- Industrial

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Indoor Commercial LED Lighting

- Where did it start?
  - High End Architectural
  - “Options” as Standard
  - High Color Quality

- Who did it target?
  - Early Adopters
  - Environment Conscious
  - Lighting Designers/Specifiers

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Indoor Commercial LED Lighting

- Where did it go next?
  - Expanded portfolios
  - Costs Lowered
  - “Options” remained Standard
  - High Color Quality remained
  - Lower Energy Solutions

- Who did it target?
  - Same as before
  - Large Entities
    - Schools
    - Hospitals
    - Retailers

Indoor Commercial LED Lighting

- Where are we now?
  - Costs Lowered further
  - Commercial Grade Luminaires
  - <3yr Paybacks Common
  - LPW vs. Initial Cost

- Who does it target?
  - Everyone

INTERIOR LIGHTING

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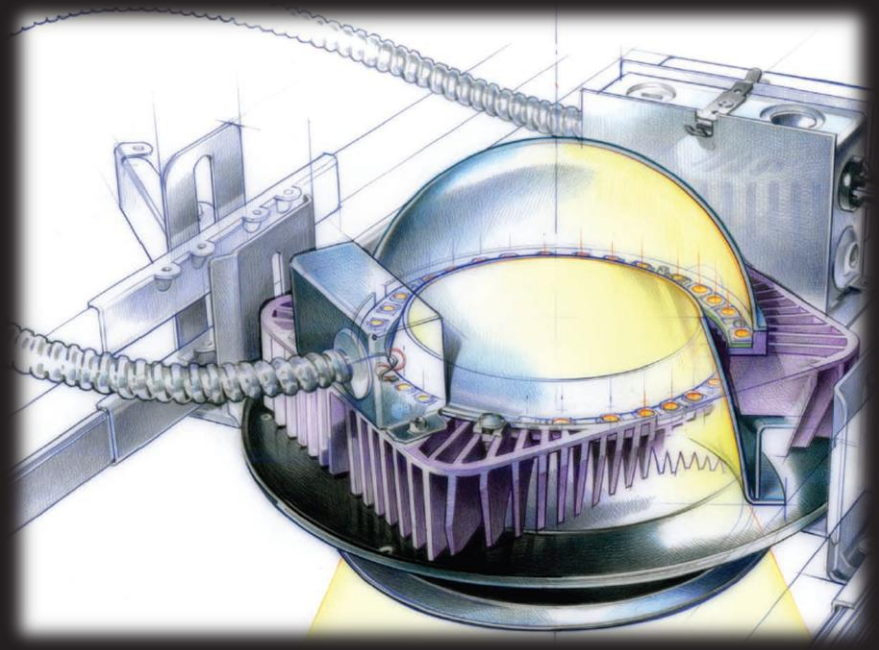
LED Downlighting

- Where did it start?
  - High End Architectural
  - Unique Designs
  - “Options” as Standard
  - High Color Quality



- Who did it target?
  - Early Adopters
  - Environment Conscious
  - Lighting Designers/Specifiers
  - Those accepting a Long Payback

LED Downlighting

- Where did it go next?
  - Expanded portfolios
  - Costs Lowered
  - Lower Energy Solutions
  - Pushed into Residential
  - Lead Indoor LED adoption
    - Better than Incumbent
    - Good Paybacks

LED Downlighting

- Where are we now?
  - Costs Lowered further
    - Highly Competitive
    - Residential Focus
  - <2yr Paybacks Common
  - Higher Lumen Packages

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Industrial LED Lighting

- Where did it start?
  - Slow to get started
  - T5 High Bay Hard to Beat
  - Tough Conditions
    - Very Hot
    - Very Cold
    - Very Toxic
  - High Lumen Packages Needed
  - Maintenance Critical
  - Controls

Industrial LED Lighting

- Where did it go next?
  - Costs Lowered
  - LEDs were able to run harder and hotter
  - Paybacks < 3yrs Feasible
  - Commercial Grade Offerings

- Where are we now?
  - See Above

INTERIOR LIGHTING

- Controls and LED Lighting
- What's Next?

INTERIOR LIGHTING

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- What's Next?

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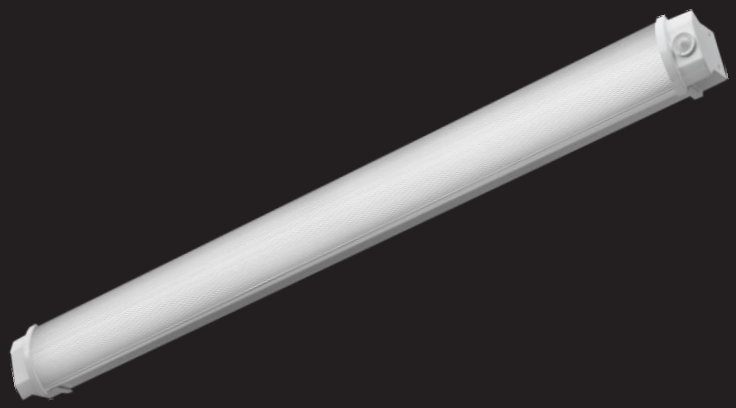
Controls and LED Lighting

- Are they different?
  - No & Yes
  - Often Embedded
  - Often Automatic
  - Often more complex yet simpler
    - *Thermal Protection*
    - *Occupancy Sensors*
    - *Bi-Level Controls*
    - *Lumen Maintenance*
    - *End of Life Indicator*
    - *Daylight Harvesting*

Occupancy Sensors

- Quick Payback
- Appearing in DLC specs
- Simple and Complex Solutions



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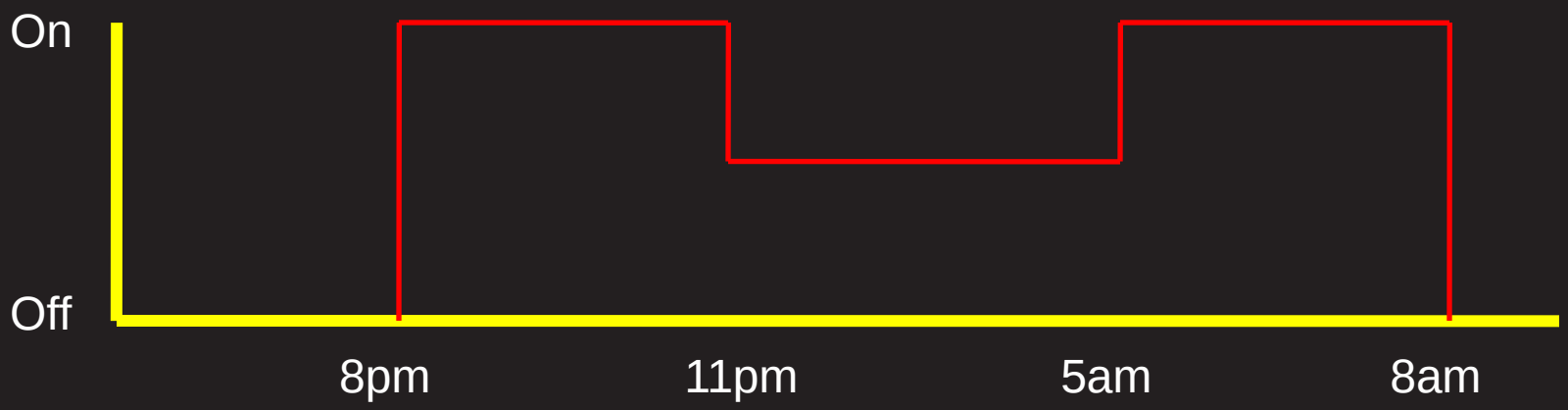
Bi-Level Controls

- Set Timed Dimming
- Set Dimmed Levels
- Set Dimming Method
  - > Reduced Current
  - > Modules Off



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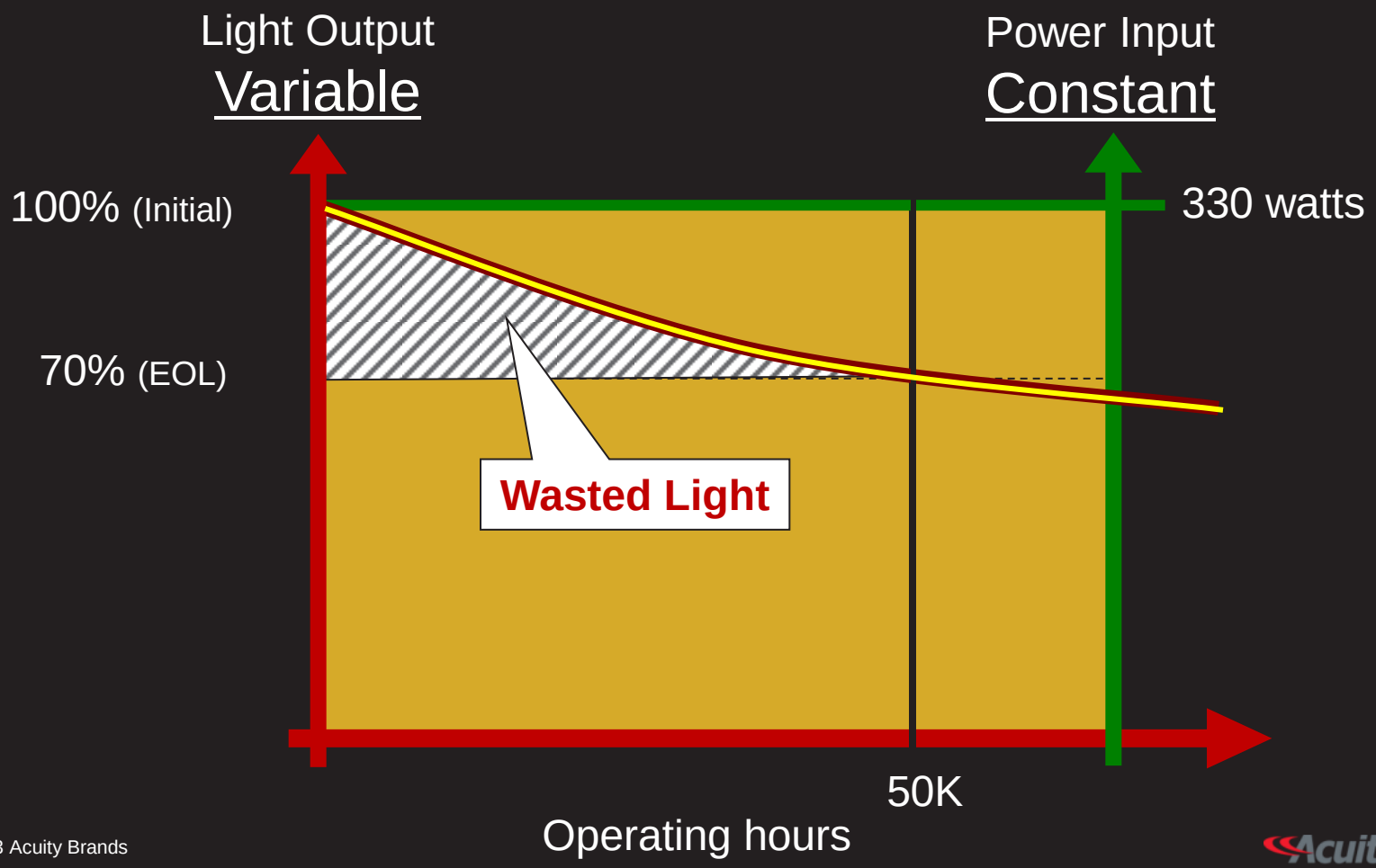
Bi-Level Controls

Lumen Maintenance

- Constant Light Level
- >10% energy savings over luminaire life



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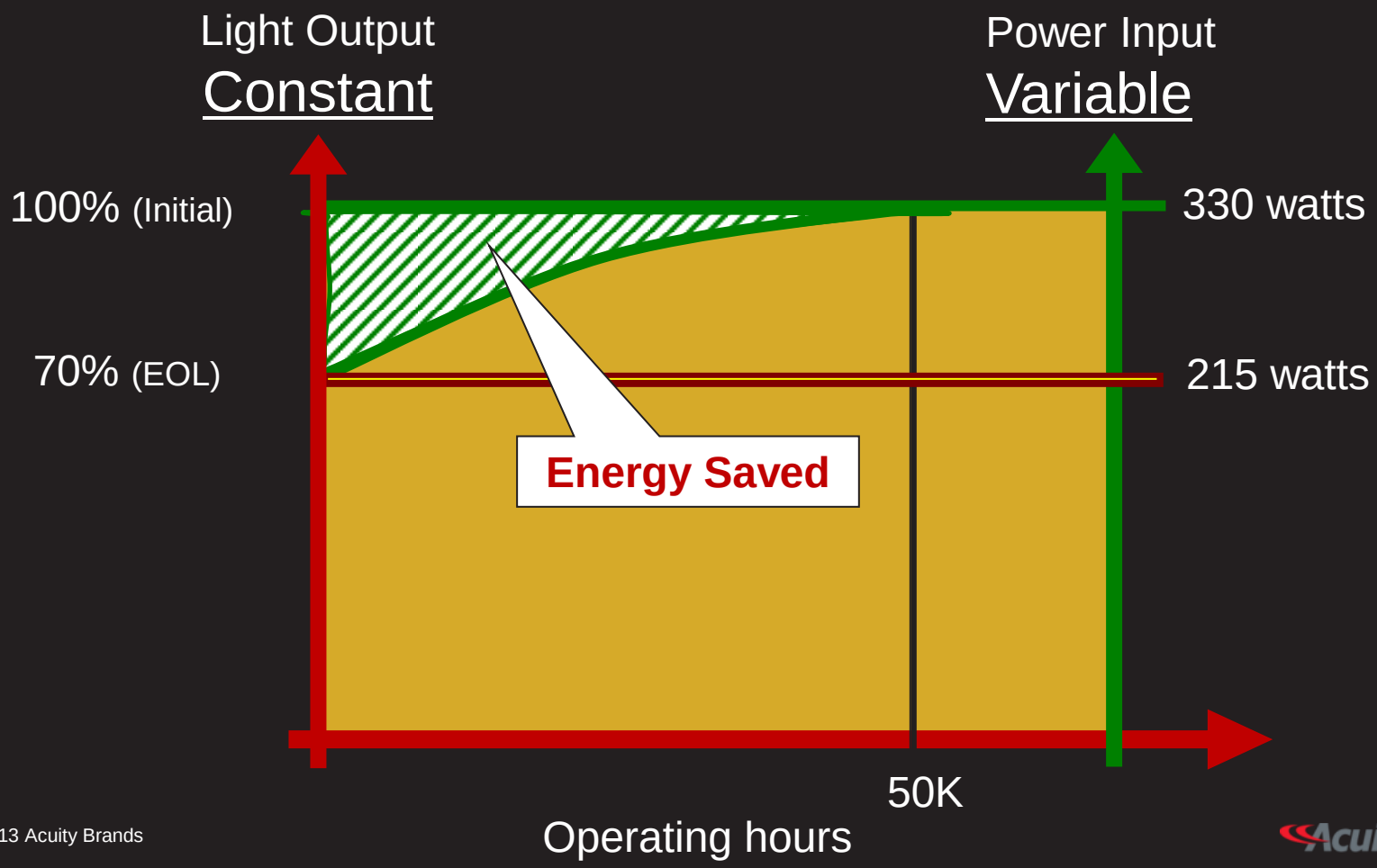
Lumen Maintenance

- Extends Luminaire life
- Bulk of energy saved early in life = quicker return



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End of Life Indicators

- Fully Automated
- Time or Flux
- Indicator?

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Daylight Harvesting

- Remember LED Lighting is digital and controls are a natural fit
  - LEDs are not damaged by dimming
  - Running them cooler extends their life
  - Turning them on and off does not affect their life
  - *LED Lighting teamed with controls and Daylighting is an even more natural fit*

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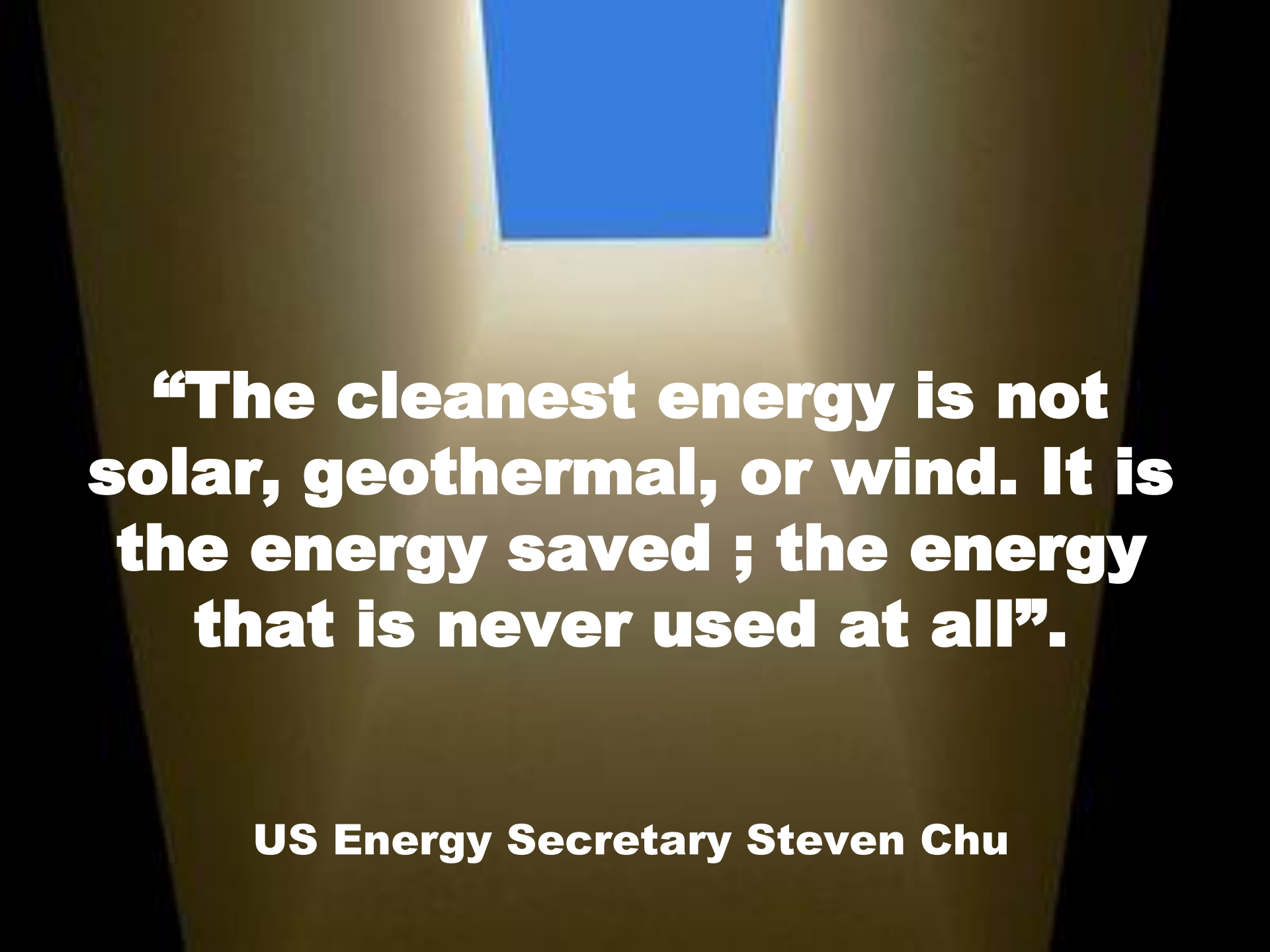
“The cleanest energy is not solar, geothermal, or wind. It is the energy saved ; the energy that is never used at all”.
US Energy Secretary Steven Chu

INTERIOR LIGHTING

- Controls and LED Lighting
- What's Next?

Interior LED Lighting

- So what is next?
  - Even Lower Initial Costs
  - Move away from “mimicry”
  - More automated controls
  - Greater Energy Savings
  - Come to LightFair and find out

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Thank You

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