NLC Commissioning



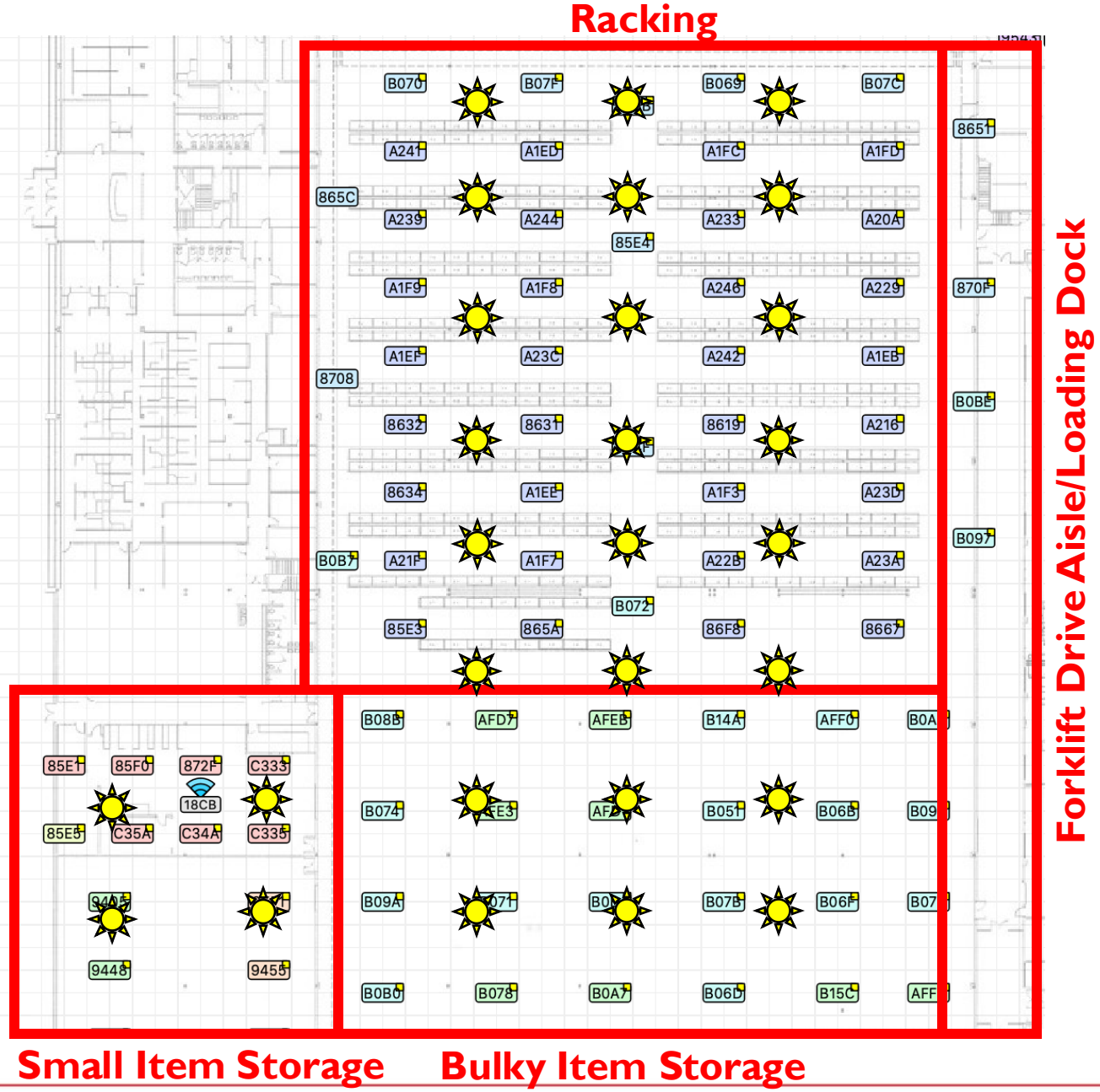



WATTSMART® BUSINESS

ROCKY MOUNTAIN POWER
POWERING YOUR GREATNESS

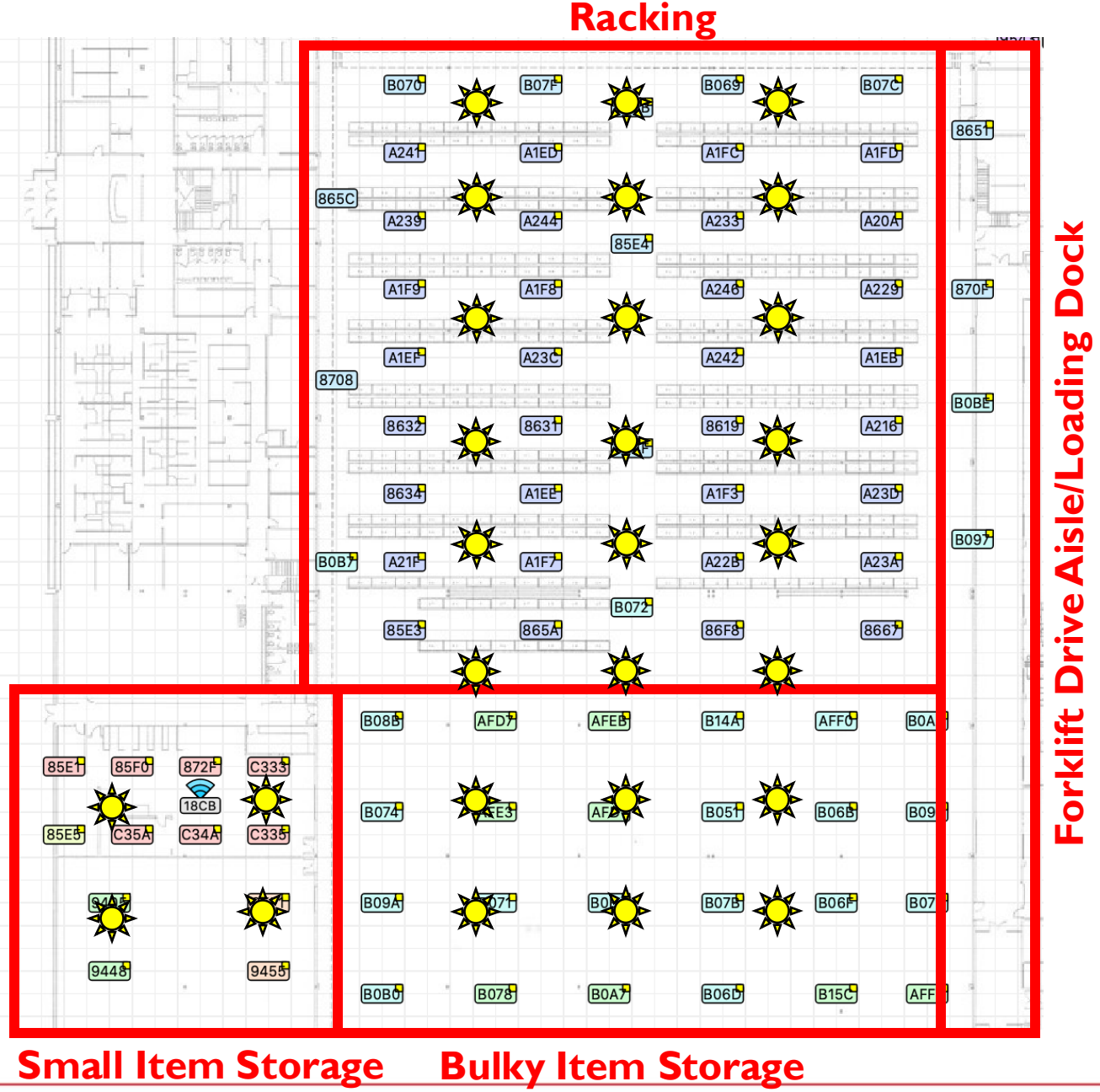
Smart Lighting Controls

- **Project:**
  - Johnny's warehouse.
- **Areas/zones to control:**
  - Bulk storage.
  - Cold storage.
  - Aisles.
  - Dock.
- **Types of control:**
  - LLLC (Luminaire Level Lighting Control) – built-in sensors/controllers:
    - Daylight sensors.
    - Motion sensors.
    - Individually Addressable



Which Areas Need "Grouping"?

- **Work independently.**
  - Greatest flexibility.
  - Most savings.
  - Default for LLLC.
- **Grouped sensors.**
  - Anticipate traffic patterns.
  - When fixtures are spaced out.



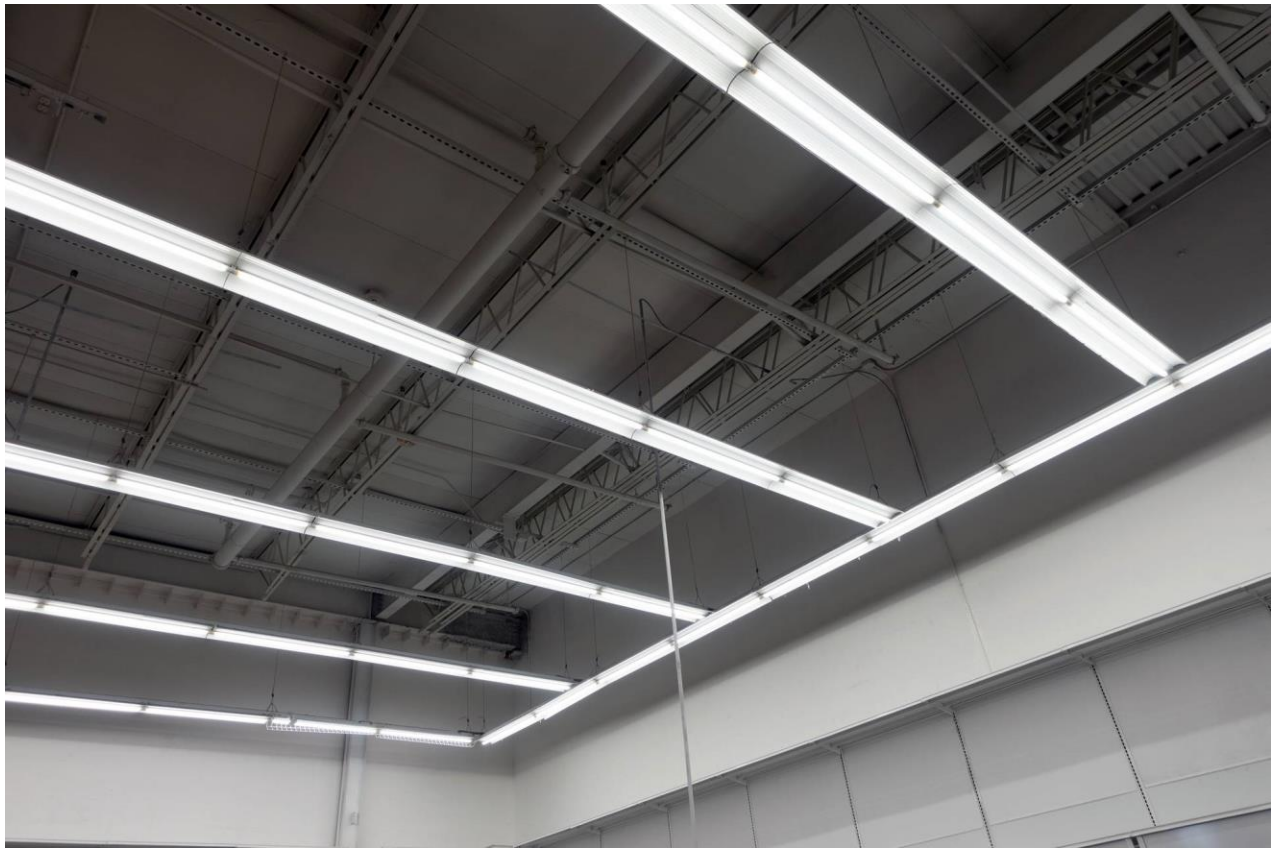
Daylighting/Ambient Light Sensing

- **With LLLC, all fixtures have light-sensing abilities.**
  - Light levels depends on distance from daylight source.
- **Why enable light-level sensing outside of a daylighting zone?**
  - Ramp up to compensate for another fixture ramping down.
  - A more accurate and dynamic way to high end trim.

High-End Trimming

- **High-end trim:**
  - Set system below 100%.
    - Set as a percentage of max light output.
    - Set a foot-candle level.
  - Highest contributor for energy savings.
    - Per DLC NLC study.
    - Most spaces are over-lit going to LED.

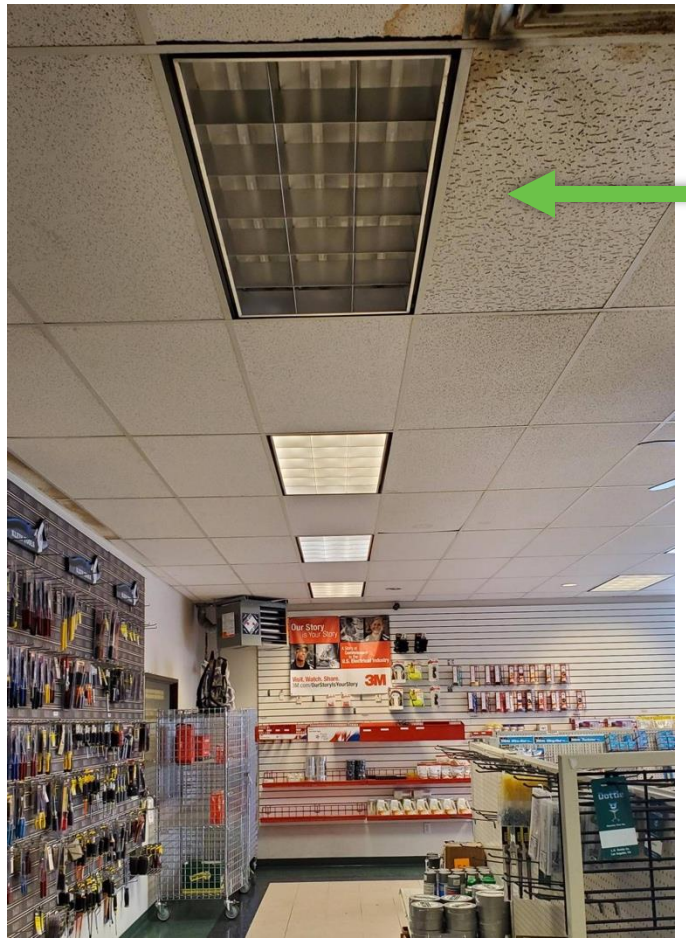
- **Comparison:**
  - 100% versus 80%.
  - Can you tell the difference?



Low-End Trimming

- **Low-end trim:**
  - Not allow fixture to actually turn off.
    - Set a minimum as a percentage of max light output.
    - Set a minimum foot-candle level.
  - Decreases savings.

- **When you would low-end trim:**
  - Occupant complaints about lights turning off (set to 5%).
  - When safety is a concern.
  - Egress lighting.



Burnt out, or just responding to daylight?

Setting the High-End Trimming

- **Methods of trimming.**
  - **Fixed percentage:**
    - Simple, but not dynamic.
    - Cheaper if not using LLLC.
  - **Based on light level:**
    - Adapts to changing conditions:
      - Paint the walls a different color.
      - Surrounding fixtures turn off.
      - Bay doors open.
      - Fixture output depreciation.
      - Etc.
    - Easy on LLLC, but could be costly on other systems.

Light Level Based High-End Trim - IES Recommendations

- What are the IES recommended light levels for:
  - Racking.
  - Bulky item storage.
  - Small item storages
  - Forklift aisle.
- Verify with customer that there are not specific needs/standards.

Building Area & Task	Average Maintained Foot-Candles (Horizontal) (FC)	Range of Maintained Foot-Candles (Horizontal) (FC)
WAREHOUSING & STORAGE		
Bulky Items—Large Labels	10	
Small Items—Small Labels	30	
Cold Storage	20	10 - 30
Open Warehouse	20	10 - 30
Warehouse w/Aisles	20	10 - 30

Time Out!

- **Occupancy sensors (on/off):**
  - Commissioning makes a difference.

Image Courtesy of RAB Lighting

Sensor Timeout

Occupancy Rate	30 seconds	1 minute	2 minutes	3 minutes	5 minutes	7.5 minutes	10 minutes	15 minutes	30 minutes
5%	95%	94%	92%	91%	89%	87%	86%	84%	79%
10%	90%	87%	84%	81%	78%	74%	71%	67%	58%
15%	85%	81%	76%	72%	66%	61%	57%	51%	37%
20%	80%	75%	68%	63%	55%	48%	43%	34%	16%
25%	75%	68%	59%	53%	44%	35%	29%	18%	0%
30%	70%	62%	51%	44%	33%	23%	14%	1%	0%
35%	65%	55%	43%	34%	22%	10%	0%	0%	0%
40%	60%	49%	35%	25%	10%	0%	0%	0%	0%
45%	55%	43%	27%	16%	0%	0%	0%	0%	0%
50%	50%	36%	19%	6%	0%	0%	0%	0%	0%
55%	45%	30%	11%	0%	0%	0%	0%	0%	0%
60%	40%	24%	3%	0%	0%	0%	0%	0%	0%
65%	35%	17%	0%	0%	0%	0%	0%	0%	0%
70%	30%	11%	0%	0%	0%	0%	0%	0%	0%
75%	25%	4%	0%	0%	0%	0%	0%	0%	0%
80%	20%	0%	0%	0%	0%	0%	0%	0%	0%
85%	15%	0%	0%	0%	0%	0%	0%	0%	0%
90%	10%	0%	0%	0%	0%	0%	0%	0%	0%
95%	5%	0%	0%	0%	0%	0%	0%	0%	0%
100%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Common Customer Hesitations

Concerns:

1. We are always in this space.
2. The lights cannot turn off for safety reasons.
3. Lights going on and off are distracting.

Progressive Dimming

Common Customer Hesitations

Concerns:

1. We are always in this space.
2. The lights cannot turn off for safety reasons.
3. Lights going on and off are distracting.

Responses:

1. You are not always in every part of the space simultaneously. Breaks, holidays, weekends, shift changes, forget to turn off lights at close.
2. So don't turn them off completely. Dim them and set a low-end trim.
3. Set up ramp-up/down rates.

Let's Turn Off the Lights

- **Other energy saving strategies:**
  - Plug load controls.
  - Scene controller/personal tuning.
  - Scheduling.

Did You Solve the Puzzle?

- How can you make your life easier on networked controls projects?

Correct answers get an extra raffle ticket.

LLLC

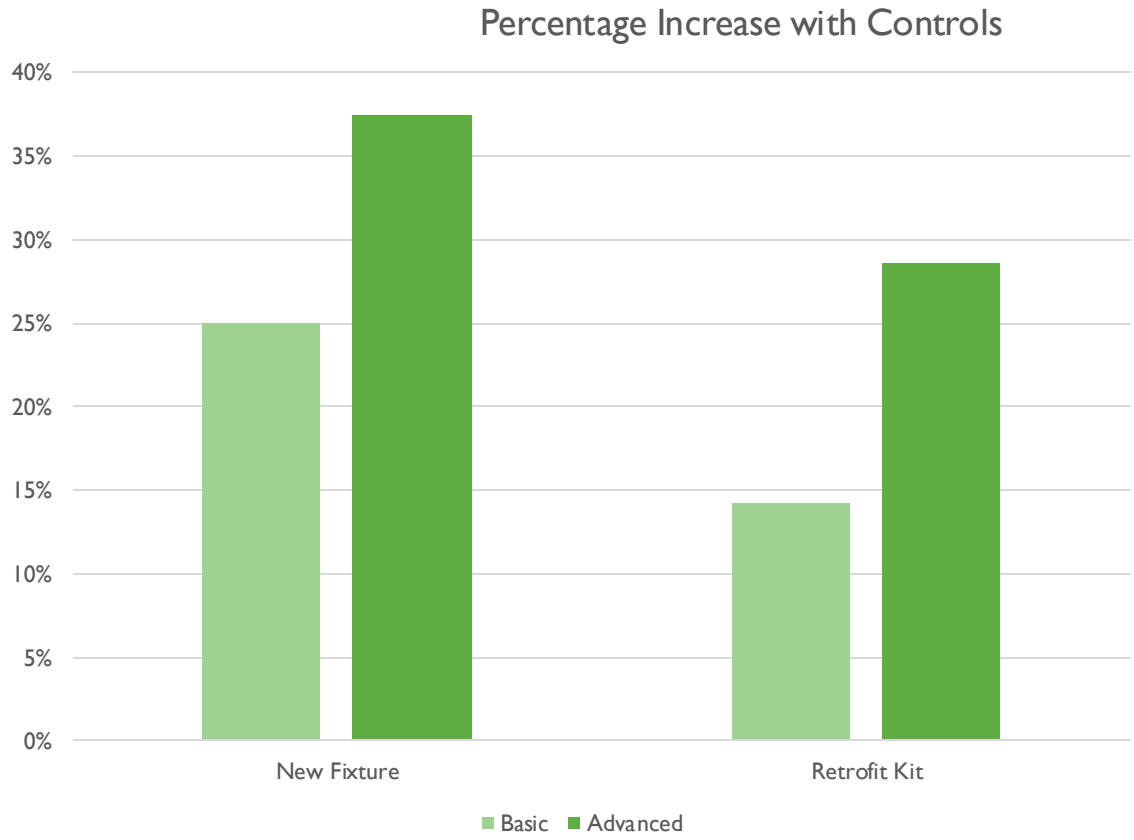
- Commissioning is tricky.
- There is support from manufacturer's reps.
- Install the right system so they have something to work with.
- LLLC fixtures come with controls from the factory.
- Install like a basic fixture.

Image Courtesy of NEEA

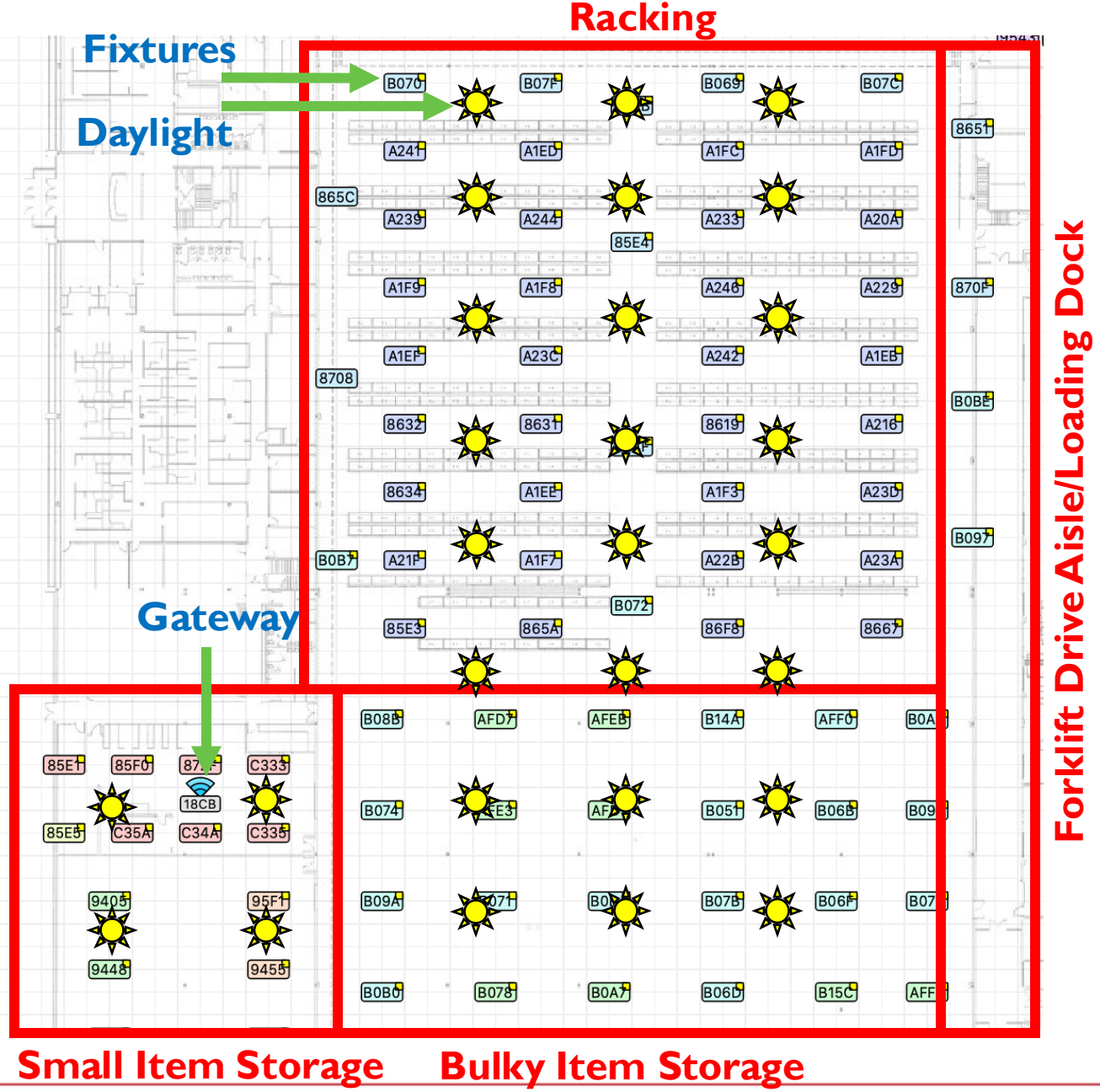
NLCs and ANLCs Pay More

- **New fixture:**
  - Advanced networked lighting controls $0.22/kWh.
  - Basic or networked lighting controls $0.20/kWh.
  - No controls $0.16/kWh.

- **Retrofit kits:**
  - Advanced networked lighting controls $0.18/kWh.
  - Basic or networked lighting controls $0.16/kWh.
  - No controls $0.14/kWh



NLC Escape Room – Handout Front



NLC Escape Room – Handout Back

What does LLLC stand for?

Q. Limited Liability Lighting Corporation.

R. Library of Lighting Luminaire Configurations.

S. Luminaire Level Lighting Control.

T. Luminaire Lighting Library Control.

Which areas would benefit from sensor grouping? (Choose all that apply.)

A. Racking.

F. Small item storage.

P. Bulky item storage.

V. Forklift drive aisle.

What are the benefits of light sensing outside of daylighting areas? (Choose all that apply.)

E. Adjust to other fixture output changes.

W. Turn off the lights when no one is occupying the space.

T. Works as a dynamic high-end trim.

When would you NOT implement a low-end trim?

F. When there are customer complaints about the lights "not working" when it's sunny.

G. When there are safety concerns about turning the lights off completely.

H. For egress lighting needs.

I. Any project that doesn't have the above-listed specific needs.

In what cases would a fixed percentage high-end trim **not** be able to compete with a light level based high-end trim? (Choose all that apply.)

M. The walls were repainted in a different color.

E. Adapt to surrounding fixtures turning off.

N. The specifier oversized the lighting system and it's too bright.

W. Bay doors that constantly open and close.

B. Occupants complain about high light levels causing headaches and want them turned down.

I. To **automatically** compensate for fixture output depreciation.

What is the correct end trim FC level for racking?

S. 10 fc.

T. 20 fc.

U. 30 fc.

V. 40 fc.

What is the correct end trim FC level for bulk storage?

H. 10 fc.

I. 20 fc.

J. 30 fc.

K. 40 fc.

What is the correct end trim FC level for small item storage?

J. 10 fc.

K. 20 fc.

L. 30 fc.

M. 40 fc.

Assuming a 50% occupancy rate, at what sensor timeout would there be ZERO energy savings?

J. 2 minutes.

K. 3 minutes.

L. 5 minutes.

M. 10 minutes.

N. 15 minutes.

When can the use of ramp rates overcome customer concerns?

K. Many of the lights serve as egress lighting.

L. Wants to avoid a "light show" with lights turning on and off all day.

M. Control systems are too complicated and expensive.

How can personal tuning save energy?

A. Some systems have color-changing options, so allow the occupants to choose the light colors based on their moods.

B. Occupants often forget to turn off the lights when they leave a space.

C. Occupants can choose to reduce light levels to their preferences, which sometimes results in reduced consumption.

Use the letters from your quiz answers to solve the question. Save time with LLLC.