TEAM BRUNDTLAND

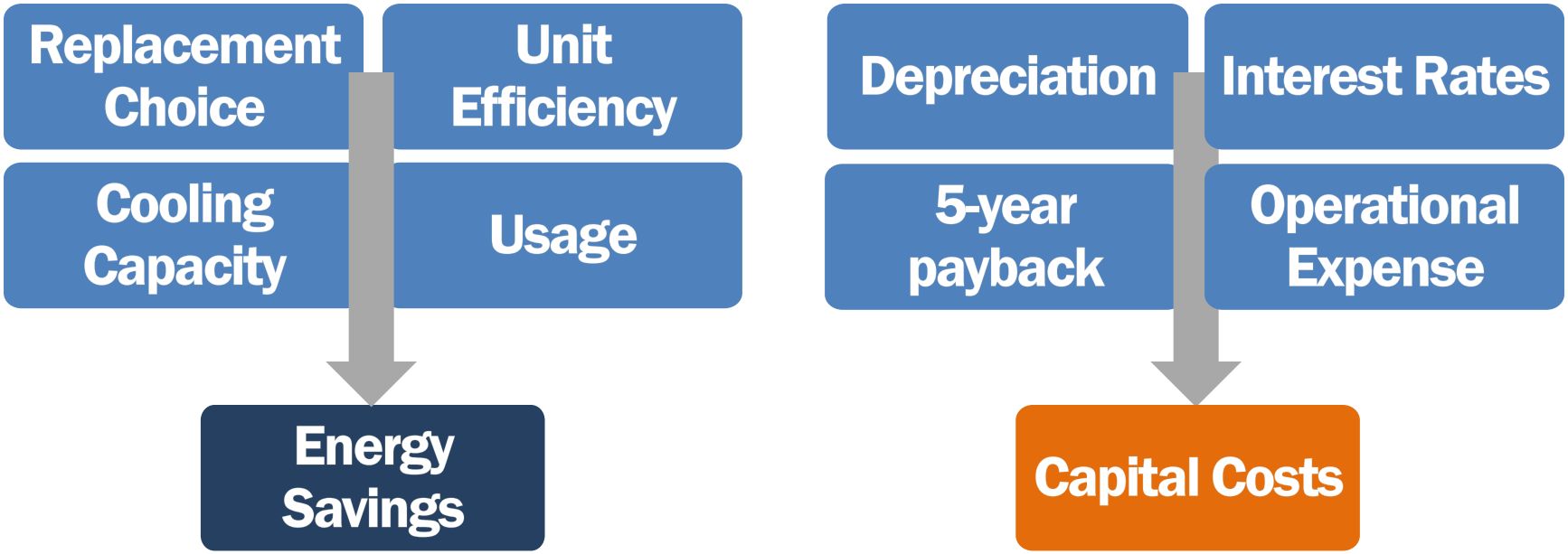
THE EVERYTHING STORE

OPTIMIZING RTU REPLACEMENTS

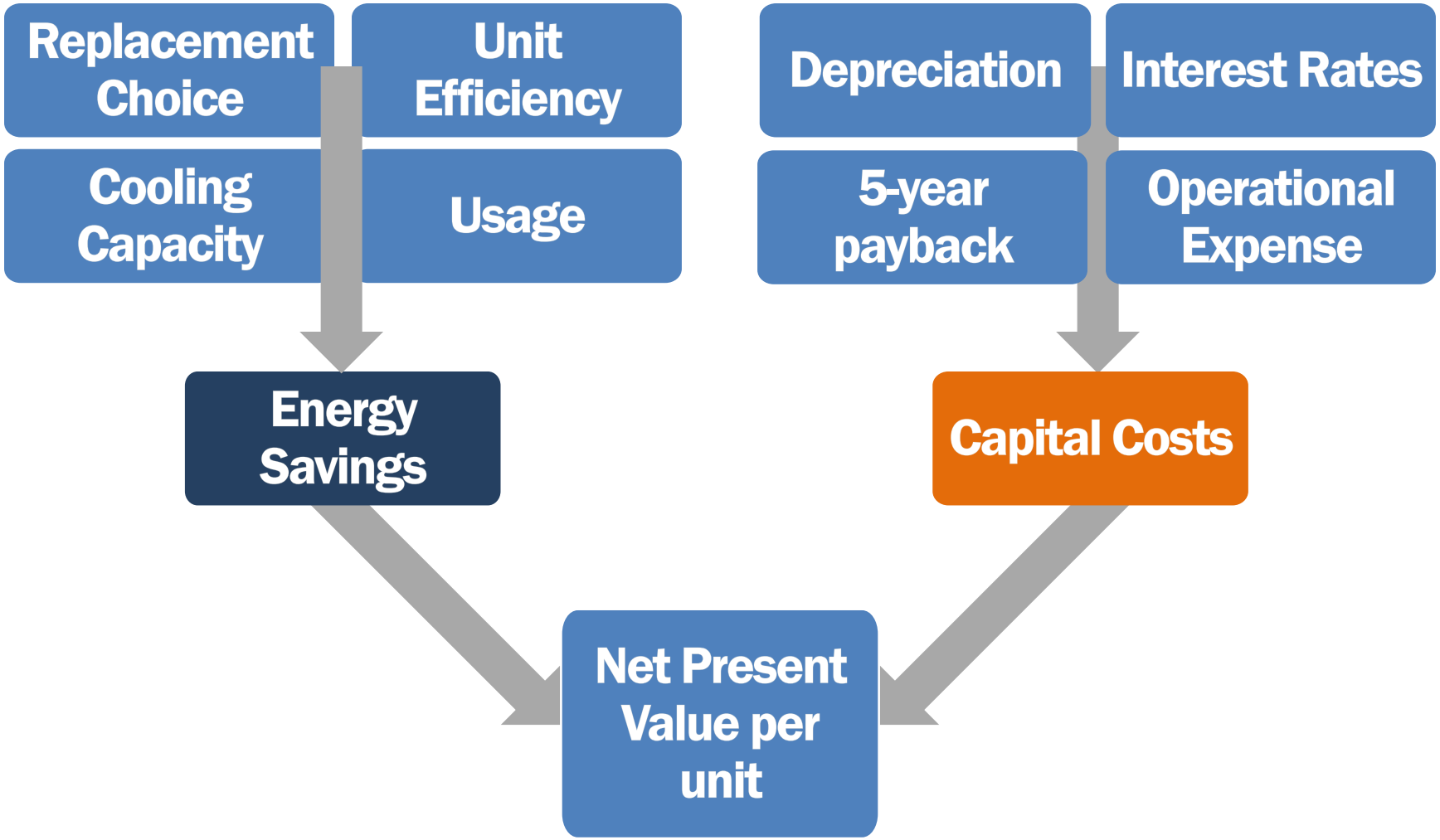
Energy Savings

Capital Costs

OPTIMIZING RTU REPLACEMENTS



OPTIMIZING RTU REPLACEMENTS



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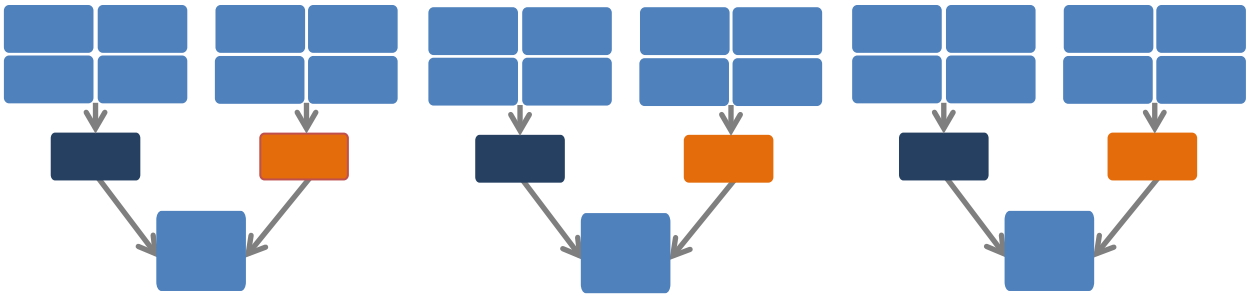
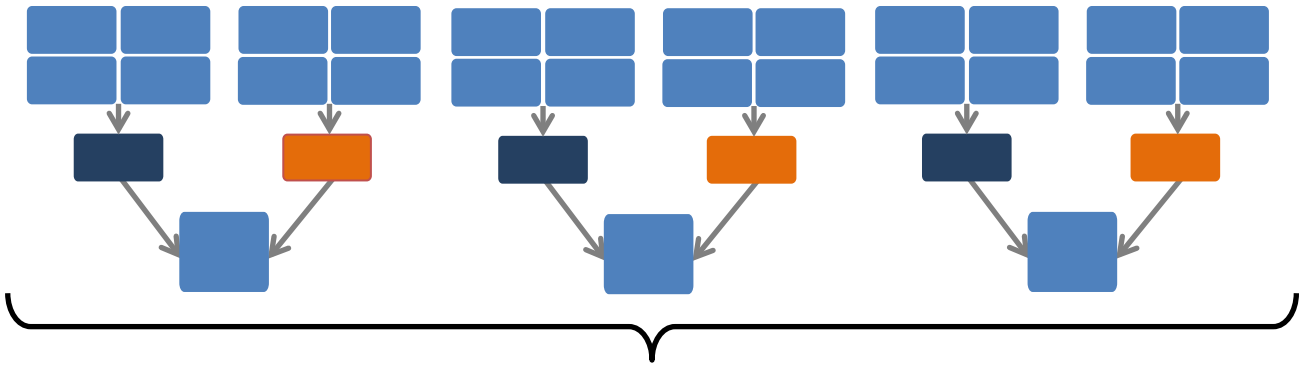


2,120 Rooftop Units from 100 Stores

OPTIMIZING RTU REPLACEMENTS

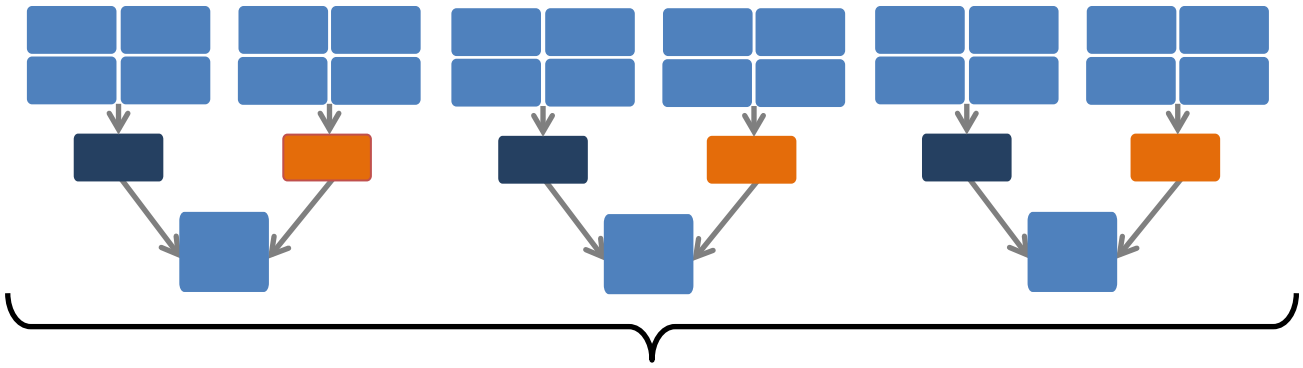


2,120 Rooftop Units from 100 Stores

Yes | ***Replace?*** | **No**

Decision 1: *Positive NPV?*

OPTIMIZING RTU REPLACEMENTS



2,120 Rooftop Units from 100 Stores

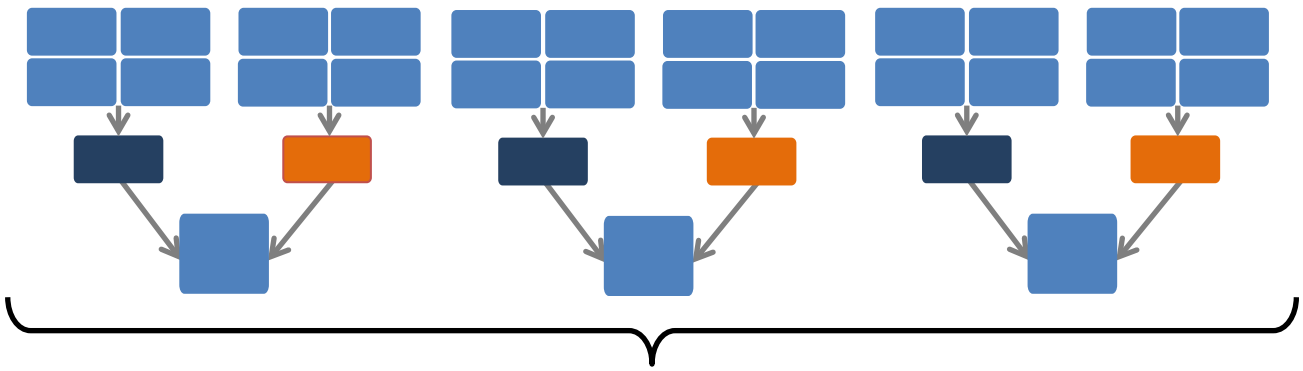
Yes — *Replace?* — **No**

Decision 1: *Positive NPV?*

- **Minimum Standard**
- **CEE Tier I**
- **CEE Tier II**
- **IEER 18**

Decision 2: *Which unit?*

OPTIMIZING RTU REPLACEMENTS



2,120 Rooftop Units from 100 Stores

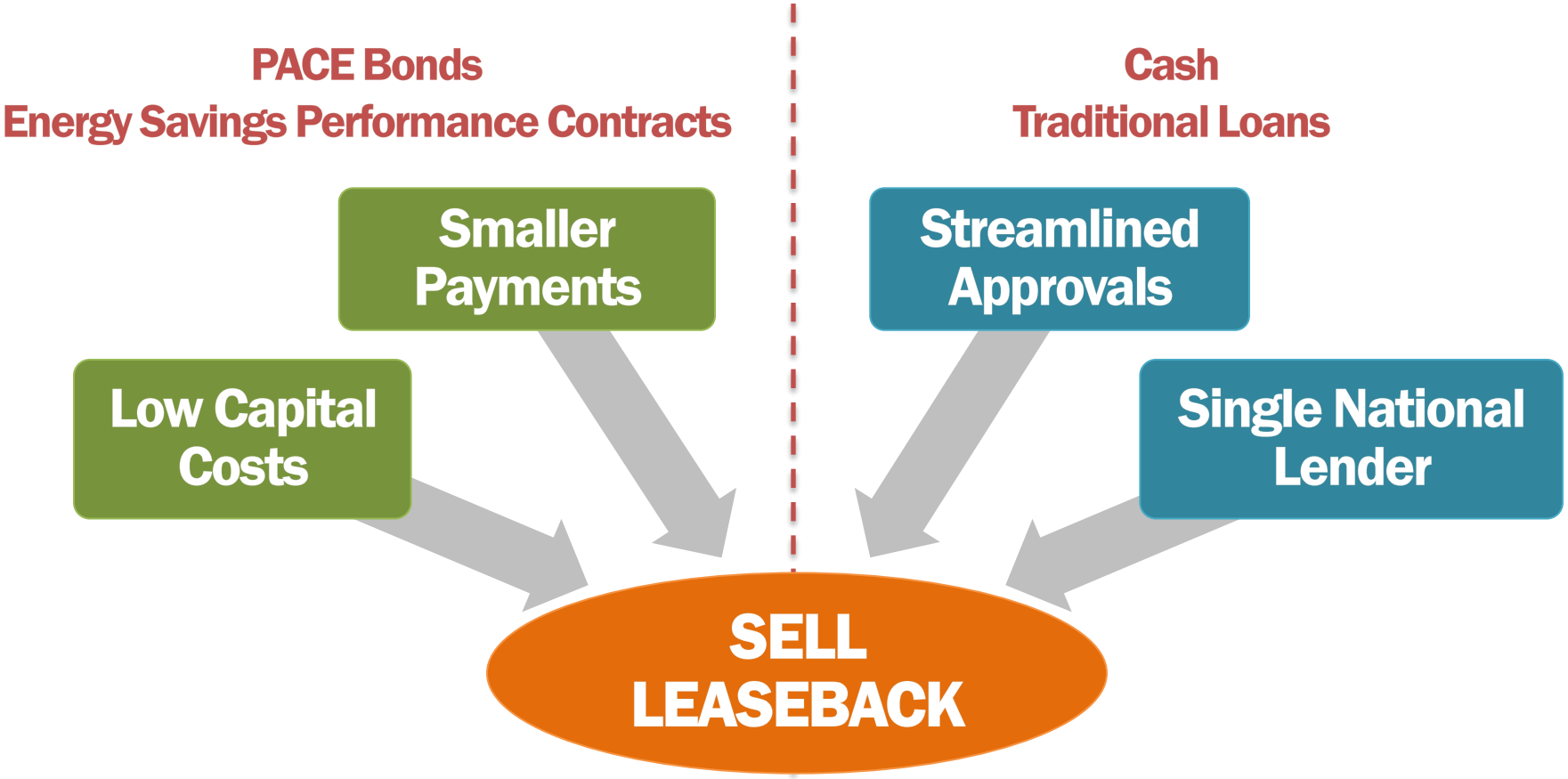
Yes *Replace?* **No** *positive NPV?*

- Minimum Standard
- CEE Tier I
- CEE
-

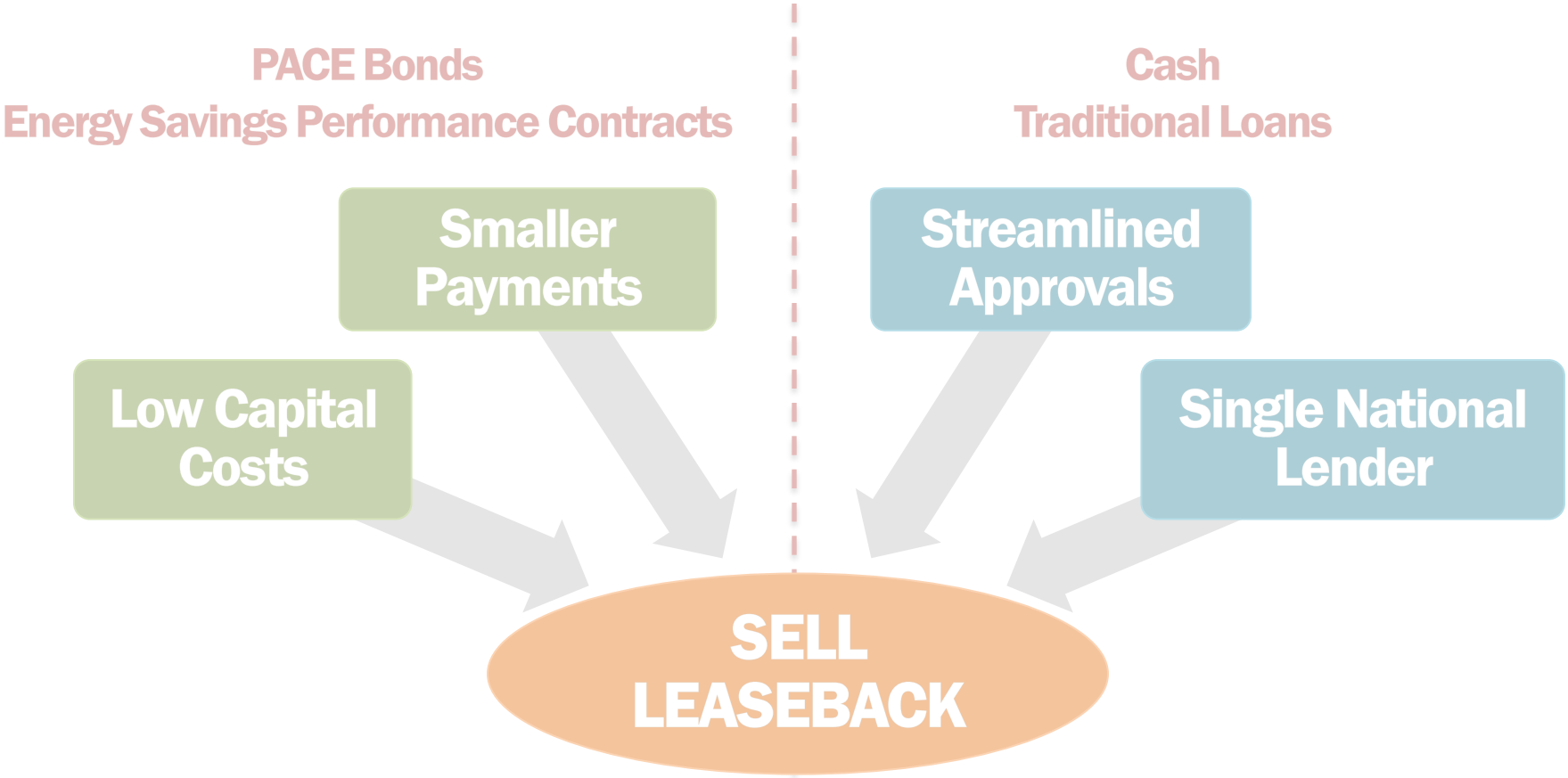
Goal: Maximize Total NPV

Decision 2: *Which unit?*

FINANCING


PACE Bonds
Energy Savings Performance Contracts
Cash
Traditional Loans
Smaller Payments
Low Capital Costs
Streamlined Approvals
Single National Lender
SELL LEASEBACK

FINANCING



Purchase RTUs from multiple sources to get best deals

Immediately sell all RTUs to a single investor

Lease all RTUs back from investor as a single item

SELL LEASEBACK

ADVANTAGES

- No down payment
- Sale's cash improves balance sheet
- Lower payments
- Increased tax benefits
- Ability to negotiate lease terms
- One lender
- Purchase Flexibility

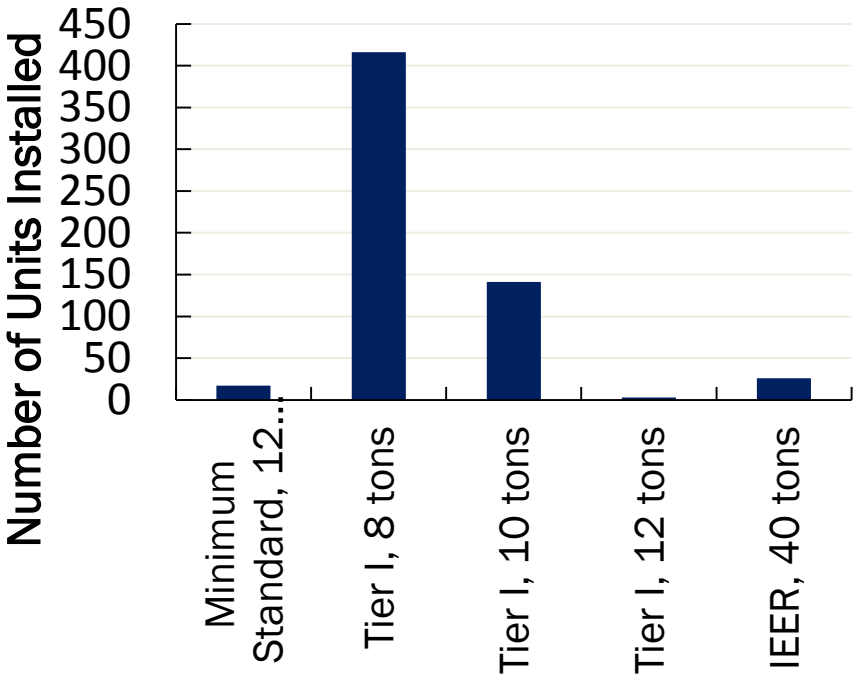
DISADVANTAGES

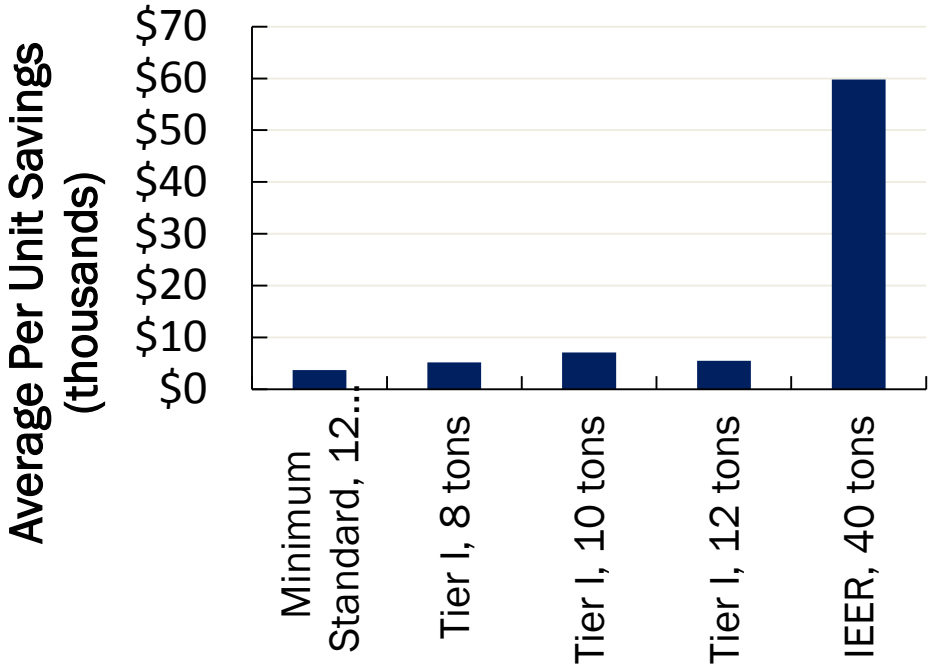
- Larger lifetime cost
- Initial purchase of equipment

Sell leaseback financing is very attractive to investors:

- ***Guaranteed cash flows***
- ***Depreciation tax benefits***

RESULTS: LOOKING FOR TRENDS





No distinct strategies found for replacing RTUs by age, climate type, usage, or size

40 ton units provide the majority of NPV savings (~ 60%), only requires replacement of 26 units.

Incremental gains still possible from replacement of other units

RESULTS

603 RTUs out of 2,120 replaced

Overall NPV of $560,000 after 5 years

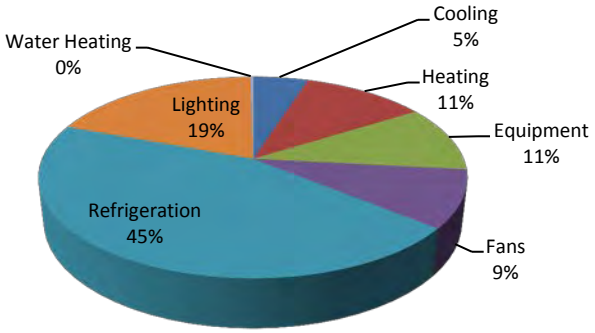
Average payback time of 3.5 years

Sell leaseback program eliminates payback period

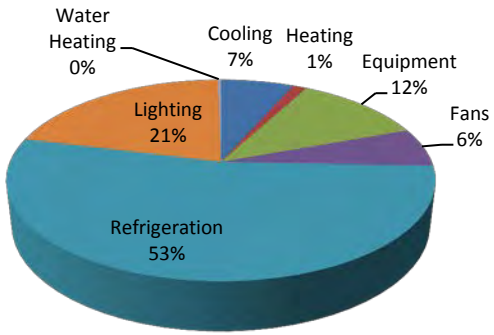
Save approximately 40 million kWh, or 27% of Cooling

16 CLIMATE ZONES

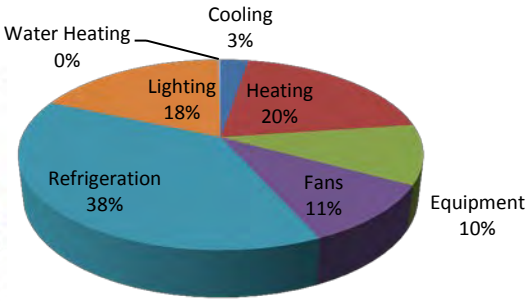
6300 < CDD50 <= 9000

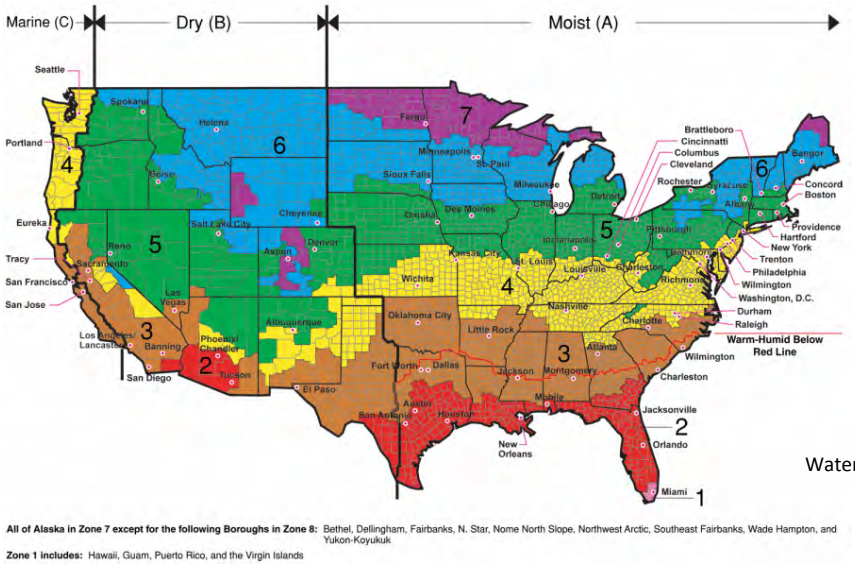


CDD50 > 9000

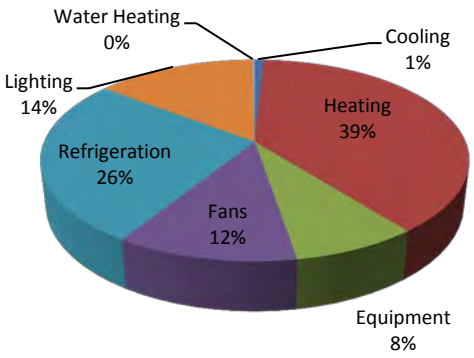


4500 < CDD50 <= 6300

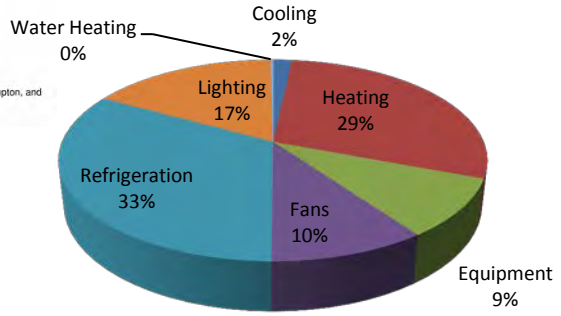




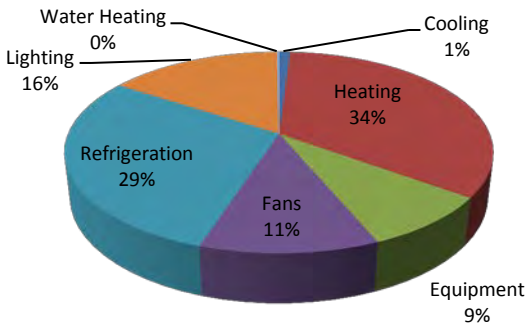
7200 < HDD65 <= 9000



CDD50 <= 4500, HDD65 <= 5400

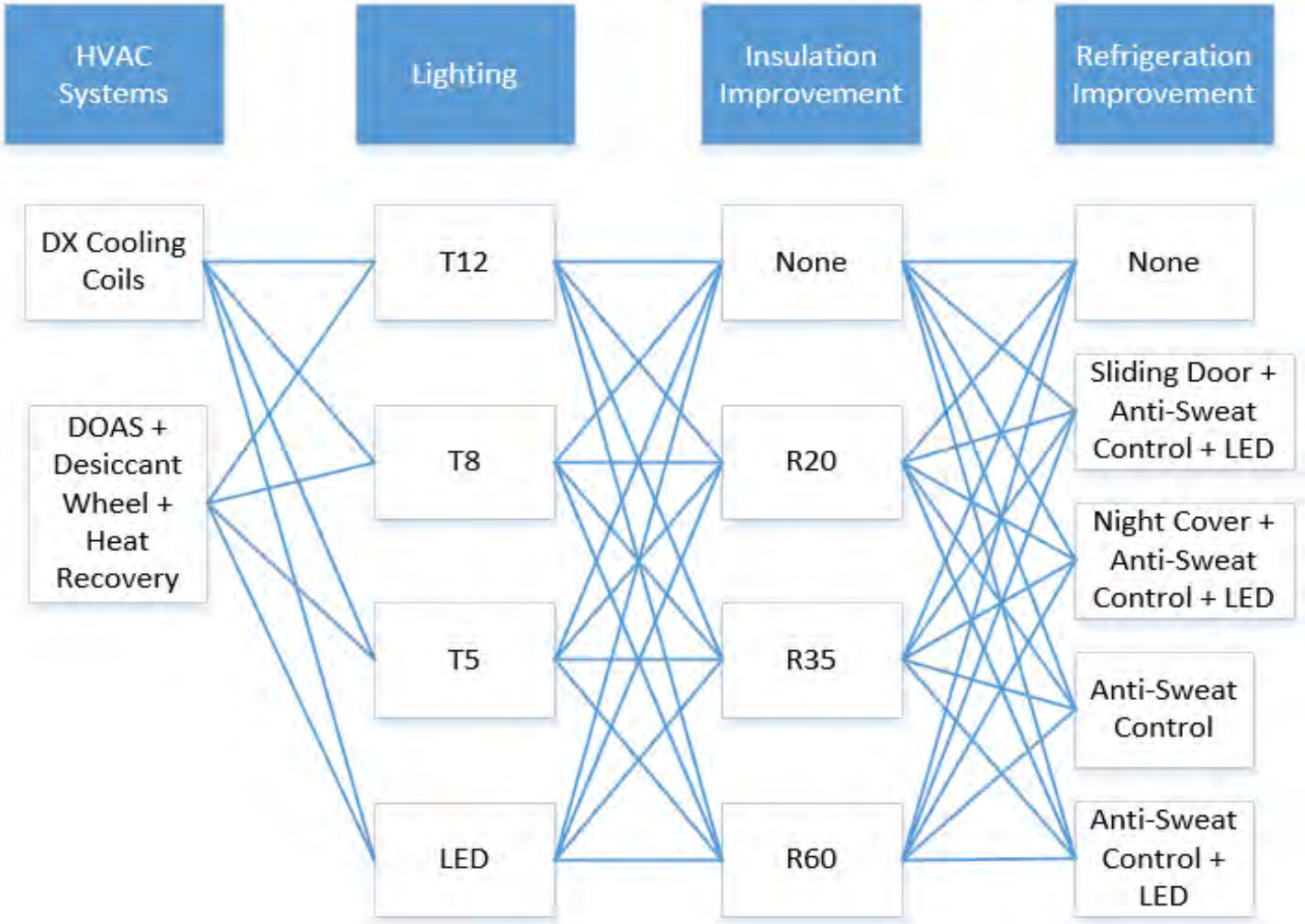


5400 < HDD65 <= 7200

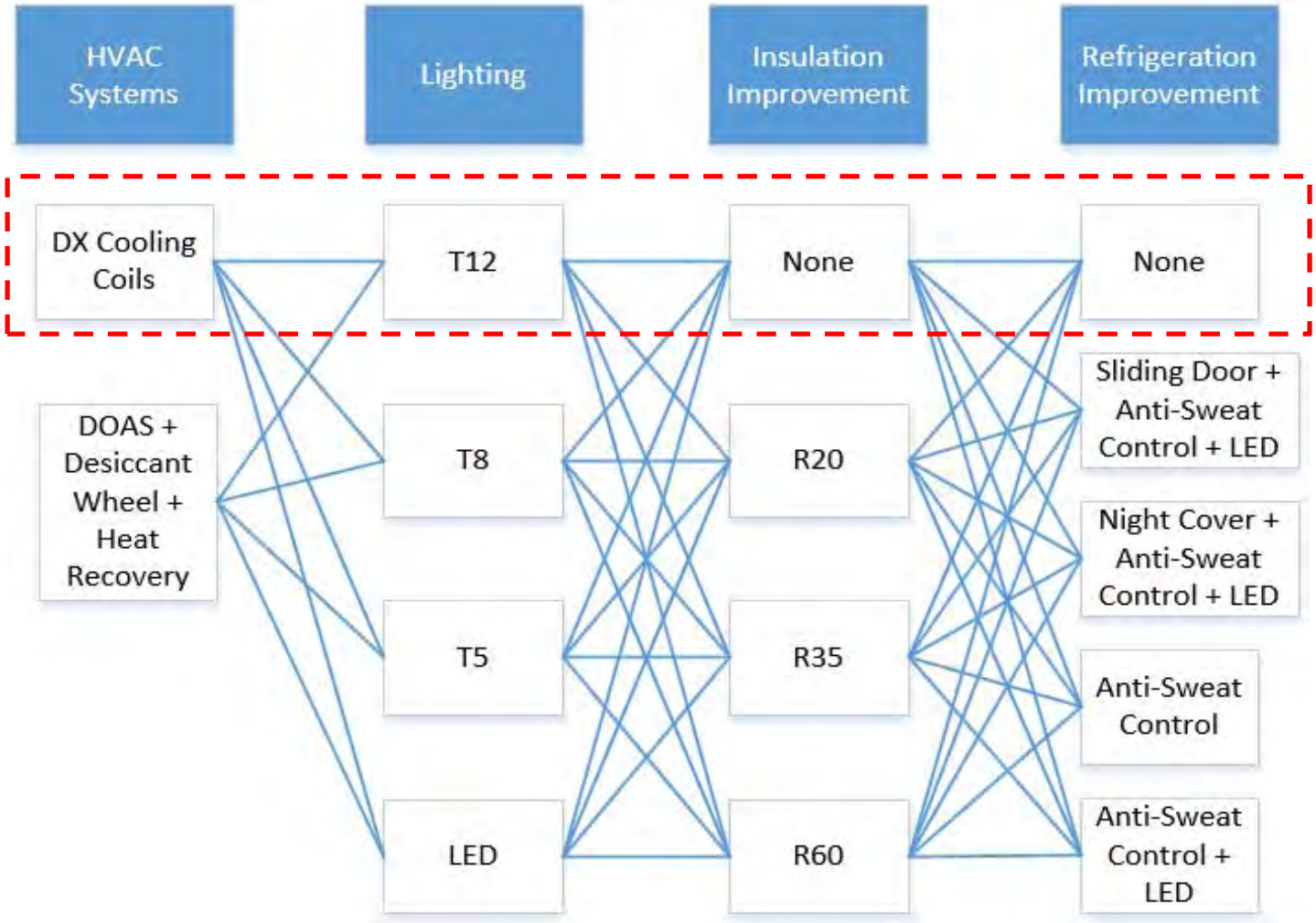


DOE. (2010). Commercial Reference Building: Supermarket

SIMULATION


HVAC Systems
Lighting
Insulation Improvement
Refrigeration Improvement
DX Cooling Coils
DOAS + Desiccant Wheel + Heat Recovery
T12
T8
T5
LED
None
R20
R35
R60
None
Sliding Door + Anti-Sweat Control + LED
Night Cover + Anti-Sweat Control + LED
Anti-Sweat Control
Anti-Sweat Control + LED

SIMULATION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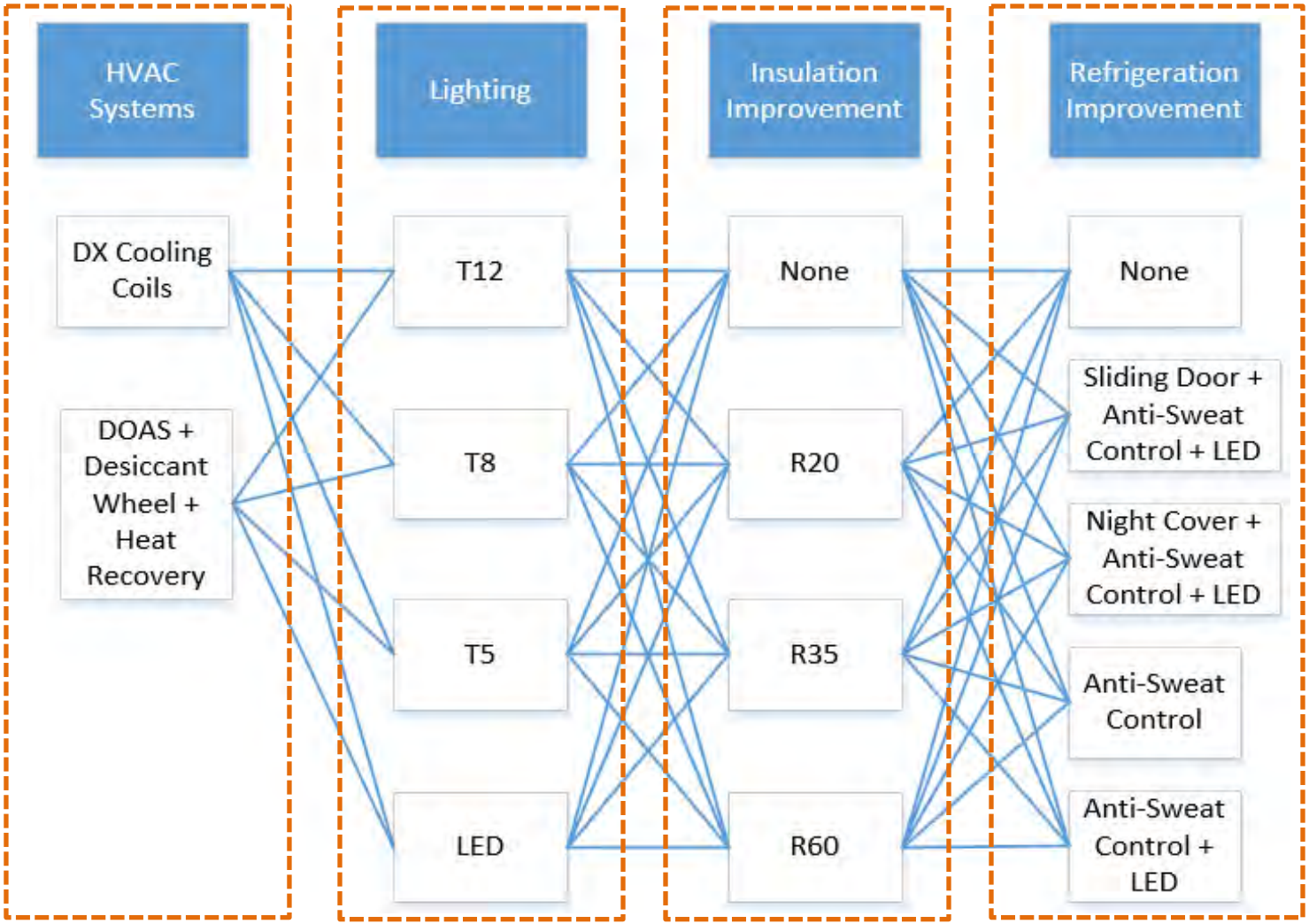
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R20
R35
R60
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Sliding Door + Anti-Sweat Control + LED
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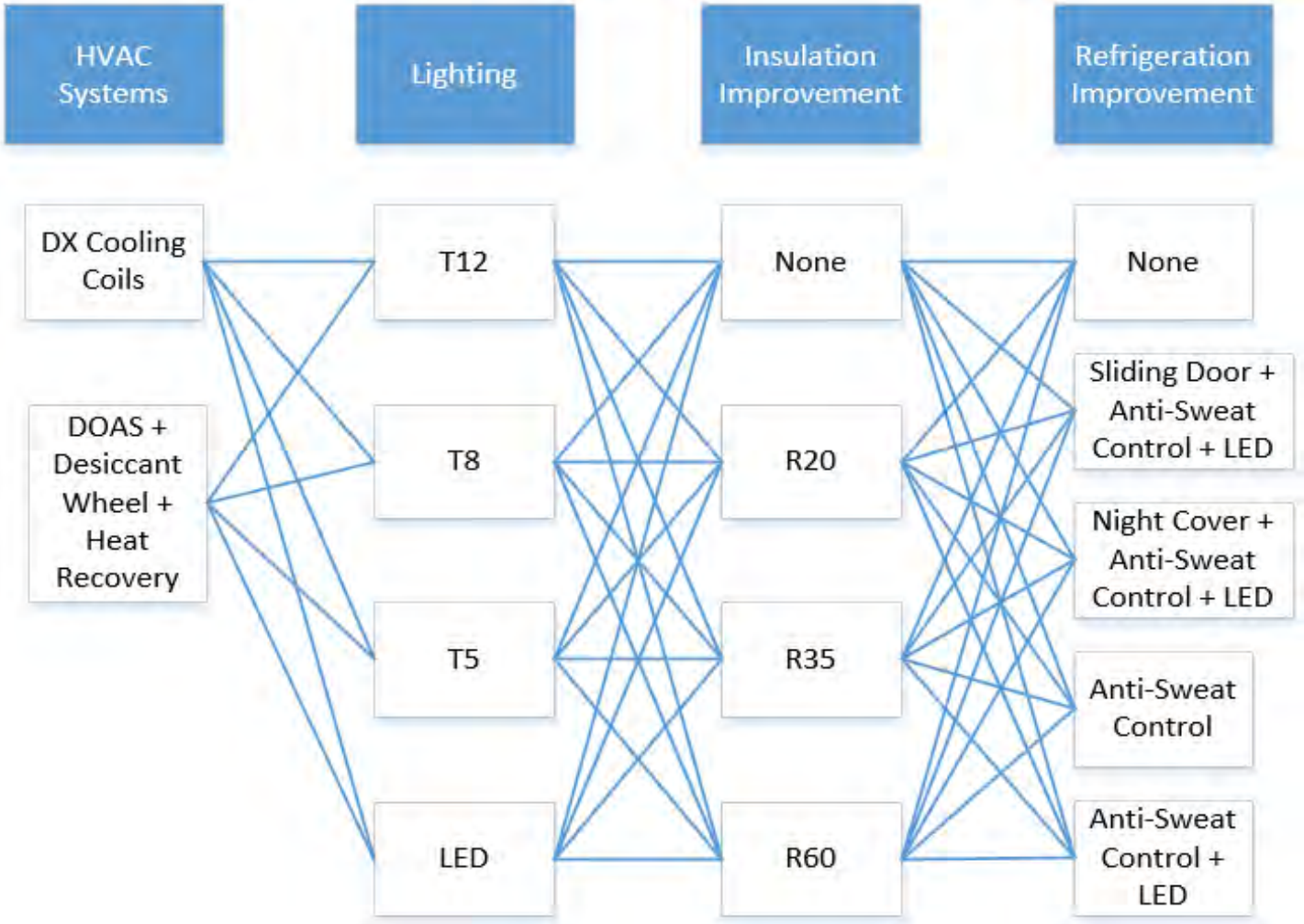
Anti-Sweat Control
Anti-Sweat Control + LED

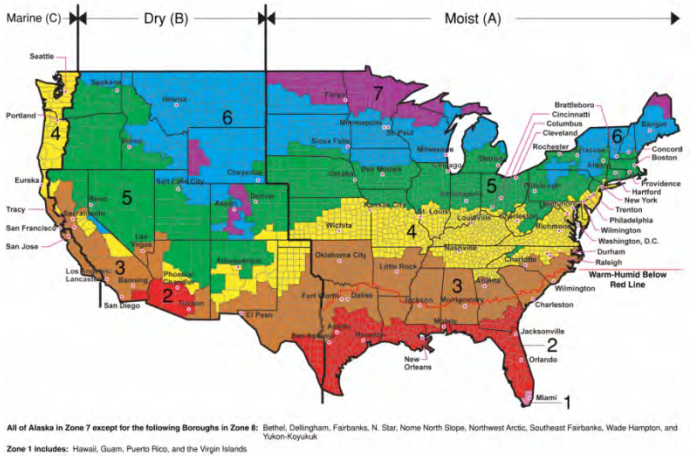
SIMULATION

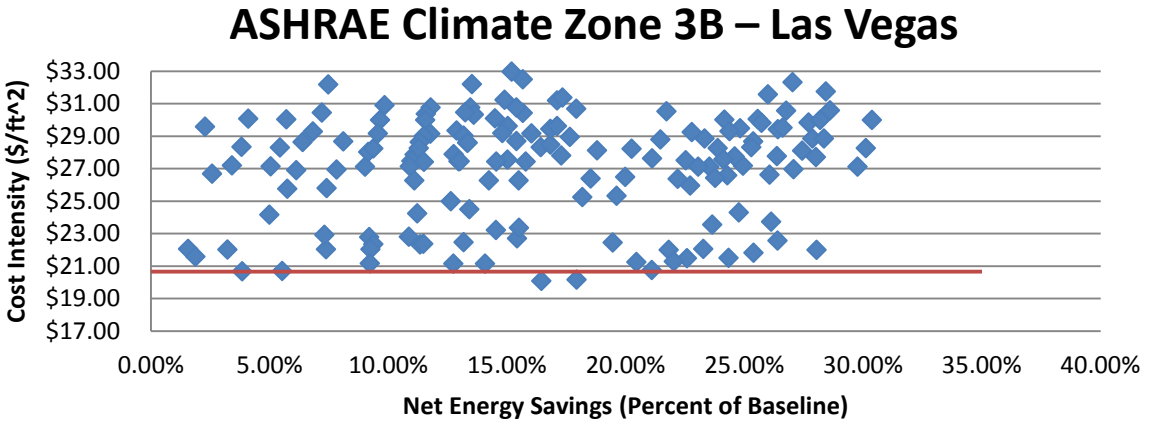
2,576 simulation runs
161 for each of the 16 ASHRAE defined climate zones

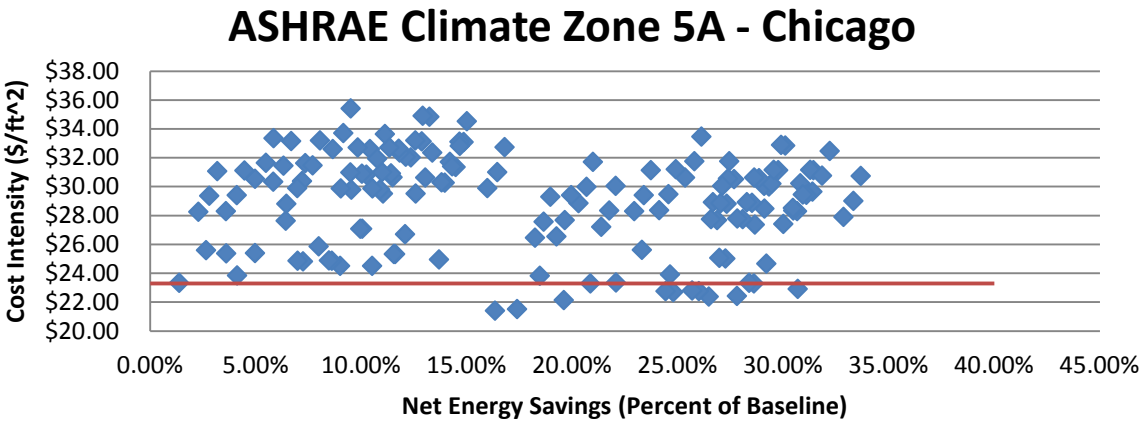


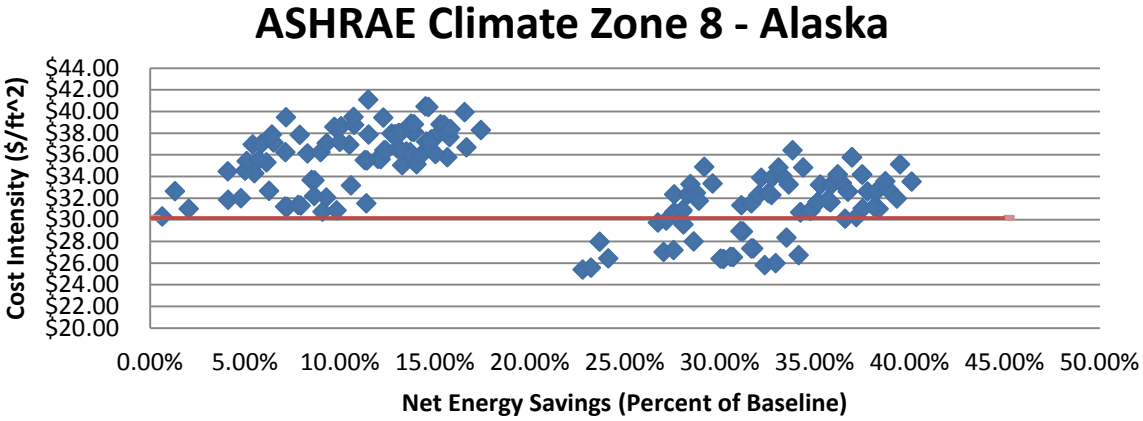
RESULTS

Possible Solutions









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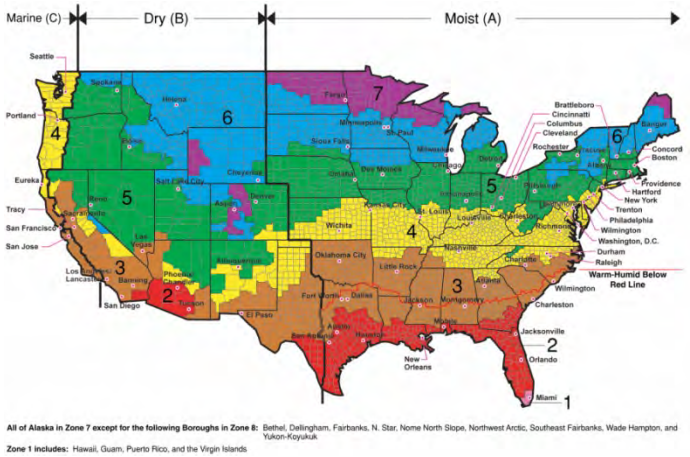

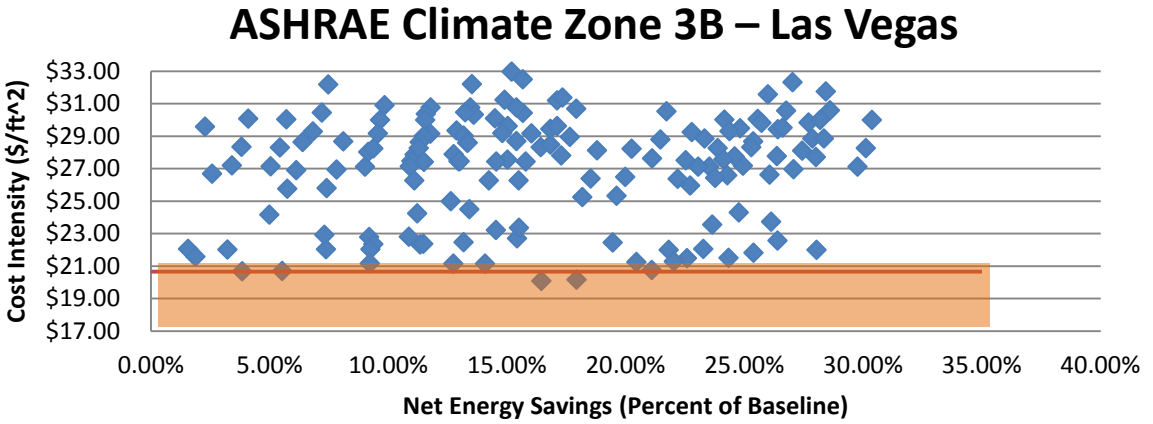

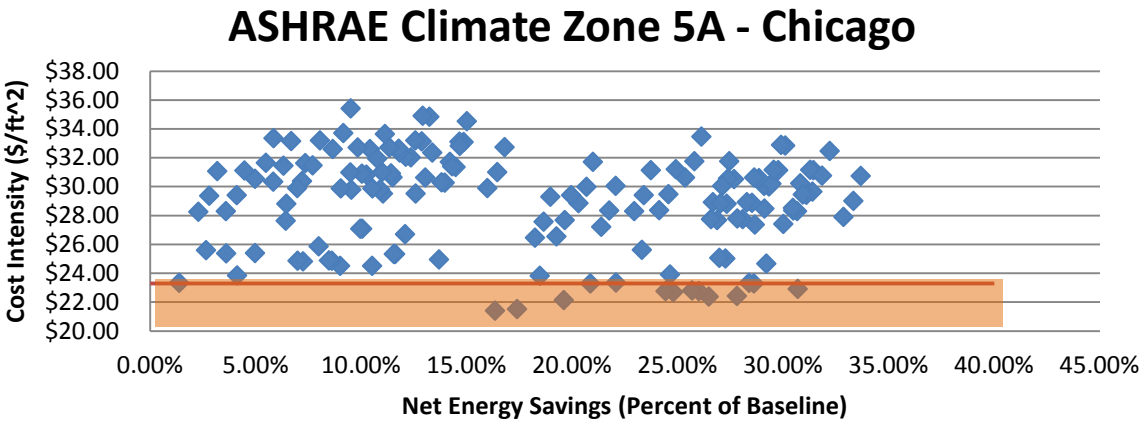

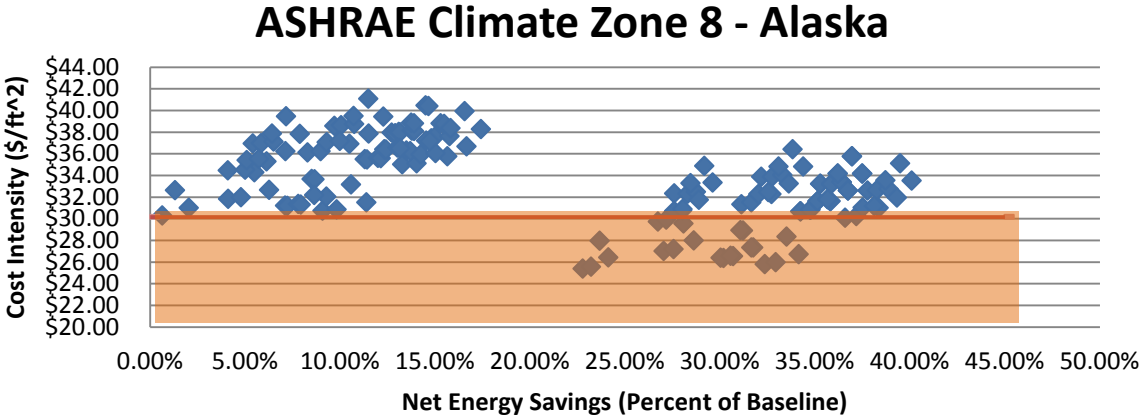

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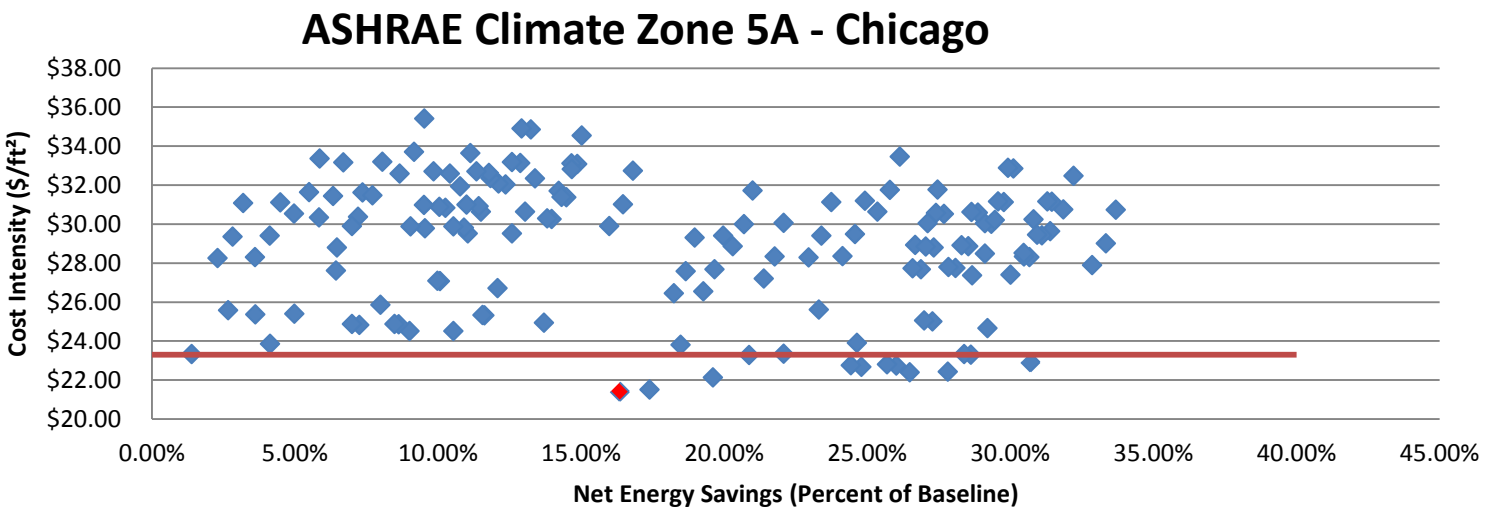
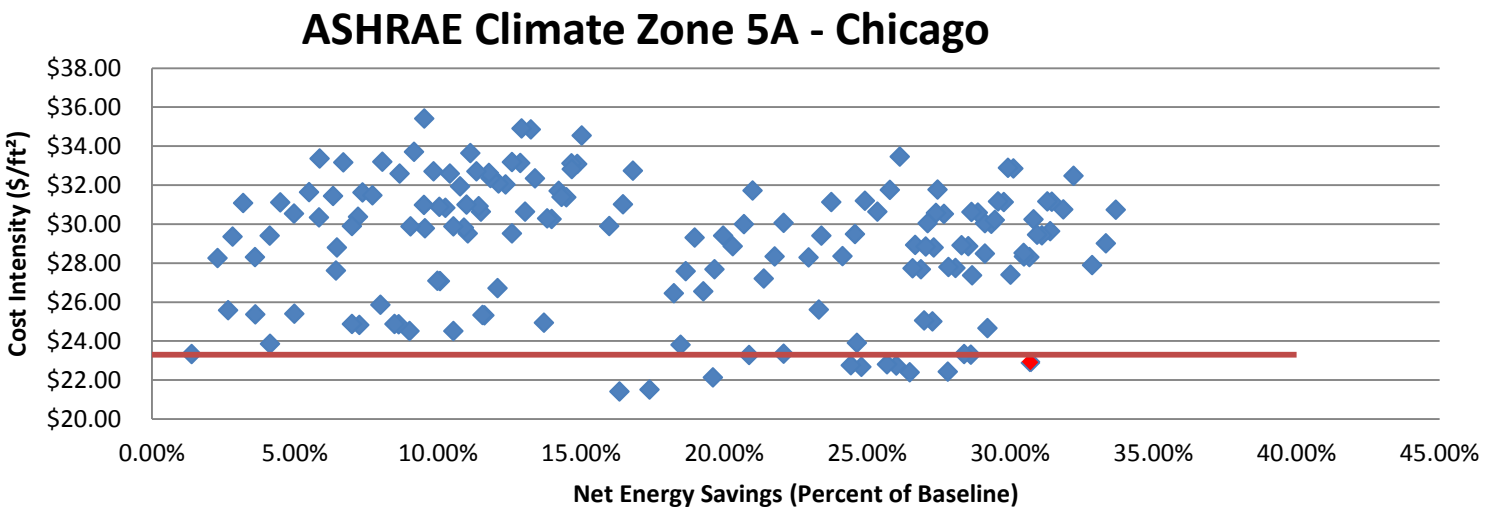


Case	Strategy				Cost Intensity ($/ft²)	Net energy savings	Simple Payback Period (years)	Cost Benefit Over 5 Years
	DOAS	Lighting	Insulation	Refrigeration Equipment				
Most Cost Effective	Yes	T12	No	No	$21.41	16.34%	1.71	$590,961.53

RESULTS

Possible Solutions



Case	Strategy				Cost Intensity ($/ft²)	Net energy savings	Simple Payback Period (years)	Cost Benefit Over 5 Years
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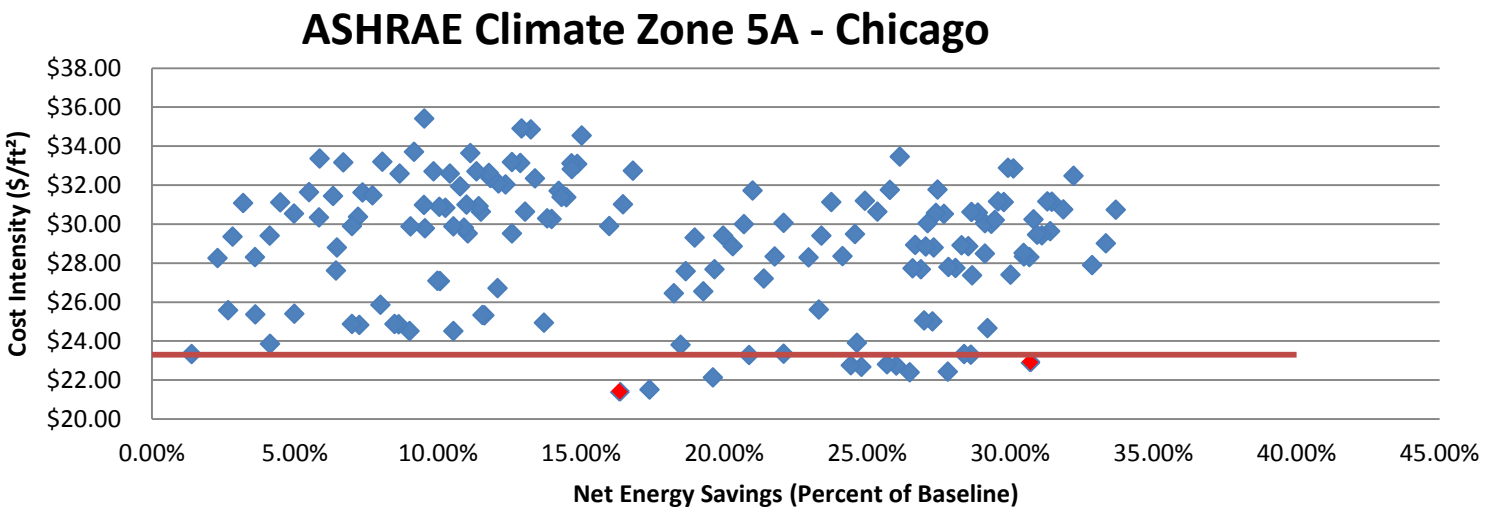
Most Energy Efficient	Yes	LED	No	Yes	$22.91	30.70%	3.38	$404,458.12

RESULTS

Possible Solutions



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Most Energy Efficient	Yes	LED	No	Yes	$22.91	30.70%	3.38	$404,458.12

CONCLUSION

20% Energy Savings and NPV Positive in 5 Years

Energy Modeling and Targeted RTU Replacement	Sell Leaseback Financing	Integrated Approach vs. Low Hanging Fruit

THANK YOU

QUESTIONS?

ASSUMPTIONS FOR FINANCIAL MODEL

Meat Case	
Length of refrigerator in Model (ft)	110.1706072
Type	Capital Cost ($/ft)
Baseline	0
w Eff Fans and A-S Controls	794.64
w Eff Fans and A-S controls + Covered at Night	813.1
w Eff Fans and A-S controls + sliding doors	910.36

Ice Cream Case	
Length of refrigerator in Model (ft)	127.9855684
Type	Capital Cost ($/ft)
Baseline	0
w Hot Gas Defrost	776.42
w Eff Fans and A-S Controls and no lighting	681.33
w Eff Fans and A-S Controls and no lighting + Hot Gas Defrost	683.46

Multi-Deck Dairy/Deli	
Length of refrigerator in Model (ft)	269.84909
Type	Capital Cost ($/ft)
Baseline	0
w Electric Defrost	595.27
w Eff Fans and Standard Lighting	498.43
w Eff Fans and Standard Lighting + Electric Defrost	510.69

Frozen Food	
Length of refrigerator in Model (ft)	268.0118196
Type	Capital Cost ($/ft)
Baseline	0
w Hot Gas Defrost	656.61
w Eff Fans and A-S Controls	682.85
w Eff Fans and A-S Controls + Hot Gas Defrost	691.76
w Eff Fans and A-S Controls + LEDs	803.22
w Eff Fans and A-S Controls + Hot Gas Defrost + LEDs	812.48