

# Turning Off T12 Lighting... For Good!

Presented at the 2017 ACEEE National Conference on Energy Efficiency as a Resource

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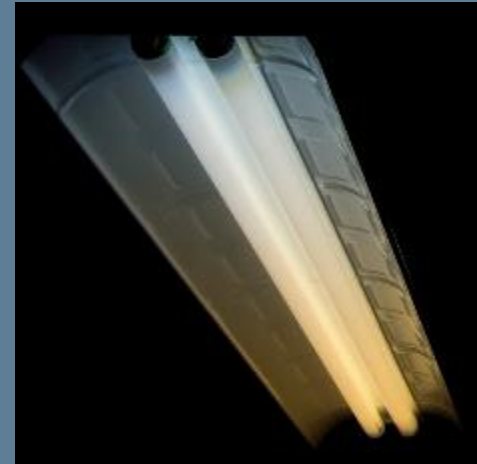


WHEN *Experience* MATTERS

# BACKGROUND

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- T12s: an outdated, inefficient technology
  - Manufacture and import phase-out beginning July 2010
  - Utilities heavily promoted T12 change-outs through T8 bonus rebates and T12 bounties
  - But... anecdotal evidence that significant quantities of T12s remain



# BACKGROUND

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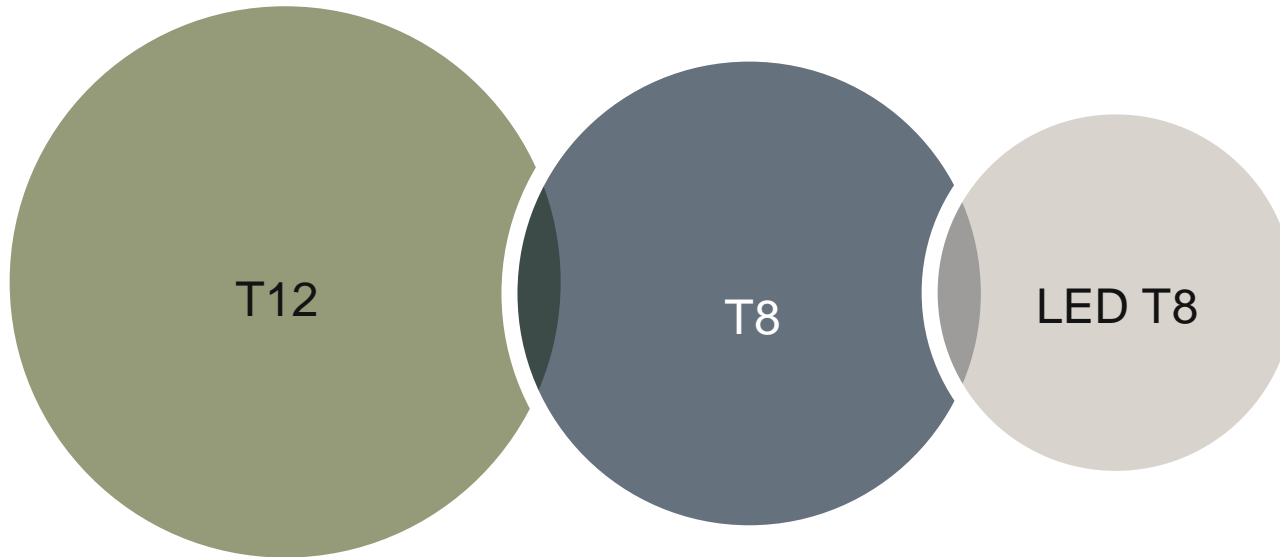
## Research questions

- What is the total T12 load remaining in Minnesota?
- What is the energy savings potential?
- How can utilities target remaining T12s?

*This project was supported in part by a grant from the Minnesota Department of Commerce, Division of Energy Resources through the Conservation Applied Research and Development (CARD) program.*



# Background

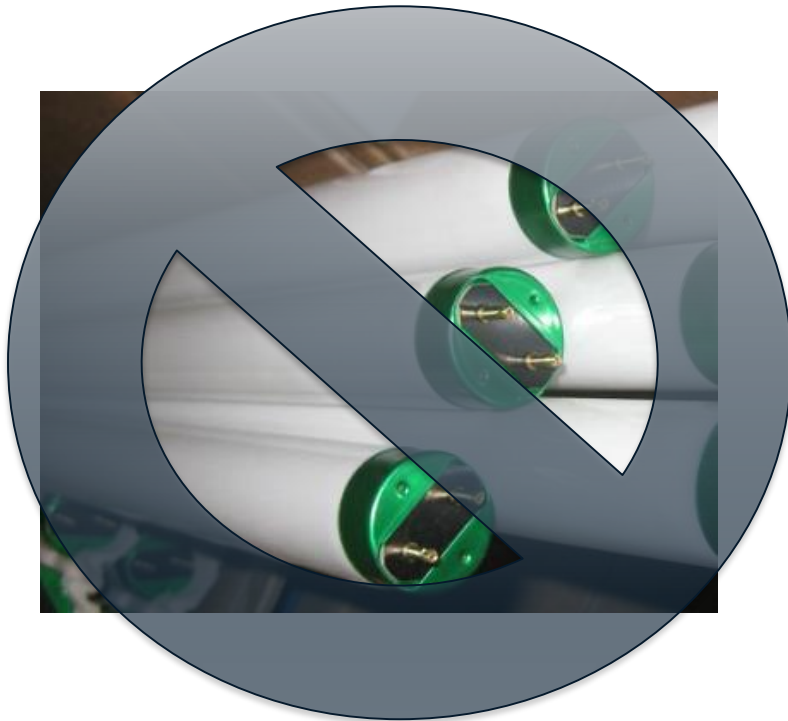


<b>Efficacy</b>	55-70 lm/W	89-96 lm/W	110-150 lm/W
<b>Watts</b>	40W	32W	13-18W
<b>Life (4')</b>	20,000 hrs	24,000-36,000 hrs	50,000 hrs

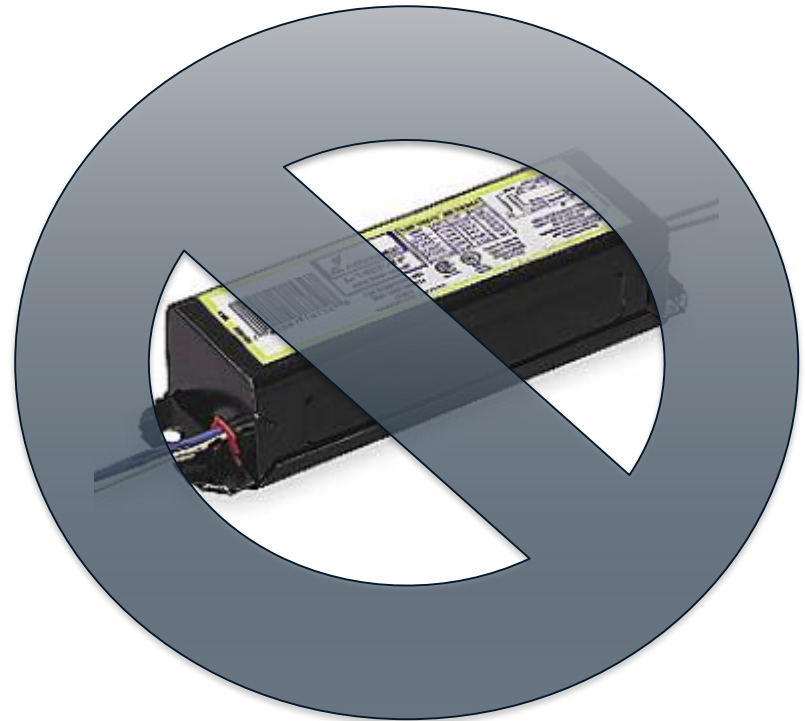
Numbers typical of 48" linear bi-pin (G13 base)

# Federal Lighting Standards

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Since 2014



Since 2010

Federal law effectively prohibits the manufacture or import of T12 lamps and magnetic ballasts

# However, T12s are still for sale...

From online searches May 15, 2017



SYLVANIA 10-Pack 40-Watt 4100K Cool White Linear Fluorescent Tube Light Bulbs (Common: 48-in; Actual: 47.78-in)

Item # 402210 Model # 22479

★★★★☆ (29 Reviews)



Philips

4 ft. T12 40-Watt Cool White Supreme ALTO Linear Fluorescent Light Bulb (10-Pack)

★★★★☆ (180) Write a Review Questions & Answers (22)

- Great for residential and commercial use
- ALTO technology for reduced mercury content
- Pack of 10

**\$21.97** /package (limit 35 per order)



Sylvania 2-Lamp 120V F40 T12 Ballast

Model Number: 50314/75304 | Menards® SKU: 3541105

**\$13.33** each

Everyday Low Price: \$14.98

**11% Mail-In Rebate:** **\$1.65** Good Through 5/20/17

Your Final Price: **\$13.33**

**You Save: \$1.65 After Mail-In Rebate**



Ace 40 Watts Cool White Fluorescent T12 Bulb

Item no: 3408168 | 082901265108

**\$3.99**

★★★★☆ (1 review)  
Read 1 Review | Write a Review

40 Estimated ACE Rewards points

- 1 +

FREE Store Pickup! Find my Ace. (details)

+ ADD TO CART  TO-DONE LIST

FREE PICKUP at Your Local Ace **CHECK AVAILABILITY**


# Methodology

- Field study – data collected from site visits
- Cluster sample design chosen to minimize travel
- Goal was to estimate MN T12 load at 90/10 confidence
  - Needed sample size of 200 businesses
  - Power analysis used to analyze different clustering options
  - Test Case 4 best balanced precision with cost

Test Case	Number of Communities Visited	Number of Businesses per Community Visited	Total Sample Size	Design Effect	Equivalent Sample Size	Margin of Error (%) at 90% Confidence Level
1	40	5	200	1.2	167	6
2	30	7	210	1.3	162	6
3	20	10	200	1.45	138	7
4	10	20	200	1.95	103	8
5	5	40	200	2.95	68	10

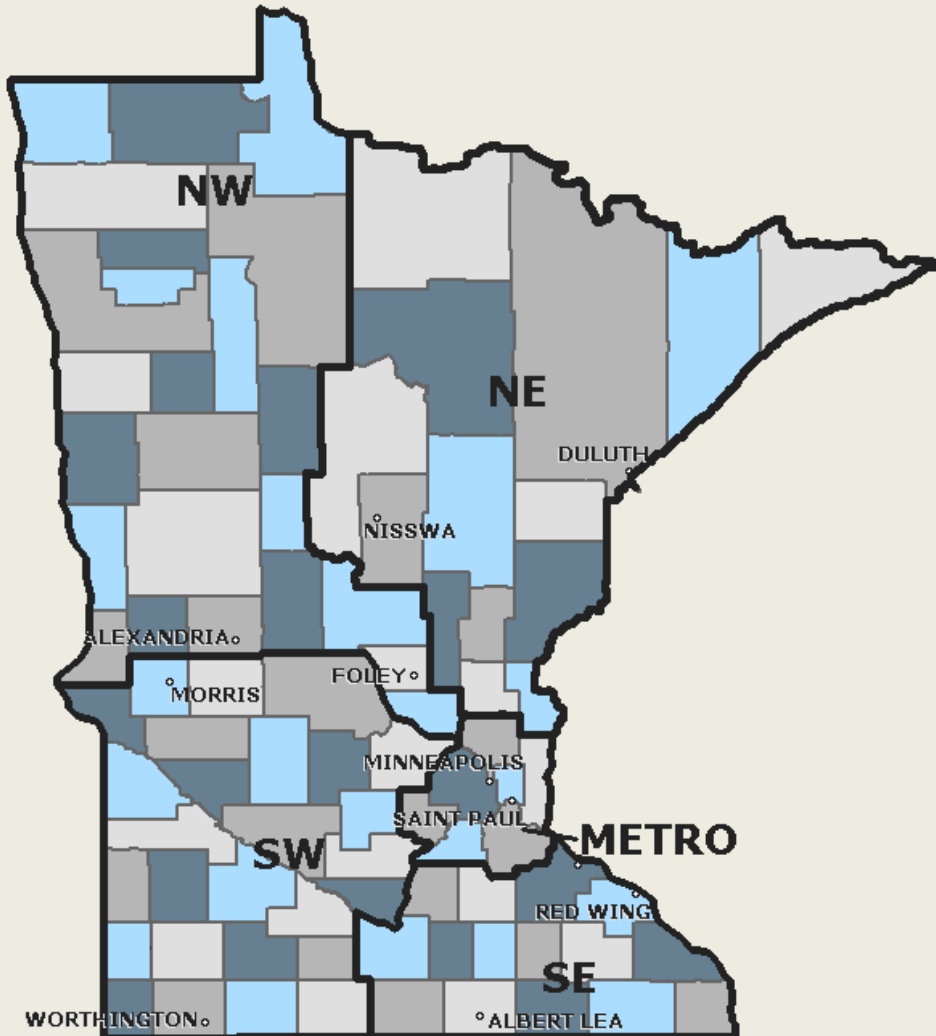
# Methodology

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- Random sample draws
    - Communities (2 per Region x 5 Regions)
      - Used probability weighting according to size (# of businesses)
    - Businesses (20 per Community x 10 Communities)
      - Stratified by size (in square feet)
        - Small: 0-4,999 ft<sup>2</sup>
        - Medium: 5,000-9,999 ft<sup>2</sup>
        - Large: 10,000 ft<sup>2</sup> and greater
      - Source: Salesgenie®



# Methodology



## SELECTED CITIES

Region	Community	Business Count
Metro	Minneapolis	57,897
	St. Paul	33,742
Northeast	Duluth	7,204
	Nisswa	311
Northwest	Alexandria	1,773
	Foley	243
Southeast	Albert Lea	1,135
	Red Wing	1,082
Southwest	Morris	501
	Worthington	860

# FINDINGS



## T12 STATEWIDE LOAD ESTIMATED AT 242 MW

- **10%** of Minnesota C/I Lighting Load (2,558 MW)



## T12 ENERGY CONSUMPTION ESTIMATED AT 881 GWh/YEAR

- Average Operating Hours = 3,226 (approx. 60 hours/week)
- Equivalent to annual consumption of **77,000 US** homes



## TECHNICAL SAVINGS POTENTIAL ESTIMATED AT 512 GWh/YEAR

- \$51,000,000 per year
- Conservative estimate (lumen equivalence)

# FINDINGS

- T12 prevalence
  - Found in 56/210 sample businesses
  - Statewide estimate 1/4 businesses
- Dominant Fixture Types
  - T12 fixtures are one of Top 3 fixture types in significant percentages of buildings statewide

Size	Average ft <sup>2</sup>	# of Businesses	T12	T8	Linear LED
Small	2,500	104,639	32%	67%	6%
Medium	7,500	41,905	20%	73%	5%
Large	32,777	91,875	24%	86%	3%

# FINDINGS

- T12 Average Power Density
  - Small (< 5,000 ft<sup>2</sup>) buildings have highest T12 power density

Size	Average ft <sup>2</sup>	# of Businesses	T12 Load (kW)	T12 Watts/ft <sup>2</sup>
<b>Small</b>	2,500	104,639	74,387	0.284
<b>Medium</b>	7,500	41,905	36,544	0.116
<b>Large</b>	32,777	91,875	130,874	0.043

# BARRIERS

## Primary barriers to upgrading T12s

1. Lack of awareness/knowledge
2. T12 lamps still available
3. Tenant/landlord split incentives
4. Cost/Return on Investment
  - Labor costs
  - Recycling costs
  - Lower operating hours
  - Small businesses often struggling financially

# SOLUTIONS

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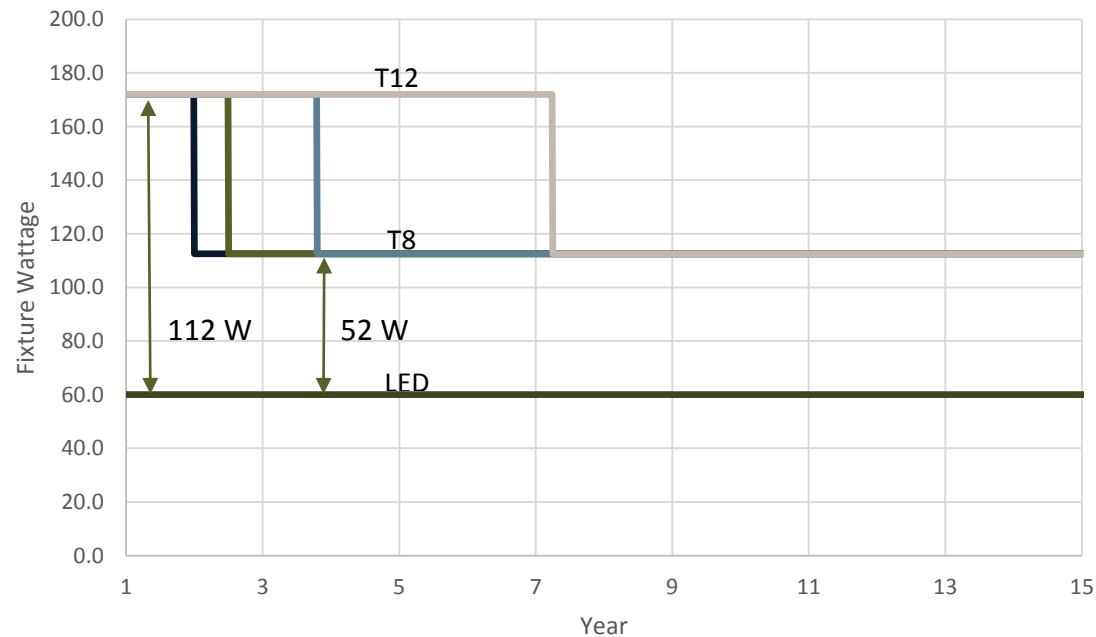
- Community-based small business campaigns
  - Walk-through energy assessments coupled with targeted incentives for T12 upgrades and/or low cost supplier option with instant rebate
  - Customer education on efficiency and utility programs
  - Combine with Direct Install measures to increase cost-effectiveness



- Trade-ally incentive program
  - Small businesses often have trusted relationships with local contractors
  - Leverage local contractors to promote upgrades
  - Requires trusted allies, outreach and education

# Regulatory Considerations

- Receiving full savings credit for T12 upgrades would encourage targeting
  - Prescriptive LED rebates typically assume T8 baseline
  - Custom incentives can generally use existing equipment as baseline
  - If T12 baseline is chosen, what is measure life?



# CONCLUSIONS

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- Significant T12 stock remains
  - 10% of C/I lighting load in Minnesota, a state with 30 years of DSM
  - Equivalent energy consumption of 77,000 homes
- Highest power density is in small businesses
- Suggested program approaches
  - Community-based Small Business Campaigns
  - Trade ally incentive program



QUESTIONS?



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WHEN *Experience* MATTERS

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