Municipal Solid-State STREET LIGHTING CONSORTIUM

Sponsored by the U.S. Department of Energy

Utility Rates and LED Light Initiatives

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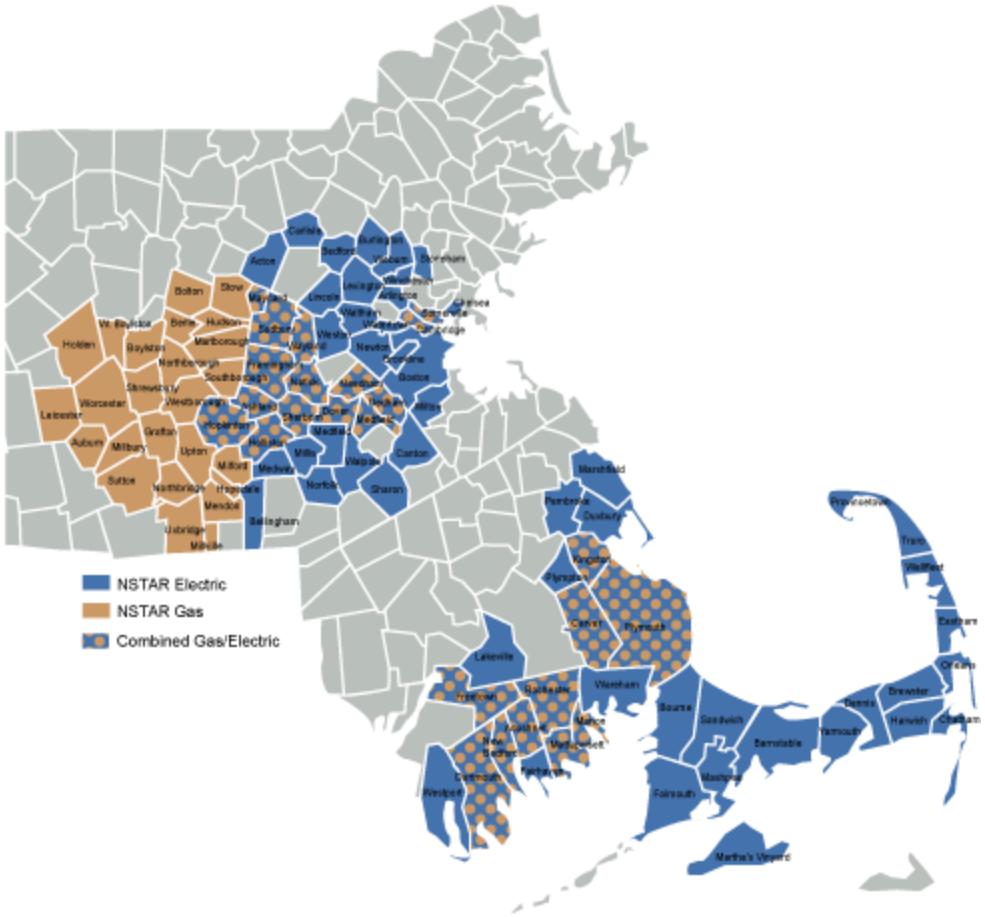
NSTAR Electric's Territory



- 1.1 million electric customers in 81 communities
- ~150,000 lights across 81 towns
- More than half of the towns own all of their lights
- One-third towns have company owned lights
- Remaining towns have a mixture of customer and company owned lights

Streetlight tariffs defined by equipment ownership

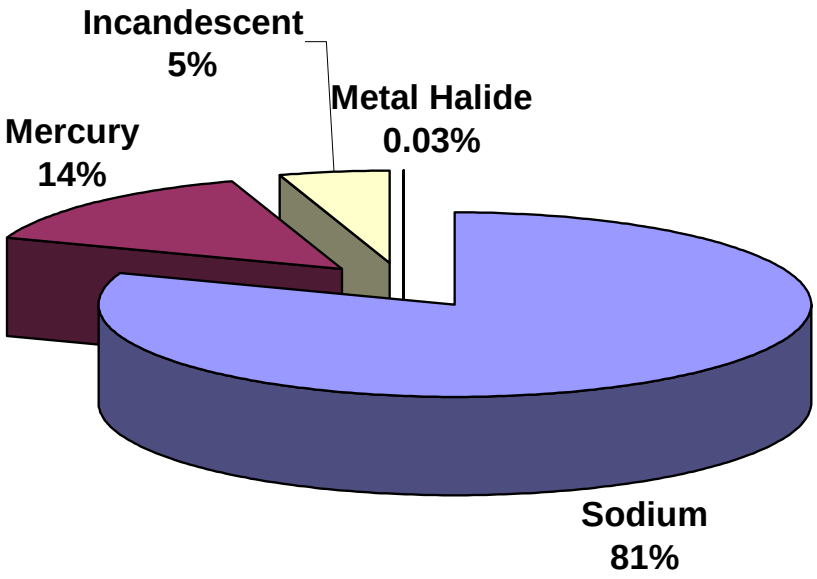
S-1: Company-owned lights

- fixed equipment charge plus delivery components
- limited by the defined offerings on the tariff
- introduction of new lights by the company require regulator approval

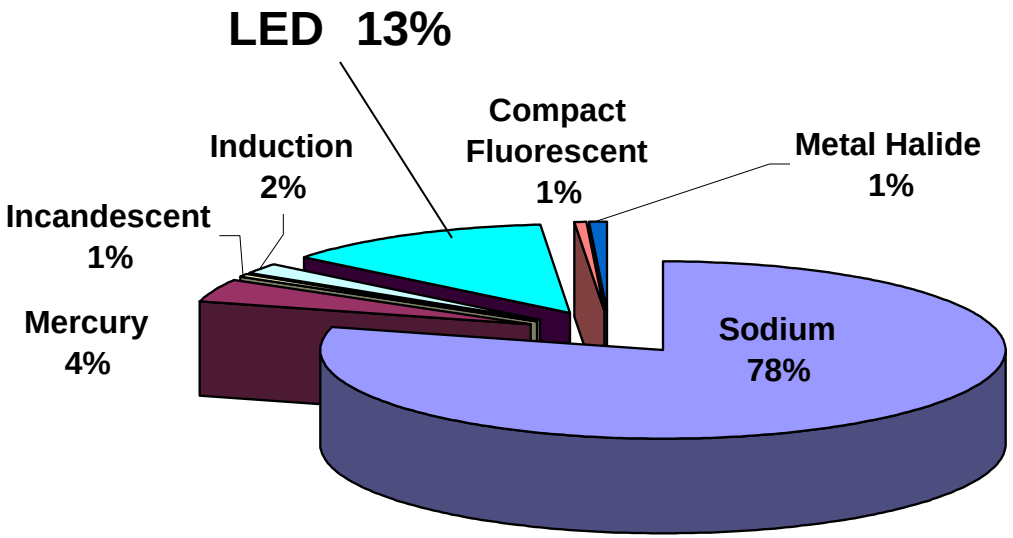
S-2: Customer-owned lights

- rates based purely on delivery components
- customer is free to introduce new technologies immediately
- customer can make their own design choices

Tariff limitations are reflected in technology deployed



Company Owned



Customer Owned

NSTAR recognizes importance of LED

- Light offerings on the S-1 tariff are stale and need to be updated
- Phase out of Mercury Vapor lights is creating an inventory problem
- There is demand from customers for new lighting technology
- Internal Energy Efficiency group has been a strong advocate of LED deployment
- LBR and decoupling allows utility to promote energy efficient investments

Example of need for new light offerings

- Customer had approximately thirty-five 400 W NSTAR owned mercury vapor lights in South Boston
- Mercury vapor lights burned out, but no inventory available for replacement
- Residents opposed installation of HPS lights because they did not like color rendering; too similar to yellow “crime lights”
- Compromise was to install HPS 250 W “retro white” bulbs
- Agreement was reached with customer where Company paid for higher cost of bulb with energy efficiency dollars
- Customer needs to pay for replacement bulbs
- Availability of LED light would have provided ready solution

Cost remains largest hurdle to LED deployment

- LED lights remain more costly than a comparable metal halide or high pressure sodium lamp
- Existing S-1 offerings are generally below market as the rates reflect a depreciated equipment base
- Low priced offerings exacerbate bill impact and make it difficult for new technologies to pass cost-benefit evaluation
- LED price stability is also a concern as tariffs lock customers into a set price; who bears the risk of stranded costs?

Streetlight Rates are not well understood

- Streetlights are not metered; usage is based on a dawn to dusk burn hour schedule (4200 hours in Boston)
- To facilitate billing, rates are converted to an average monthly fixed charge based on equipment cost (for S-1) and delivery rates for distribution and transmission

Size of Lamp Lumens High Pressure Sodium	Watts	Luminaire Type	Basic Monthly Charges Distribution	Transmission
2,150	41	Open	$6.34	$0.17
4,000	58	Open	$6.58	$0.24
9,500	117	Enclosed	$7.18	$0.48
16,000	175	Enclosed	$7.75	$0.72
25,000	295	Enclosed	$9.40	$1.21
45,000	470	Enclosed	$11.42	$1.93
2-2,150	82	Enclosed	$12.68	$0.34
2-4,000	116	Enclosed,Twin	$13.13	$0.48
2-9,500	234	Enclosed,Twin	$14.37	$0.96
2-16,000	350	Enclosed,Twin	$15.53	$1.44
2-25,000	590	Enclosed,Twin	$18.78	$2.42
2-45,000	940	Enclosed,Twin	$22.82	$3.86

Equipment charge is based on equipment cost and maintenance cost

Investment		**Maintenance Expense**	
Luminaire FixtureCost	$168.61	Annual Maintenance Cost (Material)	$11.72
Bracket Cost	$50.87	Annual Maintenance Cost (Labor) 1/2 hour	$40.81
Photo Cell Cost	$5.18		
Other cost (25 ft wire, 2X10 lamp wire)	$17.25		
Subtotal	$241.91		
Inventory Cost	$35.71		
Installation Cost (1 hour, Lamp Ranger, Vehicle)	$168.79		
Total Fixture cost	$446.40		
Annual Economic Carrying Charge Rate	13.48%		
Annual Fixture Cost	$60.16	**Annual Maintenance Cost**	$52.54

Total Annual Equipment Cost = $112.70
Total Monthly Equipment Cost = $9.39

Figures are illustrative and not indicative of actual costs

Equipment charge is then added to delivery charge

Monthly Billing kWh	Dist Rev $/kWh	Equipment	Monthly Distrib.
140	$0.03620	$9.39	$14.46

- Monthly distribution rate is equal to distribution $/kWh rate times average monthly kWh billed plus the monthly equipment charge
- Transmission charge is based on company transmission rate
- Transition and Energy Efficiency charges are billed on per kWh basis
- Basic service charges apply if alternate supplier is not elected

Variety of design choices and untested nature of LED lights require consideration

- Selection of an appropriate standard has been difficult for engineers
- A variety of design choices further complicate selection
  - Utility needs to keep inventory so light designs need to remain available
- Some municipalities can be particular about the appearance of their lights
- Lights are untested in severe weather conditions
  - How do lights hold up in a New England winter?




Regulatory strategy should emphasize quality of light in addition to long run energy savings

- More expensive lights need to be justified by quality of life improvements (e.g. directional capabilities, uniform light distribution, improved color rendering)
- Increases in public safety due to limited outages and directional light capabilities
- Less light pollution
- Reduction of carbon footprint
- Compliance with public policy goals of a “Green” community

What NSTAR is doing

- Northeast Utilities has formed internal working group to examine new streetlight offerings and revise rate structures
- Challenge is to provide a cost effective option for customers
- Need to convince regulators and customer advocates that quality of life improvements justify higher cost or a find a way to bring down cost of LED lights
- Company is reviewing product offerings and trying to determine appropriate design standard
- Department of Energy Resources (DOER) is working on an LED streetlight initiative
- NSTAR will work with DOER to determine options for introduction of new lights