



FEMP's Emerging Technology Initiative

Energy Efficiency in Government
Building Retrofits

February 4, 2005

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Federal Energy Management Program
(FEMP)



Background

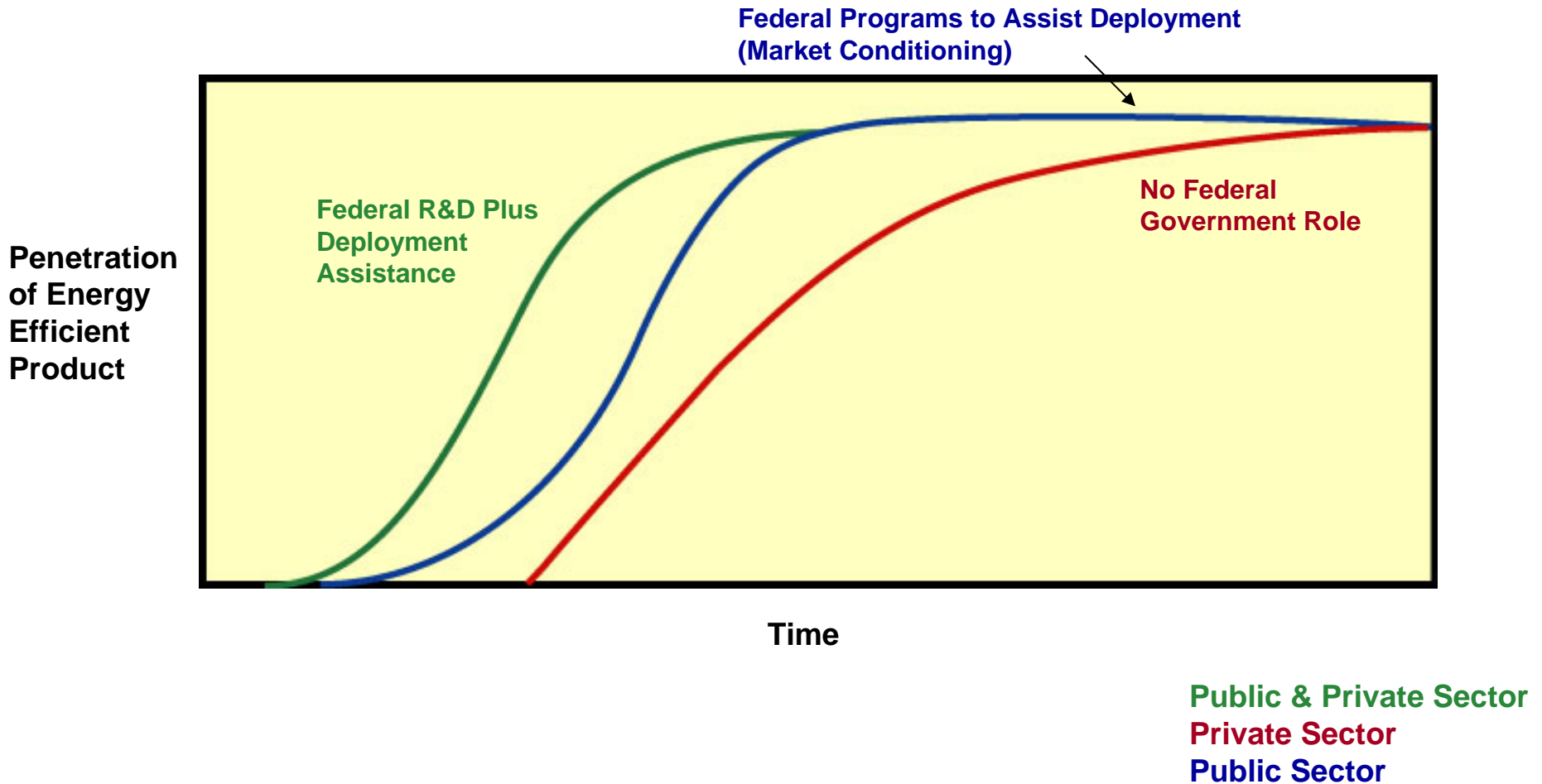
- New Energy Goals
- Impact Analysis, Energy Consumption per Gross Square Foot (EUI)
- Scope – Focus on Retrofit
- Stakeholders – Federal agencies, DOE Regional Offices, Private Sector, EERE Programs, State & Local Gov, ESCOs, Utilities, DOE Labs



- To identify promising emerging technologies and accelerate deployment in Federal sector
 - Meet the Federal Energy Goals



Impact of Federal Role in Product Market Penetration





New Technology Demonstration Program - NTDP

- Ongoing program authorized by the Energy Policy Act 1992
- Purpose – Provide Federal facility managers information on new / underutilized technologies
- Products
 - Publications
 - Response to requests for information
 - Demonstrations



- Technology Identification and Selection
 - Submissions by Federal agencies
 - Inter-Laboratory Council recommendations
 - FEMP selects technologies based on:
 - potential savings
 - cost feasibility
 - Agency interest



Tech Trans Process

- Completed in FY 2004
 - Technology Screening (303 EERE Technologies)
 - Develop Deployment Strategies
 - Coordination with Other EERE Programs
 - Coordination with Other Stakeholders (e.g. US Navy, ERDC, CEC, ACEEE, ESource)
- Work in Progress
 - Detailed Technology Assessments / Impact Analysis
 - Demonstrations (funding and technical support)
 - New Technologies Added Based on Criteria
 - Coordination with Stakeholders
 - Update FEMP Web Site

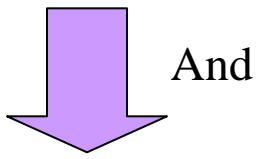


- Highly energy efficient products for residential commercial building, and industrial applications
- Technologies with potential for large energy savings on a national scale
- Products requiring late-stage (two years or less) development prior to commercialization AND
- Products commercialized, yet not established in the market



FEMP's Tool Kit for Market Penetration

- Direct Project Assistance
 - Demonstrations
 - Design and Technical Assistance
 - Site Screenings
 - Technical Tools
- Information, Training and Outreach
 - Web-based Catalog of Emerging Technologies
 - New Technology Demonstration Program publications
 - Other publications like the EE Product Buying Guide and the FEMP web site
 - Training/Meetings
 - Exhibits



- Alternative Financing Support



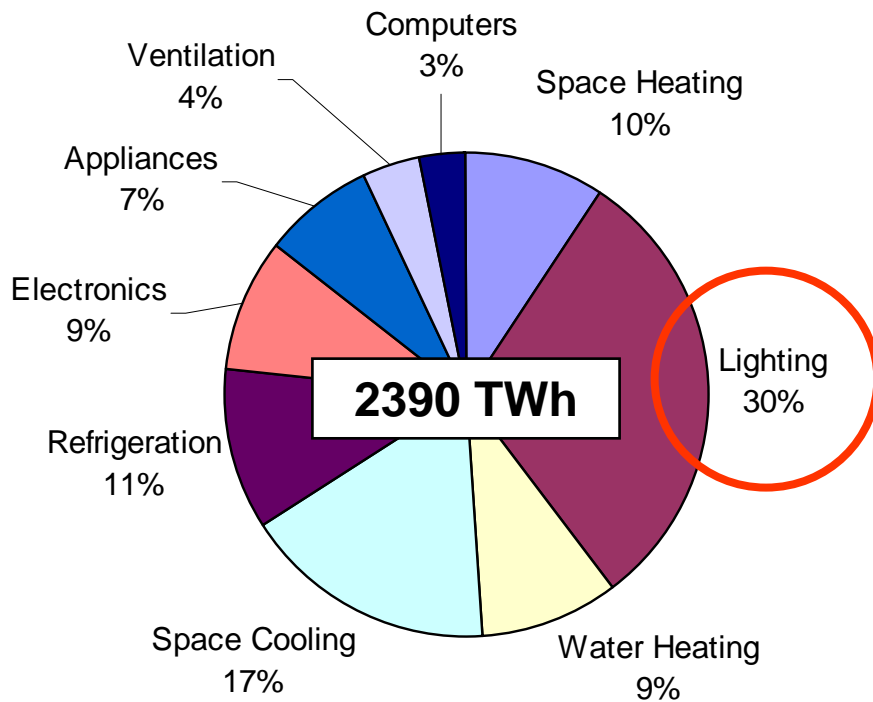


- Lighting
 - 30% end use (highest, based on EIA data)
 - Technologies are currently available and have significant savings potential
 - Technologies underutilized
 - Demonstrations / validation / tools / outreach / technical assistance - will accelerate deployment
 - Attractive financial benefits

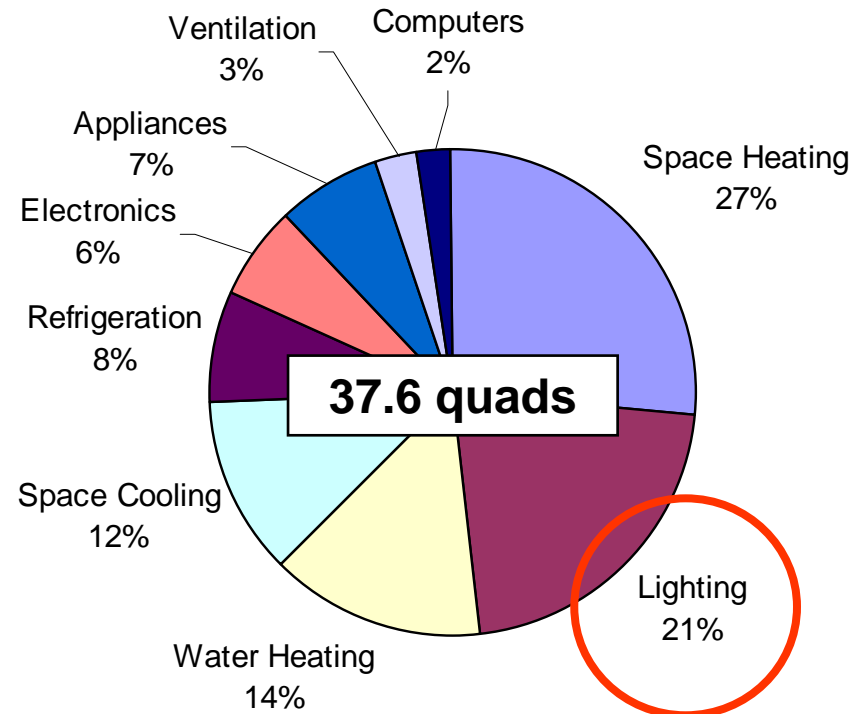


U.S. Buildings Energy End-Use Breakdown, 2001

Site Electricity Consumption

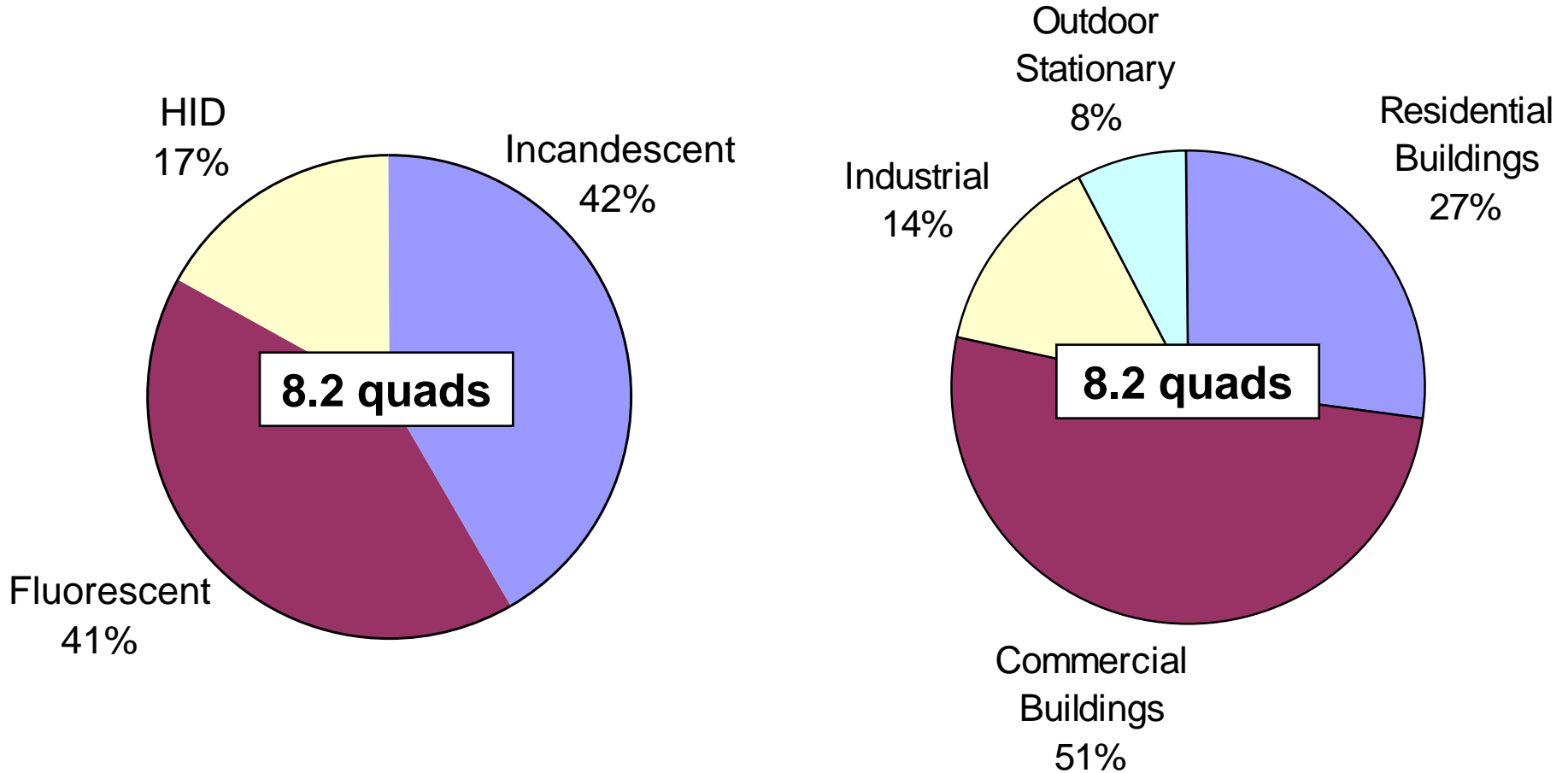


Total Primary Energy (all fuels)





U.S. Energy Consumption for Lighting, 2001



Quantity of primary energy consumed to provide electricity for lighting.

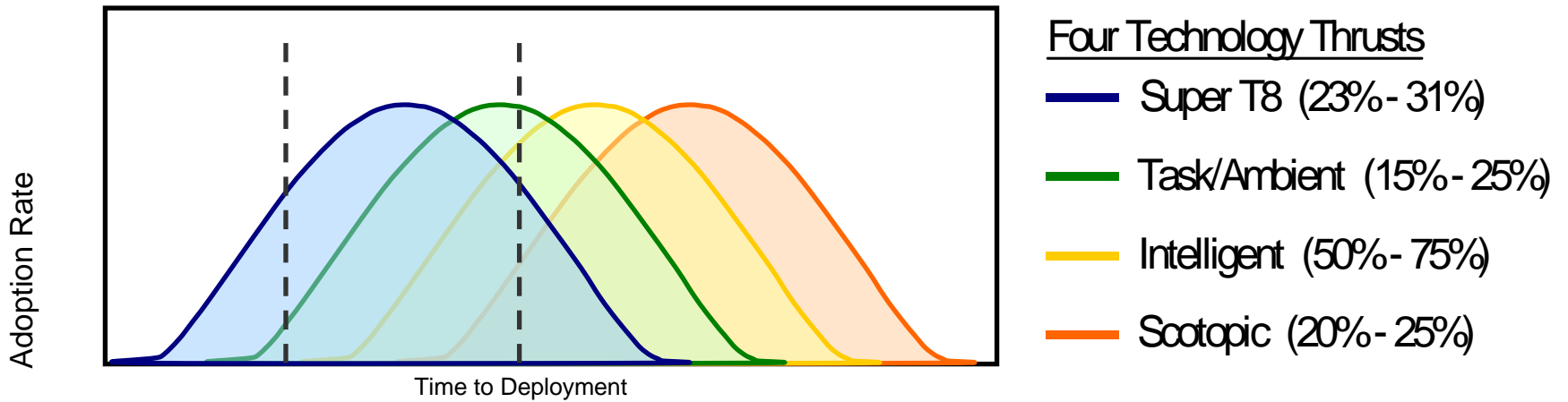


Four Technology Thrusts

- **High Performance Fluorescent T8 Components** – Premium T8 lamps and electronic ballasts (“Super T8 systems”) go well beyond the most commonly used T8 retrofit strategies. The large majority of Federal lighting projects would be able to apply this technology as four foot lamps are the workhorse of Federal lighting, at an estimated **23% to 31%** savings over standard T8 technology.
- **Task-Ambient Design** – The use of advanced luminaire^[1] technologies and lower ambient (room) light levels in combination with localized task lighting offers savings in Federal office areas at **15% to 25%**, with scientifically measured occupant comfort improvements of 10% to 16%^[2]
- **“Intelligent” Lighting** – The most progressive technology solution in lighting is a combination of workstation-specific direct/indirect lighting with personal control—this offers an optimum energy savings of **40% to 75%**, and has been shown in research to improve worker motivation and performance on tasks.
- **“Scotopic” Lighting** – The term scotopic refers to a form of vision by the human eye that has efficiency advantages that are not taken advantage of by current common lighting technology application. The use of lighting technology that is geared toward scotopic vision can provide efficiencies of **15% to 25%** across many lighted space applications.



FEMP Effort Over Time



10 year window



Savings Potential

Estimated Lighting Energy Savings Potential for typical applications			
High Performance Fluorescent T8	Task - Ambient	Intelligent Lighting	Scotopic
24%	22%	67%	20%



Proposed Super T-8 Tasks

- Article in FEMP Focus, energy trade publications and Federal Technology Alert (FTA)
- Present new CEE^[1] performance specification for High Performance T8 Systems at FUPWG Meeting and to ESCOs
- Develop 30-45 minute web-based online technology specific learning module
- Highly visible procurement program to get reduced price, guarantee availability
- Long-term price breaks and incentives through Federal supply catalogues
- Insert Super T8 specifications into Federal agency contract language, design manuals & guidelines



- Core Technologies of Interest
 - Super T-8
 - Task Lighting
 - Comprehensive lighting demonstration
 - Scotopic Lighting demonstration
 - Building Technologies
 - California Energy Commission
 - Pacific Gas and Electric
- Pilot Project
 - Street light ballast control
 - Energy and O&M Savings
 - Stake holders - Seattle City Lights / OWIP / LBL



- HVAC
 - Building Automation
 - Thermoelectric (solid state cooling)
- Lighting Technologies
 - Solid State Lighting
- Envelope Technologies
 - Electrochromic windows



- Scotopic Lighting Demonstration in California--actively looking for Federal sites
- Intelligent Lighting Demonstration, NTDP, with GSA
- Wireless Sensors for Improved HVAC Control
- Transpired Solar Collector FTA
- Fuel Cell FTA

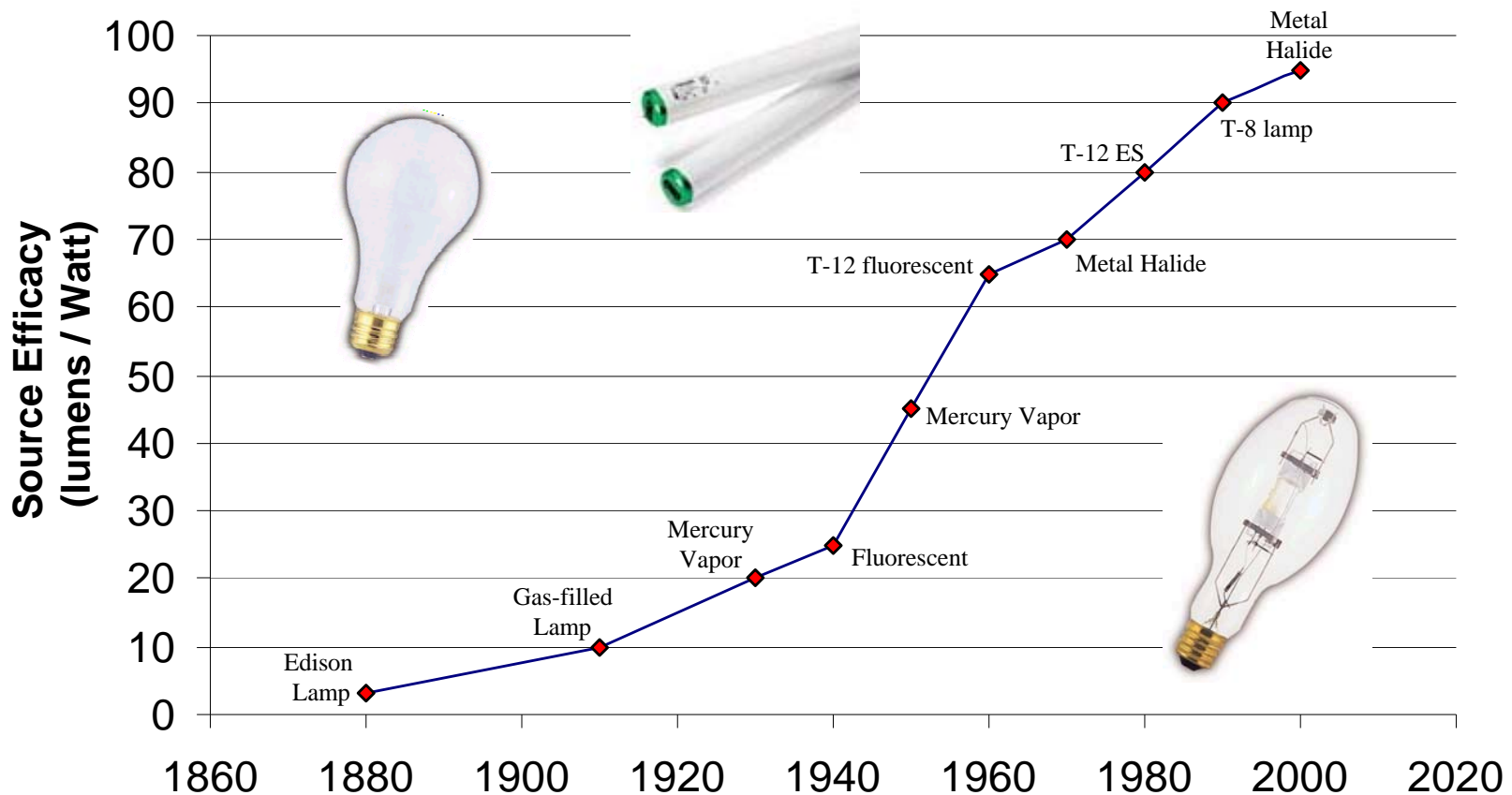


Going Forward

- Looking for sites to demonstrate Super T8's & Task/Ambient Lighting.
- Analysis and consideration of other technologies.



Historical Efficacy Improvement of White-Light Sources





Electric Lamp White Light Efficacy Improvement

