



U.S. Department of Energy  
Energy Efficiency and Renewable Energy

## Solid-State Lighting

# Southern California Edison and Solid State Lighting (SSL) Technology February 2, 2007

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# Energy Challenges

- Energy Action Plan established cost effective, reliable Energy Efficiency (EE) and Demand Response (DR) resources precede other supply side resources in the “Loading Order”
- EE permanent energy reductions resulting in kWh savings
- DR – Dispatchable loads
  - Reliability
  - Economic dispatch

## CPUC 2006-08 Approved Targets

IOU	2006			2007			2008		
	GWh	MW	MMTh	GWh	MW	MMTh	GWh	MW	MMTh
SCE	922	220	-	1,046	227	-	1,167	253	-
PG&E	829	180	13	944	205	15	1,053	229	17
SDG&E	281	61	3	285	62	3	284	62	4
SCG	-	-	15	-	-	19	-	-	23
Total	2,032	441	30	2,275	494	37	2,504	543	44

- Targets do not include savings from third parties.
- Very aggressive ramp-up of program activities.
- Savings goals for 2009-20013 are beyond the technical potential
- 55-60 percent of the IOU's incremental electric energy needs through 2013 EE

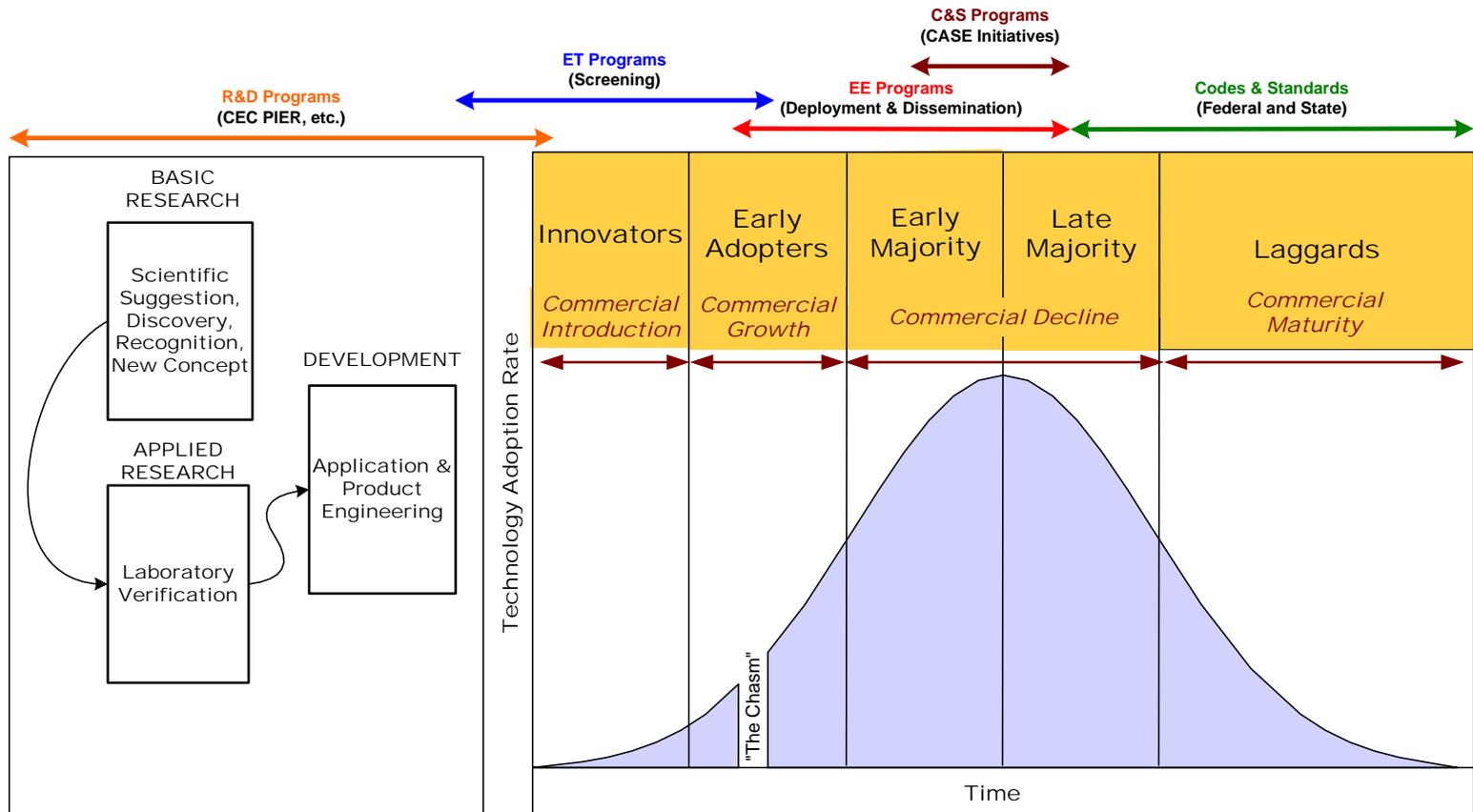
## Opportunities

- Budgets dramatically increased to nearly \$1 billion annually (EE/DR statewide).
- Energy efficiency innovations are valued pursuant to total resource cost evaluations.
- The time-dependent value of energy now recognized by California and adopted into new 2005 Standards.
- Utility profits unbundled from kWh sales for all California IOUs.

# Opportunities (continued)

- Lighting consumes approximately 30% of kWh.
- Approximately 50% of the EE potential in the commercial sector comes from interior lighting.
- Market intelligence for pre-commercial or new innovations is frequently lacking.
- Commercial technical potential for indoor lighting is 51% of all end use in the SCE service territory.

## California PGC Model of Product Commercialization

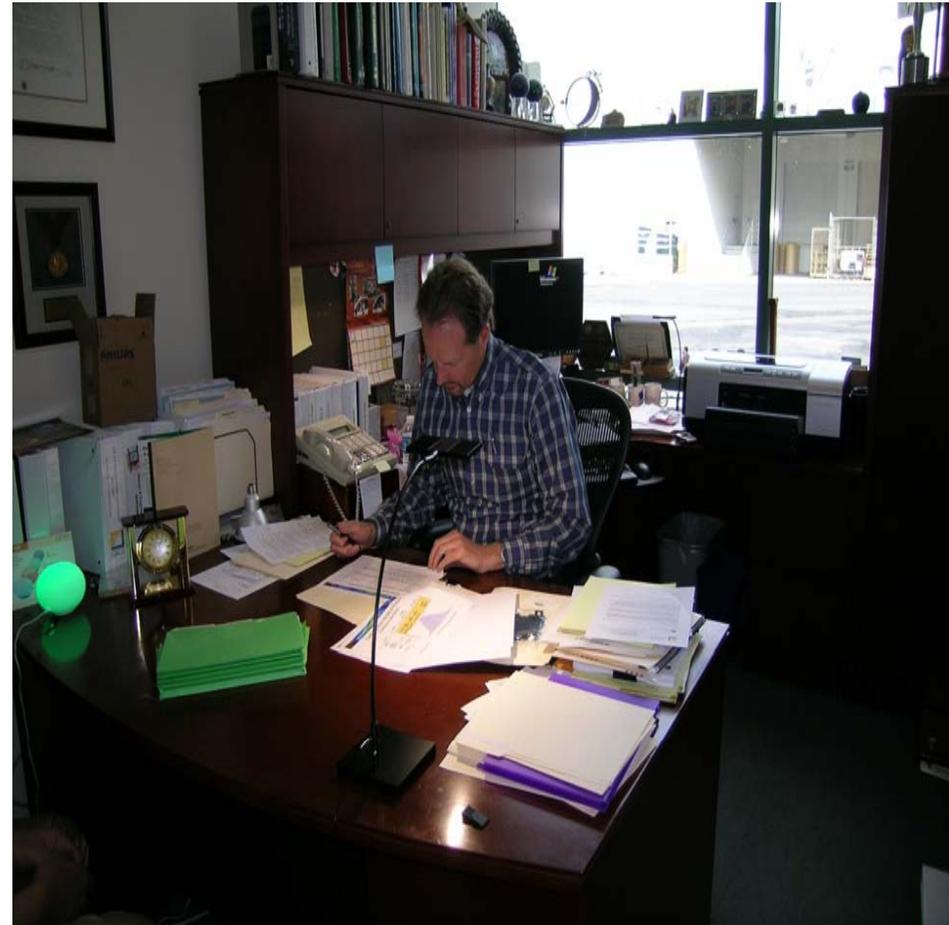


Energy Efficient Technology R&D Process

Energy Efficient Technology Commercialization Process

# Solid State Lighting is Important

- Wide range of possibilities
  - Homes
  - Offices
  - Retail
- Edison currently assessing a wide range of technologies
  - “OPEN” Signs for retail stores
  - Down-lights for residential
  - Reach-in Refrigerated Display Case Lighting for supermarkets
  - LED Hybrid Porch Light and Pathway Lights for residences and communities
  - LED Taxiway Lighting for airport runways



# LED "OPEN" Signs for Retail Stores

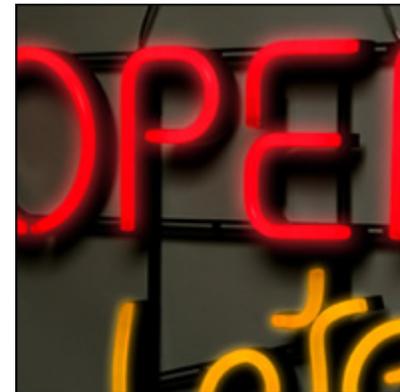
Neon



LED

Average neon sign: 46W  
Average LED sign: 15W

LED



Neon



**67% Savings**



LED

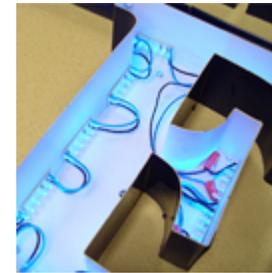
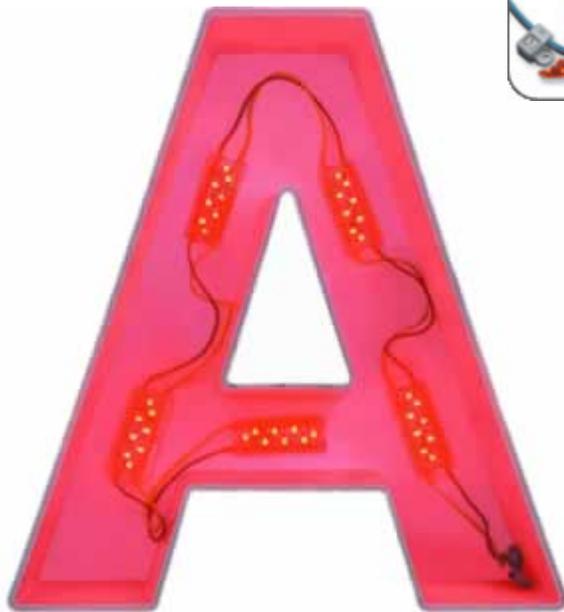
# LED Downlights for Residential Applications



9W Dimmable Downlights  
2750K  
Replaces a 65W  
incandescent lamp

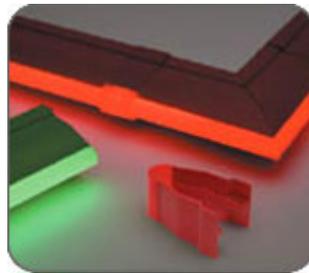


## LED Illuminated Channel Letter Signs



Red LED's are known to be more efficient than Red Neon, but other color LED's are just now being tested by SCE

# LED Architectural Border Tubing for Buildings



## LED Under-Cabinet Lighting for Residential and Hospitality Markets



## LED Reach-in Refrigerated Display Case Lighting for supermarkets



3 Door Case

T8 system = 220W

LED system = 160W



# LED Hybrid Porch Light and Pathway Lights for Residences and Communities



Typical yearly  
energy saved:  
214 kWh / fixture



Built-in occupancy  
& photocell  
activates primary  
incandescent/CFL

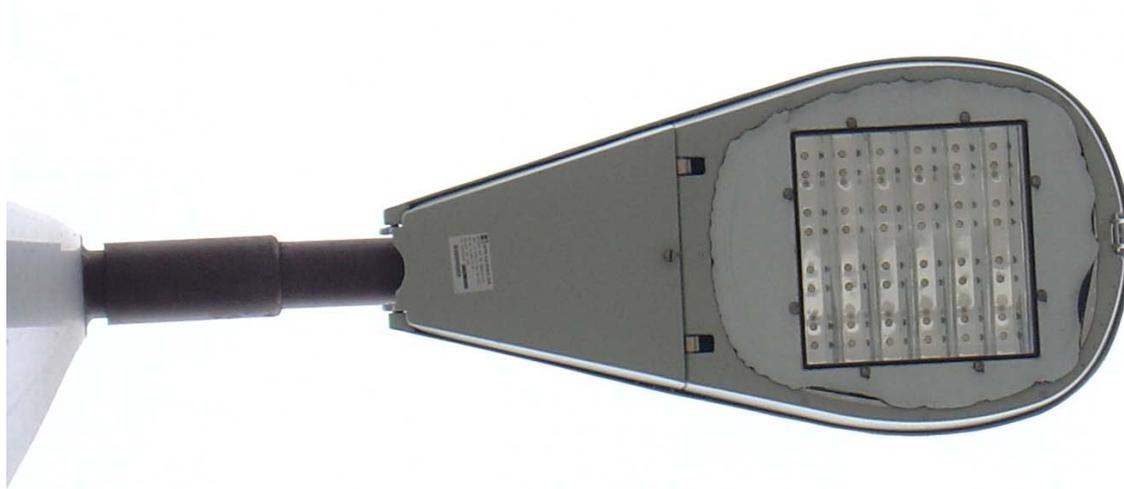
# LED Taxiway Lighting for airport runways



42W of incandescent to 6W dimmable LED to accommodate taxiway modulation requirements



# LED Streetlights



Getting closer...