RESNET
San Diego, California

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California Title 24

- Objective is least life cycle cost (not least life cycle energy cost)
- But, energy prices vary in time and place
- So, we express codes and standards in terms of energy use
  - thus, CAFÉ is in miles per gallon, not miles per $ of fuel
- How to measure electricity? -- as “source” or “primary” energy
  - 1 kWh of electricity (used for example for resistance heating) releases only 3,412 Btus of “site” energy, but requires the combustion of ~ 10,500 Btus back at the power plant. This “source” to “site” ratio is about ~ 3:1.
- California measures electricity as source or primary energy
- Unfortunately, the electric industry outside of CA has favored “site” energy or “fuel neutrality” and RESNET has had to craft a compromise which partially corrects the bias towards electric heat. So, for T-24 inspectors, CEC uses CHEERS, but not HERS.

California Title 24 History

- 1978
  - First T-24 became effective and used a source/site ratio of 3.0
- 1998
  - Third party inspection required by CHEERS raters
    - Refrigerant charge and air conditioning air flow
    - Duct sealing test to reduce losses from 22% to <6%
  - Beginning in 2005, voluntary third party inspection can yield extra credit
    - e.g. high quality installation of air barriers and insulation
  - For details, attend Bill Pennington's T-24 Panel at 10:30 today

California History

- 2001-2002 Electricity Crisis
  - Emergency T-24
  - 25,000 Real Time Meters with Time-of-Use Pricing
    - all customers > 200 kW
  - Solutions: Wholesale Price Caps and Retail Rate Increase
  - Joint CPUC/CEC Proceeding on Dynamic Pricing for Demand Response
    - Customers > 200 kW with a Critical Peak Price for Summer 2003
    - Customers < 200 kW, $10 million Pilot, 2,400 customers
- 2005
  - AB 549 directs CEC to address existing buildings
  - Study Team in 2003; Report in 2005
- 2005
  - Next T-24 will have Time Dependent Valuation

Tax Credits for Energy Efficiency in Buildings

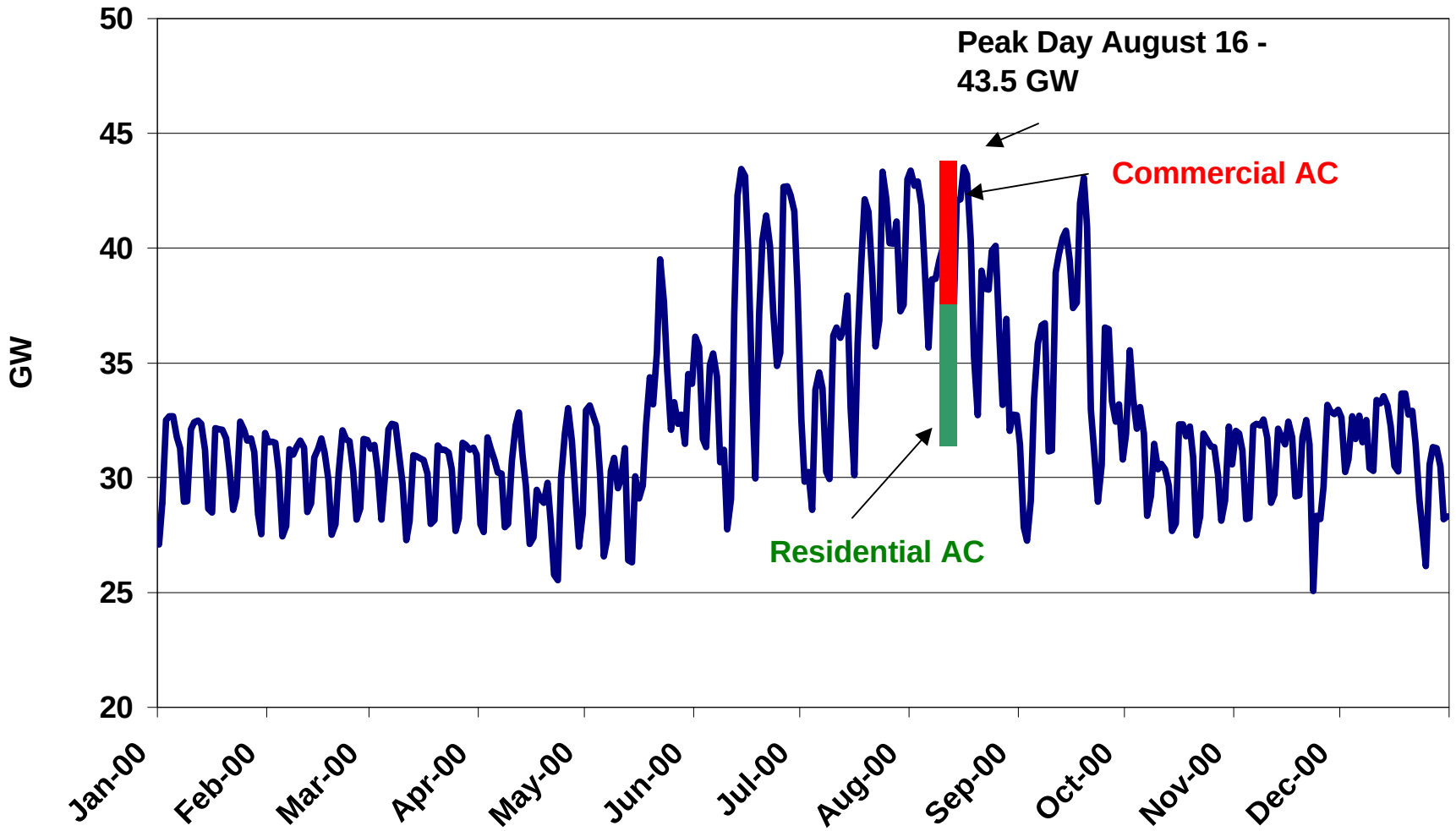
- 3 current bills: H.R. 4, Senate (Bingaman), Senate (Snowe/Feinstein)
- H.R. 4 and Bingaman are very similar
- CEC endorses Snowe/Feinstein because
  - Encourages greater energy savings
    - New Residential
      - $600 for 30% better than IEEC (sunsets in 3 years), or
      - $2,000 for 50% better
    - Existing Residential
      - $200 for 20% better (sunsets in 3 years) or
      - $500 for 50% better
  - Requires inspection by HERS raters. Other bills don't specify on-site inspection or who inspects
  - Has workable plan to deal with fuel neutrality, thus avoiding years of DOE rule making
  - Adjusts qualification levels for future appliance standards
  - Has tax credits for appliances, especially AC

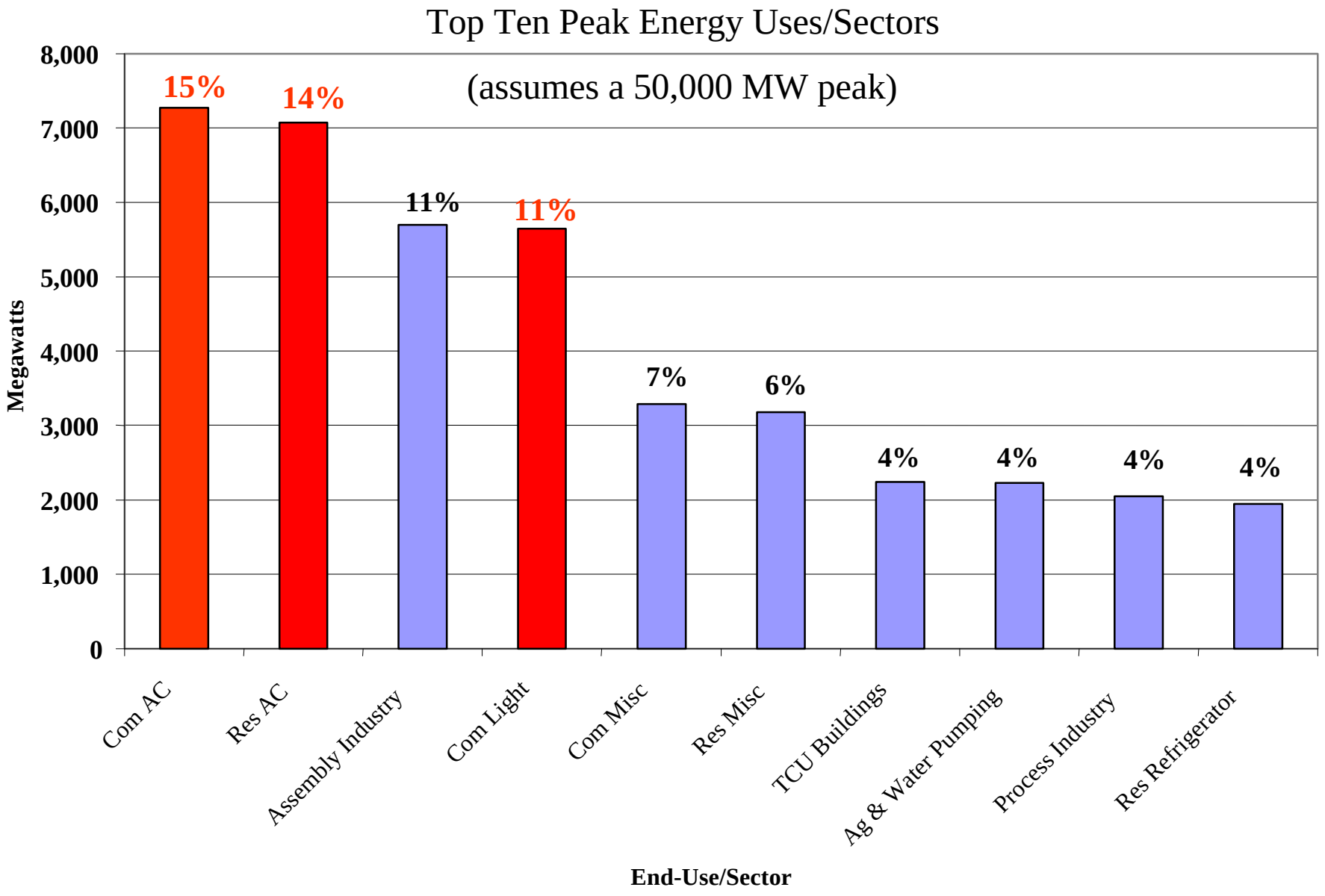
Tax Credits for Energy Efficiency in Buildings

- For more details, go to David Goldstein's Plenary talk
  9 a.m. Wednesday

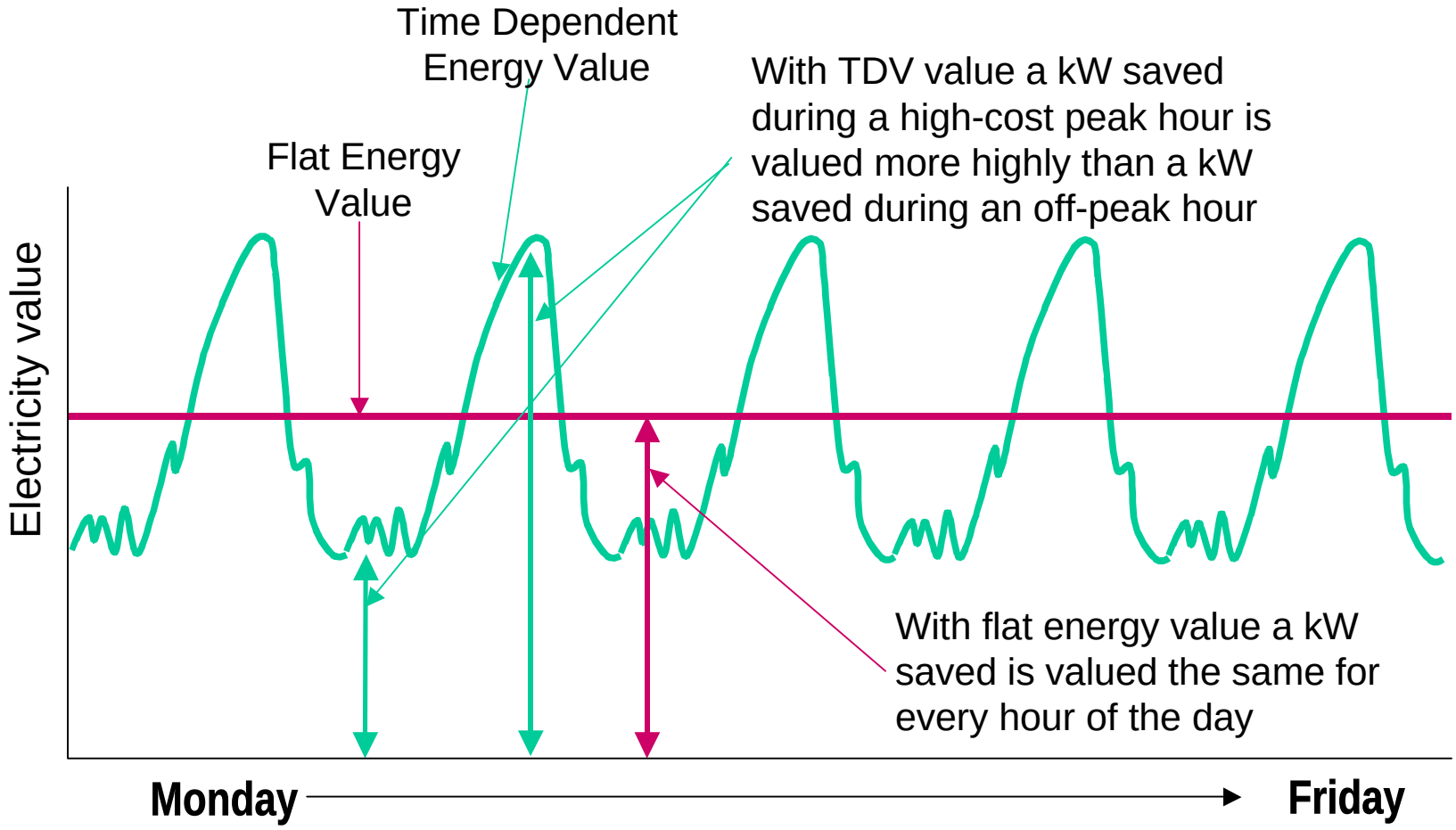
Cal ISO Daily Peak Loads

January 1, 2000 - December 31, 2000




Top Ten Peak Energy Uses/Sectors
(assumes a 50,000 MW peak)
Megawatts
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
15%
14%
11%
11%
7%
6%
4%
4%
4%
4%
Com AC
Res AC
Assembly Industry
Com Light
Com Misc
Res Misc
TCU Buildings
Ag & Water Pumping
Process Industry
Res Refrigerator
End-Use/Sector

Time Dependent Valuation (TDV)



Proposed CEC/CPUC Vision

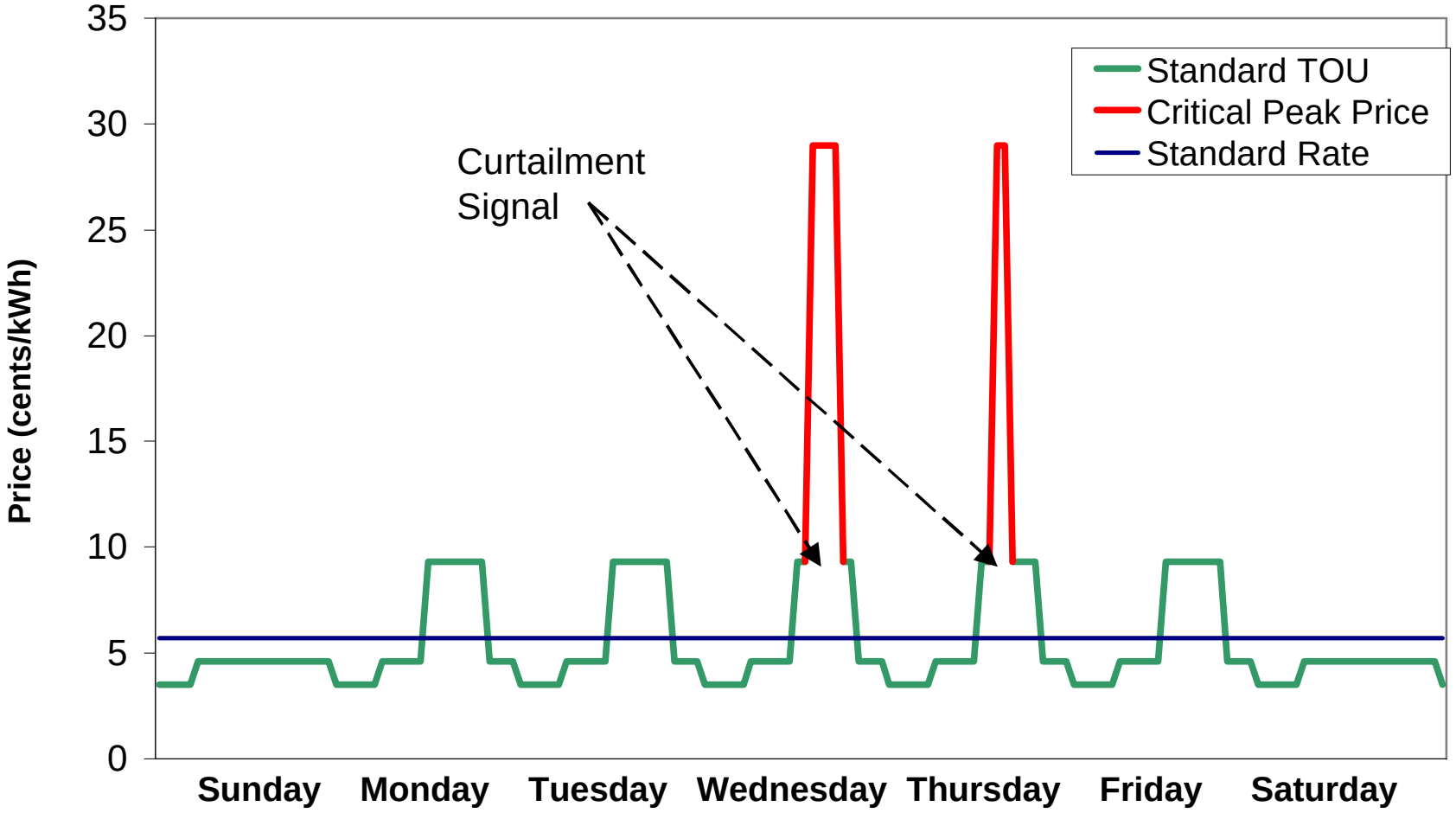
- Always TOU or Better if digital meters available and if economic
- “CPP” is an extension of TOU
- Residential and Small Commercial
  - Default = CPP
  - Hedge = TOU
- Intermediate Size Customers (perhaps 200 kw to 1 MW)
  - Default = CPP
  - Hedge = TOU
  - Option = RTP (voluntary)
- Large (perhaps > 1 MW)
  - Default = RTP
  - Hedges to CPP or perhaps TOU

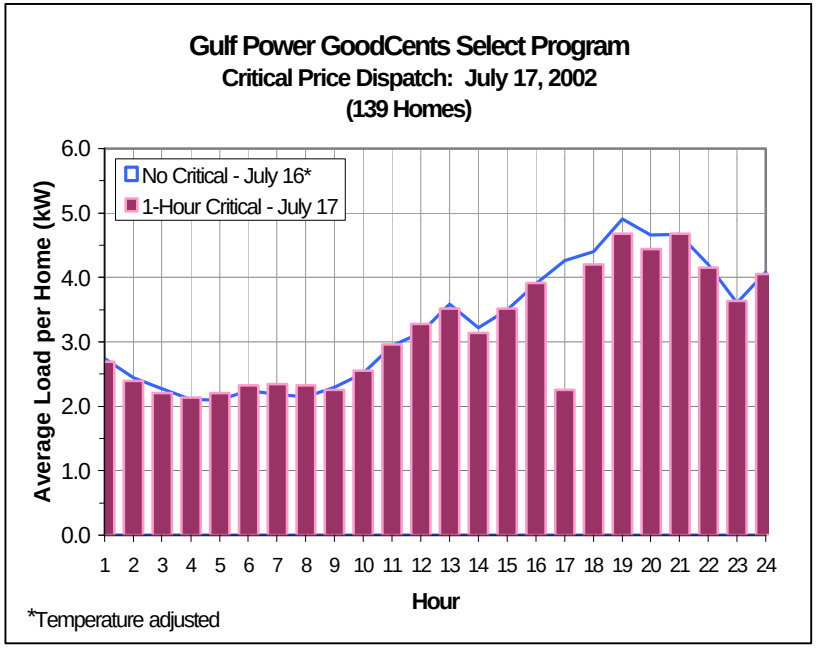
TOU Pricing vs. Dynamic Pricing (CPP & RTP)

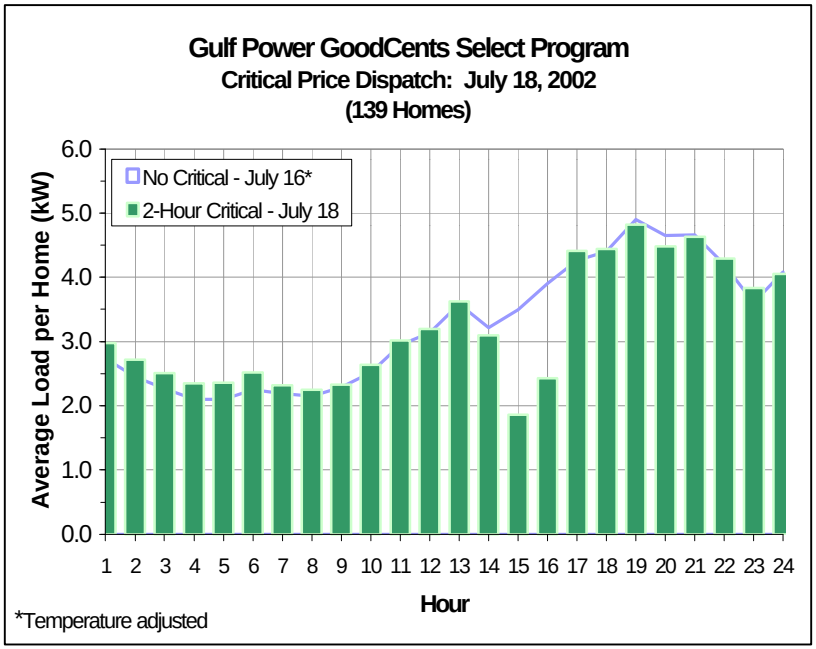
- **Time-of-Use** (TOU) is typically 3 time blocks published in advance for entire season
  - Peak, Shoulder, Off-Peak
  - Cannot address unforeseen weather or equipment failures
- **Critical Peak Pricing** (CPP) is a high price imposed on a few days a year when energy is expensive or system conditions are critical or near critical
  - Non-CPP hours are less expensive as a result
  - Customer pays the critical price when invoked by the utility
    - **day-ahead forecast of CPP offers added time for response**
- **Real-Time Pricing** (RTP) is the hourly marginal cost of a kWh
  - Reflects hot weather, scarcity, or equipment failure
    - **day-ahead forecast of RTP offers added time for response**

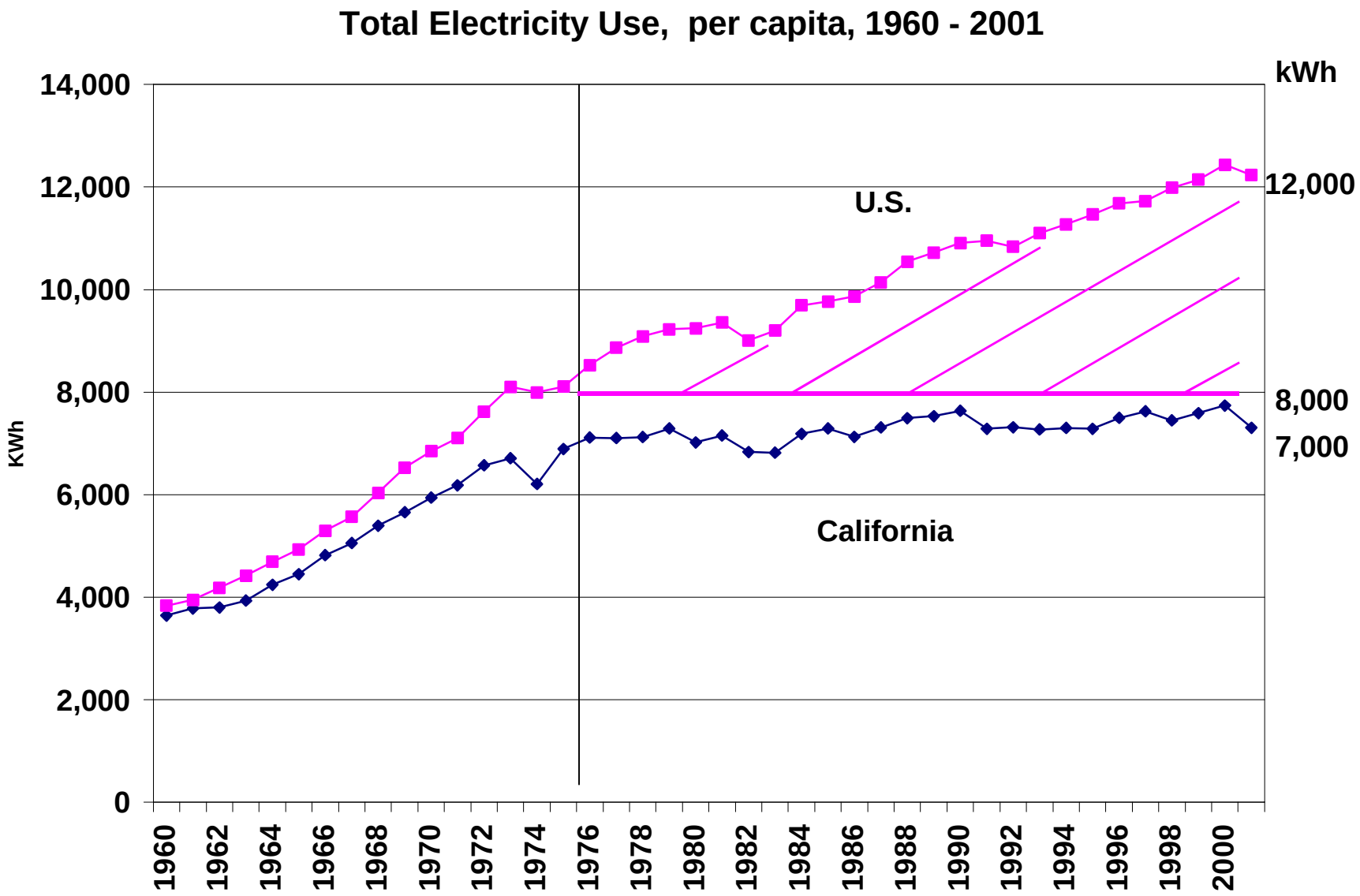
Critical Peak Pricing (CPP)

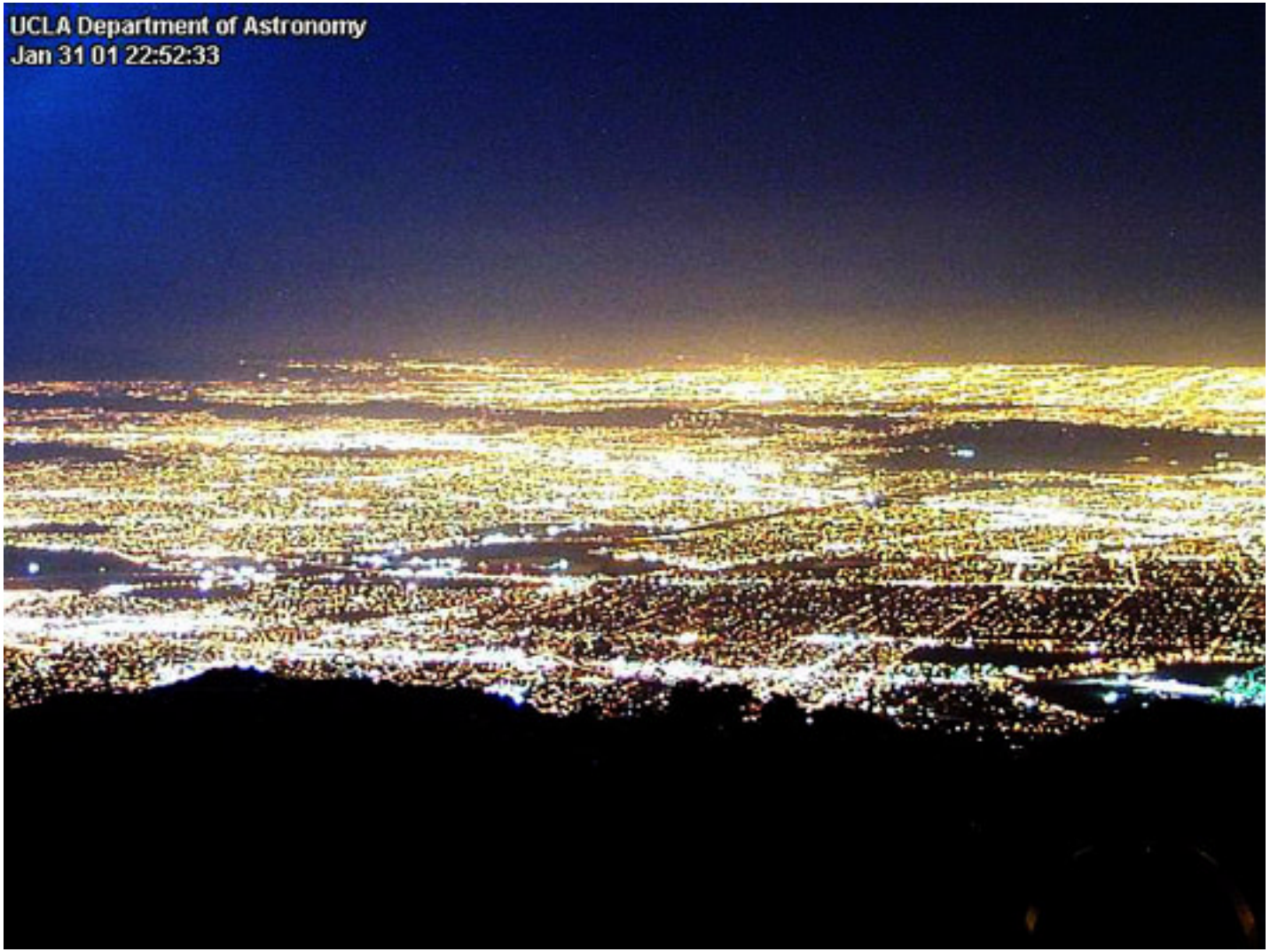
e.g. Gulf Power residential GoodCents Select tariff



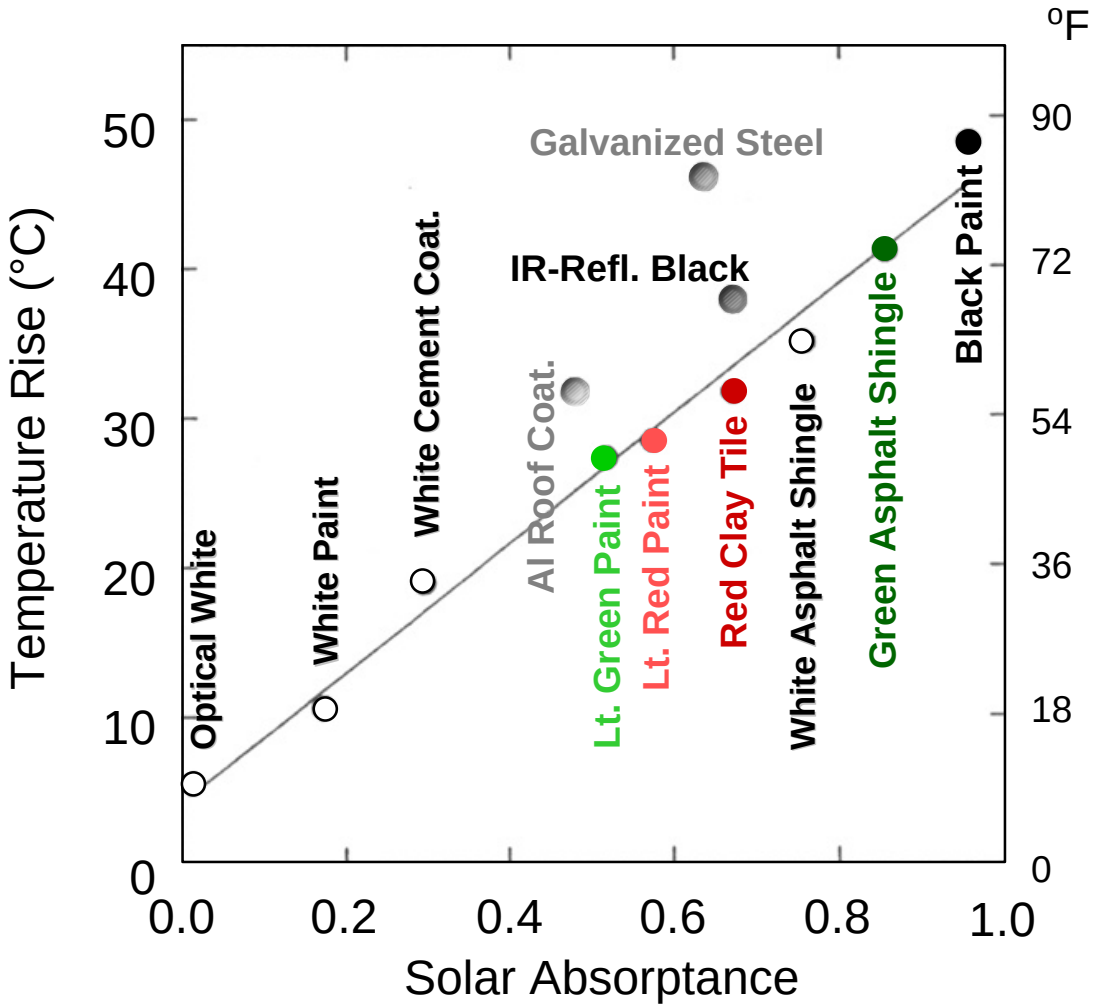

Gulf Power GoodCents Select Program
Critical Price Dispatch: July 17, 2002
(139 Homes)
No Critical - July 16*
1-Hour Critical - July 17
Average Load per Home (kW)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour
*Temperature adjusted


Gulf Power GoodCents Select Program
Critical Price Dispatch: July 18, 2002
(139 Homes)
No Critical - July 16*
2-Hour Critical - July 18
Average Load per Home (kW)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hour
*Temperature adjusted


Total Electricity Use, per capita, 1960 - 2001
kWh
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
KWh
U.S.
California
12,000
8,000
7,000
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000


UCLA Department of Astronomy
Jan 31 01 22:52:33

Temperature Rise of Various Materials in Sunlight (source: LBL)



Temperature Trends in Downtown Los Angeles