

Reducing Costs with Energy Efficiency

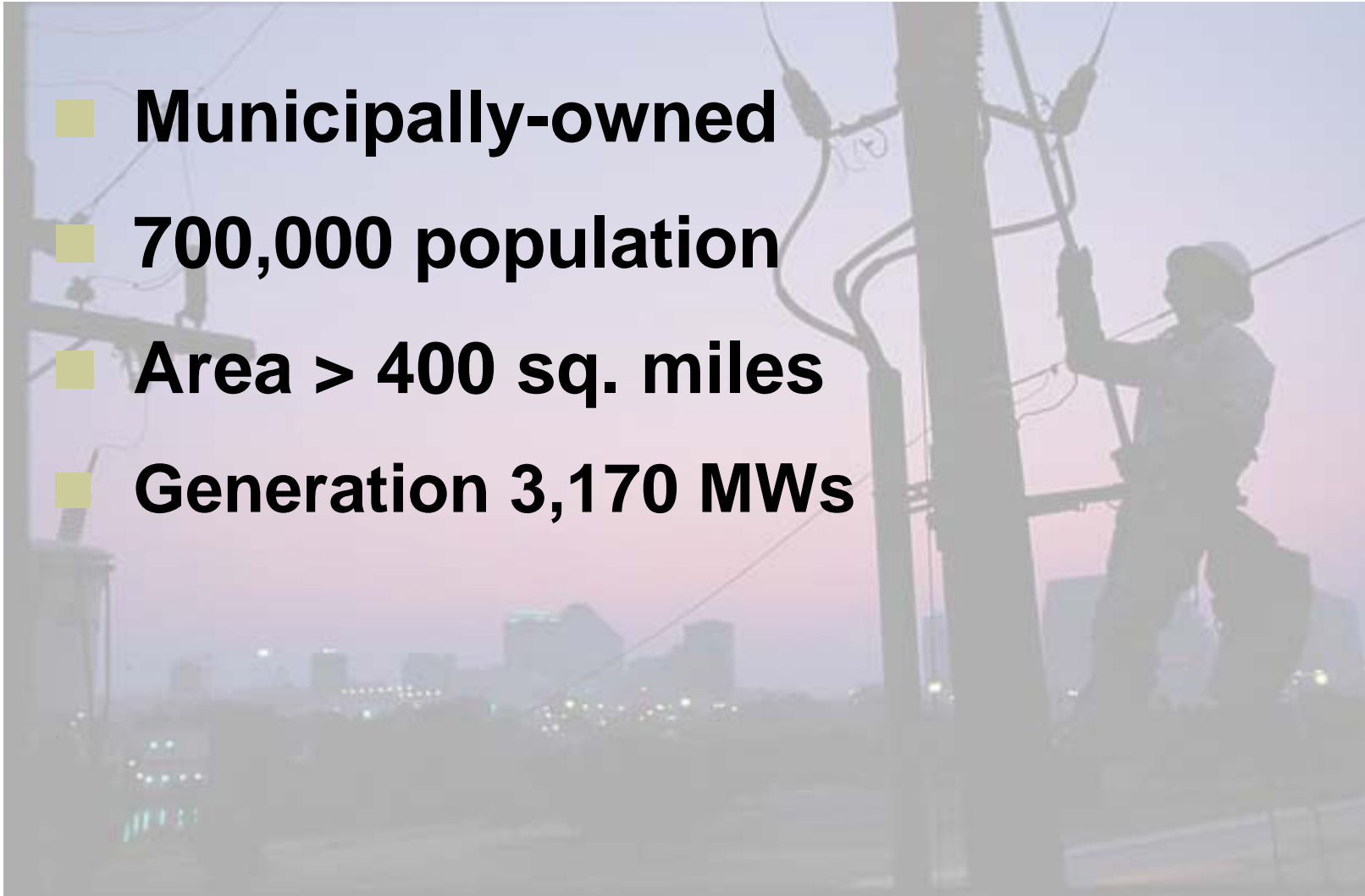
Presented to
**Pennsylvania Demand Side Response
Working Group**
February 9, 2007



Austin Energy



- **Municipally-owned**
- **700,000 population**
- **Area > 400 sq. miles**
- **Generation 3,170 MWs**



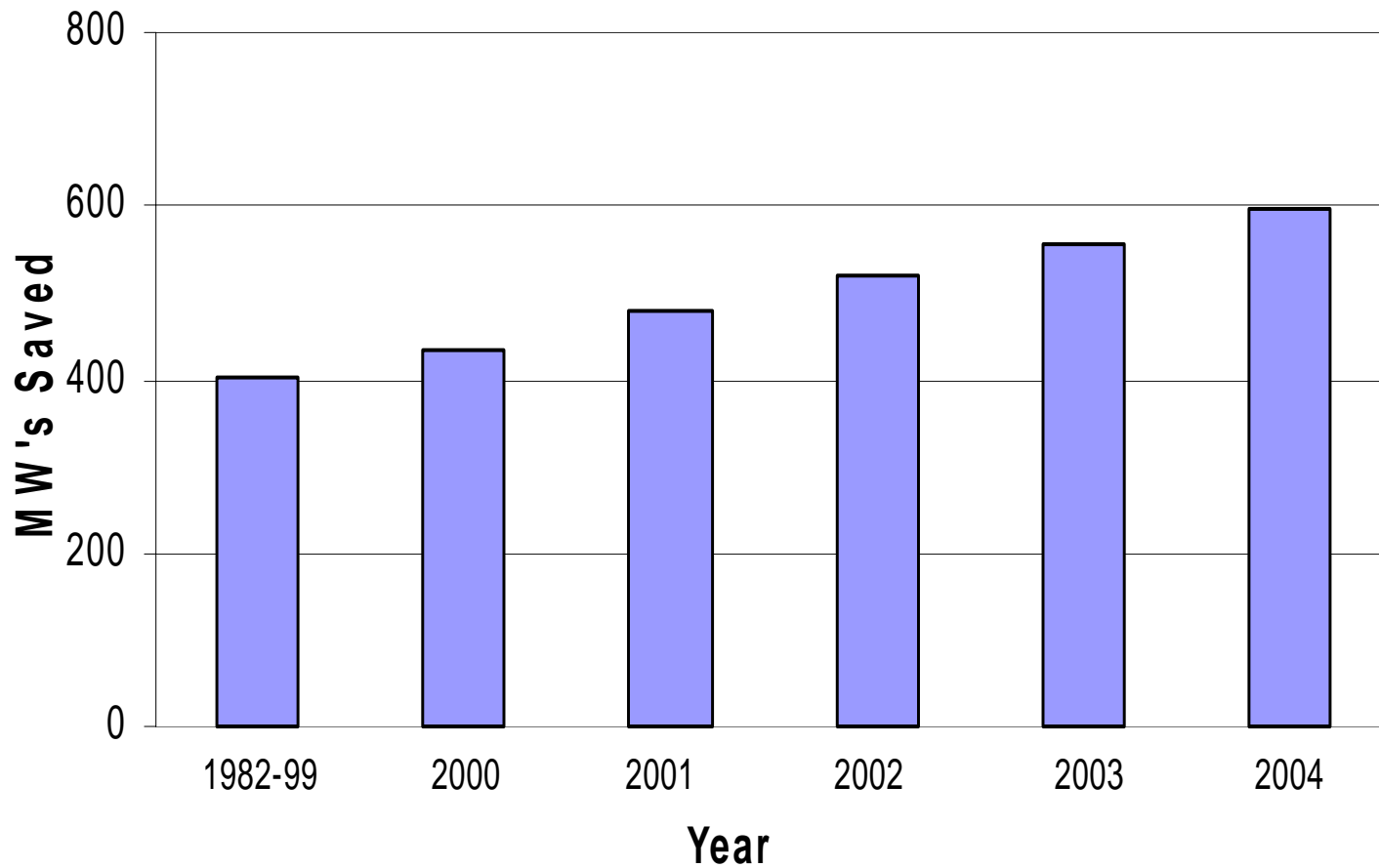
Demand-side Management's Role?



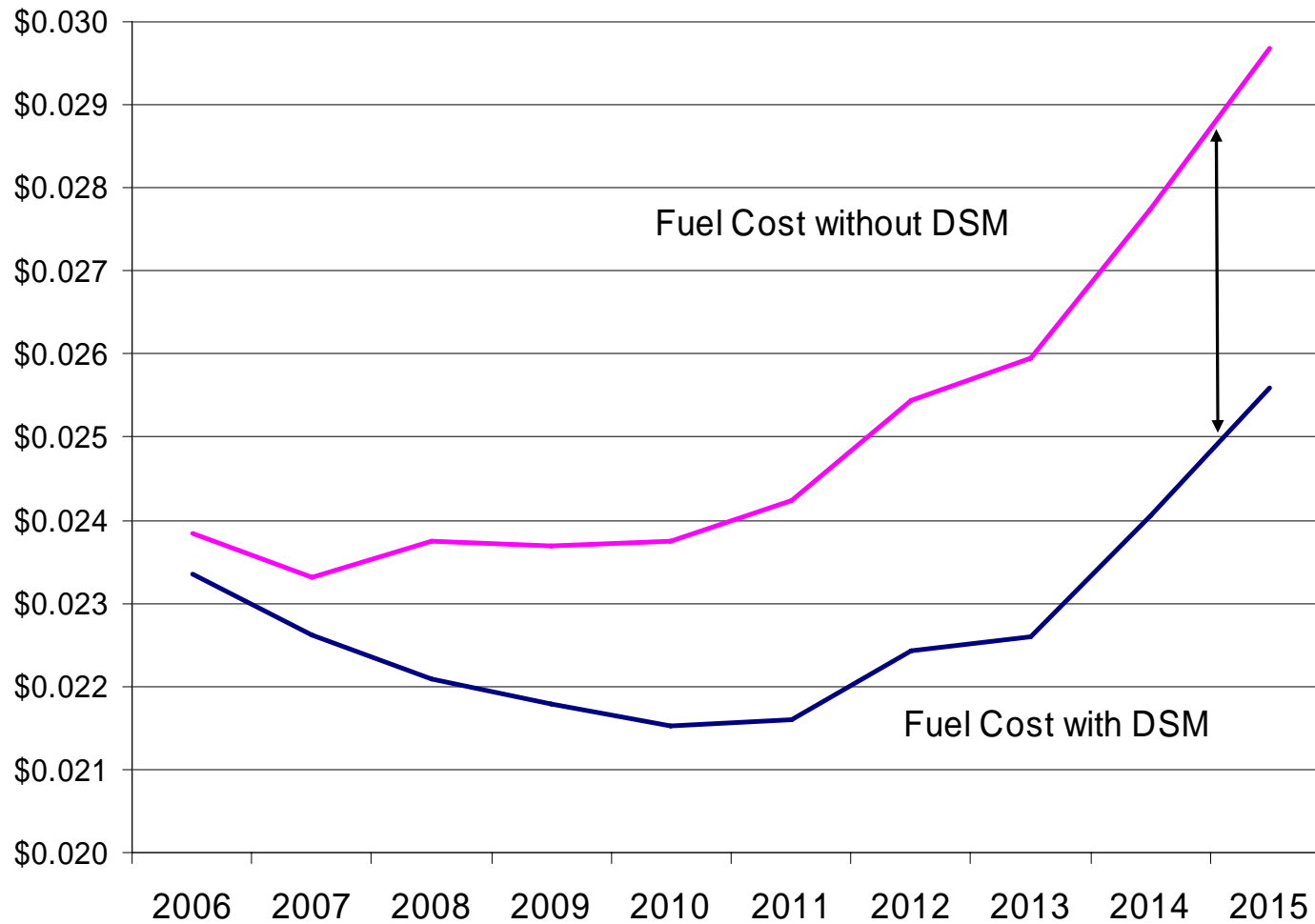
- Demand-side Management (DSM) are initiatives which modify the level and pattern of electricity use by customers.
- Provides cost-effective resources to defer the need for new capacity
- Enhances customer service



Energy Efficiency Peak Demand Savings



DSM Reduction in Fuel Costs



Austin City Council



Resolution September 14, 1999

“Cost-effective conservation programs shall be the first priority in meeting new load growth requirements of Austin Energy. ”

Clean Energy Resolution August 28, 2003

... Austin Energy Strategic Plan to ensure Austin remains a national and international leader in the development and use of clean energy



Austin Energy's Response



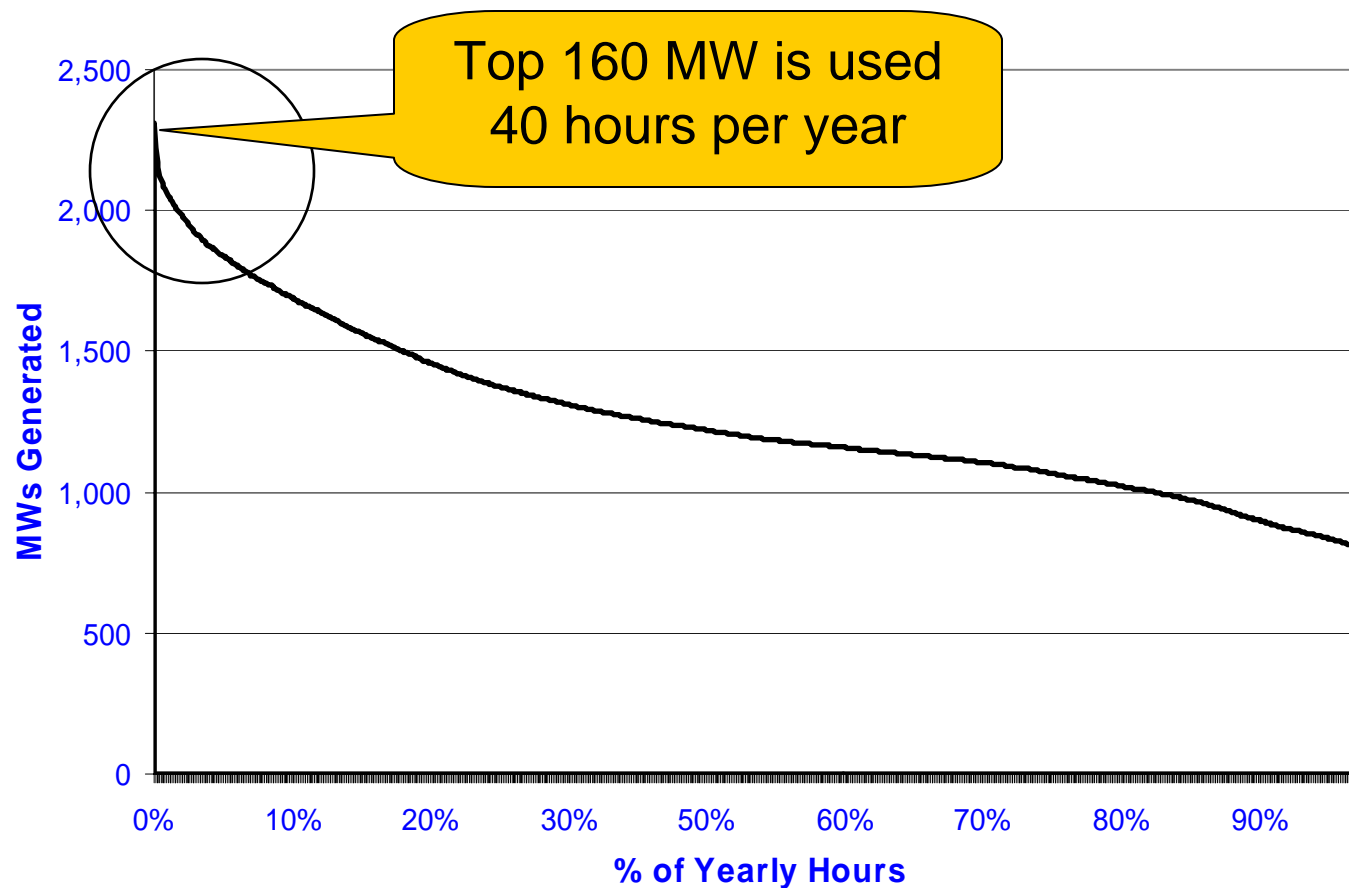
- Energy Efficiency is first priority
 - 15% Demand-Side Management by 2020
 - 20% Renewable Energy by 2020
 - 100 MWs of Solar by 2020
- Commercial, Residential and Solar Energy Efficiency Programs



DSM Opportunity



AE System Load Duration Curve -2004



Promoting Commercial Energy Efficiency



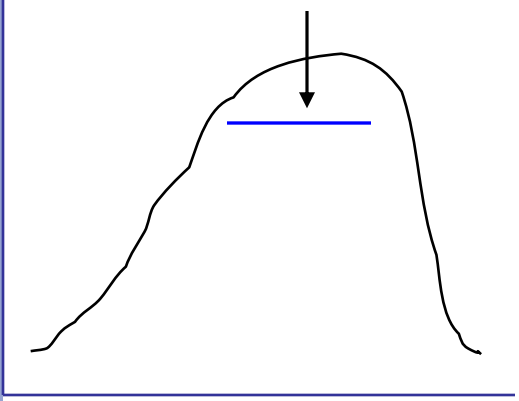
- Cash rebates that pay 20 – 30% of cost
- Up to 70% buy-down incentives for Small Business
- Direct install measures
- Innovative electric rate tariffs
- Free energy audits
- Feasibility studies
- Inter-agency agreements
- Utility Key Account representatives
- Newsletter / Mail outs



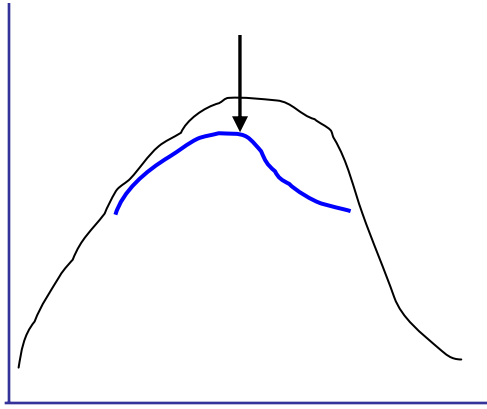


Energy Use Modification

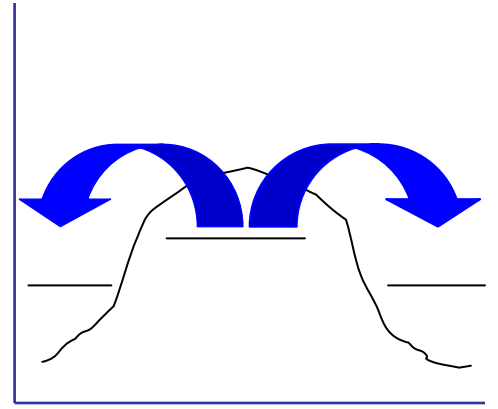
Peak Clipping



Strategic Conservation

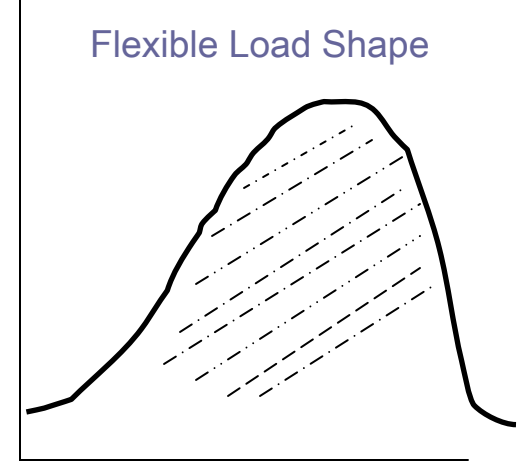
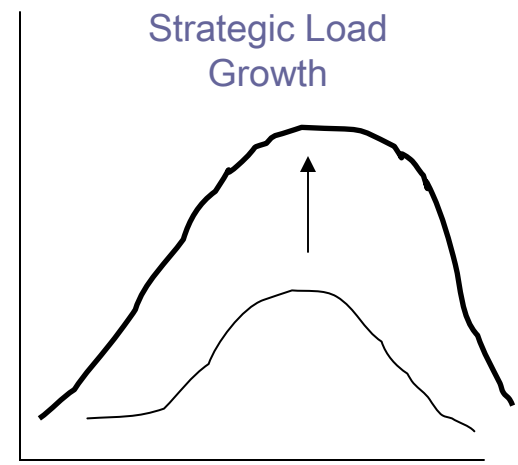
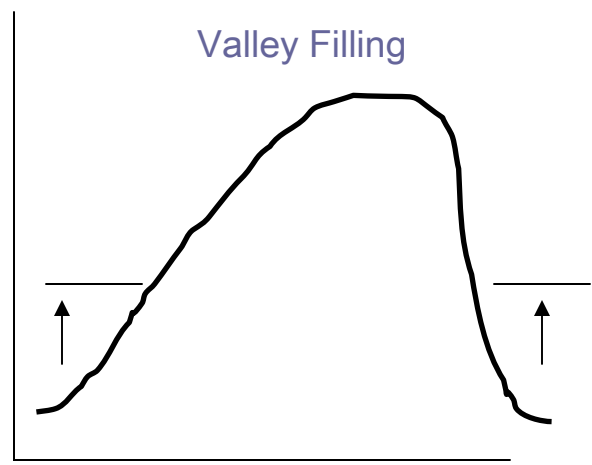
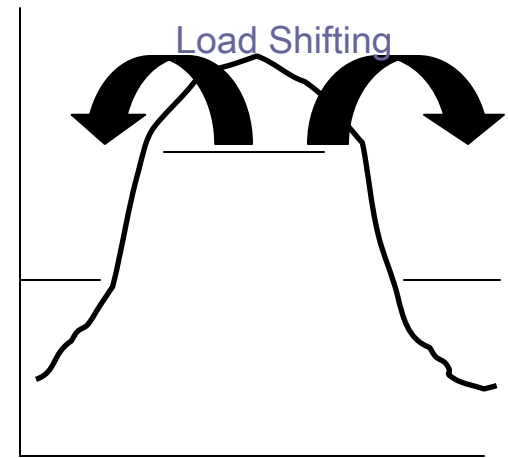
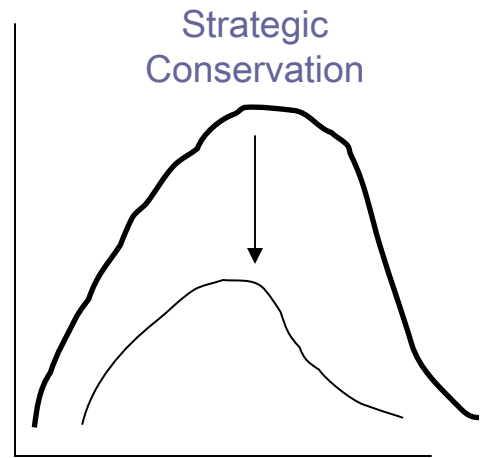
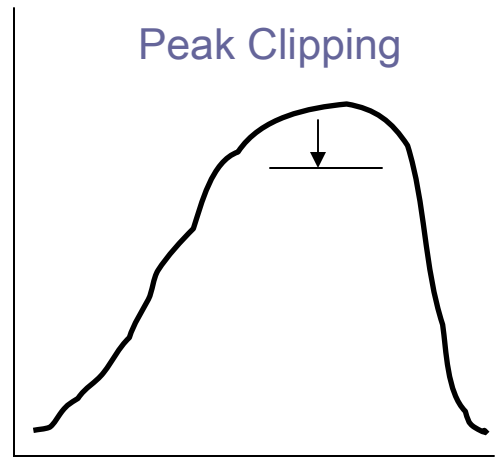


Load Shifting





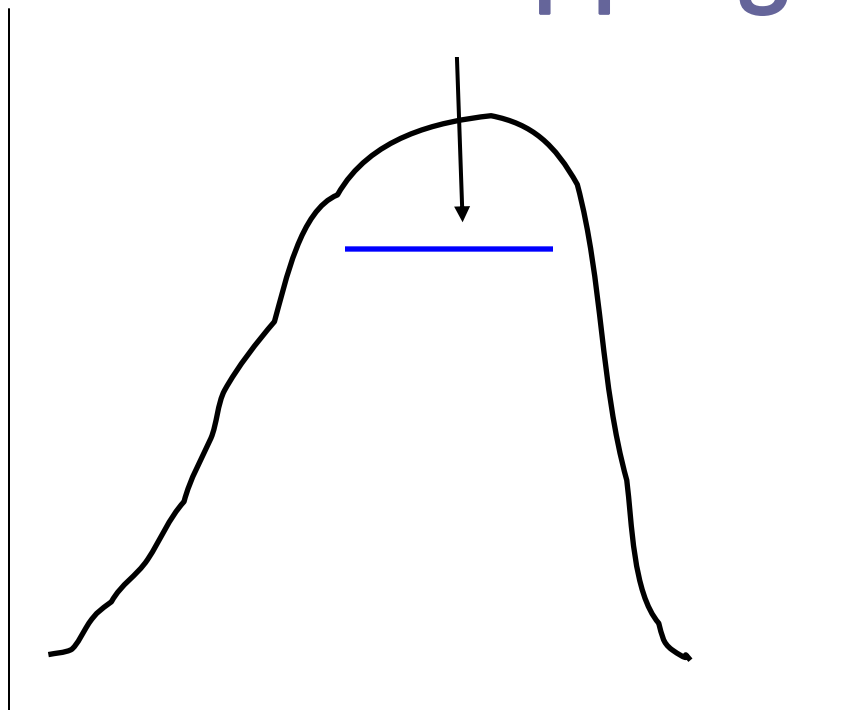
Energy Use Modification



AE DSM Programs



Peak Clipping



- Power Partner
- A/C Cycling
- W/H Cycling
- Load Co-Op

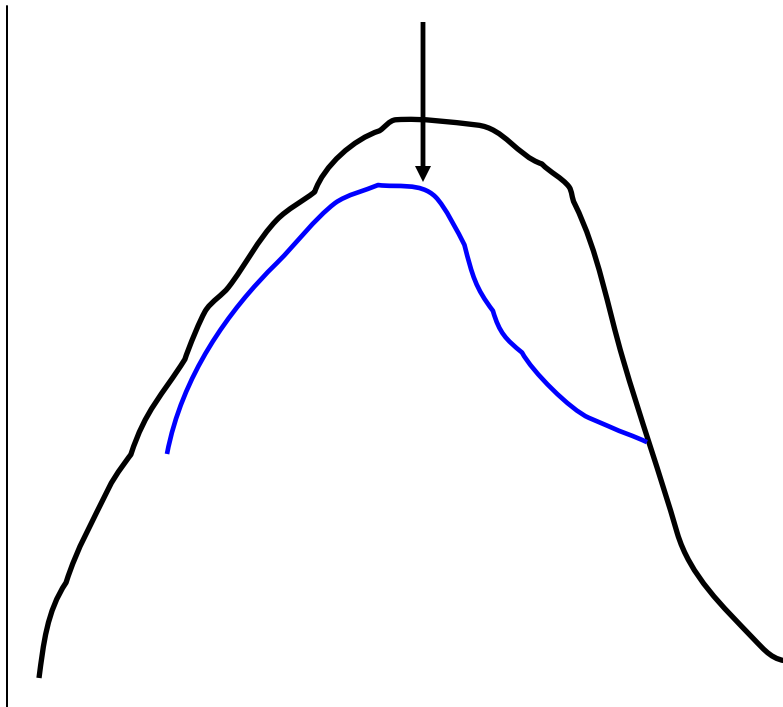
Represent 51% of new DSM program mix



AE DSM Programs



Strategic Conservation



- Total Home Efficiency
- Small Business Efficiency
- Green Building
- Appliance Efficiency
- Multi-family Rebates
- Commercial Rebates
- Refrigerator Recycling
- Free Weatherization
- Municipal Conservation
- Air Duct Sealing

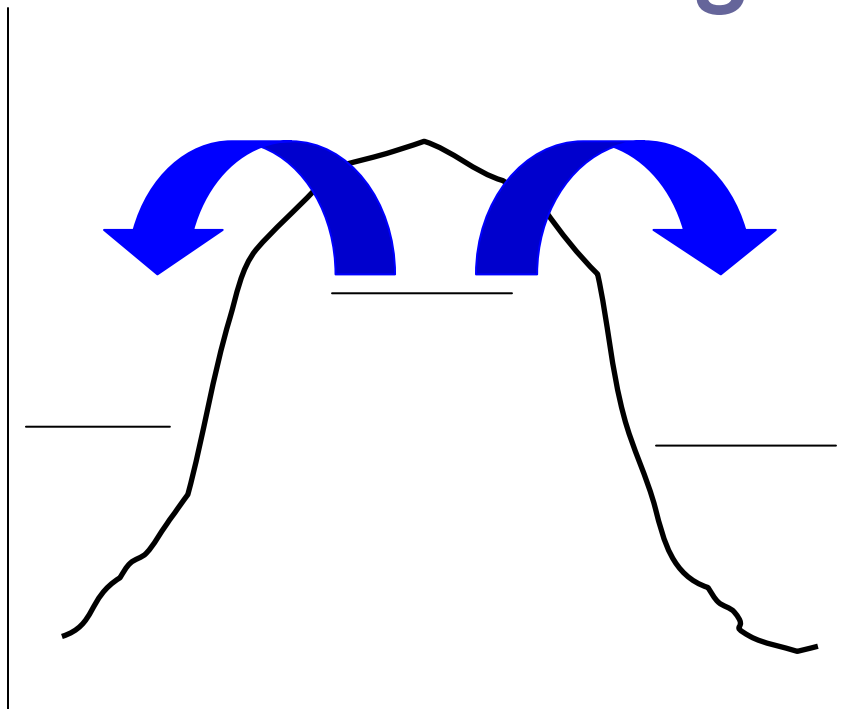
Represent 32% of new DSM program mix



AE DSM Programs



Load Shifting



- Time-of-Use Rate
- Thermal Energy
- Storage Systems

Represent 17% of new DSM program mix

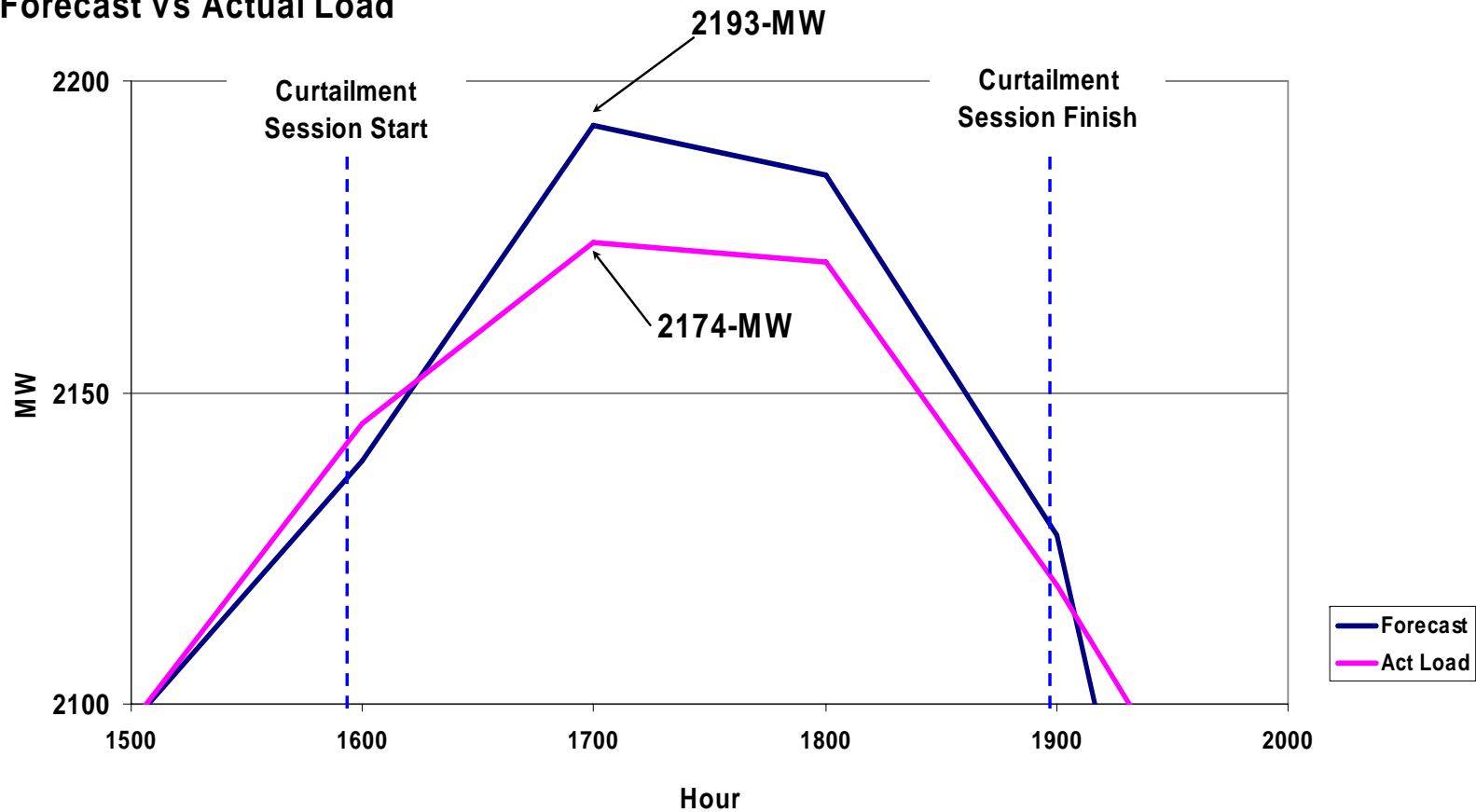


Peak Clipping – Power Partner

Cycling Session, June 15, 2005



Forecast vs Actual Load



Strategic Conservation



- Municipal Energy Conservation Program
- Traffic Signal Conversion to LED
- 5,500 traffic signals

Existing incandescent lamps	135 watts
New LED lamps	<u>15 watts</u>
Energy savings per lamp	120 watts

90% energy reduction





Strategic Conservation



- Municipal Energy Conservation Program
- Pedestrian Crossing Signal Conversion

Existing incandescent lamps 92 watts

New LED lamps 7 watts

Energy savings per signal **85** watts

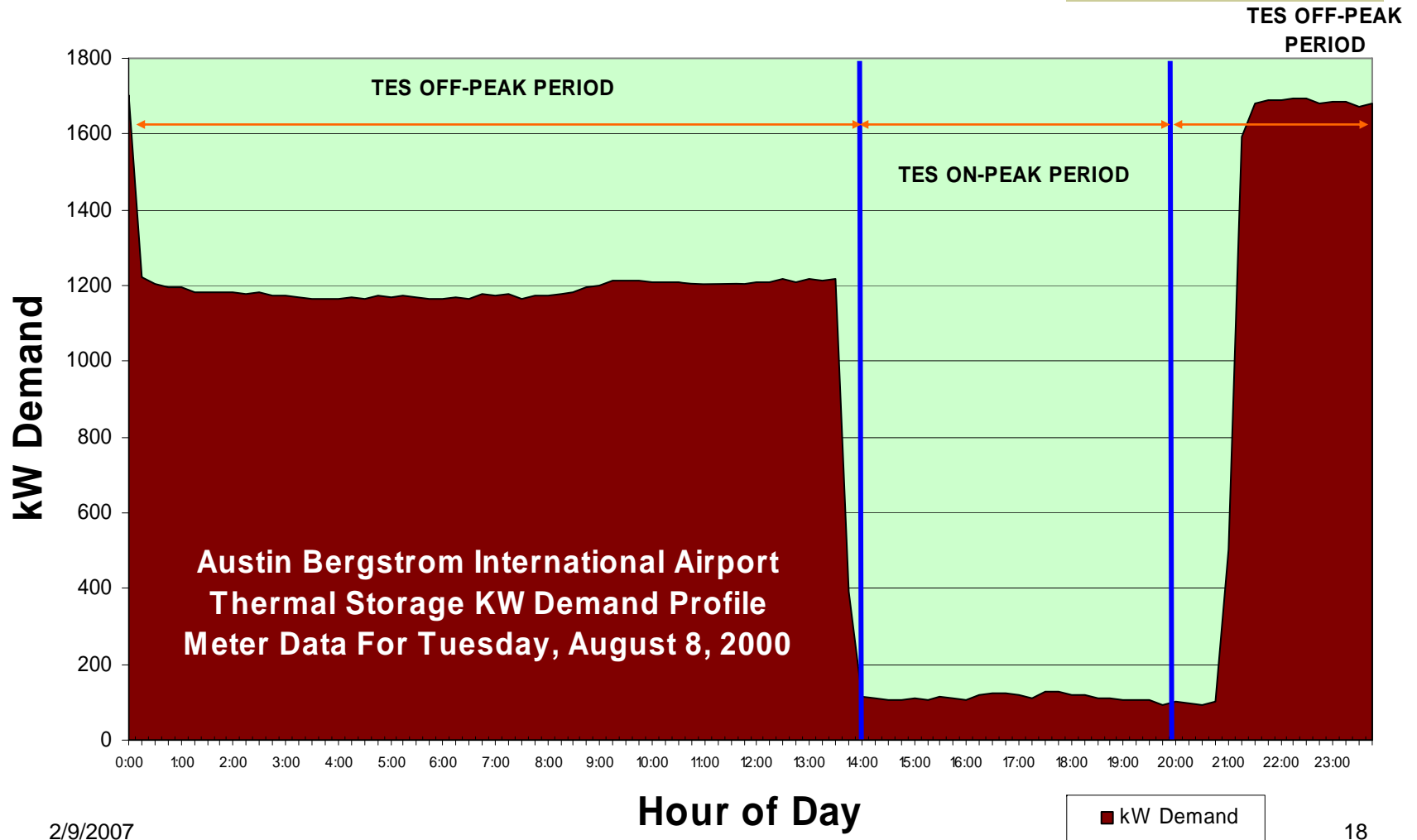
90% energy reduction



Load Shifting - Thermal Storage



ABIA, kW Demand Profile, August 8, 2000



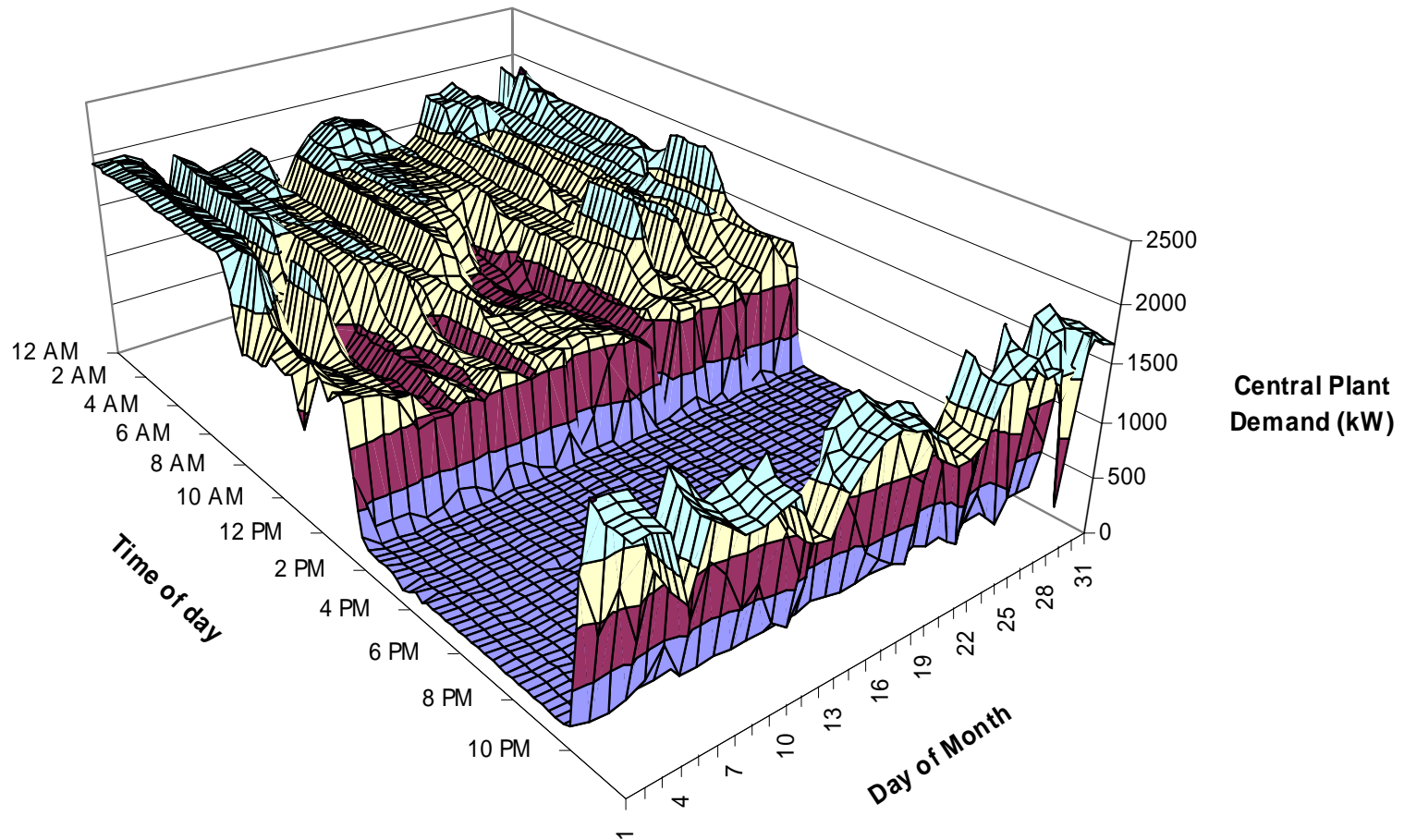
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Hour of Day



Central Plant Demand Profile

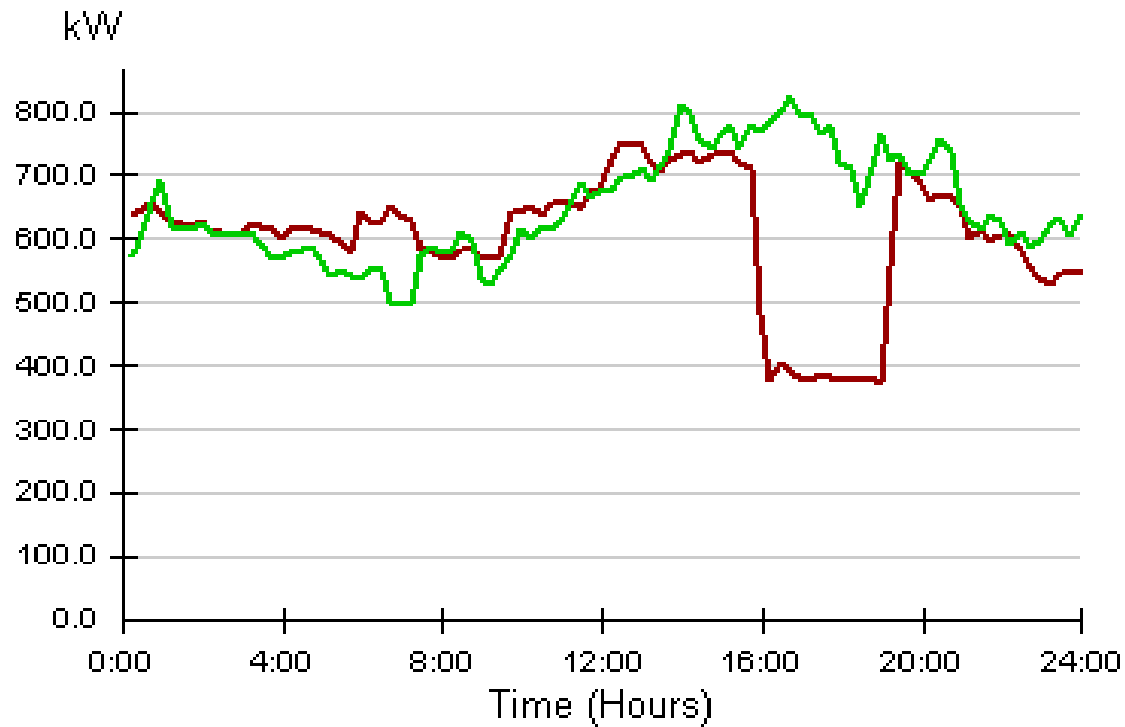
Austin-Bergstrom International Airport - July 1999



Load Shifting - Load Coop Curtailment



June 15, 2005 - Brown Distributing, Inc.



■ June 15, 2005 ■ Peak Day: June 2, 2005

Building Retrofit-Commissioning



High Tech Industry

Re-tuning & calibrating an existing building

- Savings estimate: \$260,000 per year
- Utility incentive: \$10,000 for initial assessment
- Total cost of project was \$149,000
- Economic payback was 7 months.



High Bay Fluorescent Retrofit



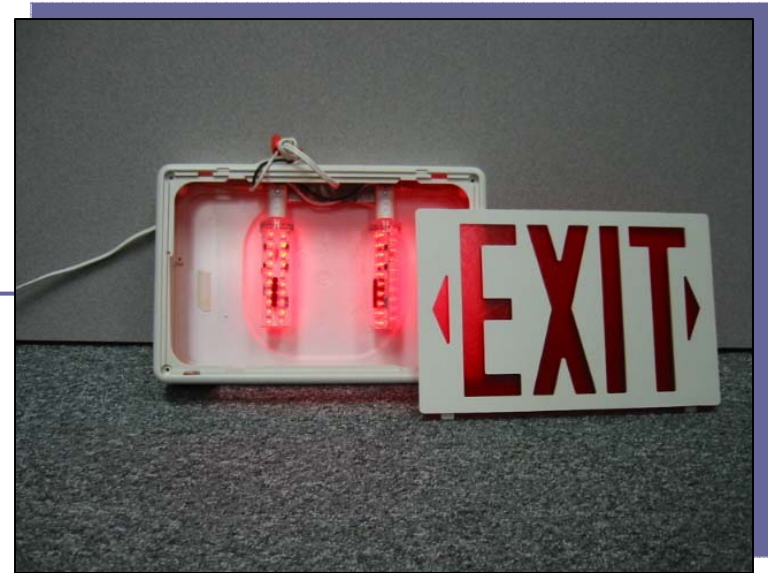
Manufacturing Facility

Converted (514) 400-watt HID lamps to
4-lamp 240-watt T5 HO Fluorescents

- Annual Cost Savings: \$43,812
- Project Cost: \$122,800
- Utility rebate: \$33,153 (27% of job cost)
- Payback was 2 years



LED Exit Sign Retrofit



Energy Savings

- 5000 units installed
- Cost Savings = \$84,350 per year.
- Maintenance Cost Savings = \$103,768 / year
- Peak Demand Savings = 137 kW
- Energy Savings = 1.2 million kWh / year





Vending Machine Energy Use

- Shuts-off refrigerated vending machines when no traffic in the area
- Cuts power costs by 1/3 (~\$100/yr)
- Does not affect product temperatures
- Installed over 4,400 VM over 3 year period.



Reflective Roof Coating



Target Commercial facilities with flat, dark colored roofs

- Rebate up to \$0.15/sq. ft.
- 300,000 sq. ft. roof
- Expected Savings
 - 192,000 kWh/year;
total of 148 kW



Cool Roof Market Penetration



Market Transformation - Austin

Year	Buildings	Sq. Ft.	kWh Savings
2001	1	31,000	13,000
2002	10	223,000	126,000
2003	27	909,000	460,000
2004	23	347,000	289,000
2005	42	707,000	769,000
Total	103	2,217,000	1,657,000



Demand Controlled Ventilation



Regulates supply of outdoor air to match fresh air needs of building's occupants.

- Saves energy & delivers good indoor air quality
- New sensors
 - Less expensive
 - More reliable
 - Require less maintenance



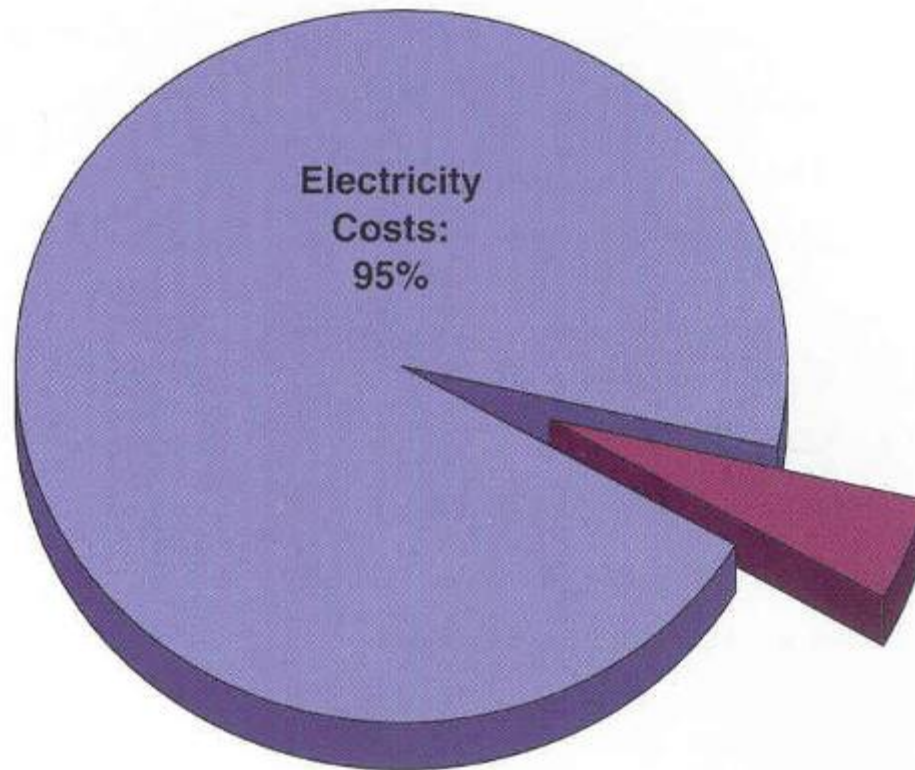
Technology Evaluations



- Polarized Refrigerant Oil Additives
 - Liquids mixed w/ refrigerant oils in a/c units
 - Claimed savings from 5 – 30% have **not** yet been substantiated.



Lifetime Motor Operating Costs



Sample

Purchase Price
plus Installation,
Maintenance, and
Other Costs:

5%



Electronically Commutated Motors (ECM)



- Emerging Technology for Refrigeration Fans
- Replaces Shaded Pole and Permanent Split Capacitor
- Reduced energy consumption to 60%
- Relatively Simple Retrofit
- Typical Paybacks Range from 2 to 3 years



Large Grocery Chain Retrofit



- Retrofit currently underway
- 22 Locations in Austin area
- Fans per location store ~ 200 fan/motors
- Energy Cost Savings ~\$10,000 /location/yr



Commercial Rebate Program Summary of Lighting Technologies



- T-8 & T-5 High Efficiency Lighting Systems
- Compact Fluorescent Lamps (CFL's)
- LED (Light Emitting Diode) Exit Signs
- Incandescent to Fluorescent Conversions
- New building designs
- Relamping & Reballasting of Existing Fluorescent Fixtures
- High-Bay Fluorescent Systems
- Lighting Controls (occupancy sensors)



Commercial Rebate Program Summary of Technologies



- Air Conditioning (Direct Expansion)
- Air Conditioning (Chillers)
- Solar Film/Screens
- Ceiling/Roof Insulation
- Reflective Roof Coatings
- Premium Efficiency Motor
- Variable Frequency Drives (VFD's)
- Re-tro commissioning
- Thermal Cool Storage
- Custom technologies



Austin Energy



Home Performance with ENERGY STAR



2/9/2007



Realtor's Checklist

Homes by Decade – Sq. Ft & kWh Usage



<u>Year Built</u>	<u>Avg. Sq. Ft</u>	<u>kWh Usage per Sq. Ft.</u>	<u>Annual Usage</u>	<u>Annual Cost</u>
1950's	1395	8.9	12,415	\$1,303
1960's	1625	8.5	13,812	\$1,450
1970's	1642	9.1	14,942	\$1,568
1980's	1871	8.8	16,464	\$1,728
1990's	2509	7.5	18,817	\$1,975
2000's	2501	7.4	18,507	\$1,943



Realtor's Checklist

Energy Usage – After Energy Improvements



<u>Base Home</u> <u>kWh/Sq. Ft.</u>	<u>Retrofit Home</u> <u>kWh/Sq. Ft.</u>	<u>Difference</u> <u>kWh/Sq. Ft.</u>
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8.98 per Sq. Ft.

7.68

1.3 kWh/Sq. Ft.
Improvement

2000 Sq. Ft.

Base Home = 17,960 kWh Annual Usage

Retrofit Home = 15,360 kWh Annual Usage

kWh Savings = 2,600 kWh

Cost Savings = \$273



Realtor's Checklist

Air Duct System



- Average Home Has 27% Duct Leakage
- Sealing, Repairing or Replacing Can Save Up to \$300
- Reduces Dust, Humidity, Outdoor Allergens
- Improves Indoor Air Quality of Home

Check Ducts for Leakage

- Turn Thermostat to "On" Position
- Check Duct Connections in Attic
- Pull Off Room Vent – Check Vent for Gaps
- Gray Flex Duct? Is it Disintegrated? Brittle?



Realtor's Checklist



Air Duct – Air Flow

- Average Austin Home – Duct Air Flow 69% of A/C Equipments Rated Capacity

Example:

1 Ton of A/C = 400 CFM of Air Flow

3 Ton System = 1200 CFM of Air Flow

69% Air Flow = 828 CFM

Common Problem/Solutions

- Some Rooms Don't Get Enough Air
- Have Contractor Balance the Duct System
- Add Additional Room Registers, Return Air Grilles

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Realtor's Checklist



Attic Insulation

- Lack of Insulation Big Energy Waster
- 30% of Homes Heat Gain Comes from Attic
- Most Homes Have 4 inches of Insulation, or R-11
- Recommend 10 – 12 inches of Insulation, or R-30

Types of Insulation

R-Value/Inch

- | | |
|--|-----|
| • Fiberglass – Blanket | 3.0 |
| • Fiberglass – Loose Fill (pink) | 1.8 |
| • Cellulose – Loose Fill (Gray Dense Packed) | 3.5 |
| • Insulsafe – Loose Fill (White Color) | 2.3 |



Realtor's Checklist

Solar Shading



- Most Solar Heat Gain – East, South & West Windows
- Can Reduce Sizing of A/C by ½ Ton
- Reduce Indoor Temperature by 20 Degrees
- Protects Against Glare & Fading

Types of Solar Shading

- Solar Screens
- Window Film
- High Efficiency - Low E Windows

Homes

Used in New Homes 80's & 90's
Used as Retrofit in Existing Homes
Used in New Homes Since 2000



DSM Cost-Effectiveness Tests



- Participant Test
 - Benefits to the customer

- Utility Revenue Requirement Test
 - Net costs of DSM program incurred by the utility

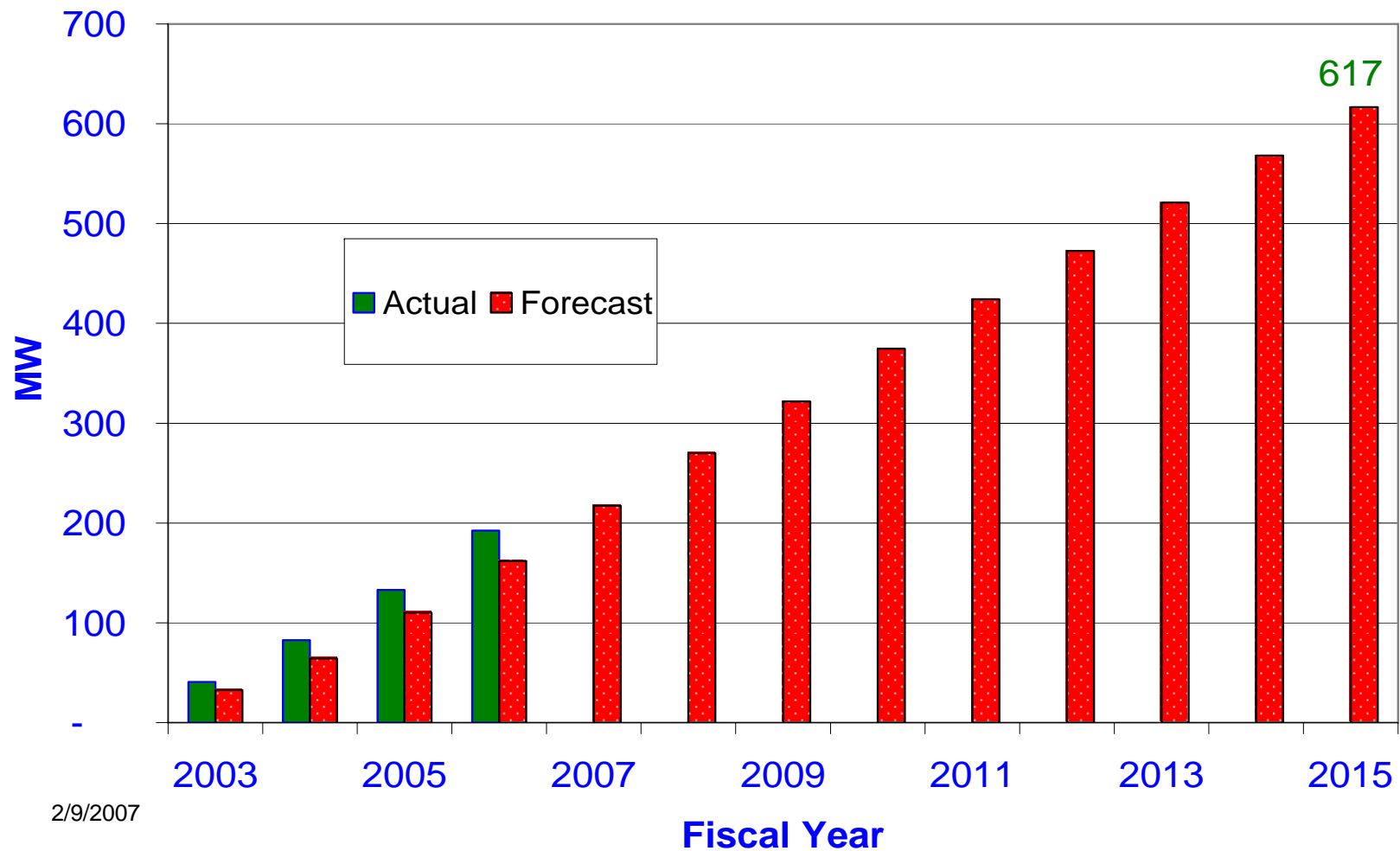
- Total Resource Cost Test
 - Net costs of DSM based on total costs to all participants and the utility

- Rate Impact Measure Test
 - Impact to customer rates due to DSM program



Strategic Goals

Demand Reduction and Savings



2/9/2007

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FY2007 Budget and Goals



Program Area	Budget	Goal MW
Commercial	\$ 4,024,170	14.49
Residential	\$ 6,078,991	11.25
Load Management	\$ 4,683,672	15.04
Solar	\$ 3,500,000	.50
Grand Total	\$ 18,286,833	41.28





Questions ?

