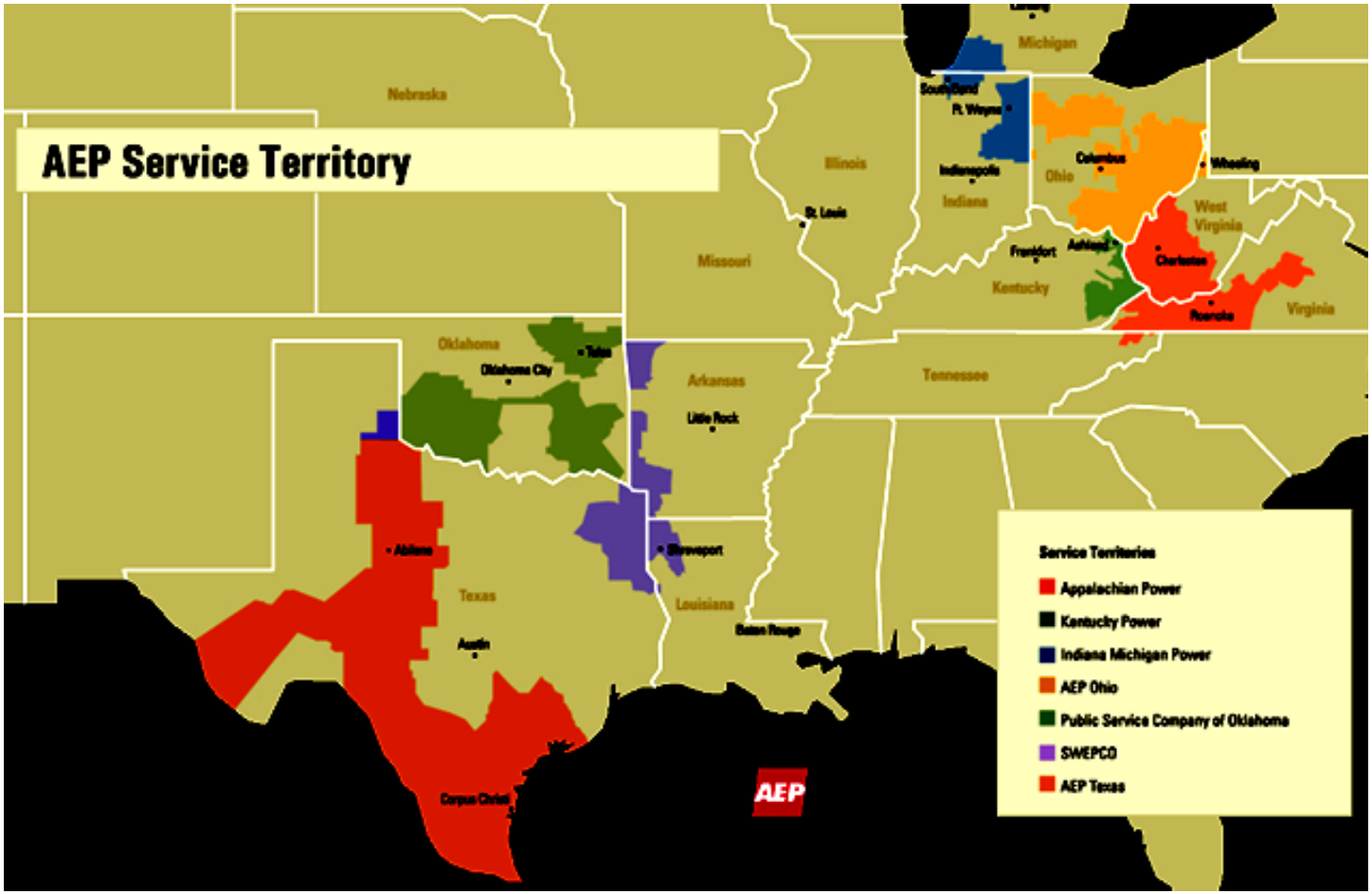
PSO Time-Of-Day Pilot Program

Project Review & Initial Results

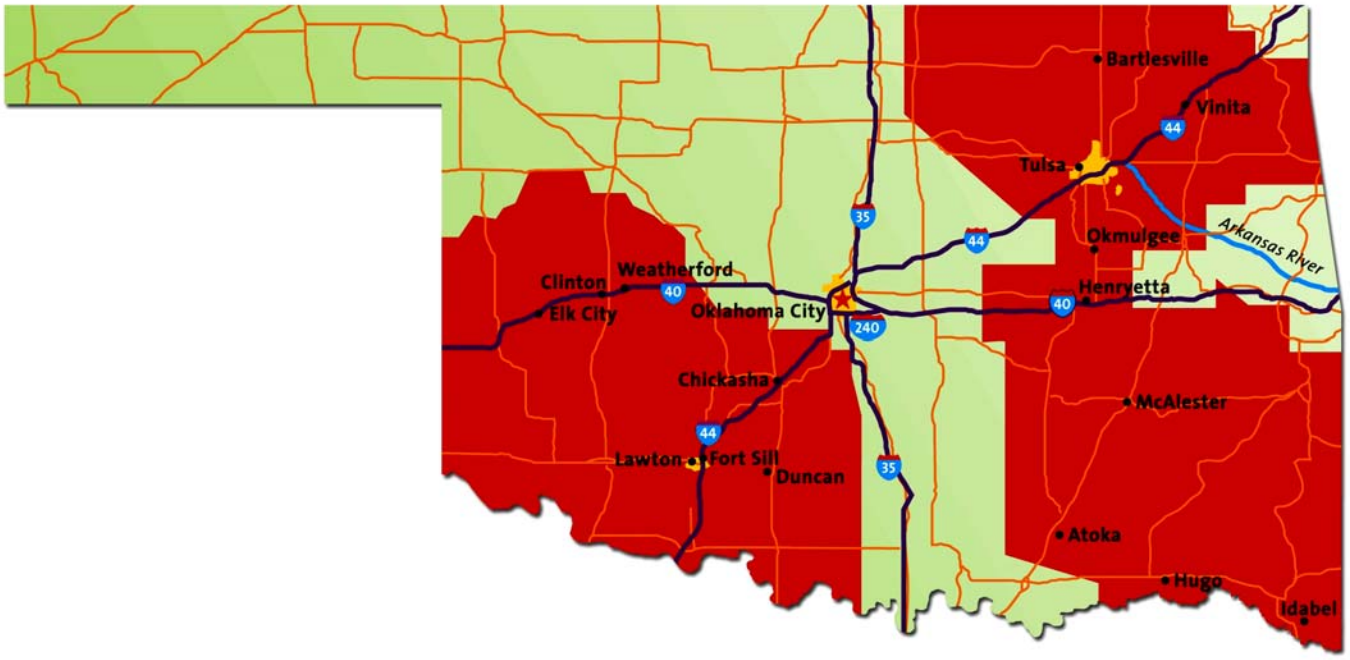
by Bruce Limke

2008 AEIC Annual Load Research Conference
Oklahoma City

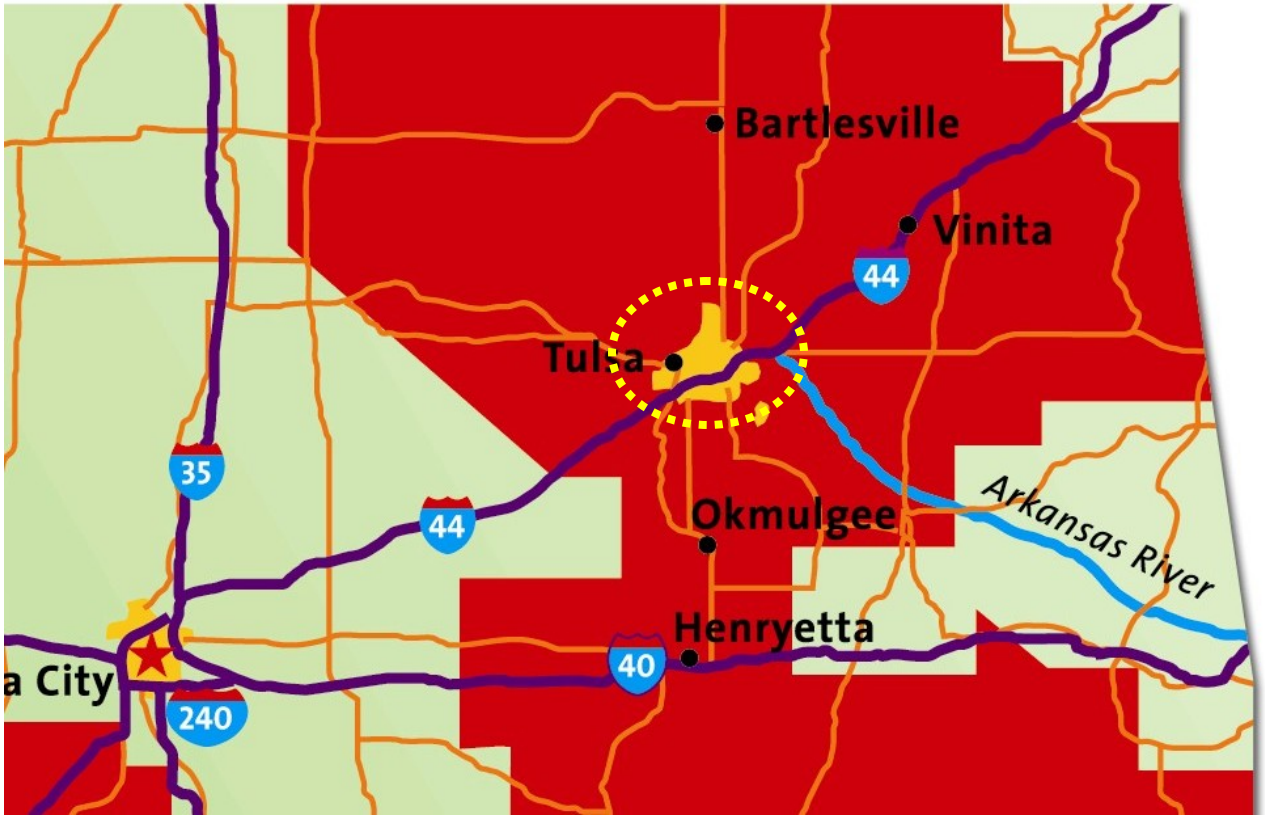
AEP System Map



PSO Service Territory



Tulsa Metro Area – TOD Pilot



Outline

- Background & Pilot Objectives
- Details of the Pilot Design & Tariffs
- Recruitment & Metering Installation
- Participants Survey
- Comparison of Survey Responses to Actual Behavior
- Next Steps

Recent Timeline of AEP/PSO DSM Activity

2003: PSO agrees with OCC request to consider new Time-Of-Day and other DSM offerings.

2006: PSO offers Time-of-Day Pilot programs to Residential and (2) Commercial classes as part of rate filing package. (approved 2007)

Summer 2007: AEP begins multi-year gridSMART[SM] implementation; a suite of customer programs and advanced technology initiatives including distribution grid management (DA/AMI), distributed resources, and internal efficiencies.

Spring 2008: As part of Final Order from 2006 case, OCC gives approval of PSO package of several "quick-start" DSM programs to help customers use electricity more efficiently & slow the annual rate of growth in energy usage. First full-year targets: 20,000 MWH energy conservation, 14MW peak demand reduction, plus environmental benefits. (These are in addition to the TOD Pilot)

Summer 2008: PSO Time-of-Day Pilots begin.

TOD Pilot Objectives

- To demonstrate the commitment to pursuing DSM initiatives.

- To gain experience and resolve process issues.

- To learn how customers respond to the offering both in terms of price response and specific actions taken to save money and/or energy.

- 3-year pilot will allow PSO time* to build the support systems needed to have a successful TOD offering.

- Also will allow time* for a successful review to determine the changes required to transition from a pilot to a permanent offering.

* Timeline for AEP's gridSMART™ in Oklahoma → ???

TOD Pilot Specifics

- **Designed for Residential, General Service, and Low-Use General Service classes.**
- **Target of 100 participants in each class.**
- **Restricted to Tulsa metro-area accounts to accommodate special metering maintenance & other site visits as needed.**
- **3-year pilot window – minimum 12 months participation requested.**
- **Billed through mainframe CIS (some new programming required).**
- **Meters read by Meter Readers on normal cycle routes wherever possible.**
- **Meters have (2) programs loaded: a TOD program capturing billing determinants and an IDR program to capture interval data for load research analysis of pilot.**
- **Residential: Single-family, homeowner, primary residence.**
- **GS/LUGS: Single-metered accounts, no consolidated billing**

Tariff Specifics

Residential

- Off-Peak Season: November - May
- On-Peak Season: June – October
- Energy Charge:

  On-Peak Season

  9.20¢ per kWh, Mon-Fri, 2:00p to 7:00p

  5.00¢ per kWh, All other hours

  Off-Peak Season

  5.80¢ per kWh for first 475 kWh

  5.00¢ per kWh for the next 775 kWh

  4.33¢ per kWh for all additional kWh

- "No-risk" program – customer billed the lower of the TOD or standard rate.
- Customer bills show total usage and the usage in the TOD window and the amount saved during that billing period.

Tariff Specifics

Low Use General Service

- Off-Peak Season: November - May
- On-Peak Season: June – October
- Energy Charge:

  On-Peak Season

  9.64¢ per kWh, Mon-Fri, 2:00p to 7:00p

  4.44¢ per kWh, All other hours

  Off-Peak Season

  5.27¢ per kWh for first 1,200 kWh

  4.44¢ per kWh for all additional kWh
- "No-risk" program – customer billed the lower of the TOD or standard rate.
- Customer bills show total usage and the usage in the TOD window and the amount saved during that billing period.

Tariff Specifics

General Service

- Off-Peak Season: November - May
- On-Peak Season: June – October
- Energy Charge:

  On-Peak Season

  10.18¢ per kWh, Mon-Fri, 2:00p to 7:00p
  4.54¢ per kWh, All other hours

  Off-Peak Season

  5.90¢ per kWh for all kWh up to a level = (150 * Max kW)
  5.40¢ per kWh for next kWh block = (150 * Max kW)
  4.54¢ per kWh for all additional kWh

- "No-risk" program – customer billed the lower of the TOD or standard rate.
- Customer bills show total usage and the usage in the TOD window and the amount saved during that billing period.

TOD Project - Recruitment

- AEP Load Research staff generated lists of randomly selected PSO customers who met the pilot program eligibility requirements.
- From those lists, Customer Services & Marketing staff performed mailings to residential customers and mailings and/or phone calls as applicable to commercial customers to solicit participation in the TOD pilot.
- Customer contacts continued until the target of ~100 participants in each of the RES, LUGS, & GS classes were reached.
- Site visits to customers interested in participating were conducted to identify any barriers to participation (access issues, incompatible meter base, etc.) and replacements were recruited as needed.

TOD Project - Installation

- Meters installed prior to first day of billing cycle of first on-peak month. Equipped with TOD and IDR programs. Install Cost = $50/meter
- Read by Meter Readers on normal routes. Billing determinants uploaded to CIS system. Pulse data loaded into HHF files for MV90 import.
- Additional equipment & data processing cost = $50/meter.

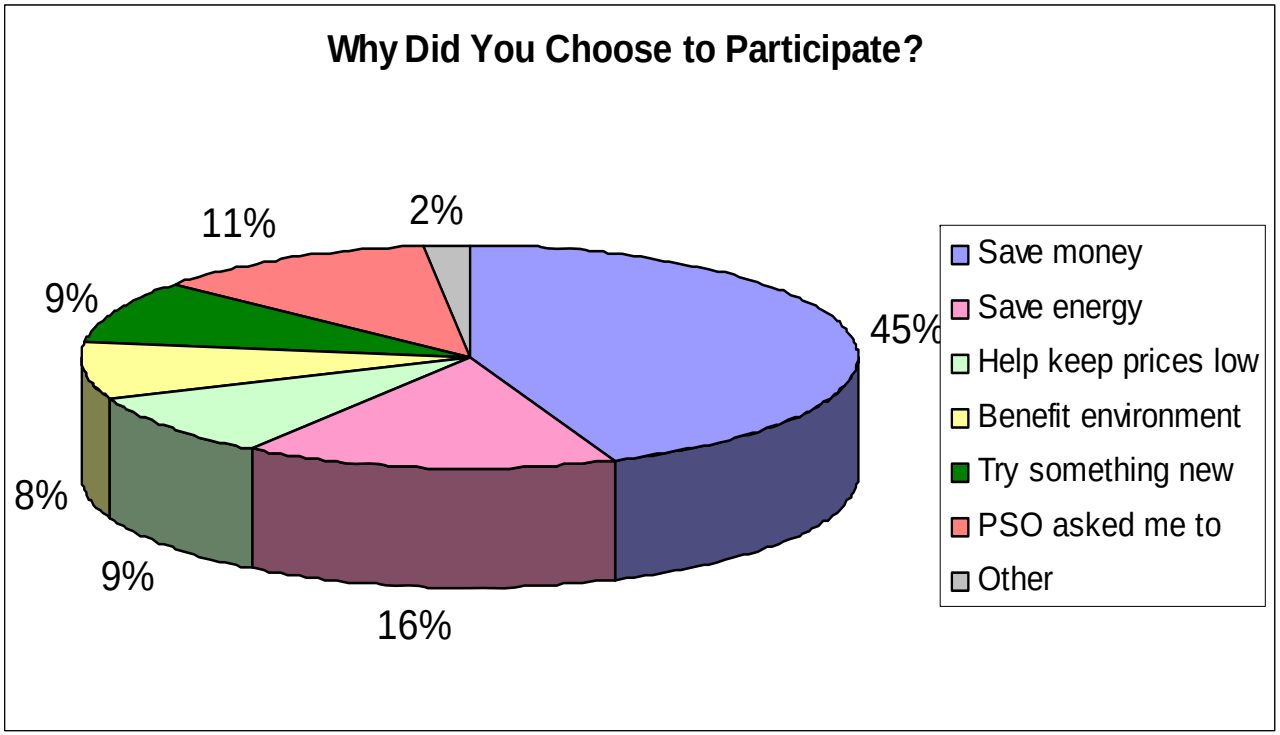
Participants Surveys

- Sent to all participants in late June/early July
- Response rates: 58% Residential; 47% GS/LUGS
- Most had 1 or 2 months of participation on the pilot at the time of the survey.
- Survey topics:
  - Reasons for participating
  - Expectations of savings/Benefits of Program
  - Plans to alter consumption? (when?/how much?/challenges?)
  - Plans to purchase energy saving equipment?
  - Building info: (age, size, how energy efficient, etc.)
  - Types of appliances & electronic devices & quantities
  - Heating & Cooling systems & fuel sources
  - Occupancy during peak pricing & other demographics
  - Hours of operation, business type (GS/LUGS)
- 1-page for Residential, 3-pages for Commercial

Analysis Of Survey Responses

Residential

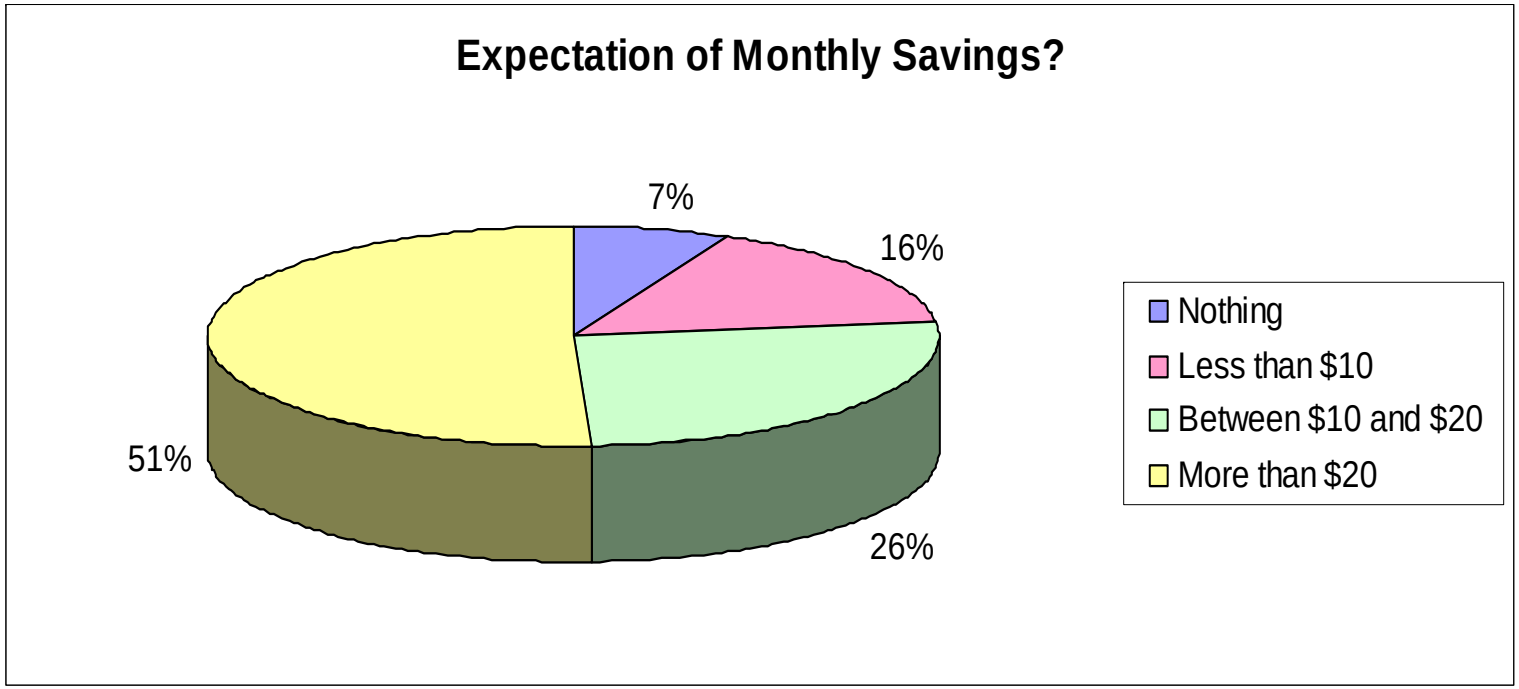
- The Responders….



Analysis Of Survey Responses

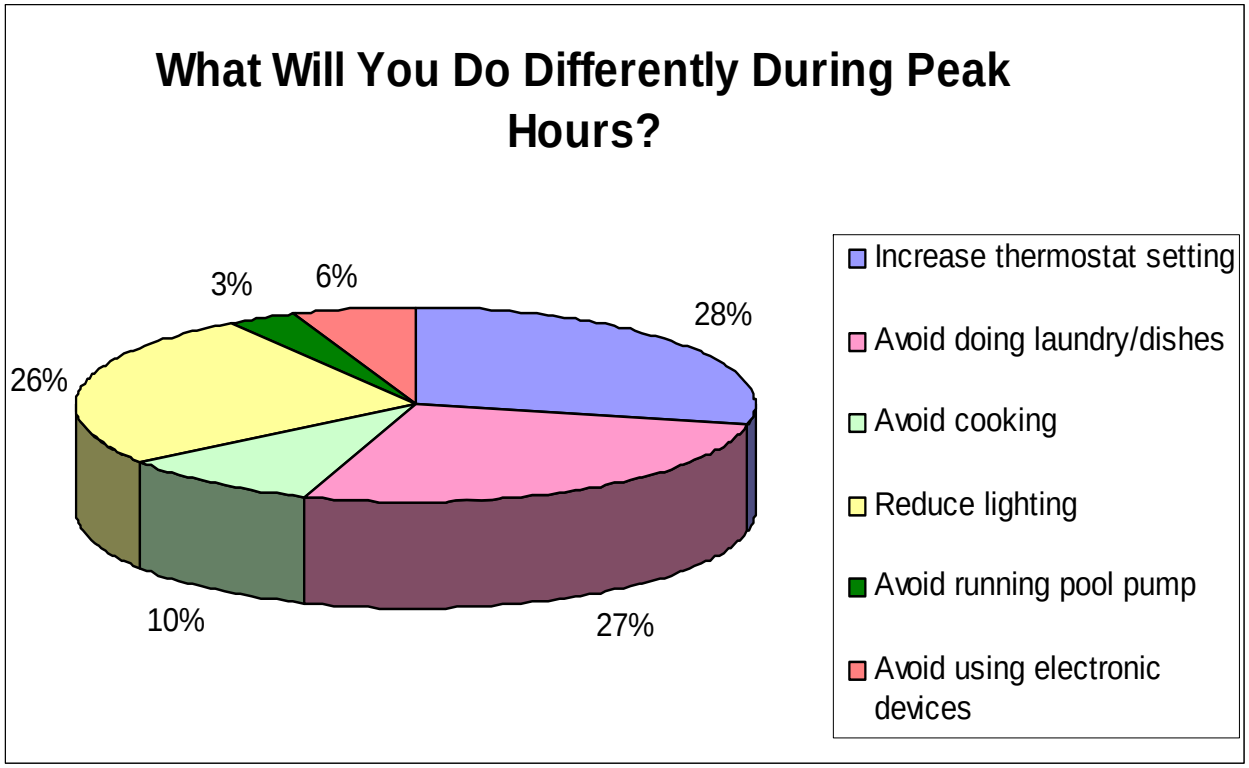
Residential

- The Responders...



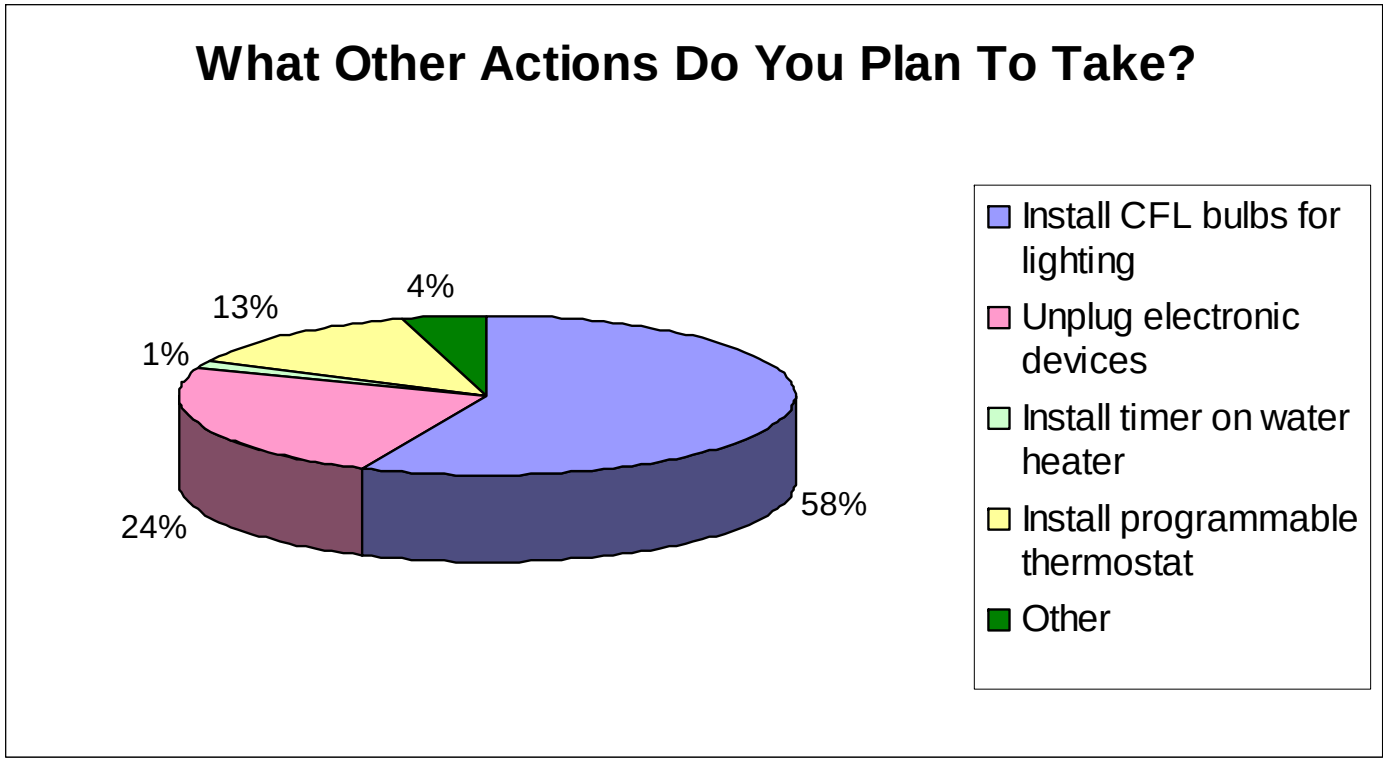
Analysis Of Survey Responses
Residential

- Changes / Actions….



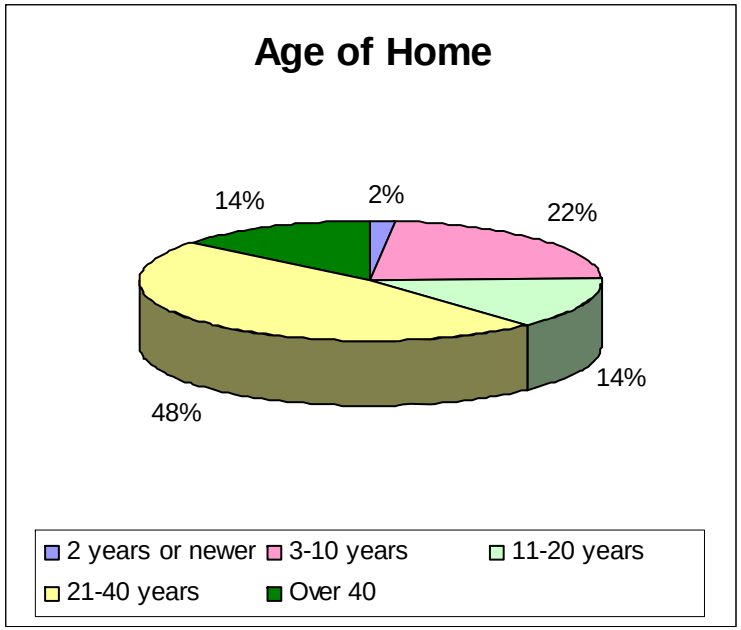
Analysis Of Survey Responses
Residential

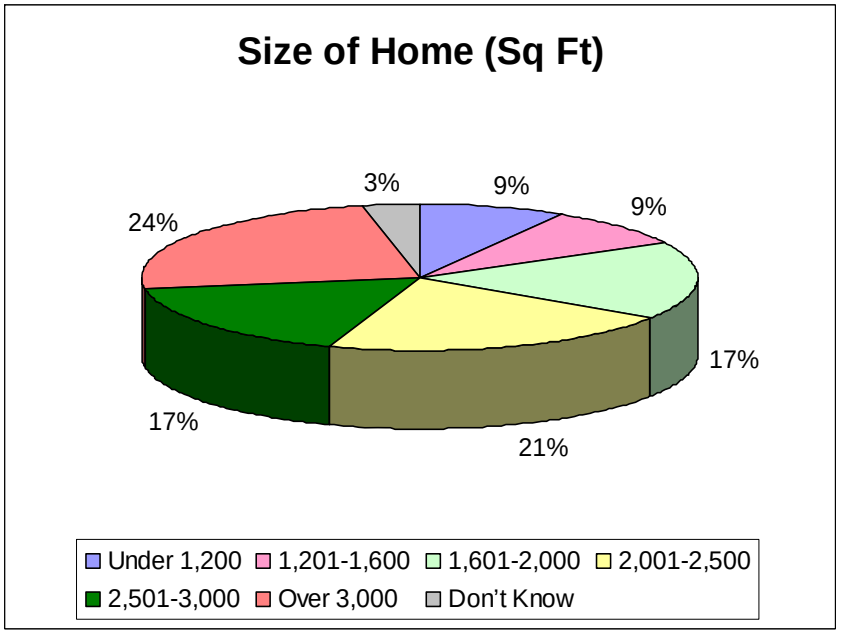
- Changes / Actions...



Analysis Of Survey Responses
Residential

- Residence Data...





Analysis Of Survey Responses
Residential

Other Responder Demographics:

- 75% said someone is at home during the summer afternoon peak pricing period
- 74% of homes have 1-3 residents during summer (2 residents – 48%)
- Head-of-Household is age 40 or greater in 84% of responses (60 yrs or older – 50%)
- 93% have some level of college or vocational education (68% college graduates / advanced degrees)

Analysis Of Actual Response
Residential

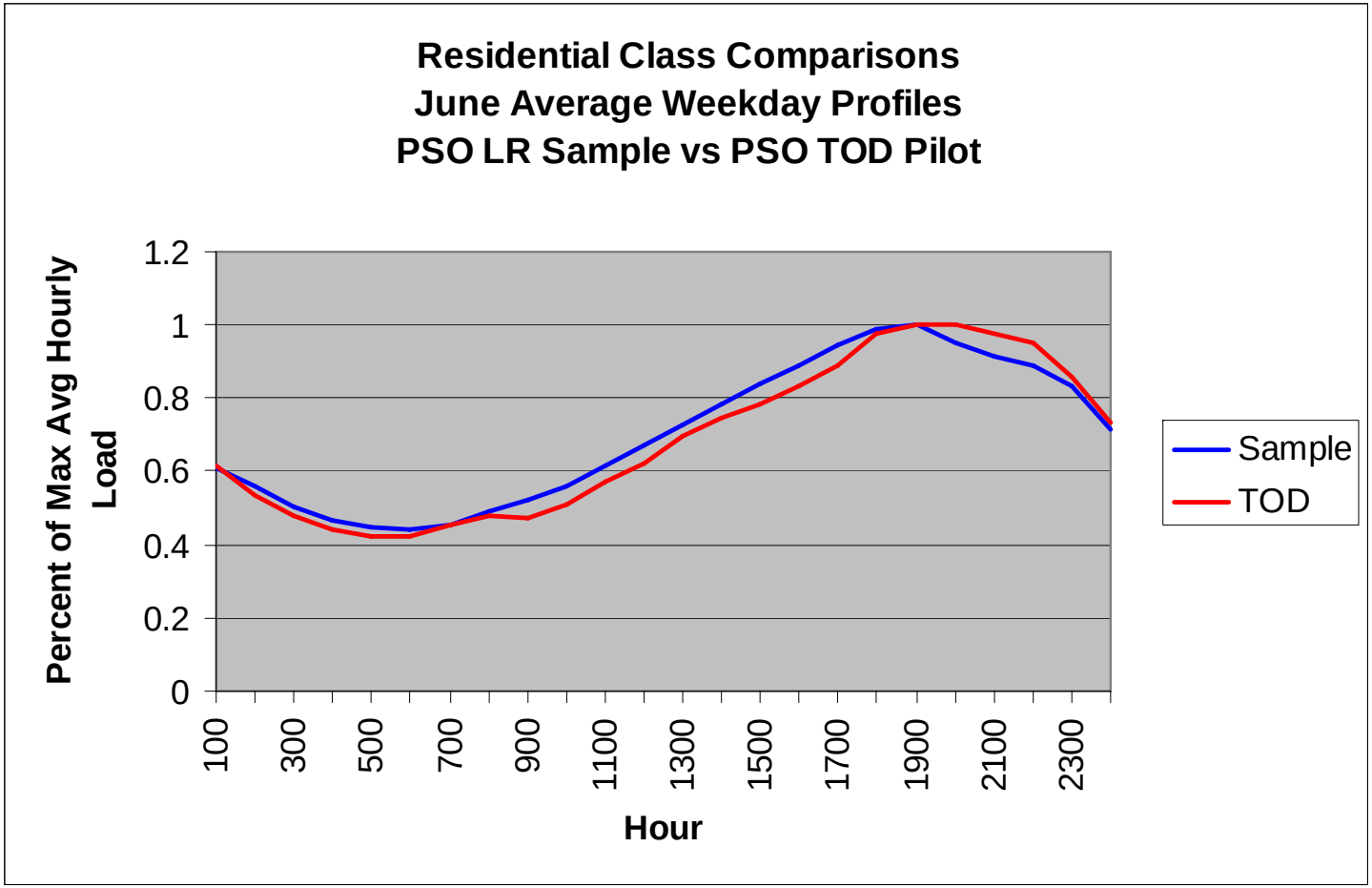
Does Usage Reflect a Response?:

- No Control Group designed (yet) for comparison.
- Active PSO residential load research sample used as proxy.

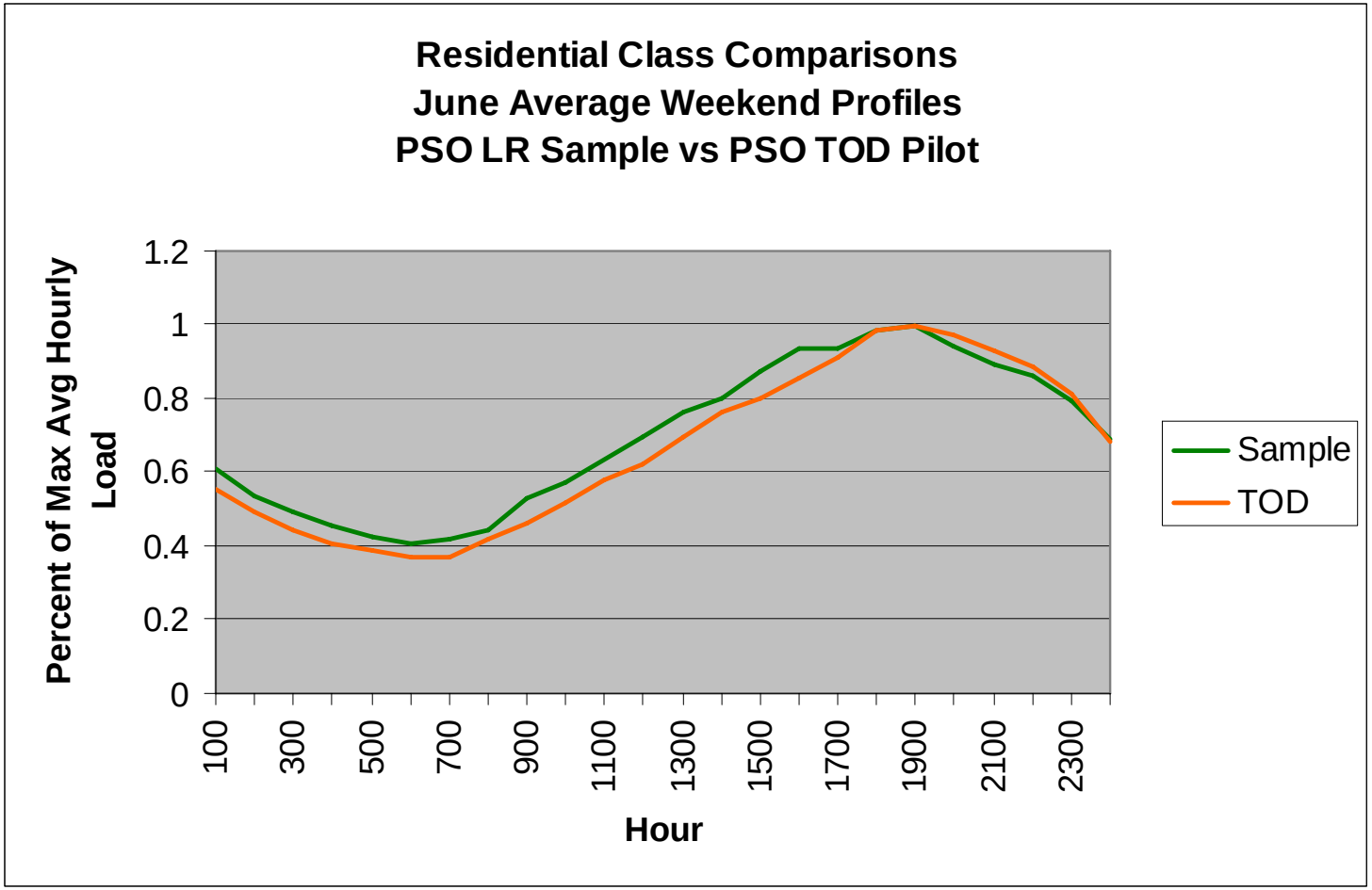
Stratum 1:	Low-use residential
Stratum 2:	Regular residential
Stratum 3:	High-use residential

- TOD Pilot does not include low-use customers. Compared aggregation of TOD Pilot participants to aggregation of Stratum 2&3 contributors of sample. Ratios of Regular to High-Use roughly the same in both.
- Developed normalized average daily load profiles for June for both groupings as a comparison.

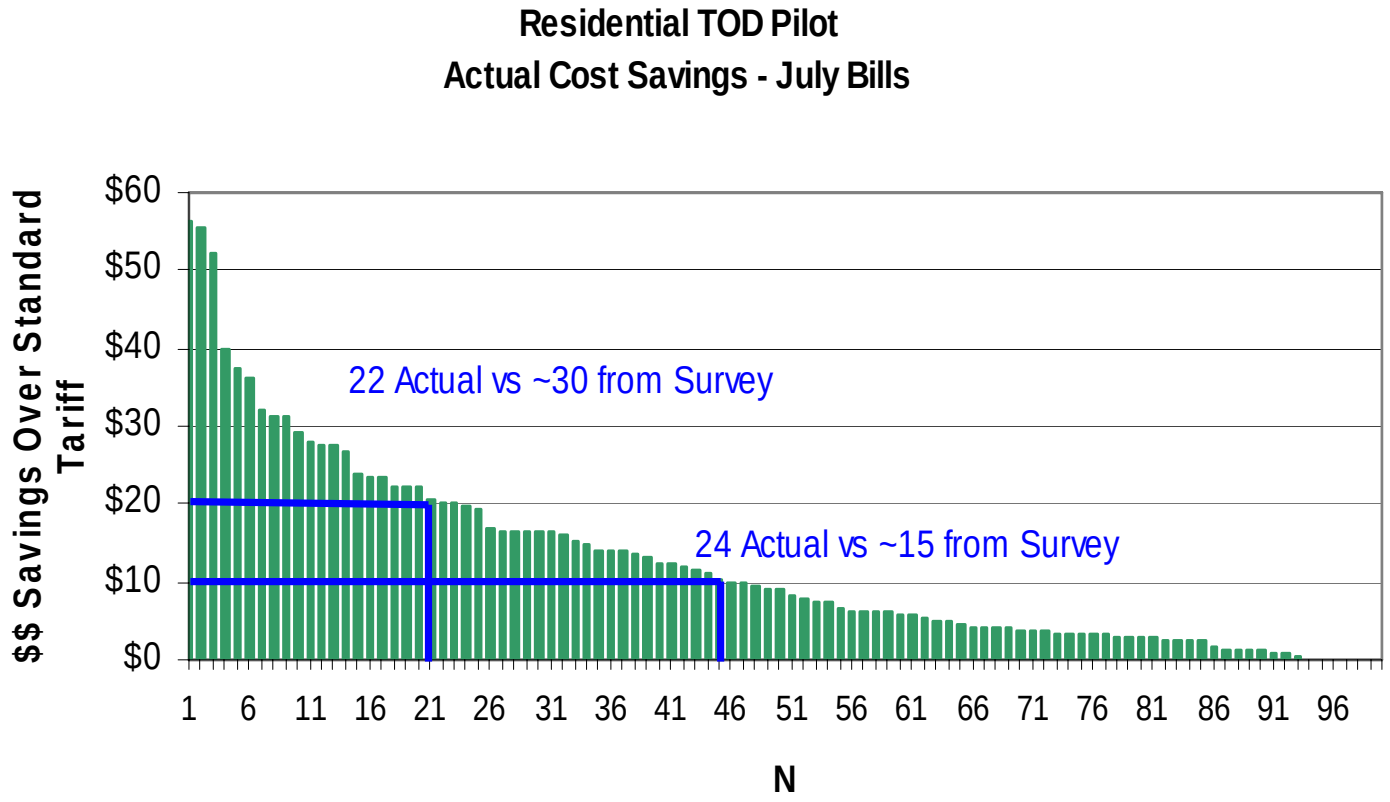
Analysis Of Actual Response
Residential Class Level



Analysis Of Actual Response
Residential Class Level

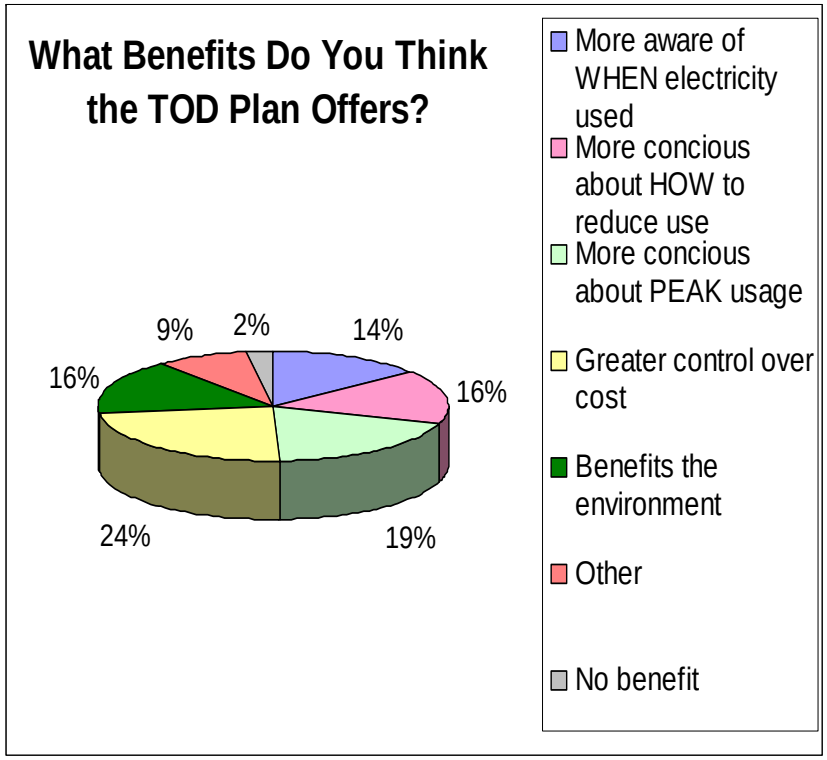


Analysis Of Actual Response
Residential Savings

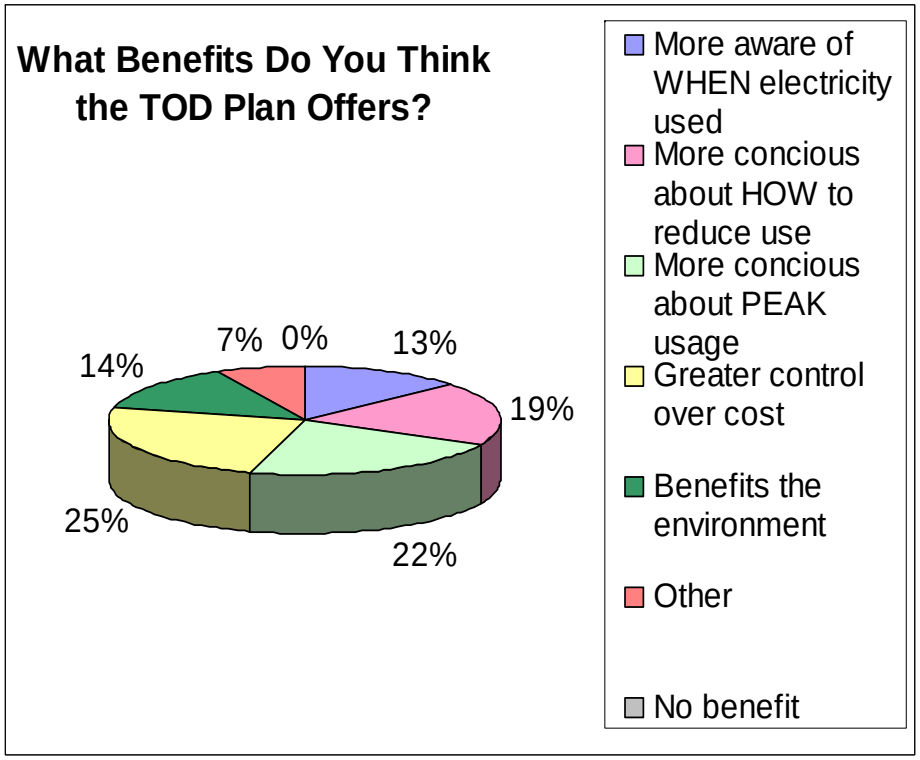


Analysis Of Survey Responses
GS / LUGS

GS

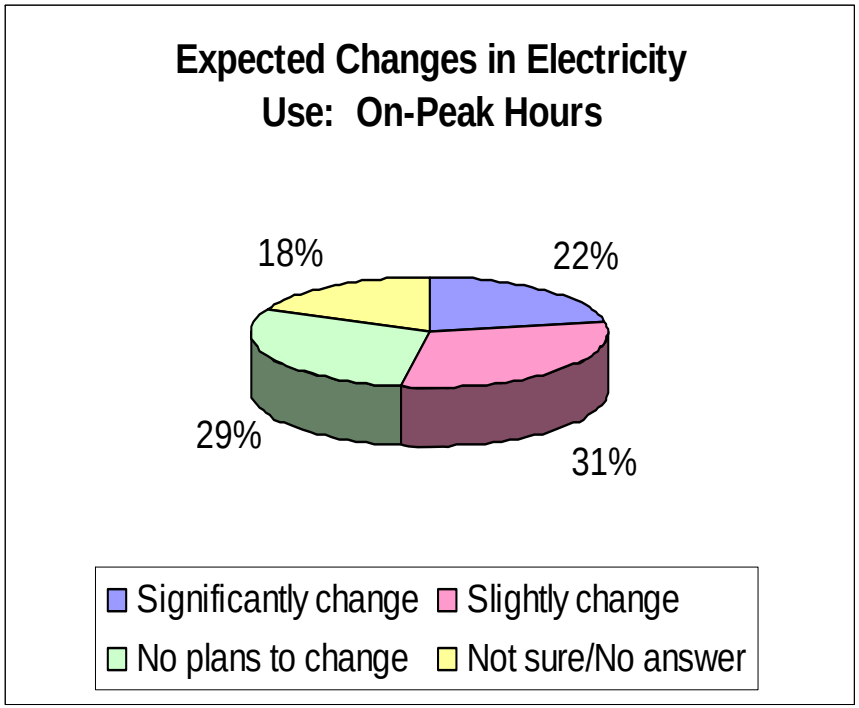


LUGS

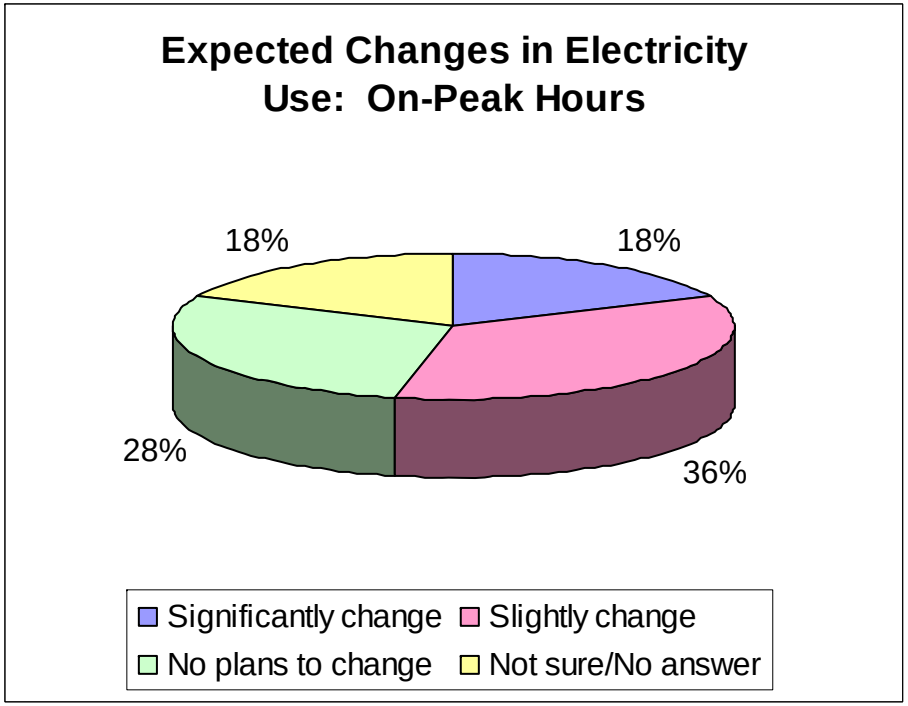


Analysis Of Survey Responses
GS / LUGS

GS

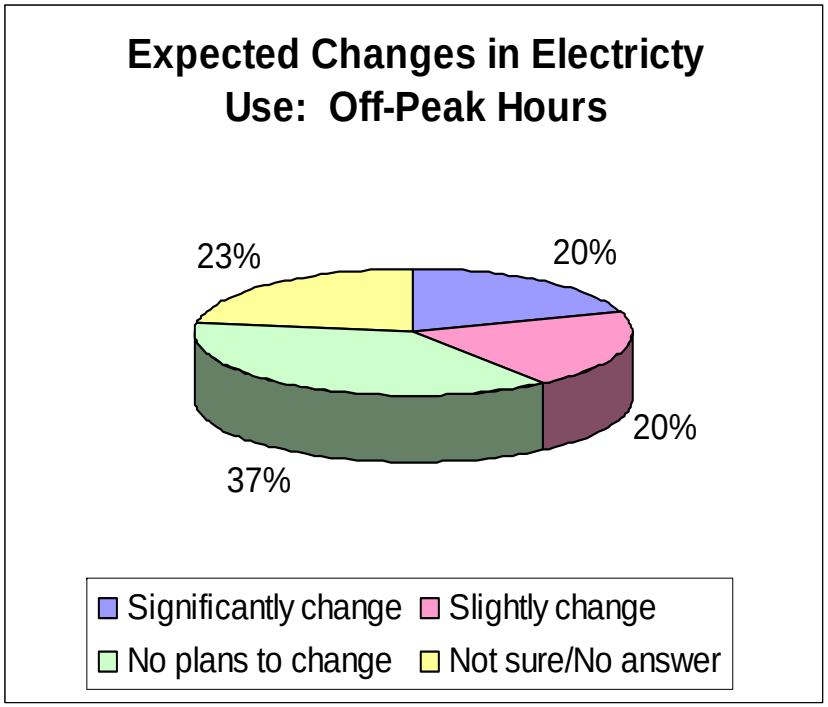


LUGS

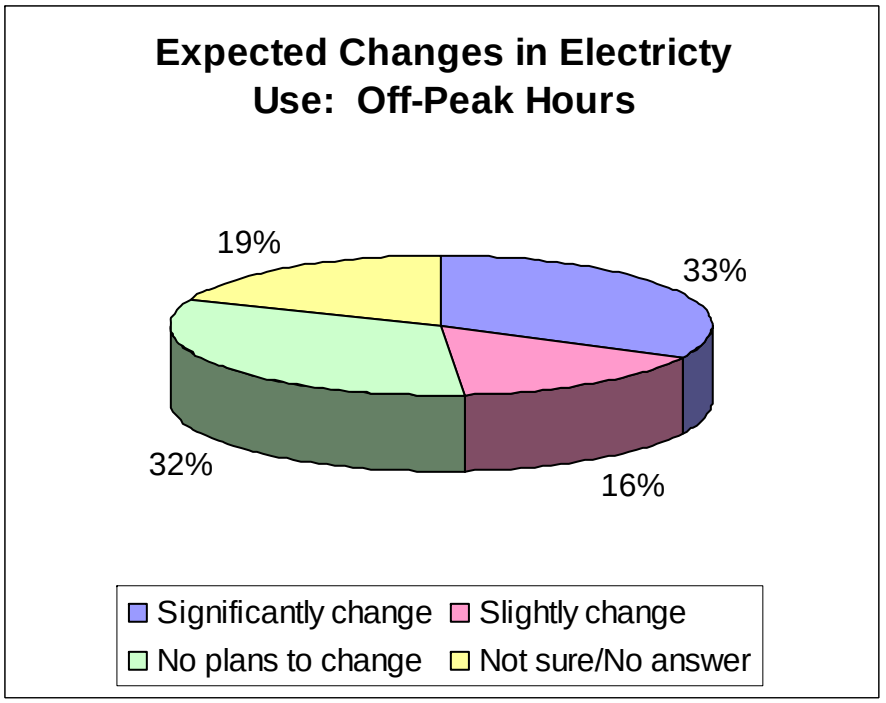


Analysis Of Survey Responses
GS / LUGS

GS



LUGS



Analysis Of Survey Responses
GS / LUGS

On Energy-Efficiency Investing:

• Approximately 90% of responders indicated they have not invested in equipment or technologies (Lighting, HVAC, Control/Monitoring) to better take advantage of Time-of-Day or similar pricing programs.

• Likely to invest in the future?

- Lighting:	22% / 35% say Yes
- HVAC:	26% / 24% say Yes
- Control/Monitoring:	27% / 15% say Yes

Analysis Of Survey Responses
GS/LUGS

Percentages of those that indicate they will be challenged in pursuing energy efficiency & load-shifting opportunities:

- **Identifying cost-effective conservation opportunities? 50% / 65%**
- **Availability of Internal Expertise to Implement? 60% / 55%**
- **Availability of Qualified External Expertise to Implement? 40% / 28%**
- **Commitment to Conservation by Internal Decision-Makers? 24% / 33%**
- **Commitment to Conservation by Employees? 59% / 38%**
- **Access to Capital to Support Initiatives? 56% / 54%**

Analysis Of Survey Responses
Gen Service Business Types

Code	Business Type	Percent
OFFICE (Non-Medical)		
011	Admin & Mgmnt	6%
015	Mixed-Use/Multi-Tenant	5%
018	Govt. Services	1%
019	Other Office	2%
RESTAURANT/FOOD SERVICE		
021	Fast Food/Self-Service	5%
022	Specialty/Novelty Food Serv	2%
023	Table Service	2%
024	Bar/Tavern/Nightclub	5%
RETAIL STORE		
041	Department/Variety Store	13%
045	Auto Sales	5%
046	Other Retail	2%
WAREHOUSE		
051	Refrigerated	2%
052	Unconditioned – High Bay	6%
053	Unconditioned – Low Bay	1%
054	Conditioned – High Bay	1%

Code	Business Type	Percent
HEALTH CARE		
065	Medical/Dental Lab	3%
EDUCATION		
072	Elementary School	1%
073	Middle/Secondary School	1%
LODGING		
081	Hotel	2%
084	Other Lodging	2%
PUBLIC ASSEMBLY		
091	Religious Assy (Worship only)	5%
092	Religious Assy (Mixed Use)	8%
093	Health/Fitness Center	5%
098	Community Center	1%
SERVICES		
103	Repair (Non-Auto)	1%
MISCELLANEOUS		
111	Assembly/Light Mfg	6%
130	Other	7%

Analysis Of Survey Responses
Low-Use Gen Service Business Types

Code	Business Type	Percent
OFFICE (Non-Medical)		
011	Admin & Mgmnt	7%
012	Financial/Legal	5%
013	Insurance/Real Estate	3%
015	Mixed-Use/Multi-Tenant	15%
018	Govt. Services	3%
RESTAURANT/FOOD SERVICE		
023	Table Service	5%
RETAIL STORE		
041	Department/Variety Store	3%
044	Shop in Strip Mall	7%
045	Auto Sales	3%
046	Other Retail	7%
WAREHOUSE		
052	Unconditioned – High Bay	4%
054	Conditioned – High Bay	3%

Code	Business Type	Percent
HEALTH CARE		
063	Medical/Dental Office	3%
064	Clinic/Outpatient Care	3%
LODGING		
084	Other Lodging	3%
PUBLIC ASSEMBLY		
091	Religious Assy (Worship only)	5%
092	Religious Assy (Mixed Use)	8%
093	Health/Fitness Center	3%
SERVICES		
104	Other Service Shop	4%
MISCELLANEOUS		
111	Assembly/Light Mfg	3%
130	Other	3%

Analysis Of Actual Response
LUGS/GS

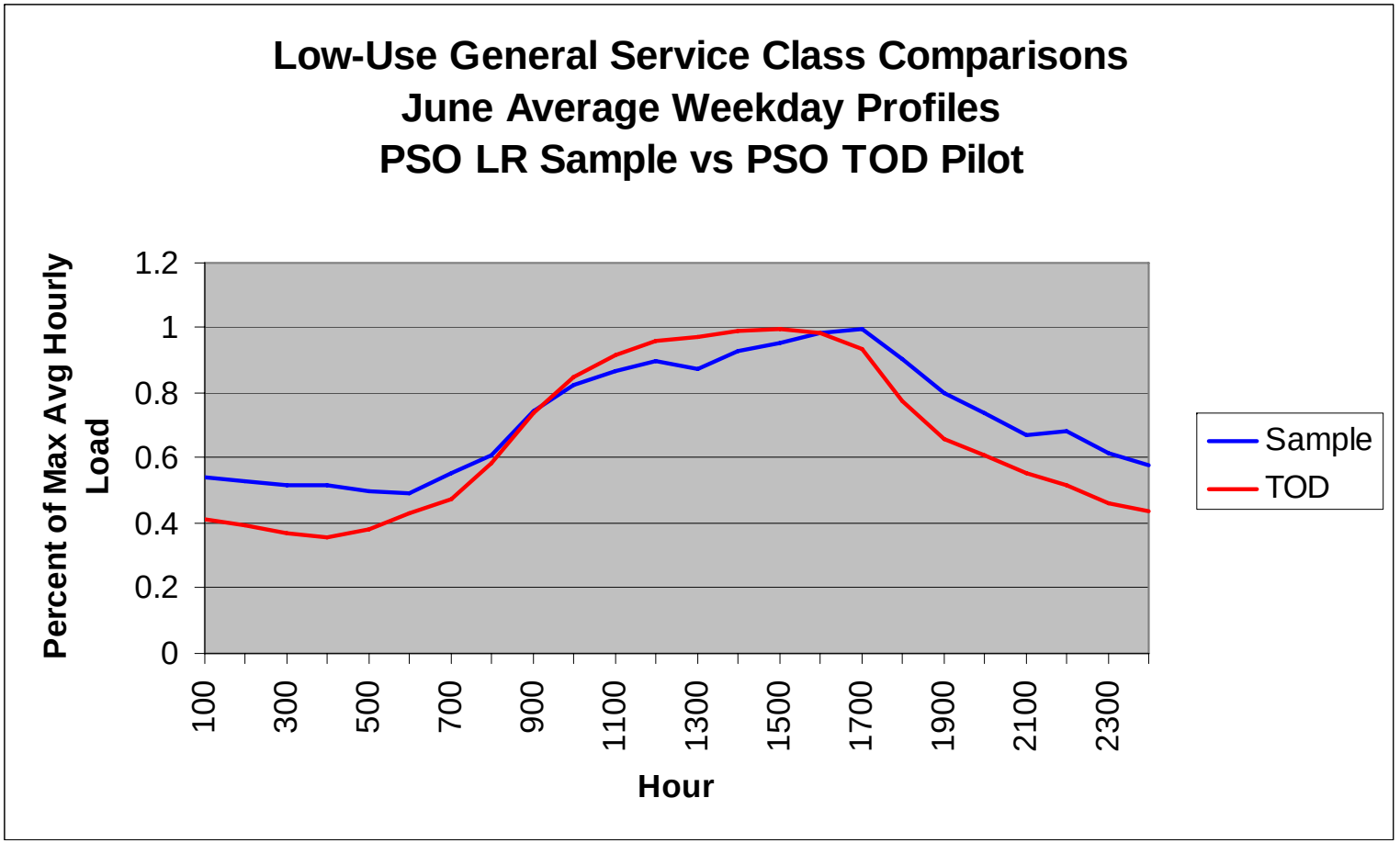
Does Usage Reflect a Response?:

- No Control Group designed (yet) for comparison.
- Active PSO Small Commercial & Industrial load research sample used as proxy.

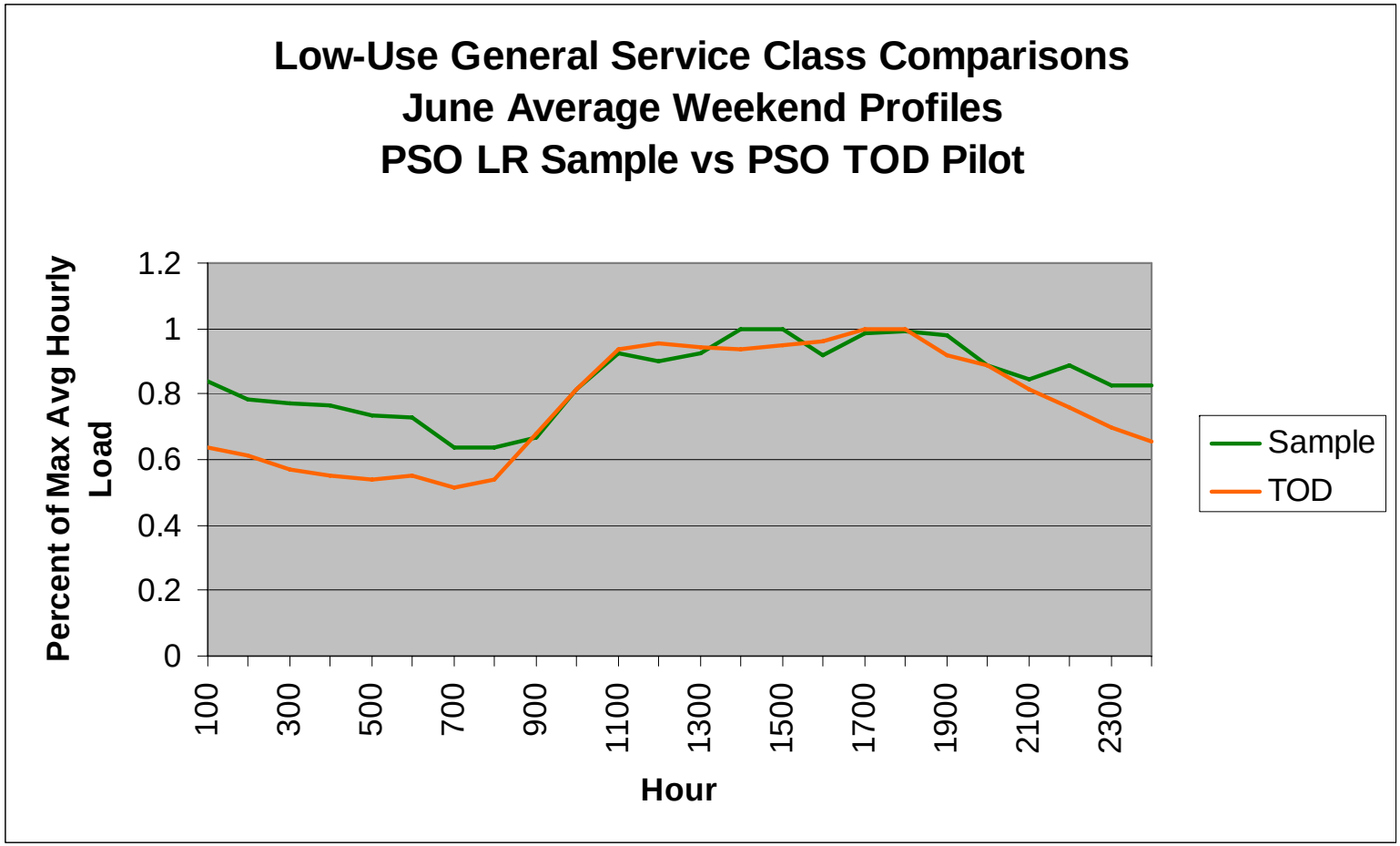
Stratum 1:	Mostly Low-use General Service
Remaining Strata:	Various General Service Tariffs

- Compared aggregation of LUGS TOD Pilot participants to aggregation of Stratum 1 contributors of sample. Compared aggregation of GS TOD Pilot participants to aggregation of contributors to remaining strata in sample.
- Developed normalized average daily load profiles for June for both pairs of groupings as a comparison.

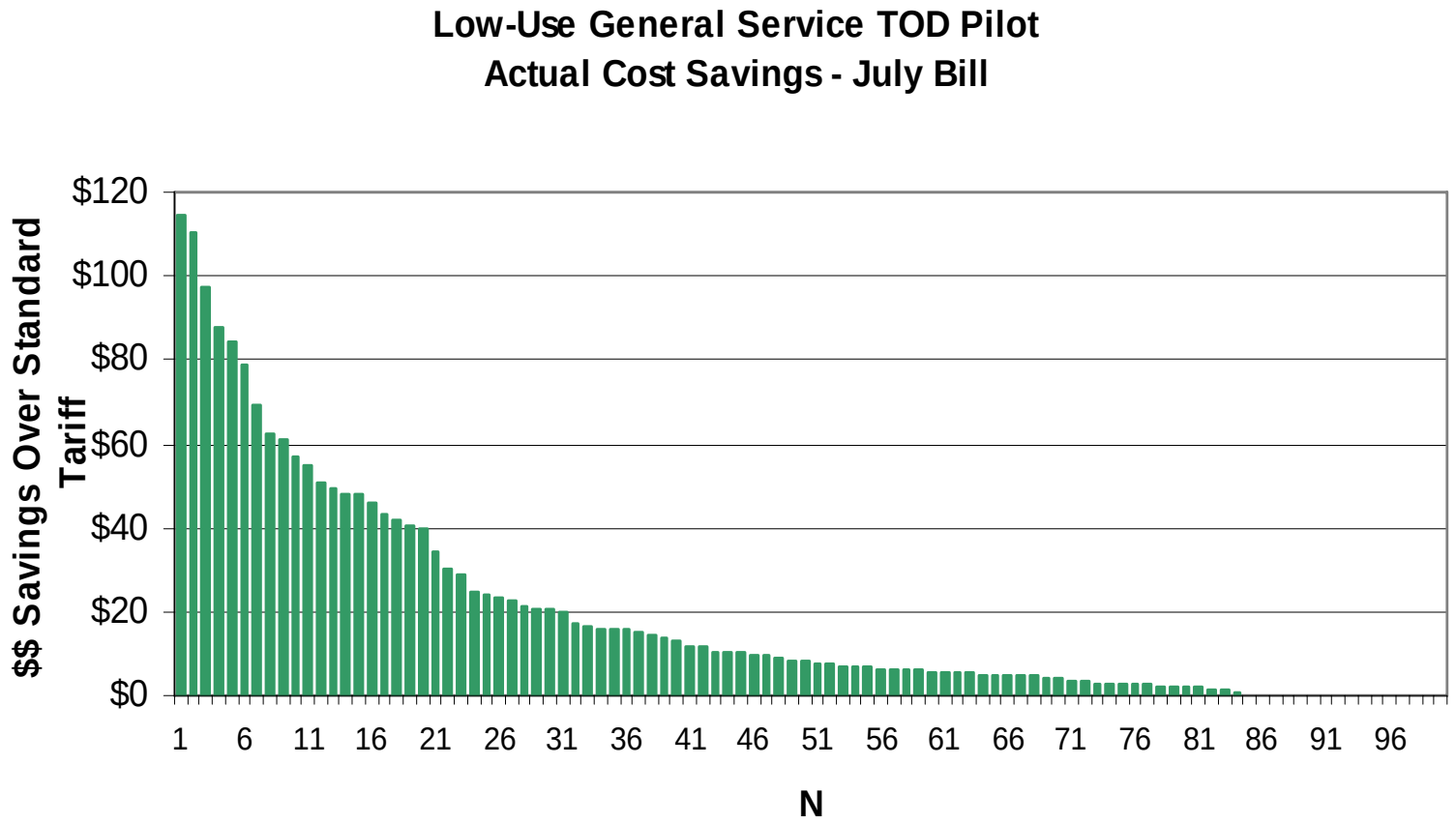
Analysis Of Actual Response Class Level (LUGS)



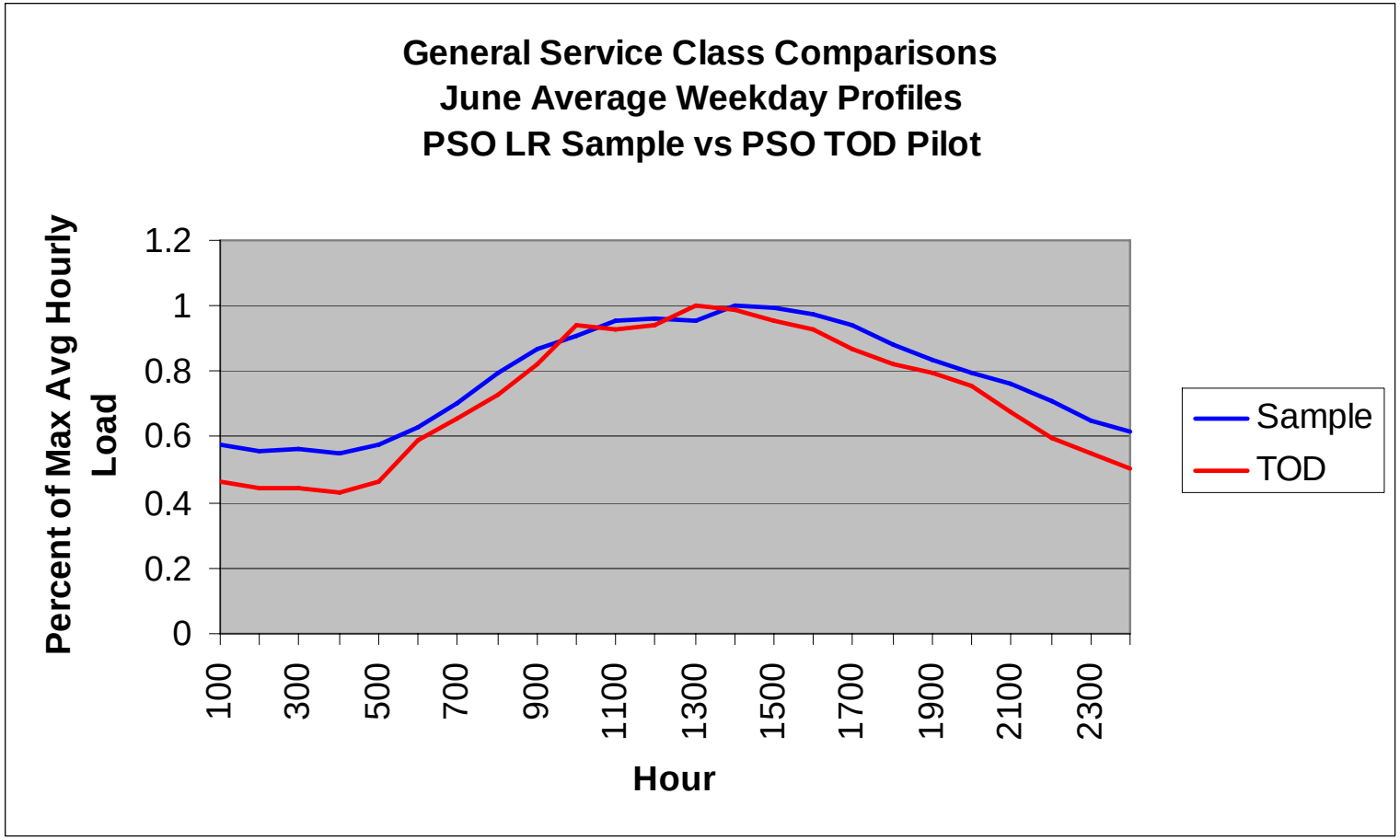
Analysis Of Actual Response Class Level (LUGS)



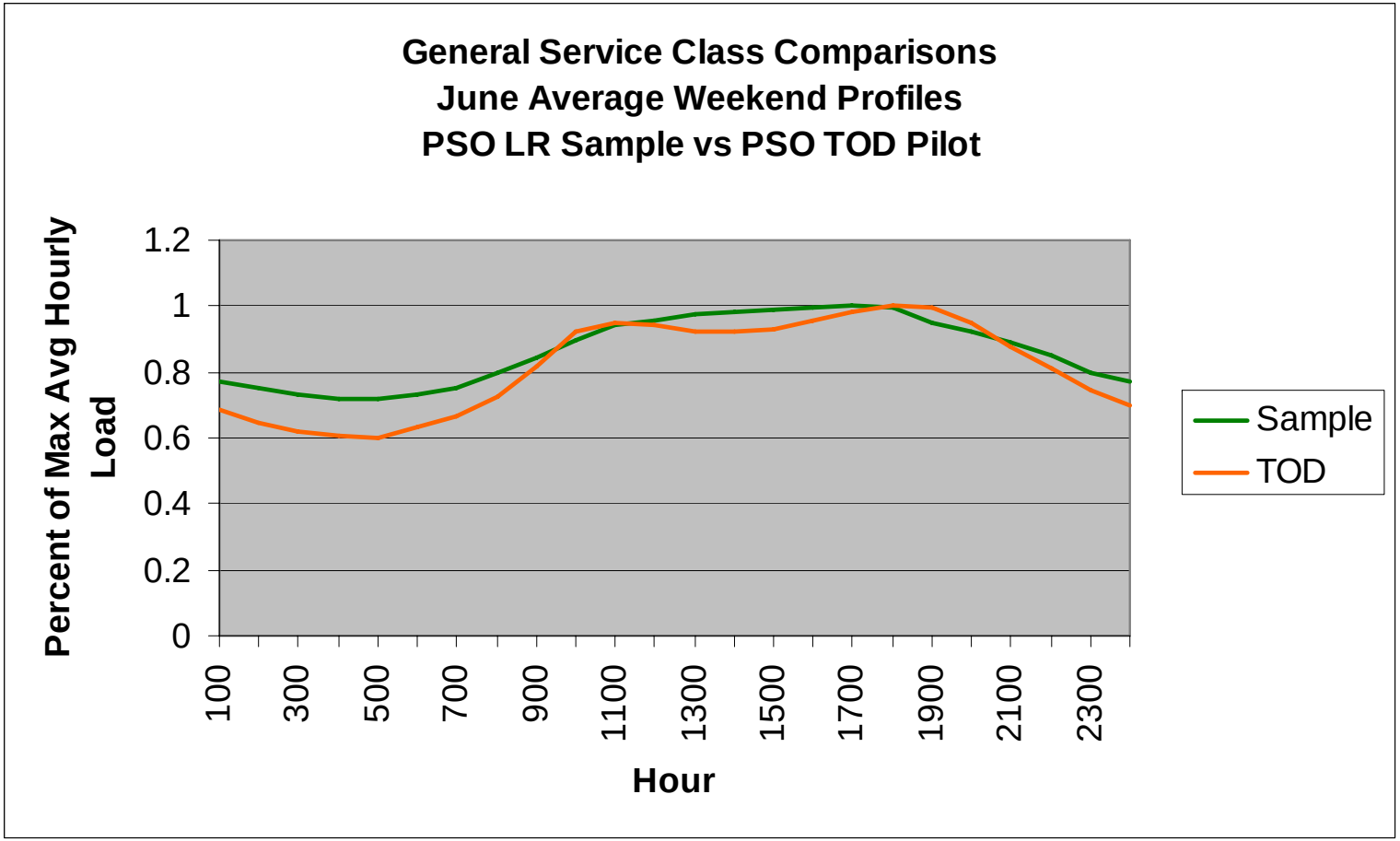
Analysis Of Actual Response
LUGS Savings



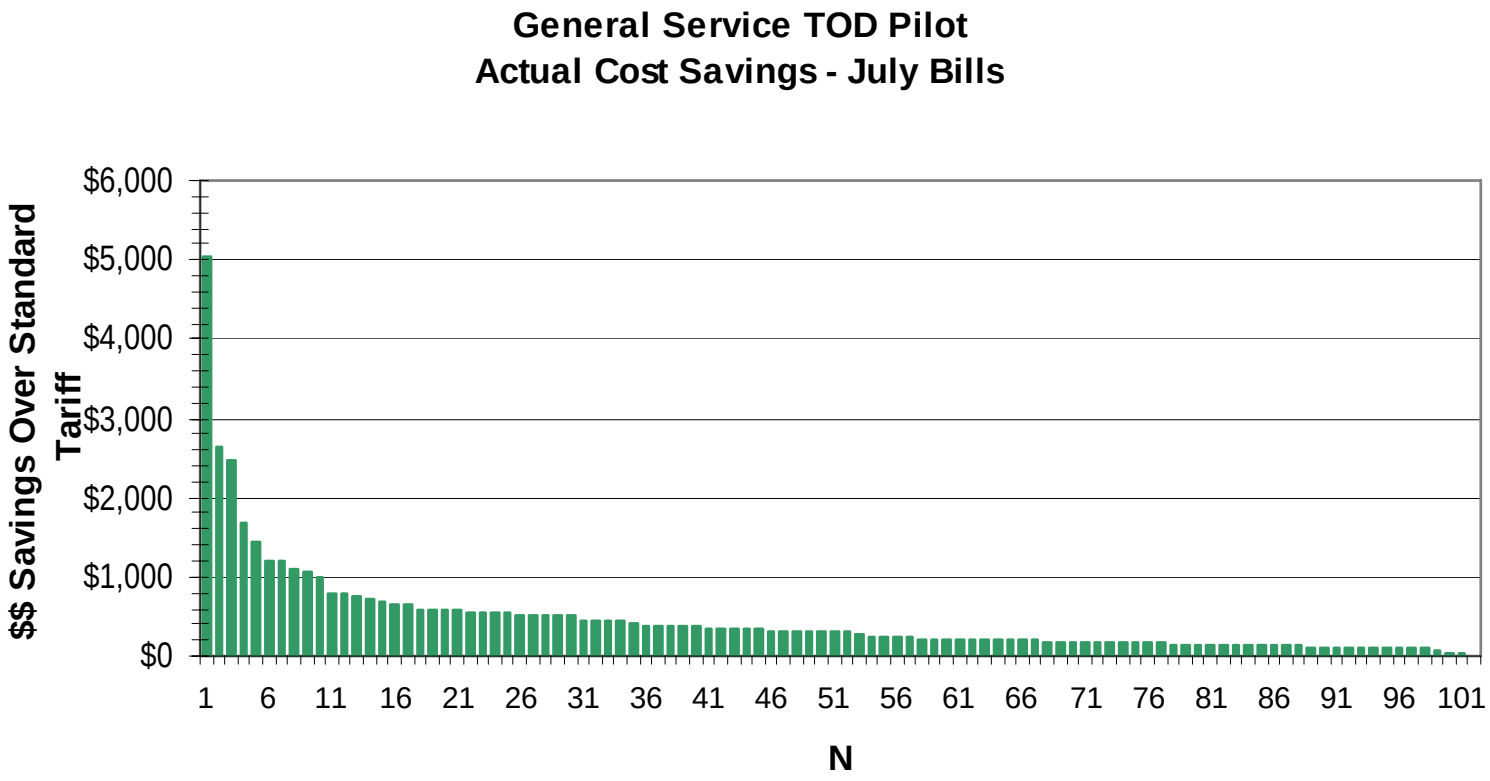
Analysis Of Actual Response Class Level (GS)



Analysis Of Actual Response Class Level (GS)



Analysis Of Actual Response
General Service Savings



Next Steps

- Continue data collection & analysis (3-year pilot)
- Survey of Non-Participants
- Control Group (augment existing sources or new design/selection)
- Follow-Up Survey of Participants (9-12 months out?)
- Incorporate End-Use Metering Project?
  - Present end-use data to participants
  - Analyze how they respond to the additional information

  (Another step towards gridSMART™- type functionality)
- Final Analysis (2011)
  - keep best practices
  - identify processes that need improvement
  - provide input to design of more permanent TOD offering

PSO TOD Pilot

Questions?

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