

Financial opportunities of Advanced Metering

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Financial opportunities of Advanced Metering

- Industry challenges and rate structures
- AMI can help provide
 - ✓ Ability to send appropriate price signal
 - ✓ Revenue stability
 - ✓ Customer convenience
 - ✓ Fair and equitable rate

Industry Challenges

- Consumption is declining
- Residential rate structures are not cost-based
- Intervenors in rate cases are becoming more common
- Society desires reduced electric consumption and solar installations
- Maintaining high quality bond ratings
- Little incentive for electric vehicle load
- Utility revenues are often sensitive to seasonal weather

Why Consider Rate Structure Changes

- Historically it was cost prohibited to meter smaller electric users, today metering the differences can be achieved economically
- Renewable generation units have:
 - changed typical usage patterns
 - created cost shifting to other customers
 - Declining kWh sales
- Billing usage on a flat kWh rate does not track cost and is inaccurate
- Fairness to customers
- Customer satisfaction by providing more control over their bills

How is our Industry addressing challenges

- Developing rates more reflective of our costs
 - Fixed costs to service a meter recovered in the customer charges
 - Fixed costs of distribution infrastructure recovered in demand charges
 - Energy rate reflective of costs during on-peak, off peak (critical peak) time periods

In other words; identifying fixed costs and variable costs of providing service and offering rate structures reflective of our costs

AMI can help set an appropriate price signal

Sending appropriate price signals

Goal is to develop rates that reflect utility costs, maintain financial stability, and promote energy conservation

- AMI can help focus on current all energy customer classes
 - Residential
 - Small General Service
- AMI can help address industry rate trends
 - Distributed generation
 - Electric vehicle charging
 - Prepay billing

Sending appropriate price signals

- Demand Charges
 - ✓ Currently have installed on large customers
 - ✓ Ability to install on all customers including the residential class
- Time of Use Rates
 - ✓ May currently have seasonal rates
 - ✓ Allows rates to be set on an hourly basis

Residential Demand Rates

Fixed Demand Costs are Currently included in kWh Charge

Residential customers were homogeneous customers with similar usage patterns

Residential customers (more or less) woke up, took a shower, went to work, came home, turned on the lights, cooked dinner, watched TV, did a load of laundry, went to bed

With each customer in the residential class each customer looked an awful lot like the next, utilities and regulators could lump energy and demand elements together into one \$/kWh price

Changing Residential Usage Patterns

Today residential customers are not the same and usage patterns vary substantially:

LED lights, smart thermostats, plug-in electric vehicles, rooftop solar, demand-flexible water heaters, battery energy storage, and myriad of other technologies make their loads and consumption patterns very different.

With AMI, it's now inexpensive to meter these differences, including time of use and identifying a customer's peak demand.

Issues with Current Rate Structures

	Customer One	Customer Two
Customer Charge	1	1
Demand Usage	7	7
Energy	300	800
Current Rates		
Customer Charge	\$ 10.00	\$ 10.00
Energy	\$ 0.120	\$ 0.120
Cost of Service Rates		
Customer Charge	\$ 19.00	\$ 19.00
Demand Charge	3.50	3.50
Energy Rate	0.0590	0.0590
Comparison		
Current Charges	\$ 46.00	\$ 106.00
Cost-Based Charges	\$ 61.20	\$ 90.70
Dollar Difference	\$ (15.20)	\$ 15.30
Percent Difference	-24.8%	16.9%

Fixed Customer costs not recovered in current customer charges are rolled into energy charges

Fixed Distribution system costs not recovered as a demand charge are rolled into energy charges

Rate Strategy and Transition Plan

- Understand impacts on customers
- What costs to recover in demand charges?
- Should rate be phased in?
- Should rate be opt-in; opt-out or mandatory?
- Should rebates for enabling technologies be provided?
- How to educate customers to understand demand
 - Bill inserts discussing electric demands and how to control demand
 - Place demand on bill without a charge for a year
- What internal education is needed?

Residential Demand Charge

Many utilities are moving toward or considering demand charges for distribution cost recovery for Residential customers

- Send better price signals to customers
- Promote electric vehicles
- Reduce distribution subsidies for customers with solar or wind installations
- Promotes customer battery installation

Residential Demand Implementation

- **Georgia Power** has optional Residential Demand charge at \$6.53/kW
- **APS** Residential Demand Charge of \$0.70/kW
- **Tucson Electric Power** Optional Residential Demand Charge \$8.85 - \$12.85
- **We Energy** Demand Charge \$3.80/kW for solar
- **Alabama Power** Optional Demand Charge of \$1.50
- **Polk County Public Power District** – Mandatory residential demand charges since 2014
- **Cornhusker Public Power District** – Mandatory residential demand charges since 2018
- **Elkhorn Public Power District** – Mandatory residential demand charges since 2018
- **North Central Public Power District** – Mandatory residential demand charges since 2019
- **Burt County Public Power District** - Mandatory residential demand charges since 2019

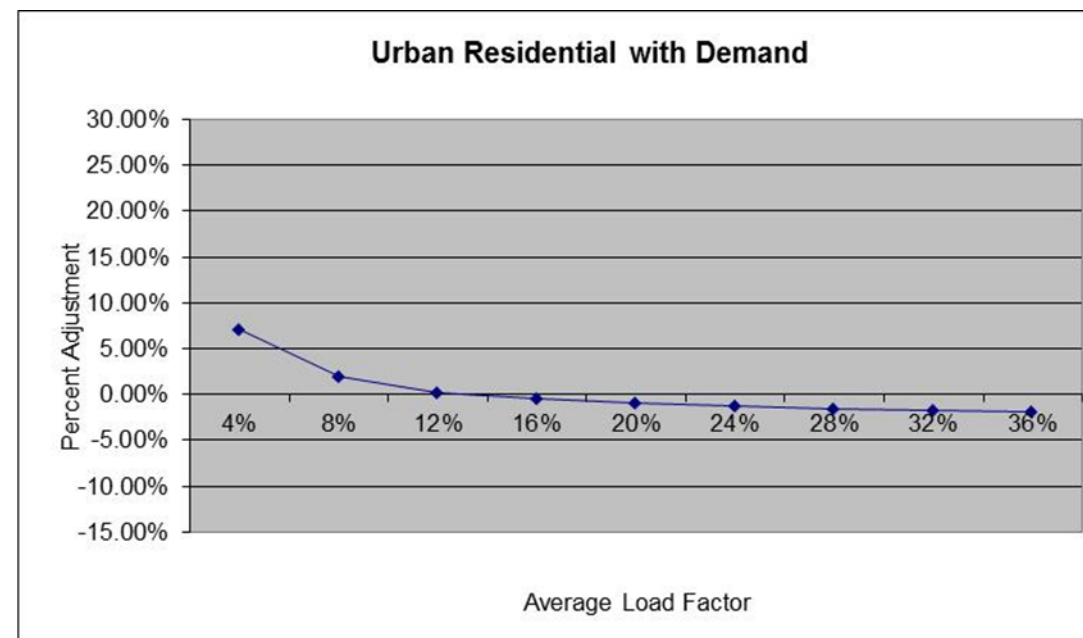
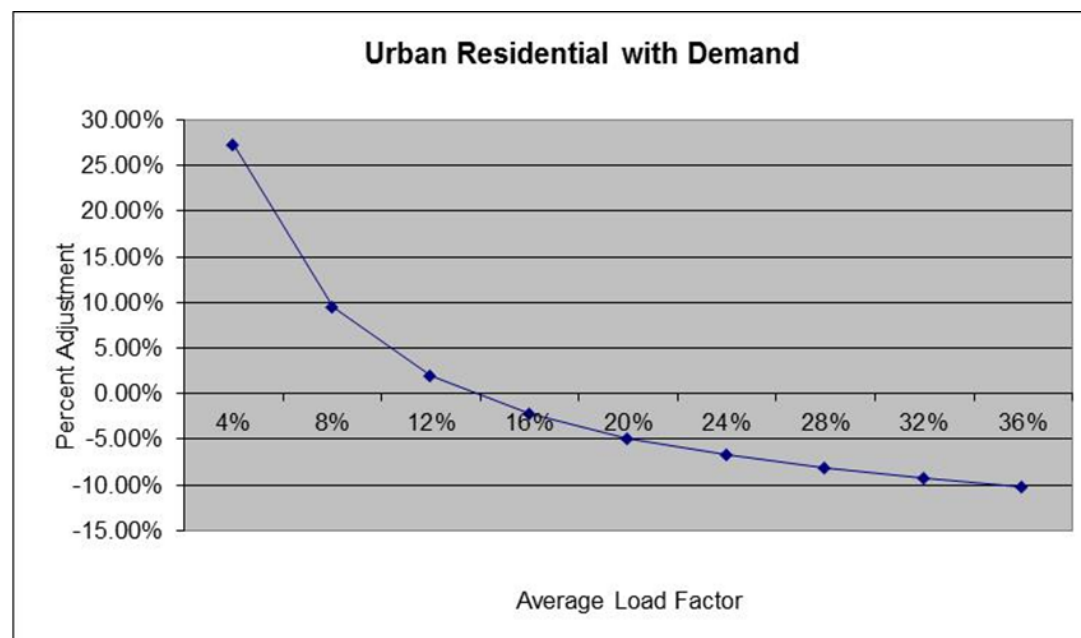
Case Study for Implementation of Residential Demand Rate

- 1) Identify cost-of-service distribution system demand charge
- 2) Initial Implementation \$0.50/kW
- 3) Second Year implementation \$1.00/kW
- 4) Fourth Year implementation \$1.50/kW
- 5) Completed a review to identify the impact on all customers to ensure rate impacts were acceptable to Board of Directors

Implementation of Distribution Demand Charge

Customer Impacts @ full demand
Charge of \$1.77/kW

Residential Impacts first year phase
Starting rate - 50 cents/kW



Cornhusker Public Power District

- Implemented a \$1.00 demand charge in October 2018
 - Bill inserts, Website, Magazines
 - Explain demand charges and how differ from energy
 - How demand charges are determined
 - Customer portal to show demands and when peaks are occurring
 - Showed demand usage on customer bills for 8 months
 - Received two phone calls – 6,000 customers affected

Cornhusker Demand Charge \$1.00

Customer Impact Analysis

Annual Rate Impacts				Customer Distribution
Rate Impact	Avg Demand kW	Dollar Impact		
-10% +	3.291	\$ (8.12)	8%	73% of customers within +/-5%
-5% to -10%	5.902	\$ (5.10)	12%	
-1% to -5%	7.357	\$ (2.72)	21%	
0 to -1%	8.832	\$ (0.46)	6%	
0 to 1%	8.911	\$ 0.75	9%	53% of customers with bill increases totaling 2955 dollars
1% to 5%	11.520	\$ 3.86	37%	
5% to 10%	11.359	\$ 4.90	3%	
10% +	5.335	\$ 4.27	3%	

47% of customers - bill decreases totaling - 2955 dollars

Time of Use Rates

AMI allows implementation of Time of Use rates

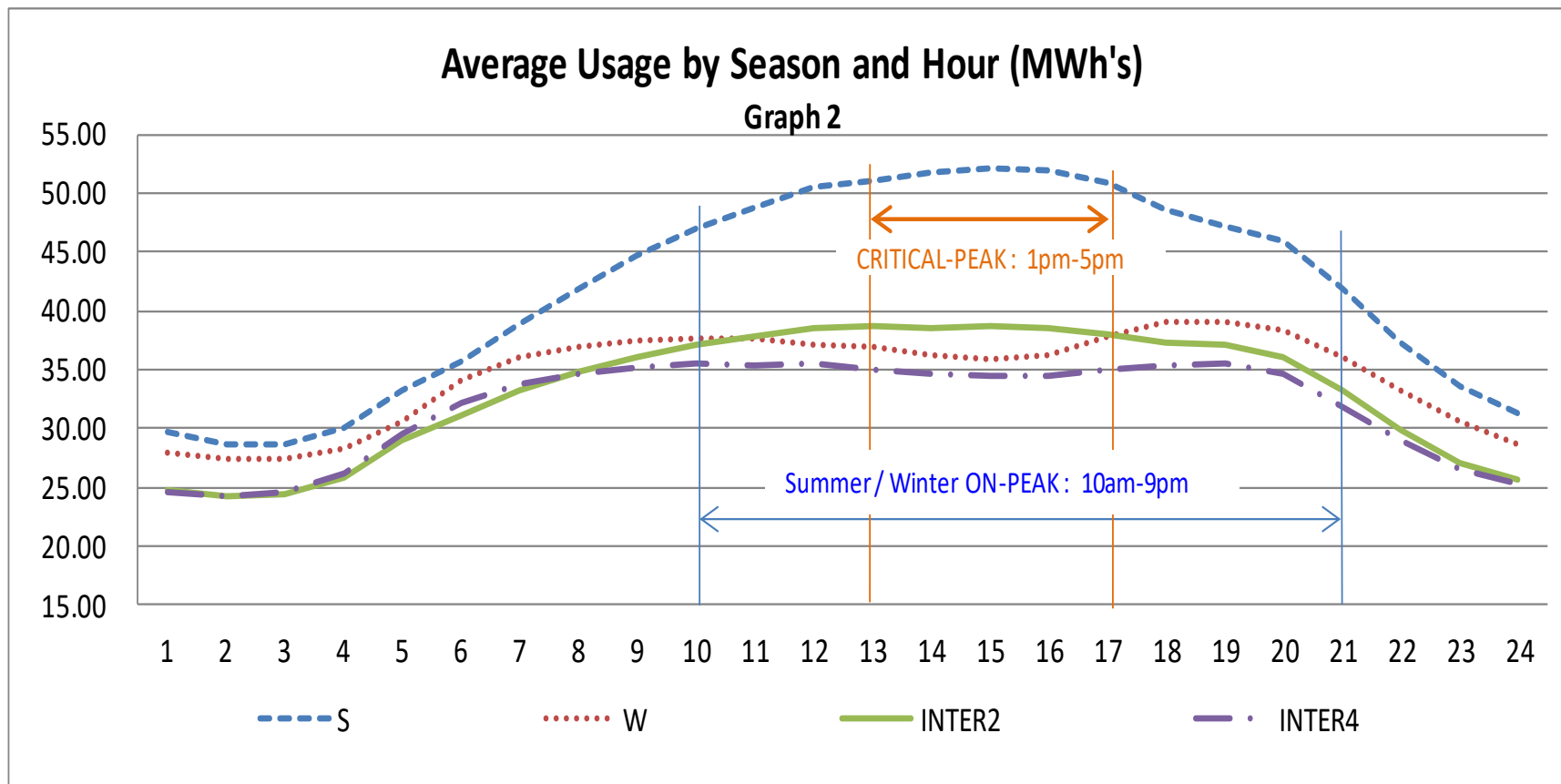
Allows utility to manage or reduce generation costs

- Capacity (Demand) related costs are recovered through on-peak energy rates
- Price signal encourages usage in off peak periods
promotes EV charging rates
- May benefit solar production if on peak period coincides with solar production
- Residential time of use will continue to become more common

Residential Time of Use Implementation

- Pacific Gas and Electric
 - SMUD
 - Southern California Edison
 - Duke Energy
 - El Paso Electric
 - CLECO
 - Florida Power and Light
 - Consumers Energy
 - Detroit Edison
- *This is only a small sampling,* utilities are moving to offer time of use rates
 - Many have on peak, off peak and critical peak time periods
 - Many are currently offering optional time of use with long term objective of moving most customer to time of use

AMI Provides System Average Usage Data by Hour



TEP
Tucson Electric Power

On-peak hours:
 Summer: M-F 3-7 p.m.
 Winter: M-F 6-9 a.m. and 6-9 p.m.
 Excludes all major holidays

TOU Pricing Objectives

Create a Win/Win for Customer and Utility

If a customer avoids usage the customer saves and utility costs are reduced by same amount

Does Win/Win occur if Time of Use Made Optional?

Considerations when Choosing Hours

- A lengthy on-peak period tends to reduce cost differences between on peak and off peak pricing
- Ease of implementation for Utility
- Ease of Understanding for Customer
- Is a Critical Peak period needed?
- Dual winter on peak?

Customer Convenience

Optional Prepaid billing (Pay-as-you-go)

- Requires a daily customer charge
- Utility is able to provide customer with a real-time account status

Fair and Equitable Rates

AMI provides detailed customer usage profiles that can be utilized for future cost of service analysis and rate designs

Fair and Equitable Rates

COS data without AMI

- kWh usage (each class)
- Number of Customers (each class)
- kW (if available)
- System hourly load data
- Potential feeder SCADA data

COS with AMI Data

- kWh usage (each class)
 - ON Peak & OFF Peak
- Number of customers (each class)
- kW (each class)
- System hourly load data
- Customer class hourly load data
- Class contribution to system peak

IN SUMMARY

Financial Opportunities of AMI

- Demand Charges
 - Revenue Stability
 - Flat or decreasing sales
 - Year to year seasonal temperature variations
 - Reduced sales from customers with DG
 - Promote electric vehicle charging
 - Reduce distribution cost shifting for customers with solar or wind
- Time of Use rates
 - Send price signal to increase sales in off peak periods
 - Promote electric vehicle charging
 - Send appropriate price signal to solar and wind customers
- Customer Convenience
- Fair & Equitable Rates