

Time of Use Rates and How to Construct Them

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Reasons for Offering TOU Rates

- 2005 Energy Policy Act requires electric utilities with greater than 500 million kWh sales to consider TOU rates
- Provides customers with opportunity to manage their energy bill
- Provides customers with choice

2005 Energy Policy Act

- Sec 1251- Each electric utility shall offer “a time-based rate schedule under which the rate charged by the electric utility varies during different time periods and reflects the variance, if any, in the utility’s costs of generating and purchasing electricity at the wholesale level. The time-based rate schedule shall enable the electric consumer to manage energy use and cost through advanced metering and communications technology.”

Using TOU Rates with Customers

- Offering TOU rates as an option in a rate menu from which customers can choose
- TOU rates allow customers to move usage around in a way that reduces energy bill
- With TOU rates, customers can still perform the same functions, but at a different time
- With flat rates, the only way to reduce energy bill is to cut functions

Basis for Time of Use Rates

- The cost of serving load differs substantially over time
- Fixed cost per kWh varies over time as different generating units and technologies are used to meet customer needs
- Variable cost per kWh varies over time as different fuel sources are used to meet customer needs (coal, nuclear, gas)

Generating Cost Comparisons

	Natural Gas Fired Simple CT	Conventional Coal Plant
Capacity (KW)	50,000	500,000
Cost per KW	\$425	\$1,400
Total Fixed Cost	\$21,250,000	\$700,000,000
Carrying charge	15.0%	15.0%
Fixed Cost/year	\$3,187,500	\$105,000,000
Hours of Operator	200	7,008
Fixed Cost /kWh	\$0.319	\$0.030
Fuel cost per kWh	\$0.080	\$0.015
Total Cost /kWh	\$0.399	\$0.045

Weighted Average Price

Price	Hours	Price x Hours
\$0.399	200	\$79.750
\$0.045	7,008	\$315.120
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	7,208	\$394.870

Weighted Average \$0.055

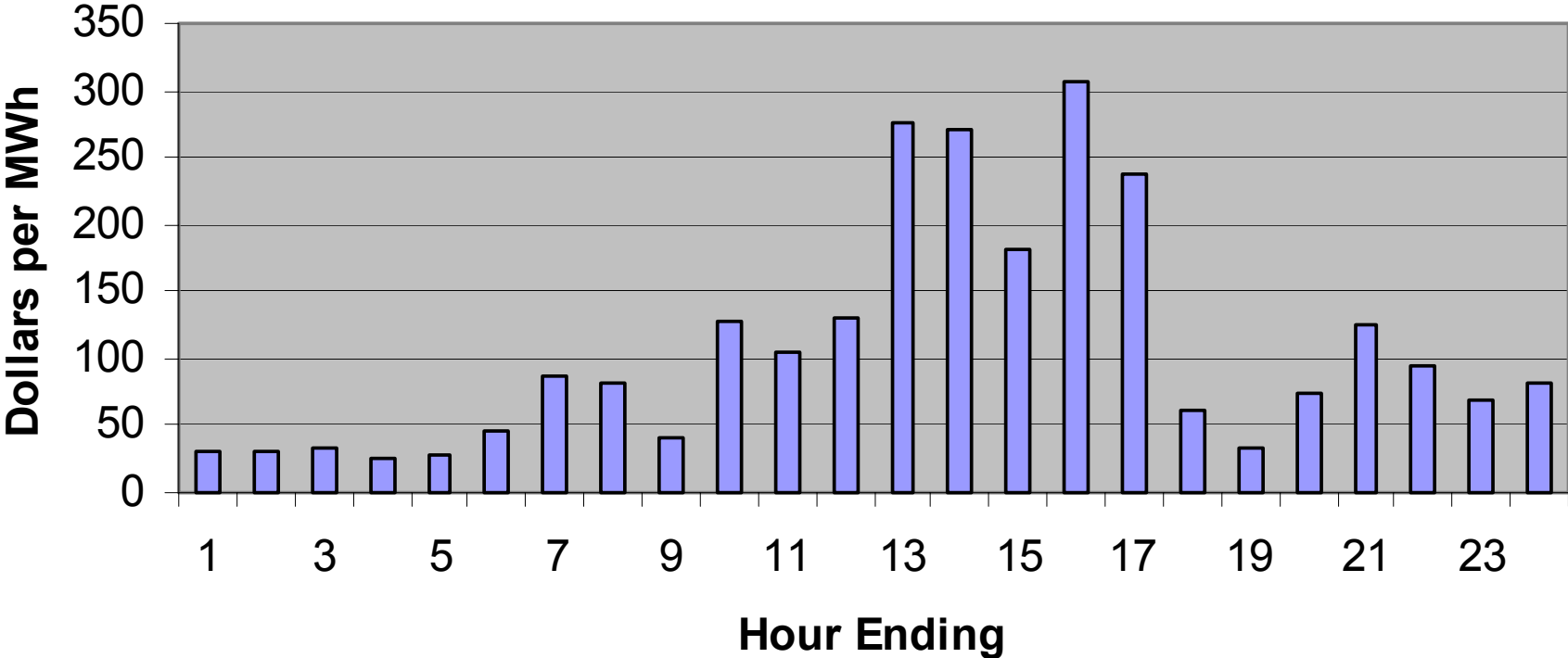
Locational Marginal Price (LMP)

- LMP is the cost of serving the next MW of load at a specific location using the lowest production cost of all available generation while observing all transmission limits
- LMP is the sum of generation marginal cost, transmission congestion cost and losses at a specific location at a particular point in time

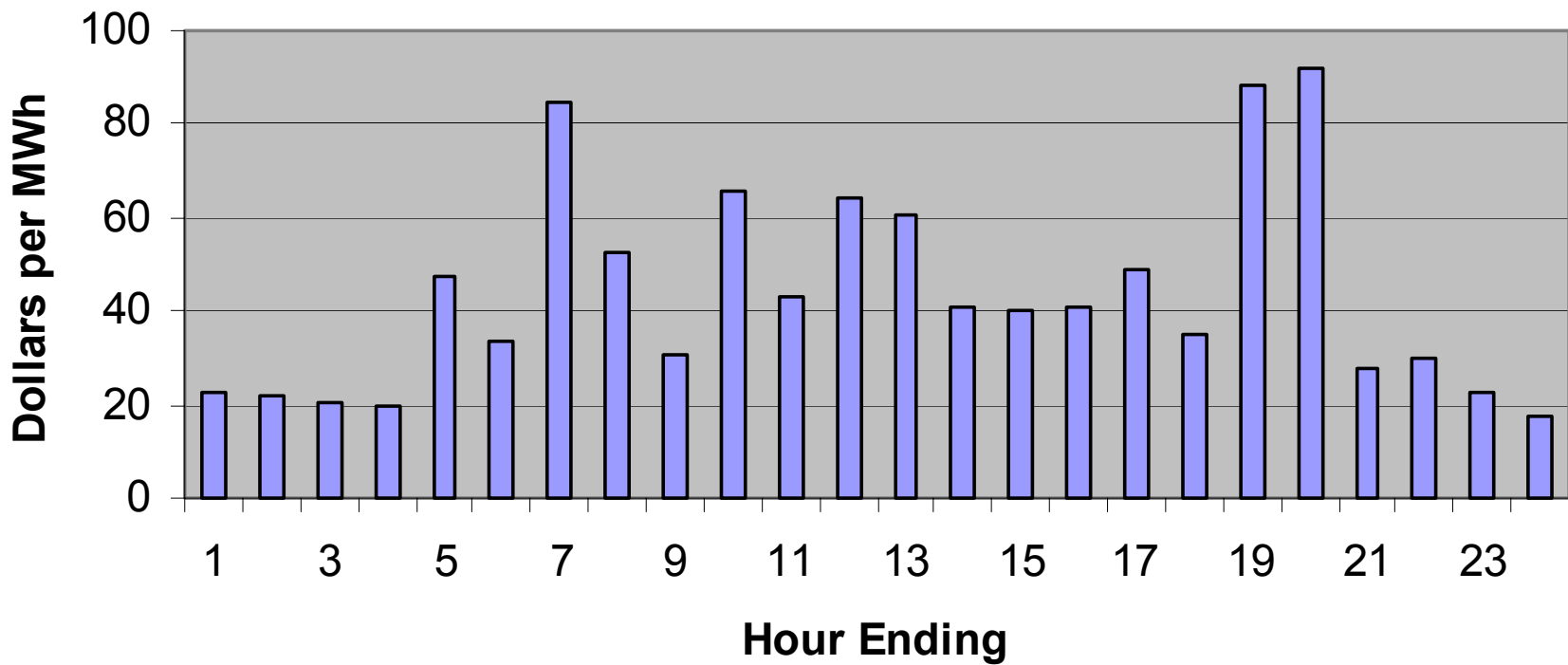
LMP-Based Markets

- All generators at a node receive the locational marginal price
- All load at the node pays the locational marginal price
- Natural gas sets the marginal price in the Midwest ISo about half of the time

July 31 2006 LMP Prices at LGE Node



October 4, 2006 LMP Prices at LGE Interface



TOU Rates

- Time-of-use (TOU) rate structures are used to recognize differences in costs relative to the time of the day
- Either demand or energy costs can be time differentiated
- In developing TOU rates, it is important to consider marginal costs

Candidates for Time Differentiation

Likely

Production Demand

Transmission Demand

Production Energy

Somewhat Likely

Distribution Demand

Not Likely

Customer-related Costs

Electric Cooperatives

- Opportunities for time differentiating G&T wholesale rates
 - Demand charges applicable during peak periods
 - Production demand costs
 - Transmission demand costs (generally calculated using a load share ratio)
 - Energy charges
 - On-peak (representing units with high running cost)
 - Off-peak (running cost of base load units)

Electric Cooperatives

- Opportunities for time differentiating distribution cooperatives retail rates
 - Opportunities can be limited by the rate structure of the G&T provider
 - NCP billing
 - No time differentiated energy charge
 - “Titled” demand charges
 - Demand ratchets

Electric Cooperatives

- Opportunities for time differentiating distribution cooperatives retail rates
 - Turn CP demand charges into on-peak retail rate differentials
 - Time differentiated energy charges at the G&T level enhance distribution cooperative's ability to offer on-peak and off-peak differentials
 - The cost of distribution substation equipment can also be time differentiated (these facilities are generally installed to meet peak demands)

Key Design Elements

- Purchased power demand costs
- Determination of peak periods
 - Likely to vary by season
 - May or may not include weekends
 - Needs to capture G&T's peak
 - Shorter periods provide more opportunity for customers to shift usage
- Recovery of enhanced metering costs

Data Requirements

- Monthly purchased power demand costs
- Time of day and day of the week when the G&T's monthly system peaks have occurred
- Load profiles which can be used to determine energy and demands during the peak periods
- Cost of enhanced metering equipment from vendors
- Recent cost of service study

Key Steps in Designing TOU Rates

- Step 1 – Develop TOU periods
 - Examine 2 to 5 years of system peak demands
 - Determine whether weekend/holiday peaks are likely
 - Determine whether different time periods are appropriate by season
 - Summer peaks often occur in the evening
 - Winter and shoulder peaks can occur in either the morning or evening

Key Steps in Designing TOU Rates

- Step 1 (cont.) – Develop TOU periods
 - Determine whether 1 or 2 daily peak periods are appropriate
 - Determine whether the peak period should be split up into two non-contiguous periods
 - If G&T has TOU or window rates, then those periods should generally be used

Key Steps in Designing TOU Rates

- Step 2 – Determine billing units by TOU periods
 - Determine kWh by TOU period for residential and small general service rates from load research data or from borrowed profiles
 - Determine peak period demands (kW) for large power rates

Key Steps in Designing TOU Rates

- Step 3 – Calculate TOU
 - On-peak charge includes:
 - On-peak differential - CP demand charges from G&T during the peak period divided by peak period kWh or kW billing demands
 - G&T energy charges
 - Distribution delivery charge
 - Off-peak charge includes:
 - G&T energy charges
 - Distribution delivery charge

Unbundled Cost Based Residential Rates

- Cost of service results:
 - Customer related costs are \$20.84/cust/mo.
 - Margins on customer related \$4.83/cust/mo.
 - Distribution demand costs are \$0.012/kWh
 - Margins on dist demand are \$0.008/kWh
 - Purchased power demand is \$0.027/kWh
 - Purchased power energy is \$0.024/kWh

Flat Energy Rate Example

- Customer charge = \$25.67/cust/mo.
- Distribution demand charge = \$0.02/kWh
- Purchased power demand = \$0.027/kWh
- Purchased power energy = \$0.024/kWh

Time of Use Rate Example

Purchased power demand/peak period kWh =
 $\$772,791 / 5,770,947 \text{ hrs.} = \0.134

On-peak rate = $\$0.024 + \$0.134 = \$0.158/\text{kWh}$

Off-peak rate = $\$0.024/\text{kWh}$

Customer charge = $\$25.67$

Distribution Demand charge = $\$0.02/\text{kWh}$