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Rethinking Rate Design Strategies

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Rethinking Rate Design Strategies

Industry Challenges & Opportunities

- Declining average energy consumption
- Roof top solar
- Promotion of battery installations
- Potential growth in electrification of buildings
- Future growth of electric vehicles
- Customer installed generation
- Difficulty in forecasting growth and revenues
- Intervenors at rate hearings

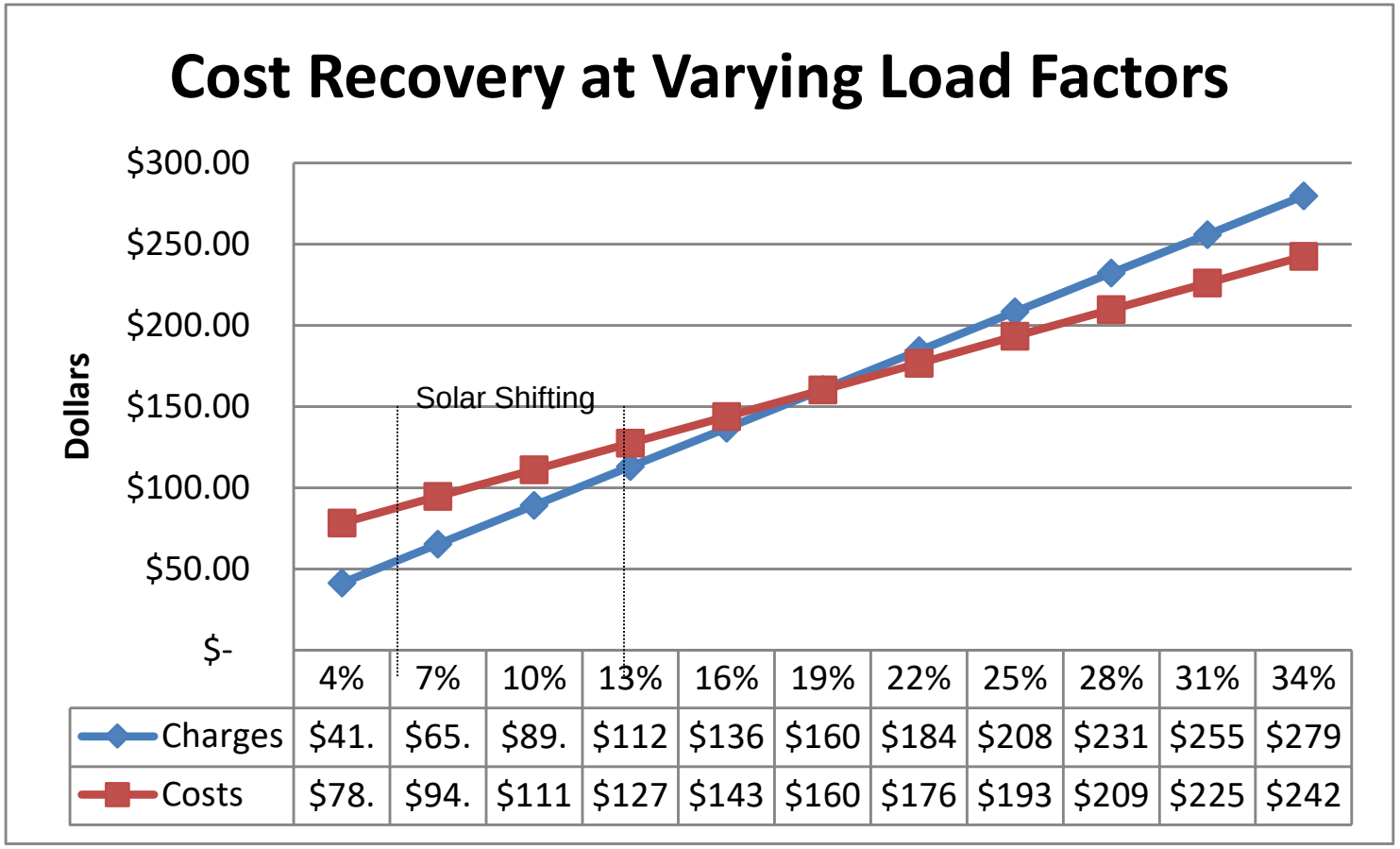
Problem with Two Part Rates

- Two-part rate structures include a Customer Charge and a kWh Energy Rate
- Billing on a per kWh basis is an inaccurate method to recover infrastructure costs
- Utilities assets are sized to handle customer's peak demands not energy usage
- Current rate lack the ability to send price signals to promote when excess capacity is available

Two Part Rate Structure

- Established due to Historical limitations in metering
- Customers were grouped together based on common usage patterns to form rate classes
- For example: Residential rate class created because most residential customers had similar usage patterns: load factors between 16% - 20%

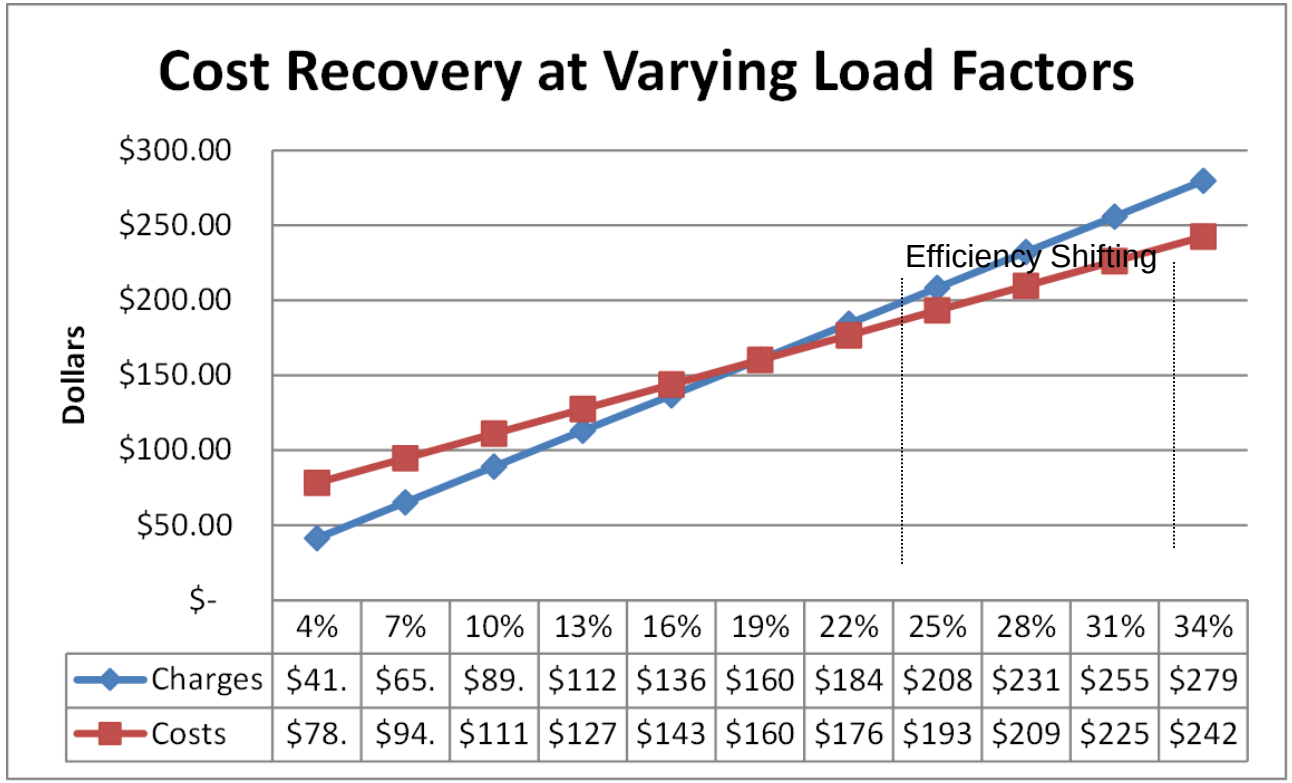
Solar Load Factor



	4%	7%	10%	13%	16%	19%	22%	25%	28%	31%	34%
Charges	$41.	$65.	$89.	$112	$136	$160	$184	$208	$231	$255	$279
Costs	$78.	$94.	$111	$127	$143	$160	$176	$193	$209	$225	$242

Energy Efficiency Programs

- Reduces customers kWh usage and Demand, load factor improves



Market Share - Electric Vehicles

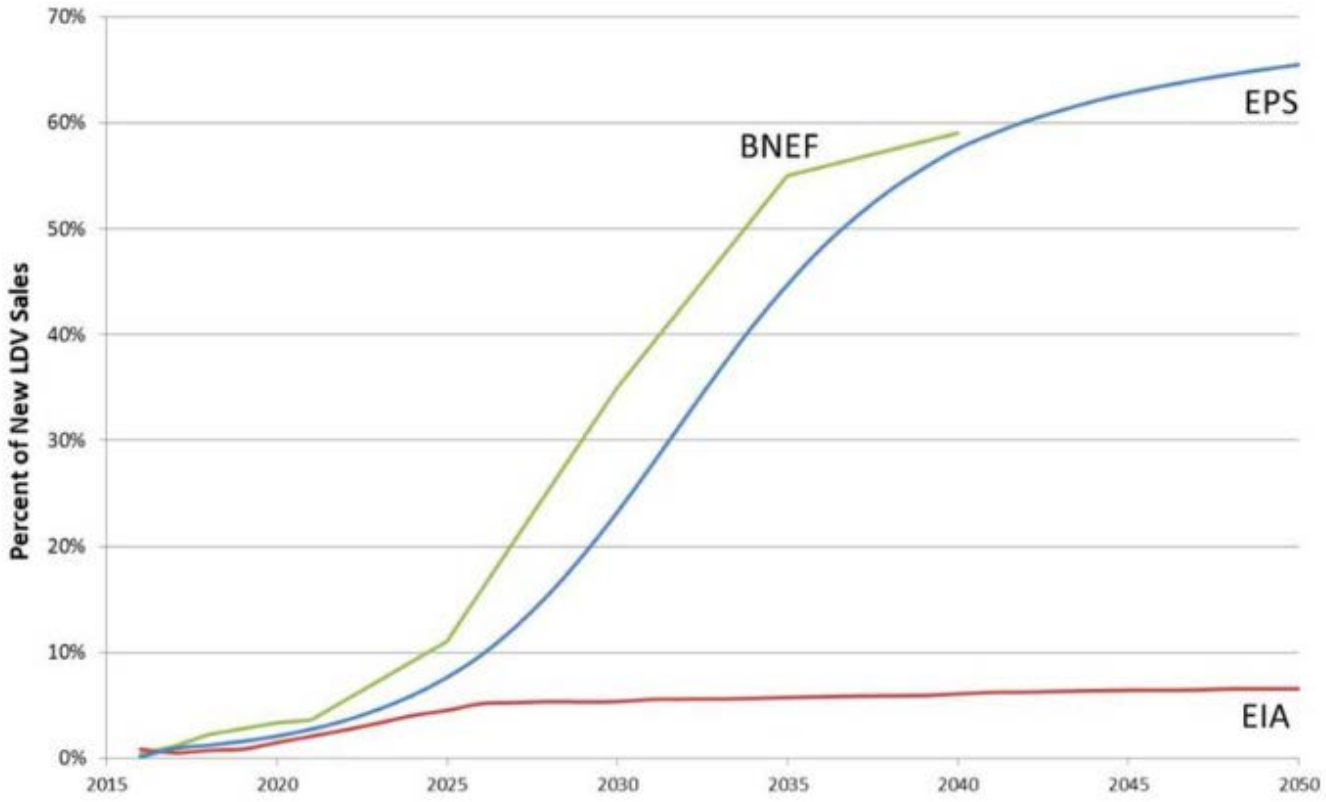


Figure 1. Projections of U.S. market share of EVs from three sources: the Energy Policy Simulator (EPS) 1.3.1 BAU case, the Energy Information Administration (EIA) Annual Energy Outlook 2017 "No Clean Power Plan" side case, and the Bloomberg New Energy Finance (BNEF) Electric Vehicle Outlook 2017.

U.S. electric vehicle deployment forecast to 2050 ENERGY INNOVATION

Electric Vehicles

- Average energy consumption; 15,000 miles per year – 4,500 kWh's
- Operating Costs
  - Gasoline costs $1,400
  - Electric Costs $ 540 (0.12/kWh)

- Source Plug-in America

Development of a long-term rate strategy is critical for the utilities financial stability and achieving the community's objectives

Forecasting Margins with Cost Based Rate Structures

			Solar	Energy Efficiency
		Customer One	Customer Two	Customer Three
kWh		1000	500	800
kW Peak		8	8	5
Load Factor		17%	9%	22%
Customer Charge	$ 20.00	20	20	20
Demand Charge	$ 2.00	16	16	10
Power Supply	$ 0.10	100	50	80
	Revenue	$ 136.00	$ 86.00	$ 110.00
	Margin	$ 36.00	$ 36.00	$ 30.00

The Ideal Cost Based Rate Structure

Cost Based Rate Design	Option One	Option Two	Billing Unit
Production Demand Coincident with System Peak		$14.12	kW
Distribution Demand Based on Customers Maximum Demand	$ 2.19	2.19	kW
Energy Charge - Critical Peak	0.165	0.061	kWh
Energy Charge - On-Peak	0.112	0.061	kWh
Energy Charge - Off-Peak	0.048	0.048	kWh
Customer Charge	$ 21.44	$ 21.44	Monthly

If this is ideal, how do we get there?

How is the Industry Addressing the Challenges

- Developing rate structures reflective of costs
  - Fixed costs to service a meter recovered in the customer charges
  - Demand charges for recovery of infrastructure costs
  - Time of use energy rates (on-peak, off peak, critical peak) time periods

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

Generation infrastructure recovered in time of use energy or demand charges

Industry Rate Trends

- Demand Charges – AMI required
- Time of Use Rates – AMI required
- Customer charges on AMP's or single and three phase services
- Grid access fees
- Inverted block rate structure differentials are being minimized
- Offering green energy rates to customers
- Standby Rates
- Movement away from net metering for customer installed renewables

Residential Time of Use

- Pacific Gas and Electric
- SMUD
- Southern California Edison
- Duke Energy
- El Paso Electric
- CLECO
- Florida Power and Light
- Consumers Energy
- Detroit Edison

- Most IOU's are offering time of use rates to residential customers
- Many TOU rates have
  - on peak
  - off peak
  - critical peak time periods

Tucson Electric Power

Time-of-Use (TOU)

Shift a majority of your usage to off-peak hours and reduce your monthly bill.

Peak Demand

Pay lower energy rates plus a charge for your highest hourly on-peak usage.

Demand TOU

Combines demand and time-of-use components to maximize your savings opportunities.

Basic

Pay bills based on your total monthly electric use, regardless of when it occurs.

At a Glance

Basic Service Charge:
$10 per month

Energy Charge, per kWh[1]:
Summer (May-Sept)
- On-peak - 10.06 cents
- Off-peak - 6.03 cents

Winter (Oct-Apr)
- On-peak - 6.66 cents
- Off-peak - 5.96 cents

Demand Charge, per kW[2]:
- Up to 7 kW - $8.85
- More than 7 kW - $12.85

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

Residential TOU and Impacts

	On Peak Hours	Super Peak Hours
On Peak Start	8	15
On Peak End	21	19

Class Impact

Rates	Current	COS
Monthly Facilities Charge:		
All Customers	$ 19.50	$ 21.60
Energy Charge:		$ -
Non Summer On-Peak	$ 0.10545	$ 0.14611
Non Summer Off-Peak	$ 0.10545	$ 0.06804
Non Summer Critical-Peak	$ 0.10545	$ 0.15118
Summer On-Peak	$ 0.12596	$ 0.16581
Summer Off-Peak	$ 0.12596	$ 0.06662
Summer Critical-Peak	$ 0.12596	$ 0.21075
Demand Charge:		$ -
Non-Summer	$ -	$ -
Summer	$ -	$ -
Power Cost Adjustment:		$ -
All Energy	$ 0.00600	$ 0.0060
Revenue from Rate	$ 50,827,083	$ 50,827,398
Change from Previous		0.0%

Residential with Electric Charging Station

Rates	Current	COS
Monthly Facilities Charge:		
All Customers	$ 19.50	$ 21.60
Energy Charge:		
Non Summer On-Peak	$ 0.10545	$ 0.14611
Non Summer Off-Peak	$ 0.10545	$ 0.06804
Non Summer Critical-Peak	$ 0.10545	$ 0.15118
Summer On-Peak	$ 0.12596	$ 0.16581
Summer Off-Peak	$ 0.12596	$ 0.06662
Summer Critical-Peak	$ 0.12596	$ 0.21075
Demand Charge:		
Non-Summer	$ -	$ -
Summer	$ -	$ -
Power Cost Adjustment:		
All Energy	$ 0.00600	$ 0.00600
Revenue from Rate	$ 1,567	$ 1,388
Change from Previous		-11.4%

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 starting in 2018
- **Elkhorn Public Power District** – 2018 mandatory residential demand charges
- **NorthCentral Public Power District –** Mandatory planning implementation in 2019
- **Burt County Public Power District** - Mandatory planning implementation in 2019

Implementation

- Polk County 4 years of implementation has received no calls from customers but two requests from city councils to discuss demand charges
- Cornhuskers (6,000 customers) and Elkhorn's (15,000 customers) recent implementation has resulted in each receiving two phone calls
- All utilities commented that revenues were more stable

Large Midwest Utility Grid Access Charge

- Year One Objectives: Roll rate increase into customer charges and create three blocked rate design. Energy rates remained the same
- Year Two Objectives: Roll $0.01035/kWh from energy into the customer charge and create a fourth block between 2,000 and 4,000 kWh usage. Energy rates reduced by $0.0135/kWh

*Customer's block is determined based on customer peak demand for the year

	Rates	Year One	Year Two
Customer Charges			
Between 0 - 500 kWh	$ 11.83	$ 13.50	$ 17.32
Between 501 - 2,000 kWh	11.83	$ 16.90	$ 23.63
Between 2,001 - 4,000 kWh	11.83	$ 16.90	$ 37.37
Equal to and above 4,001 kWh	11.83	$ 31.40	$ 64.34
Energy Rates - kWh	0.10160	0.10160	0.091248

Roof Top Solar Rate Strategies

- Net Metering
  - Initially implemented to promote the installation of customer installed solar generation
  - Created a cost shift
- Net Billing – Wholesale Value for Excess Generation
  - Used by many utilities
  - Cost shifting still occurs due to inaccurate residential rate structures (Appropriate Customer Charges, Demand & TOU)
- Buy All; Sell All
  - Used by utilities to fully recover costs from customers installing solar generation without modifying all residential rate structures
- Creation of new rate class for solar customers
  - Used to fully recover costs from customers with solar generation

Residential Charges; Comparison of methods

	Net Metering	W/O Net Metering	Net Billing	Buy All; Sell All
Meter in	**600**	**900**	**600**	**600**
Meter Out	**500**		**500**	**500**
Production from Solar Unit	800	-	800	800
Customers Usage	900	900	900	900
Customer KWH Usage for billing	**100**	**900**	**600**	**900**
Utility Rates				
Facilities Charge	$ 9.00	$ 9.00	$ 9.00	$ 9.00
Energy Rates KWH				
First 500 kWh's	0.08000	0.08000	0.08000	0.08000
Excess kWh's	0.12000	0.12000	0.12000	0.12000
Power Cost Adjustment	0.01000	0.01000	0.01000	0.01000
Solar Compensation Credit per kWh	0.065	0.06500	0.06500	0.06500
Customer Charges				
Facilities Charge	$ 9.00	$ 9.00	$ 9.00	$ 9.00
First Block Energy (kWh) Charges	8.00	40.00	40.00	40.00
Second Block Energy (kWh) Charges	-	48.00	12.00	48.00
Power Cost Adjustment	1.00	9.00	6.00	9.00
Solar Compensation Credit			(32.50)	(52.00)
Total Charge	**$ 18.00**	**$ 106.00**	**$ 34.50**	**$ 54.00**

Utility Rate Design Objectives

- **Fairness to Customers**
  - Cost of service based rates
  - Send appropriate cost-based price signals
  - Rate Simplicity
- **Promote Economic Development**
- **Community Social Objectives:**
  - Impacts on Low Income Users
- **Environmental Objectives**
  - Promote Carbon Free Resources
    - ➢ Utility Scale Renewable projects
    - ➢ Roof Top Solar
    - ➢ Reduce Energy Consumption
  - Promote Electric Vehicles
- **Maintain a Financial Stability of Utility**
- **Stable rates for customers**
- **Provide customers greater control over rates**

Rate Strategy and Transition Plan

- Understand impacts on customers
- What costs to recover in demand charges?
- Should rate be opt-in; opt-out or mandatory?
- Should rebates for enabling technologies be provided?
- How to educate customers on demand charges and time of use?
- What internal education is needed?

Implementation Method Considerations

Opt-In, Opt-Out, Mandatory

- Opt-Out: Customer has to intentionally opt out of rate and choose another - most customers stay in rate provided by utility
- Opt-In: Customer will choose if saves money based on current usage patterns. Win for customer, loss for utility

Customer Education

- Bill Inserts
- Quarterly Newsletters
- Including usage on bill prior to implementation
- Newspaper articles
- Website
- Include instruction on how modifications can save money