Fundamental Basis for Determining Value and Direction in the Electric Energy Industry

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Price to Utility Customers via Tariffs

• Utility Tariffs provide recovery of costs incurred by Utilities
• Costs include:
  ▪ Fixed Costs of “Prudent” Investments over Useful Life
    • Return of investment (depreciation)
    • Return on investment (interest, equity return)
    • Income taxes
    • Property taxes
    • Maintenance
  ▪ Variable Costs
    • Accumulated Power Costs
      – Fuel costs specific to owned plant operation
      – Purchased energy when deficit
      – Less Sale of Energy beyond domestic load
    • Operating Costs
  ▪ Utility operating costs
• Allocated to customer groups based upon relative “Cost of Service”
Prudence is determined by the regulatory authority to allow for cost recovery.

Consistent with the intent to minimize customer costs – hence the lowest cost alternatives to satisfy customer demands (termed least cost revenue requirement).

Historically, anticipated customer energy that required supply was assumed to be unaltered by price (inelastic). Not Valid Today

Given the lowest cost of serving customers was achieved and customer consumption is indifferent to price, the greatest customer value was achieved.
Customers Become Involved

• Technology is changing the landscape
  ▪ Information flow and Communication
  ▪ Development of devices that can react to prices

• Supply options and volatility of clearing prices resulting from mix of supply
  ▪ Renewables
  ▪ Distributed generation
  ▪ Supply alternatives

• General acknowledgment and adoption of customer choice
Industry Approaches
Market Fundamentals

Preference for consumption corresponding to price – reflects Customer Indifference Price
Value = Indifference - MCP

Incremental cost of supply
- **Near-term** > variable costs; positive value contribution
- **Long-term** - incented by positive cash flow to investors

**Market Clearing Price (MCP)**
Level at which cost of incremental supply equals price level of indifference to higher demand
The Basics - "Why It Matters"?

Customer is King! Decisions are made corresponding to his demands.

Supply Options?

Transmission Options?

Distribution options?

Prices; tariffs, incentives?

Demand Response Actions?
Utility Planning Aligns with Market Perspective

- Aligned - both address forward looking costs and attempt to establish the most competitive method of serving customer demands

- Utility planning, historically has assumed demand unaltered by price, but as previously described is out of touch with current reality

- Market prices are the equivalence of true “avoided costs” that include the volatile timing of supply and demand options; hence inclusive of incremental cost or opportunity value
Supply/Demand Equilibrium in the Electric Energy Industry

Resource Supply Stack
- Increasing cost of supply
- Near-term ~Marginal Variable Operating Cost
- Long-term supply incented by cash flow

Market Clearing Price (MCP)
(alias: opportunity cost, utility avoided cost)

Consumer Consumption:
- Non-discretionary load
- Discretionary Load
  - Consume/Decline
  - Defer Consumption
Decisions Needing Market Perspective

Regulated Utilities
• Existing investments
• Rates based upon regulated tariffs
• Future supply decisions
  • Generation/Distribution/Control

Customer Loads and Options
• Many diverse uses
• Available Choices
  • Consume energy
  • Timing of delivery
• DER (Distributed Energy Resources)
The Basis for Decisions that Optimize “Value”

A single metric to apply to all decision making

Market Competition Drives Economic Benefits to Consumer Level

Higher Profit Margins

Lower Consumer Prices
Dynamics of Metric Providing Industry Direction

- Election of Alternatives *Dynamically* changes Prices and Value of Potential Alternatives
- Important to adopt the “low hanging fruit” ahead of less effective alternatives
- As adoption occurs, the market will saturate, whereas continued development is diminished
Walking Through the Mire

The Good

- Adoption of market price incentives aligns supply and demand, providing value to both customers and comparative basis for supply
- Avoids election of non-economic alternatives
- Provides added value for renewables – increases demand corresponding to increased supply; hence higher prices than without change in demand

The Bad (hurdles)

- Problematic issues facing Electric Energy Industry to adopt open, transparent market (price determination, communication, volatility, grid stability etc.,)
- Current Utility pricing to customers is far from providing appropriate economic signals to incent customer behavior

The Ugly (obstacles)

- Market pricing re-aligns value to investors of existing infrastructure investment
Concluding Remarks

✓ **Greatest value** achieved when supply/demand options selected based upon *clearing price metric*

✓ **Dynamics**

✓ **Current Wholesale Clearing Prices**
  ✓ Current prices communicated in some wholesale markets
  ✓ Future prices forecast using *Market Simulation Models* that include supply/demand alternatives.