Technology and Non Price Influences

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In Home Solutions With End Use Controls  
(Preferences / Portals)

Two Pilot Regions: 32 Homes/ 5 Solar PV & 98 Homes/ End Uses Only

“I know what I use and might save, but now I can also set schedules.”
Use Of Modes, Not Price Directly With EE and DR As Implicit Options

“We can set our home and appliances based on when we are there or not”.

Source: Lixar
Advances Load Management Ability
Dynamic Dispatching Results

Dispatch end uses real time to mitigate solar risk, levelize peak load

Test 1: Opt in to “help grid efficiency” (42%)
Test 2: Opt out of auto-checked box (6%, nets 94%)
Test 3: CRM phone call, then opt in (42% to 52%).
No price signal or price credits.

No one noticed real time dispatching, yet pilot results were 9% to 20% demand savings.

Dynamic Dispatching on Transformers
Dynamic Dispatching Results

Total Demand, July 29th, 5:00 p.m.

Net Peak Reduction For the Hour (~10%)

Not flat because of a focus, in this case, on marginal cost, and respect for minimum appliance run times.

Afternoon Solar Volatility
Extending Dynamic Dispatch To Simulation
Peak Day Scenario in July for a Circuit

Baseline kW (per minute) for Simulated Circuit (~10 MVA)
Peak Day Simulation
Dynamic Dispatching With 10% Share of EVs

Peak Load Expanded/Shifted By 10% EVs Adopted
Stylized Peak Day Dispatching Operation
With EV, AC and WH.....Just To Show What’s Possible

Dynamic Dispatching May Enable More Efficient Baseload (e.g., clean coal, nuclear)

Generation Costs

Heroically assumes All 10% Smart Charge

Dynamic Dispatching
AC 2 to 5 degrees (40%)
WH 1 to 4 hours (40%)
SmartCharging (10%)
Clearly, pricing credits exist
But w/ customer convenience
Pilot Evidence On Price (in)Elasticity?
Duke Energy CPP Pilot Results Mirror Others

National results similar to Duke Energy.
(~500% ratio, ~10% reduced) **2% elasticity !!**

**Typical Price Elasticities**
- Residential: 8760 ~ 10% (8760)
- Commercial: ~ 10% to 50%
- Industrial: ~ 50% to 100%

Yes, some sectors are price sensitive, but not residential, and clearly not for the Top Peak Hours when we need it the most.

**What makes demand so inelastic?**
(comfort, convenience, control, certainty......nonprice)

Better To Spend on Marketing Acquisition vs. Price Credits?

In Duke Energy pilots:
Got 13% more participants for 50% more price credit on AC, and 1% fewer participants with 35% price decrease.

Source: Freeman, Sullivan $ Co.
Even Where Price Does Matter, Its Influence May Narrow With Increasing SG Options

With enough MW and hours, SmartGrid customers might be price setters more than supply side.

Price based solutions will be increasingly less influential, as SmartGrid succeeds.

Policy Concern: Where non-regulated, home solutions succeed, aggregations of end uses may “game” the ISO real time price signal. Utilities may be eager to go behind the meter, then, to mitigate risk via “end-use hedging”.

Non price factors may be the cheapest way BELOW $75/KW

IRP runs for range of forward market prices and hourly weather conditions. Value is delta revenue requirements in KW value, for the hours deployed.
What SG Behaviors Has Duke Energy Seen?
Increased Customer Knowledge and Control Does Not Guarantee Conservation

Energy increases were just as common as energy reductions. Perhaps we see now why some vendors claim savings up to 40%. Sure, that is the max, but there is a bigger story underneath this.

Why the INCREASED use?
Were inefficient homes
High bill volatility
Older home > 25 yrs.
Income > $75K

Clearly, customers differ.
Need to target different solutions to different customer segments.
Inefficient Customers Are “Worth” More, Higher Avoided Costs
To Accurately Value DSM, We Need To Value Weather & Markets

Source: DSMore
...how can we target better?...to get higher value...

**High Users** = Green (uses a lot, but may have efficient building)
**Energy Losers** = Yellow (inefficient, with higher kwh/degree)
**Red** = Both

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**Targeted Energy Recommendations**
- More efficient HVAC
- Insulation
- Infiltration

**Targeted Energy Recommendations**
- Lower Temp Set
- Lighting
- Pool Temp Set

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Added Worry: High income customers also like EV fast charging (corr = .3). Convenience trumps Cost, again.
In Sum, Non Price and Price Both Matter

Some search for rational price solutions

Others look to anything BUT price?
Product, Place, Promotion
Person, Positioning, Process
People (sales), Packaging, & Price
Reinforcement (ads), social modeling,
Norm, shame, experts, friends, kids
Operant conditioning, signage,
“Set it, Forget it”, Occupancy Sensors

Implies: Real Time System Price May Be “Half of the Solution”
Single system average price, sent by utility, always subsidizes half the customers. And at least some (half?) of customers are inelastic, responding mostly to nonprice factors. Including these customers in our energy markets might just lower the ISO price BELOW the cost of “iron in the ground”, and be more reliable.