



**A SUCCESSFUL
“PILOT” NEEDS A
WELL-DESIGNED
COCKPIT**

**PANEL: LEVERAGING
SMART METERS TO BENEFIT
LOW-INCOME CUSTOMERS**

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6/7/2016

About DEFG

We are a management consulting firm, specializing in energy, and focused on retail energy consumers. We identify opportunities to create value in a commodity marketplace

Our clients participate in our collaborative research groups. We help refine customer strategy, improve customer service and create innovative customer programs

- Demand & Energy Technology Research Consortium
- Utility Customer Research Consortium
- Low Income Energy Issues Forum
- Prepay Energy Working Group
- ABACCUS

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How would I define “a successful utility customer”?

- A successful utility customer receives the electric service she wants
- A successful utility customer selects from a mix of services that satisfies her *lifestyle*
- A successful utility customer understands what she is buying and its cost
- A successful utility customer can afford her electric service
- A successful utility customer feels that she is receiving a value that exceeds the cost

Please note that lifestyle is not a high-income customer concept. Everyone desires and deserves a certain mix of reliability, quality, convenience/ease of use, control, peace of mind, etc., and to have the preferred mix balanced against what she can afford

- How is success possible? How do we leverage smart meters?
 - Digital data and communications platforms
 - *Distributed energy* opportunities and choices

**“Designing
the cockpit”**

Please note that distributed energy includes a range of energy services, including end-use energy efficiency, control of devices, pricing, renewable energy generation, storage, ...



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What's wrong?

For too many years ...

For too many years, we have focused on the commodity

- Too many electric industry stakeholders have a habit of describing the electric industry in pure commodity terms, and that language is detrimental to customer-focused reforms
- Regulatory commissions focus on cents per kWh; but total bills matter more
- Energy efficiency advocates have long argued that consumers want *end-use services*, not the *power commodity*
- Technological change and evolving consumer preferences have put *every regulatory commission in the US* in the position of *overseeing electric industry restructuring*, regardless of whether they acknowledge these changes or use that phrase
 - 21st century consumers want choices, convenience, mobility and control
 - 21st century technologies make distributed energy resources more viable
 - One-size-fits-all residential tariffs can no longer effectively satisfy consumer needs
 - Jurisdictions that do not acknowledge a need for change are probably doing a poor job
- Regulatory commissions ought to study consumer preferences and develop a strategic vision for residential electric service (and in particular, **a strategic vision for low- to moderate-income customers**); they must align their public policies and regulations with their strategic vision

From a focus on commodity → to a focus on what?

From	→	To	
Commodity		Service	No one wants gasoline. It's a dangerous commodity. As soon as I can purchase an electric vehicle, I will abandon gasoline
Tariffs		Offerings	Tariffs treat everyone in a customer class the same, but people differ; some people would like to choose among different offerings
Customer Class		Individual	Requiring everyone to pay the same (average costs allocated by formula) sounds equitable, but it may be unfair to people who are not average or median customers
Cost		Value	Bulk power costs vary, but power market volatility has little to do with the value of an end-use service for any person at any given moment
Load		End Use	Consumers value end-use services; utilities allocate costs to loads
Dependency		Autonomy	It has been a century since we started paying for power after we use it, yet customers don't know the cost of operating each device yesterday
Centralized		Distributed	The Internet of Things (IoT) is recent terminology for changes that have been occurring since the end of WWII (see <i>Small is Beautiful</i> , 1973)
Mandate		Choice	Choice is empowering; people want control; people need tools to take control over their own lives, including their household utility budget

For too many years, we have thought that customers need more training/education to better understand the commodity

Too many utilities are trying to “make excellent customers” when the real problem may be the existing customer experience (bills, charges, rate designs, payment processes, etc.)

Are we training pilots? Or designing cockpits?

During World War II, the United States military was troubled by the recurrence of “wheels up” crashes: after landing, pilots would retract the wheels instead of the flaps. ... Lieutenant Alphonse Chapanis was a psychologist by training, ideally suited to get inside these pilots’ heads. Why were they so careless? Were they relaxing too soon, thinking they could “let go” after a stressful mission? Was it a problem of training?

One clue quickly surfaced: the problem was limited to bomber pilots, those flying B-17s and B-25s. Transport pilots did not make this mistake. This clue helped Chapanis break free of his own biases. He decided not to look inside the pilots’ heads but instead inside their cockpits. In these bombers, the wheel controls and the flat controls were side by side and looked nearly identical. Transport planes, by comparison, had very different controls. What separated the bomber pilots from the transport pilots were the cockpits. One type of cockpit made it too easy to make a mistake.

The experience transformed how cockpits are designed. Chapanis and others came to realize that many pilot errors were really cockpit errors. Until then, the focus had been on training pilots and ensuring alertness, on producing “excellent pilots” who made few mistakes. (*emphasis added*) But Chapanis’s conclusions changed this. Of course pilots must be trained; of course you must select for the best. But no matter how well you train them or pick them, they will make mistakes, especially if put in confounding contexts.

Error is inevitable, but accidents are not. A good cockpit design should not facilitate mistakes and, more important, should prevent errors from becoming tragedies.

Sendhil Mullainathan and Eldar Shafir (2013) *Scarcity*, Chapter 8, Improving the Lives of the Poor

For too many years, we have had very limited interactions with customers in nearly the worst possible way

*If after-consumption monthly billing of poorly-understood commodity units is such a great idea, then let's apply it to groceries!**



- Meet my family. We have a monthly grocery budget of \$300. We shop weekly and locally
- We select items—usually 50 per week—and put them in our cart. No prices are marked on any item in this store! We check out. The grocery clerk assures us that an accurate bill will be mailed at the end of the month
- After four weeks—and much concern—we receive a \$400 grocery bill. There is no itemization, just a total monthly bill plus a note that “204 items were purchased this month.” (We “ate too much.”) We are given several weeks to pay, so we pull money from next month’s budget
- We repeat this, reducing the number of items each week from 50 items to about 45 items. The next bill is \$350
- We are offered payment arrangements and sent to a social service agency. We feel that we’ve failed. If we cannot pay, we will not be allowed to buy groceries until we pay the past due amount

Which part of this process—for one of life's necessities—makes sense?

* This is sarcasm.



2

What are we doing today?

And what can we do better?

Long-standing types of low income customer assistance

Reduce Their Energy Use

- Weatherization
- Technology-based programs (direct install; incentives)
- Energy education and outreach

Help with Budget Management

- Payment arrangements
- Referral to financial management services

Discount Their Tariff

- Percentage discount to the tariff
- Percentage of income plans

Provide Money or Write Off Debt

- Customer-funded universal service; shareholder donations
- Income-based utility bill credits (LIHEAP)
- Targeted assistance (seniors, disabled, veterans)
- Emergency assistance (temporary financial crisis)
- Bill credits to avoid disconnection
- Arrearage forgiveness for consistent payment

Keep Them Connected

- Weather- or calendar-based restrictions on disconnection

Long-term consequences of certain programs

Current situation

- Universal service programs, utility bill assistance and restrictions on disconnection each has merit to ensure that everyone has electric service, however, ...
- Dependency is reinforced with people saying “there is nothing I can do to control my usage” or “there is nothing I can do but pay my utility bill”

Customers: the unused “resource” of the future

- Low-income consumers exhibit initiative, resilience and determination in almost every aspect of their lives, but they may not know how to manage utility service
- Low income consumers could be among the most engaged, price-responsive, and usage-conscious customers on the utility system, but they lack tools

In other words, we need to redesign the cockpit!

With the right tools, low income customers may prefer ...

Budget- & payment-related choices

(ability to decide when to pay, where to pay, how to pay, how much to pay, etc.; the ability to avoid security deposits or the extension of credit for utility service)

Communication choices

(ability to choose what information to receive and when and how to receive information regarding billing, alerts, outages, restoration, usage, etc.)

Price-risk choices

(ability to make tradeoffs regarding the management of energy prices; pay a premium for price-risk-management or not)

Load control & time-of-use choices

(ability to interrupt service or a device during certain periods; the ability to alter the timing and patterns of use during the day, week or month)

Distributed resource choices

(ability to invest in on-site power production, storage, and other technologies that alter the level and types of service)

Energy efficiency choices

(ability to access energy efficiency-related options)



3

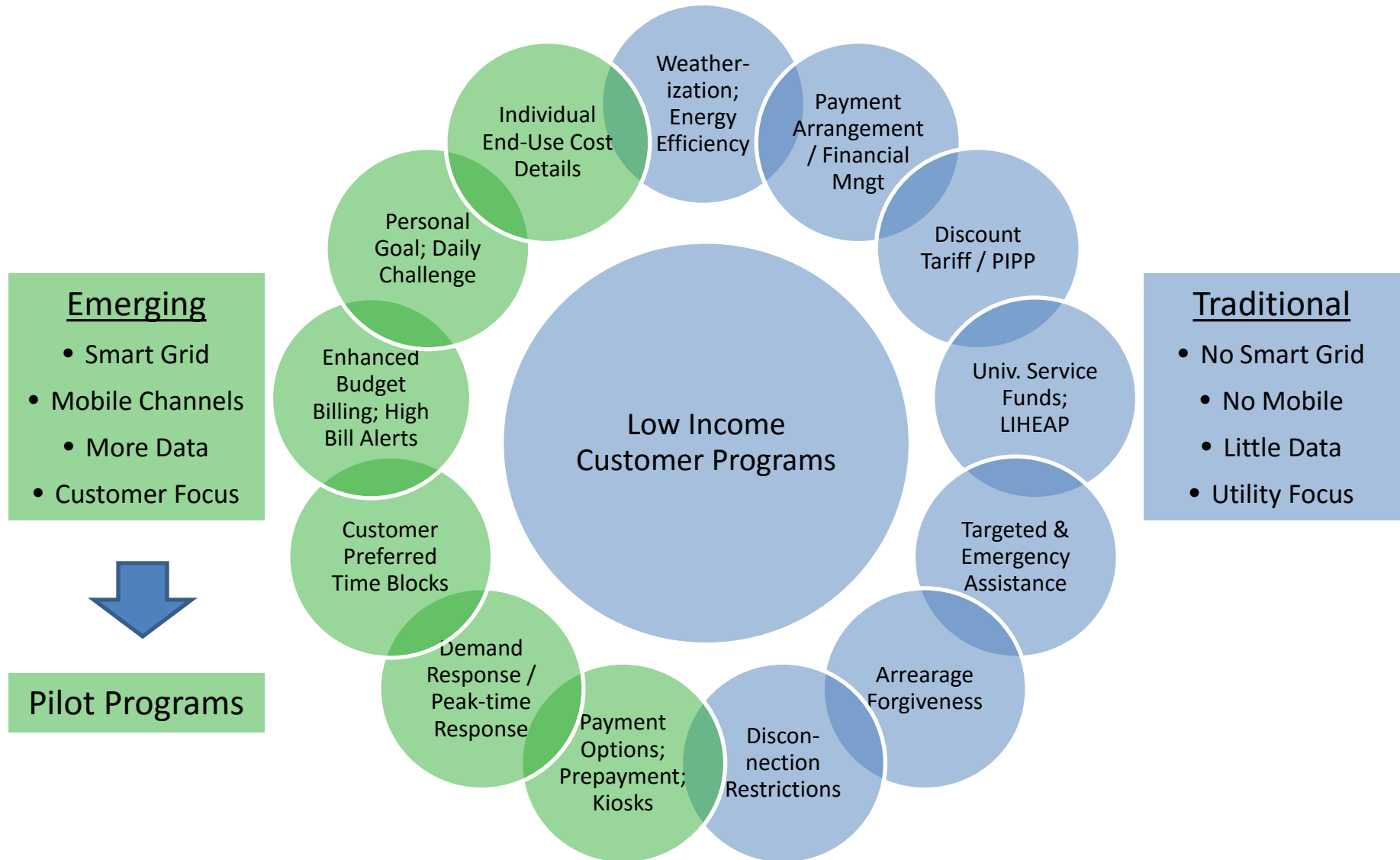
How do we leverage smart meters?

*(customer initiative and determination) +
(the right tools) = (control and savings)*

Six opportunities to leverage smart meters

1. Payment Options: Tap into the pervasive consumer preferences for choosing when, where, how, and how much to pay; convenience and control (e.g., kiosks for frequent payments)
2. Demand Response / Peak-time Response: Engagement leads to conversations about peak periods, and alerts regarding extreme weather, high costs or potential system outages
3. Customer Preferred Time Blocks: Let consumers determine when they want discounted power costs, what they can shift and when they can shift it to; utility should move to a reactive role → a focus on the value of any changes in consumer behavior
4. Enhanced Budget Billing / High Bill Alerts: Connect budget billing transactions to other services; facilitate savings/control; offer personalized and predictive planning
5. Personal Goal / Daily Challenge: Personal goal setting coupled with daily communications about performance, bill projections, budget management and incentives
6. Individual End-use Cost Details: Frequent communications about the cost of operating major appliances (shift away from engineering estimates of average costs (conservation tips); move to personalized costs of actual appliances and household behaviors)

Emerging programs to leverage smart meter data



Low-income customer pilot program concept: The “Dollar-A-Day Challenge” (personal goals; daily challenge)

The Setting

- Commonwealth Edison wanted to target customers who were recurring, above-average recipients of grants (between ~\$700 and the maximum allowed \$1500 every two-year cycle)
- The utility’s goals included: 1) lower the need for cash assistance (stretch limited assistance dollars), 2) lower the customers’ energy consumption (“get customers to a better place”; improve cash management and household budgeting; get them out of a debt cycle), 3) reduce the utility’s operating costs, and 4) realize the full return on smart grid investments

The Concept

- DEFG recommended an “enhanced transaction” to leverage new smart meter data and create a new, daily transaction between the retail consumer and the utility
- DEFG believed that behavioral change and an improved customer experience would result from the appropriate enhanced transaction
- Enrolled customers set a savings goal, receive daily communications about their performance, and receive daily incentive payments based on performance
- Daily information begins a process of self discovery—customers taking responsibility to understand the usage drivers in their households

Where did we get these ideas? What drives behavior change?

Consider a sample daily text message to a customer with a prepaid electric service account

“UTILITYNAME (10/24 - 11:59PM): You have \$13.94 (5 days). 29 kWh (\$3.03) since last read. Rate: \$0.330/Day, \$0.090/kWh. Payment #ACCOUNTNUMBER”

The prepaid service customer pays close attention to the daily balance and conserves 10-15%

Regardless of what you think of prepayment as a tool, here's what's happening:

1. **Communication**. Customers see yesterday's usage, costs, account balance and price—four pieces of information that are timely, relevant, consciousness raising—and can associate these with yesterday's household behaviors (information you can act on)
2. **Currency**. Daily transactions in dollars and cents are more readily understood than the kilowatt-hours; dollars convey value; e.g., dollars = days; (kWh might as well be a fiction to the typical consumer); consumers associate dollars spent yesterday with appliances used yesterday
3. **Commitment**. Creation of an account balance—your money held by another party for a particular future use—increases commitment and encourages responsibility
4. **Clarity**. Simple, straightforward pricing builds trust (contrast this with the complex line-items required by a regulatory commission; these line items reduce transparency and increase confusion when displayed on a monthly bill)
5. **Choice**. The ability to choose—even between two items—is empowering; the choice of prepayment increases commitment; consumers are motivated to discover their particular household behaviors that drive usage; consumers manage usage in a way that suits their household situation; consumer authority, autonomy and control can increase

We can't completely redesign the cockpit

While we can't completely “redesign the cockpit,” we must make changes:

- State regulatory commissions must give utilities flexibility, latitude and permission to fail; that is, utilities must feel the need to try new things, even pilot programs that fail
- Utilities must implement pilot programs that are quick, inexpensive, measurable and customer-focused
- Business agility refers to rapidly responding to changes in the environment without losing momentum or vision; agility requires adaptability, flexibility and balance*; agile companies stamp out organizational inflexibility and define a continuous innovation culture**
- We do not associate “utility” with “agility,” but that must change

What I have offered:

- One low-income pilot program that leverages smart meters
- Five behavioral drivers of change (my “5 Cs”)
- Six topics (that leverage smart meters) to investigate through utility pilot programs
- Unlimited opportunity to participate in DEFG’s Low Income Energy Issues Forum

* HRZone. <http://www.hrzone.com/hr-glossary/what-is-business-agility>

** Zwilling, Mark, July 23, 2014 in Forbes, “Agility Is The Key To Survival In Good Times And Bad”