Circuit Based Deep Dive

Once people on Samsø started thinking about energy, a local farmer explains, "it became a kind of sport".

-regarding the Danish island that recently became 100% renewable energy powered, as reported by Elizabeth Kolbert

Immediate Problem: Some circuits on utility distribution systems are being overloaded. Historically, the least cost alternative has been for utilities to add capacity (new transformers, bigger cables, and more generation from centralized plants).

Low Carbon Solution: We will target an overloaded circuit as a model for smart meter deployment, deep efficiency retrofits and distributed generation. Choose a circuit that (ideally) meets these criteria: 1) overloading within 3 years; 2) not too large in capacity or geography; 3) diversity of customers: C&I = low hanging fruit, big EE/DR opportunities; residential = good educational & marketing potential.

Details:

1) **Agencies & Utility** launch educational & **marketing blitz** to let customers know about the challenges & opportunities of this program. Create a buzz about this exciting and forward looking experiment. The goal at this stage is to maximize participation on the circuit (voluntary for residential, mandatory for C&I ?).

2) **Utility and agencies** deploy **smart metering** on all utilities of participants and begin a comprehensive monitoring program. Gather data from each site, analyze it, then develop EE, DG, RE strategy for the circuit. Customers can access data in real time and react accordingly. *Hurdle: smart metering is being deployed extensively in CA and locally in FL, CT, OK, etc. But it is not cheap. Cost share with utilities? ARRA smart grid $$? Invite Google for presentation?*

3) **Agencies and Policy makers** target the circuit for **fast tracking** of various EE and RE programs. This helps reward the participants, who otherwise may be faced with higher electric bills due to tiered or real time pricing. *Hurdle: requires policy makers to focus public treasure in a limited area.*

4) **Customers and contractors install** thermal and electric EE, RE, CHP/DG, informed in part by 3-12 months of collected data. Put local contractors and laborers back to work (there's time for training during data collection phase). Bring in private financing in part by matching or guaranteeing with public funds.

5) **Regulators and Policy Makers** promote conservation and efficiency through **price signals**. Use tiered pricing in which increasing levels of consumption are priced at higher levels (non-linear pricing to match non-linear circuit losses). Tiered pricing is one reason California has the best EE adoption in the country. Or use real time pricing so that customers understand and react to the price peaks of the day and so that RE and CHP systems are rewarded for peak generation. Real time pricing and system loading is already available from the ISO, but could be made more

user friendly. This is a step below smart grid, where demand side actions would be automatic based on grid conditions. *Hurdles: a) public acceptance; b) legislative and regulatory approval for a bold experiment in a targeted area.*

6) **Customers** receive **awards/rewards** for best efficiency gains and RE use. A neighborly competition is induced. Metrics: kilowatt hours and therms reduced, tons of carbon avoided.

Goal: Customers begin to understand the dynamic nature of their electricity system and take pride in maximizing efficiency and generating locally *("I save $5/month by running my dishwasher on timer at 11pm"*). With smart meter technology we'll be putting the data in the hands of those that need it most. The end result, despite possibly higher per unit energy prices, is reduced consumption and lower energy bills. In the process, the circuit is more lightly loaded. By targeting a specific area and focusing our resources, we hope to build a local critical mass of interest, neighborly competition, and ultimately success. This program could provide a model for the deployment of far-reaching conservation efforts.

Abbreviations:

EE energy efficiency
RE renewable energy
DR demand response
DG distributed generation
CHP combined heat & power
C&I commercial & industrial
ISO independent system operator
CBDD guess