Advanced Metering Infrastructure

New Jersey Energy Strategy Academy

February 24, 2009

Richard Sedano

The Regulatory Assistance Project

Vermont ♦ Maine ♦ New Mexico ♦ California

About the Regulatory Assistance Project

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  - Richard Sedano was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.
- Funded by US Department Of Energy & Environmental Protection Agency, foundations, and international agencies. We have worked in nearly every state and 16 nations.
- Also provides educational assistance to stakeholders, utilities, advocates.

Smart Grid and AMI

- Evolution or Revolution?
- The business model
  - Operational savings throughout the grid
    - Tend not to justify investment alone, need…
  - Customer response
    - Consumption changes reduce system costs
    - Will utility see benefit in a choice state? If not, then?
  - How much speculative benefit is OK?

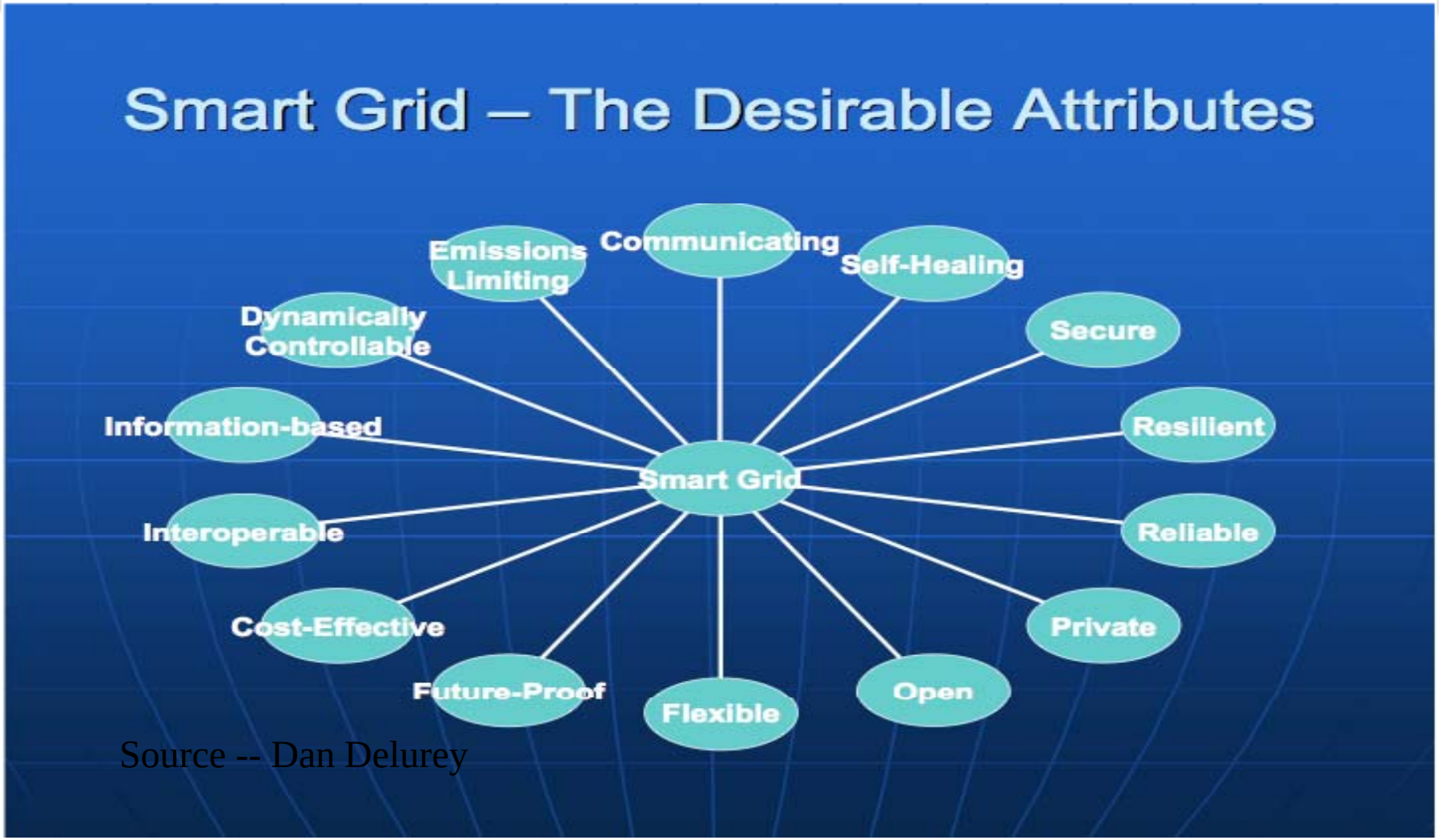
Smart Grid: Interactivity

- Two way communications and information storage and management
- Enables automated responses from devices with sensors and communications
  - Requires significant upgrade in information processing capabilities beyond just meter data management
  - Remember that people are still making choices

Customer Response

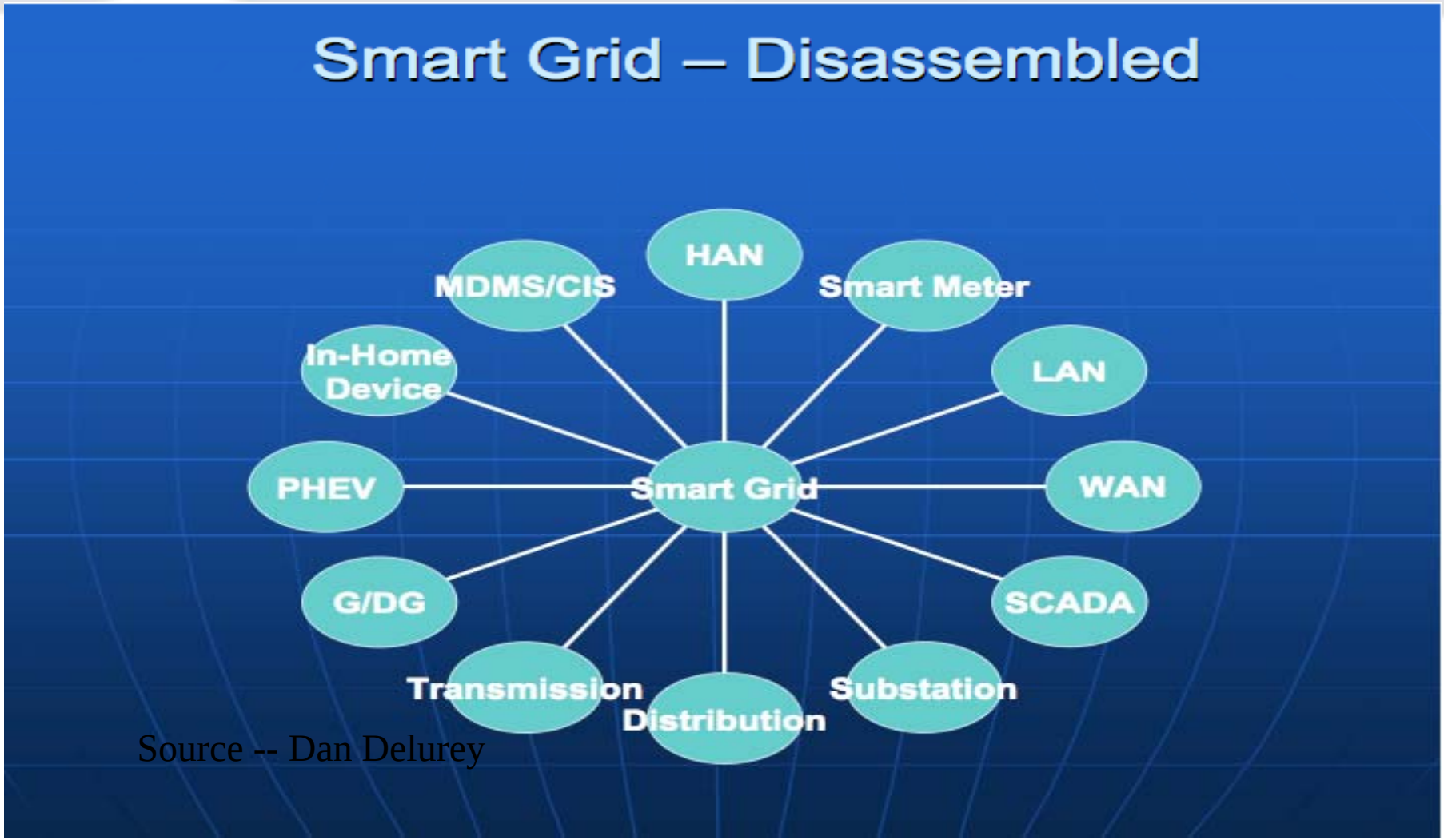
- Customer reaction follows understanding
  - How can information have meaning and relevance? Consequences for no response?
  - Response has to be easy, focus on important end uses (water heater, yes; toaster, no)
  - How many customers do you need? 5%? 20%? 50%?
  - Flat rates are dumb rates and produce little response

Smart Grid version 1
the attributes



Source -- Dan Delurey

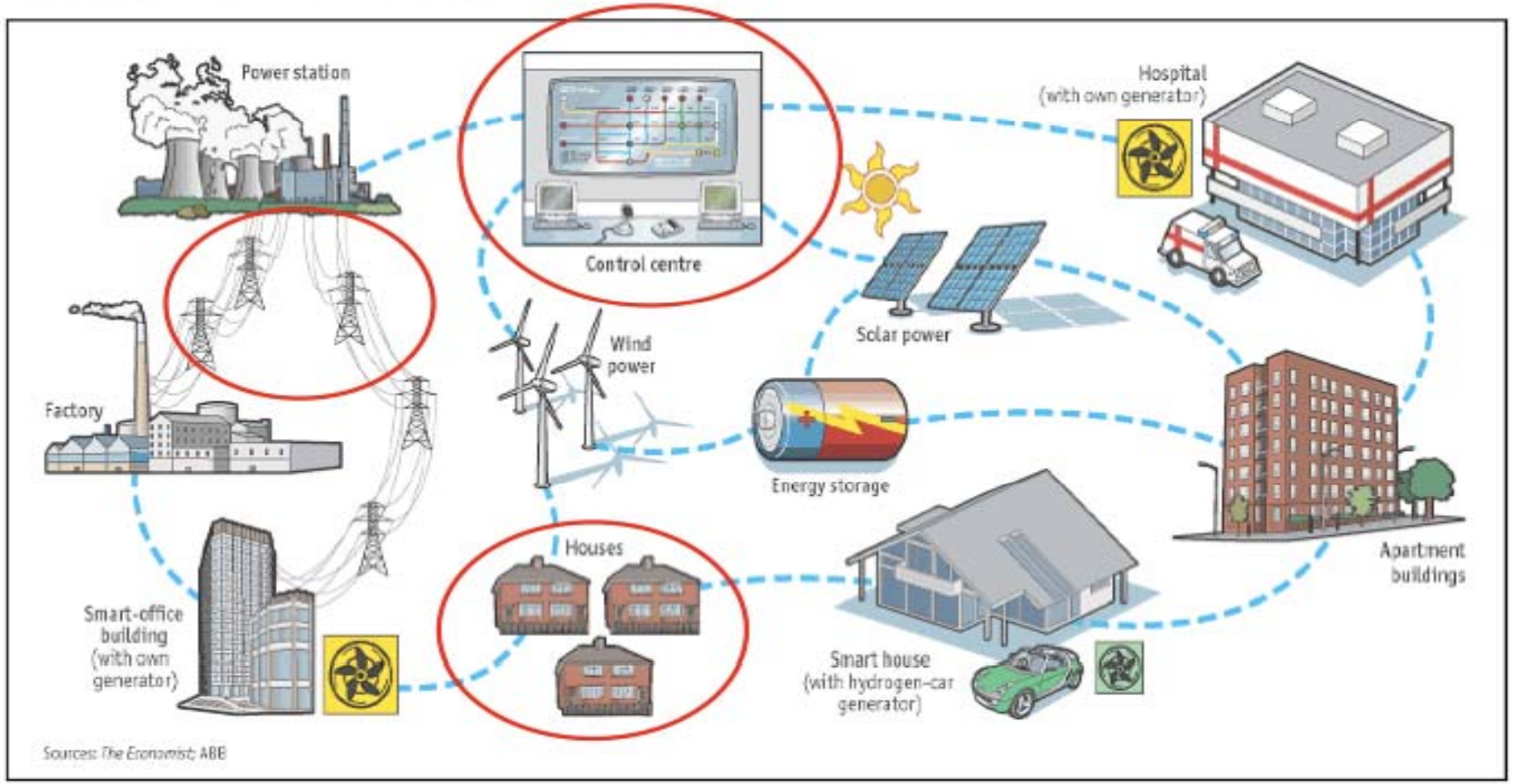
Smart Grid version 2
the pieces



Source -- Dan Delurey

Smart Grid version 3
what does 2-way mean?

Deployment Strategies



The electricity system isn't just about electricity

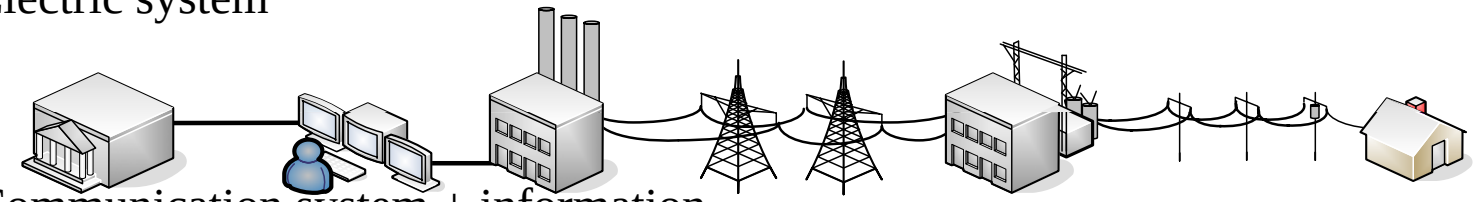
Three flows across three integrated networks:

- Electricity
- Information (**New for most regulators**)
- Money

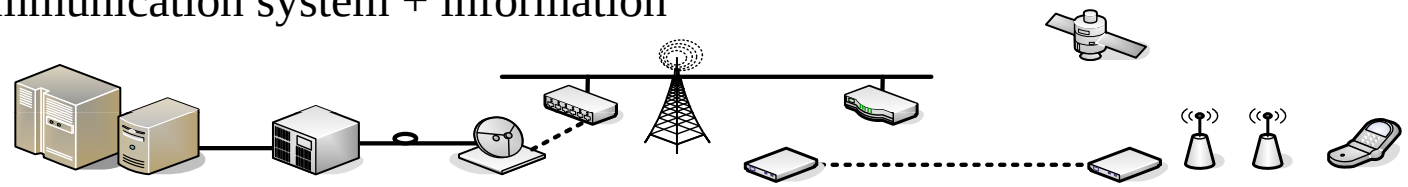
The smart grid is a way to better facilitate and manage all those flows and transactions into a cooperative, collaborative, transactive, reliable system

Smart Grid version 4
more graphics

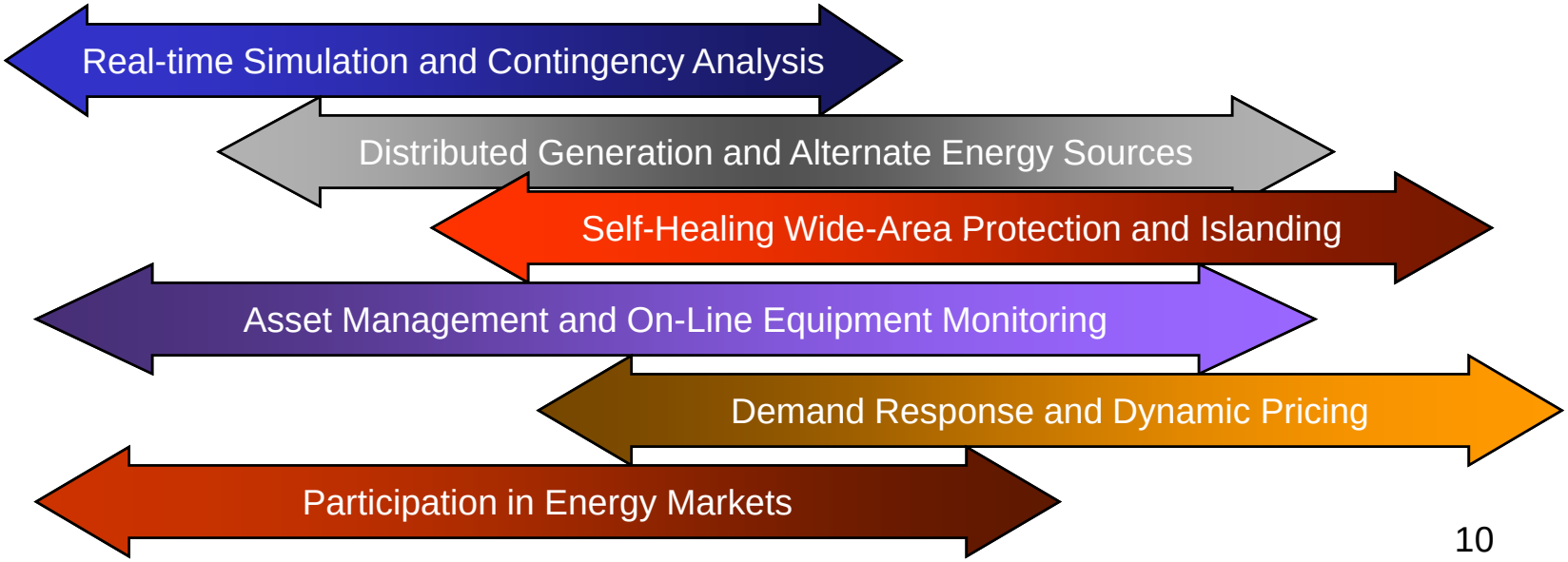
Electric system



Communication system + information



What you do with them



Strategy should drive interoperability

- Utility and customer networks, devices, applications exchanging and using information without creating interference
- Expectation of users is critical
  - Vendors will meet expectation if it is clear

Smart Grid Challenges

- Is it just evolution? Looks different to many
- Is it a paradigm shift, with price tag and transition issues to match?
- Benefits ephemeral, or emergent?
- What we do know is big money is now available from DOE for smart grid development, demonstration and deployment

Strategy should drive be careful about Optimality

- Optimality is generally thought of from the perspective of a controller.
- Essence of smart grid: multiple actors make independent decisions in a network of interrelated devices
- In the “protection” culture of regulation, is this “letting go” reasonable?

Utility Business Model for a Service Utility

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Policy Objective

- Coherence
  - Implementation elements consistent with overall policy
  - If overall policy is to avoid inefficient uses of electricity, implementation, including business model of utility, should support this policy
  - Step 1: define overall policy goals
  - Step 2: identify key implementation elements and examine for coherence

Key Policies to examine for coherence

- How does the utility make money?
- How does the utility acquire resources?
- How do customers make consumption choices?
- How can these choices be made in a unified way?

Answer this question

- Can the utility be motivated by
  - the quality of its service,
  - the efficiency of its operations,
  - the satisfaction of its customers and
  - the health of its service territory?

How can a utility make money?

- 1. Sell more volume
- 2. Reduce service without reducing prices
- 3. Sell more service
- 4. Be more efficient

1 and 3 add revenue
2 and 4 reduce cost
3 and 4 give customers what they want

Throughput Incentive and a Policy to Dampen Usage

- Throughput incentive: where the utility profits from adding consumption and so encourages sales and discourages reductions through efficiency
  - An aspect of traditional regulation
- Where added consumption is counter to policy goals, throughput incentive is a drag on success

Why Throughput Incentive is Bad

- Utility is a very important actor in motivating customers
  - A utility can motivate consumption
  - A utility can motivate efficiency
- If the policy clearly calls for efficiency, the throughput incentive will get in the way of full utility commitment to help

Solutions to the Throughput Incentive

- Decoupling
- Lost revenue adjustment
- Straight Fixed Variable Rate Design
  - This idea has so many problems I don't intend to spend time on it

Lost Revenue Adjustment also has problems

Decoupling

- A revenue per customer plan
  - Provides revenue requirement for fixed costs
  - Links revenues to cost trends
    - Base costs determined in a rate case
    - Objective: collect what would have been awarded in a rates case
  - Regulatory lag can be reduced toward zero
  - Risk reductions benefit all – factor it in

Grades of Decoupling

- Full – insulates utility revenue from any sales deviation between actuals and expecteds
- Partial – part of revenue change is insulated, part is not
- Limited – Sales adjustments due to energy efficiency programs only, so weather and economy are normalized in an extra step

Idaho (Idaho Power)

- Seen as a pilot for 3 years (CY 07-09)
  - PSC staff or company can say “quits”
- Revenue per customer
  - 54% of revenue requirement is fixed costs
- Limited decoupling
- Partial decoupling: res and sm comm
- Annual true up
  - Annual cumulative rate change capped: 3%

Idaho

- Connected to Idaho Power commitment to do energy efficiency
  - 1.5% of revenues
  - Performance incentives with penalty potential also allowed
- Initial rate adjustment was down

Vermont (third party EE administration)

- Both IOUs under a decoupling plan
- Revenue cap (forecasted for future years)
  - Dead band, adjustable for exogenous factors
  - Adjustments triggered if actual are outside
- Partial decoupling
- Earnings sharing outside a collar
- Dead band for power cost variation
- Rate change capped
- ROE adjustment

Maryland

- Full decoupling for PEPCO
  - BGE expected???
- Revenue per customer
- True up monthly
  - Cap of 10%
- ROE adjustment

California

- Decoupling in place for all three IOUs
- Revenue cap
  - Future test year
  - Attrition case captures inflation, productivity

Oregon (third party EE administration)

- Portland General Electric, 2 years (09-10)
  - Approved coincident with a rate case
  - Evaluation required, discussion encouraged
- Revenue per customer
- Deferrals at a risk free (Treasury) rate
- Small ROE reduction

Oregon PUC Order 09-020 pg 27

"… PGE does have the ability to influence individual customers through direct contacts and referrals to the ETO. PGE is also able to affect usage in other ways, including how aggressively it pursues distributed generation and on-site solar installations; whether its supports improvements to building codes; or whether it provides timely, useful information to customers on energy efficiency programs. We expect energy efficiency and on-site power generation will have an increasing role in meeting energy needs, underscoring the need for appropriate incentives for PGE."

Wisconsin Public Service 6690-UR-119

- Full decoupling
- Rules for range of under or over collection that will be adjusted and what will not
- Connect to added energy efficiency spending and other climate change policy

Other State Implementation

- Minnesota
- Massachusetts
- Connecticut
- New York

In these states, there is a recent legislative or commission directive to adopt or consider decoupling. The implementing activities are in varying stages.

Where Has Decoupling Gone Wrong and Why?

- Maine
  - Coincident with economic slowdown
  - Accumulated deferrals over two years
- Washington
  - Linked in to expensive PURPA contracts
- Both cases would have led to similar rate increases under traditional regulation but could have been designed much better

Three elements to coherent utility business model

- Solve the throughput incentive
- Positive incentives consistent with policy
- Stable regulatory foundation, especially regarding utility cost recovery (no further prepared discussion in this talk)

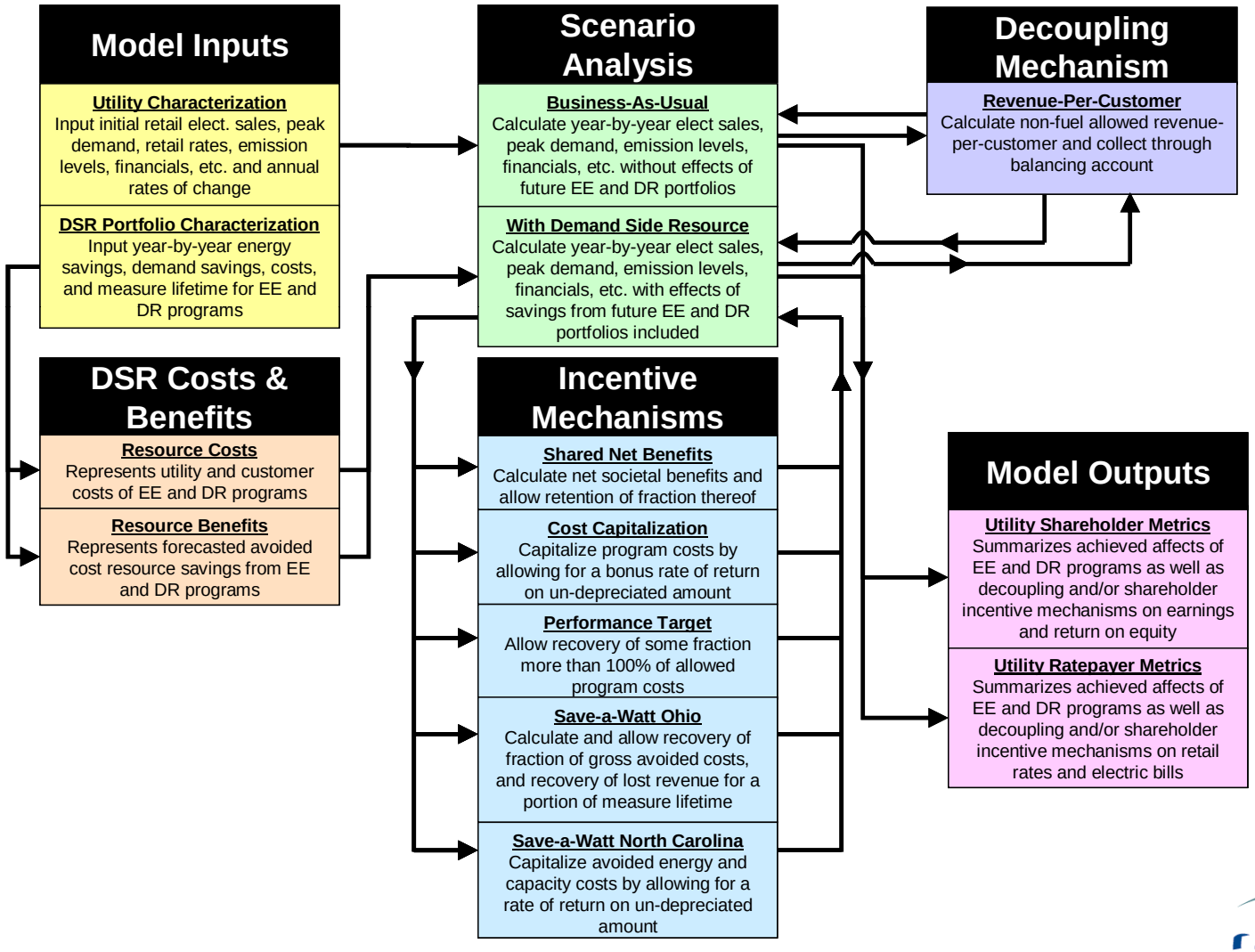
Incentives

- Choices
  - Performance bonus
  - Shared savings
  - Rate base, with opportunity for ROE bump
- Concerns
  - Total $$ compared with EE budget and rates
  - Calibrate to the right metrics
  - Regulatory asset balances

Benefits Calculator is part of the NAPEE Toolkit

- **NAPEE Benefits Calculator was designed to be a relatively "simple" tool for quantitatively illustrating major policy issues associated with implementing energy efficiency**
  - **Identification of Disincentives**
    - Short-term: Lost fixed cost recovery
    - Long-term: Reduced opportunity to expand earnings
  - **Aligning incentives to improve business case**
    - Short-term: Application of decoupling
    - Long-term: Application of shareholder incentives

LBNL Benefits Calculator Flow-Chart



Questions, Comments, Concerns

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Other important business model issues

- Rate design connected to production cost
  - Critical peak rate (as with PSEG pilot)
  - Inclining block rates
- Performance metrics
  - Reliability
  - Service
  - Energy efficiency

Thanks for your attention

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