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Utility Regulatory Models: LBNL Technical Assistance, Analysis and Tools

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DOE OE Electricity Advisory Committee Meeting

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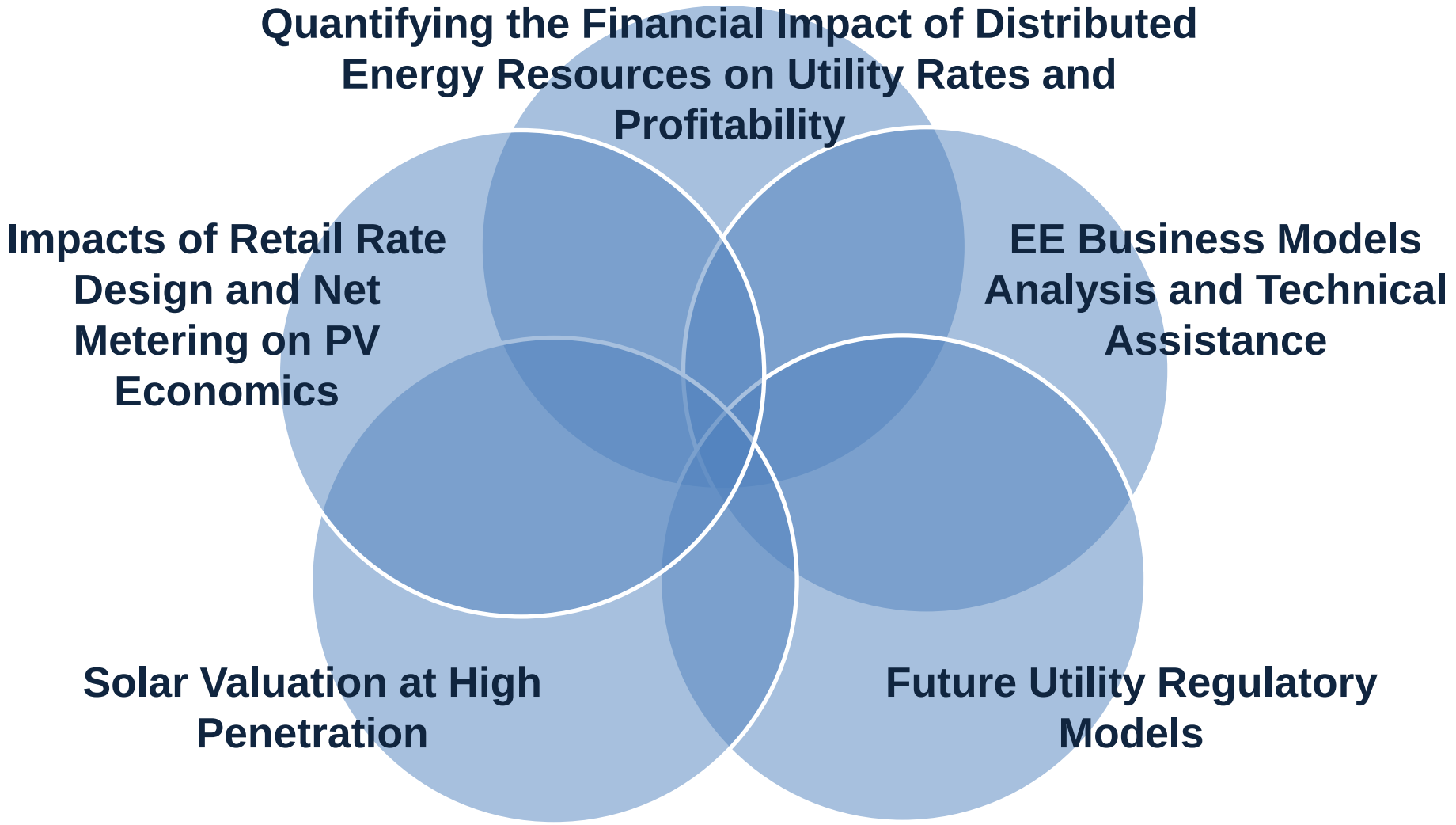
LBNL Work at the Intersection of Distributed Resources and Utility Business Models



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Impacts of EE and DERs on Utility Profitability and Customer Rates/Bills

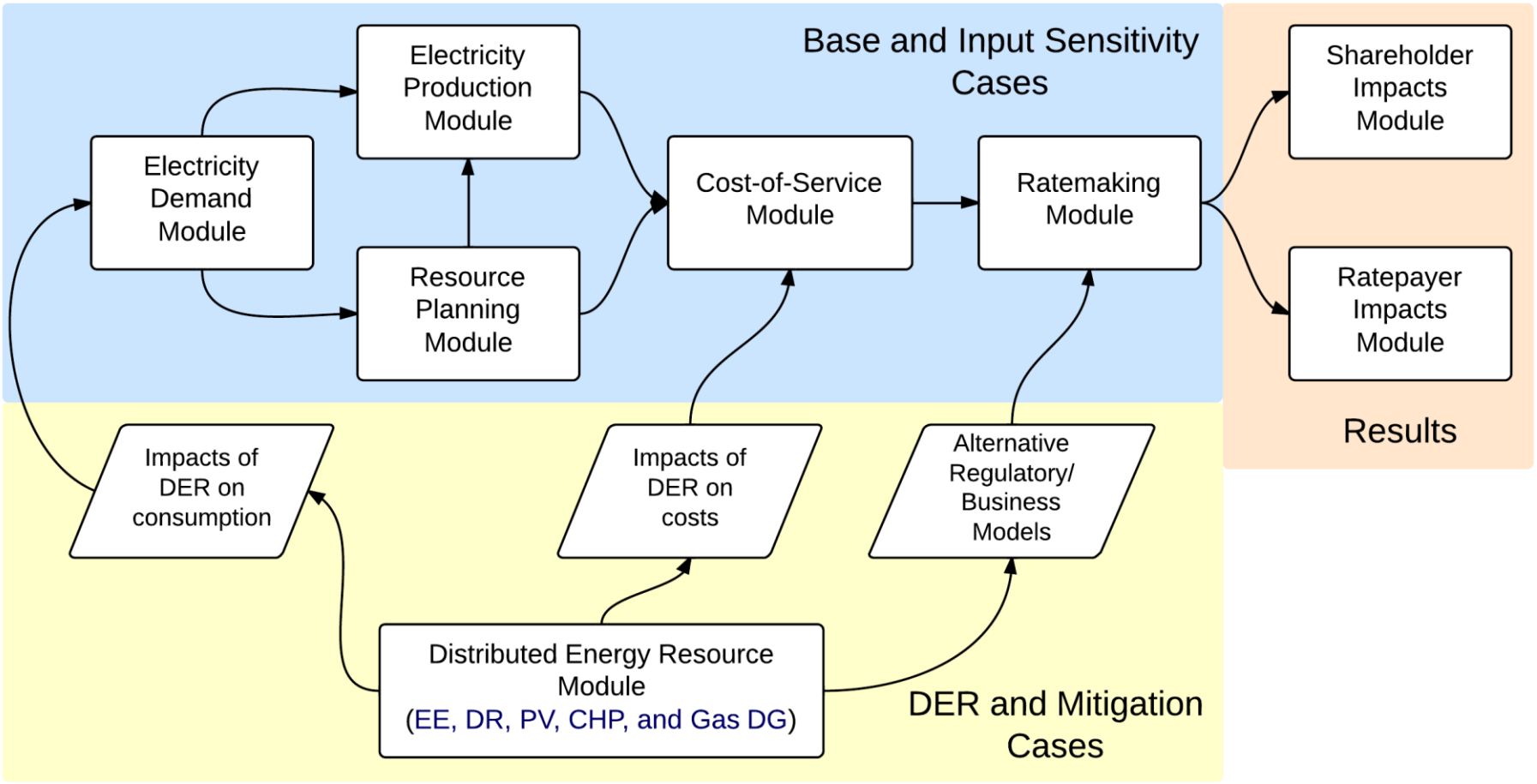
- **Context**:
  - Regulators and policymakers are considering clean energy public policies to meet environmental and other policy goals (e.g., energy efficiency resource standard (EERS), promoting customer-sited DG, increased customer choice)
- **Problem**:
  - Misalignment of clean energy public policy goals and cost-of-service regulation
  - Utilities are concerned about earnings erosion and lost future earnings opportunities
  - Customers are interested in retaining benefits of program participation and are concerned about rate increases
- **Approach**:
  - Quantitative analysis to assess the direction and magnitude of impacts of distributed energy resources (DERs)
  - Sensitivity analysis of key drivers
  - Consider efficacy of mitigation approaches (e.g., rate design, shareholder incentives)

EE Business Models Analysis and Technical Assistance

- Use LBNL FINDER model to quantify the financial impact of EE on utility shareholders and their ratepayers

- Ongoing technical assistance effort funded by DOE OE:
  - State regulatory commissions (e.g., Arizona, Kansas, Nevada, New Mexico)
  - State energy offices (e.g., Massachusetts Dept. of Energy Resources)
  - Investor-owned utilities (e.g., AmerenUE, Commonwealth Edison, Detroit Edison, APS, Tucson Electric, Kansas utilities, Nevada Power)
  - State Energy Efficiency Action Network (e.g., regulatory policy exercise)

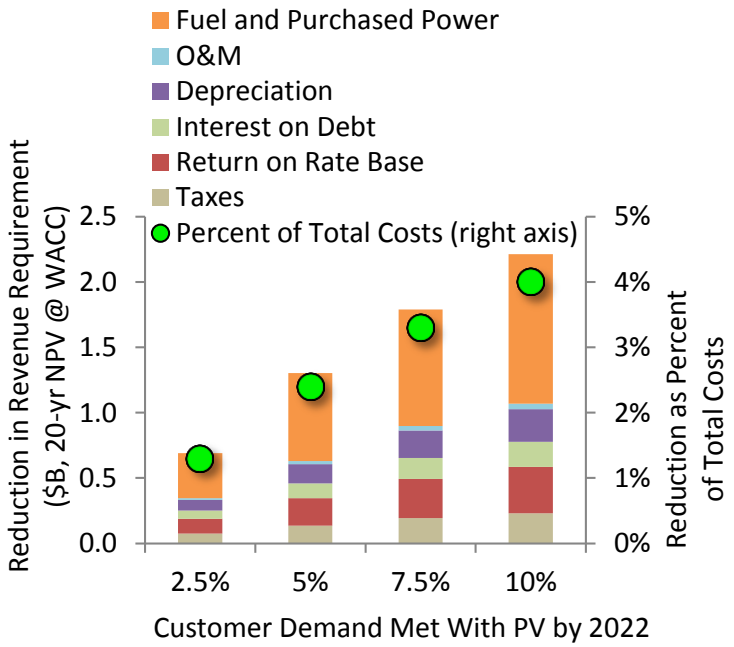
Financial Impacts of DER (FINDER) Model



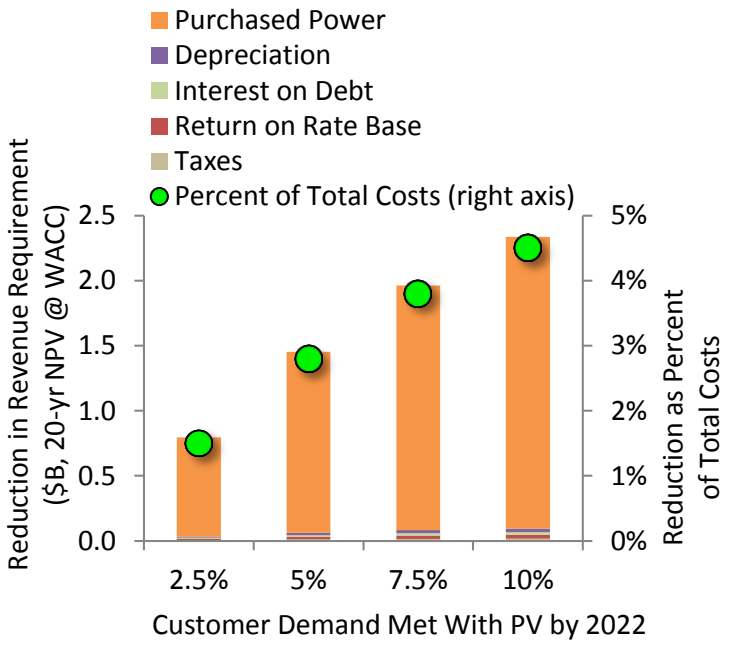
- **LBNL FINDER Model can assess participant and non-participant bill impacts, apply various rate designs at the customer class level (e.g., residential and non-residential), and quantify detailed impact of DERs on distribution system investments**

Utility cost reductions from PV

Southwest Utility



Northeast Utility



- Differences in composition of cost reductions between utilities are due to their differing cost structures: i.e., SW Utility owns generation while NE Utility procures all generation requirements via purchased power
- Assumptions related to deferral of generation and T&D investments, and to fuel and purchased power costs, are explored further in sensitivity analysis

Summary of base case results

	ROE Impacts (Avg. 10-yr)		Earnings Impacts (NPV 20-yr)		Average Retail Rate Impacts (Avg 20-yr)	
PV Penetration	*2.5%*	*10.0%*	*2.5%*	*10.0%*	*2.5%*	*10.0%*
Southwest Utility	-0.3%	-2.9%	-3.9%	-8.1%	0.0%	2.5%
Northeast Utility	-4.7%	-18.1%	-4.5%	-15.4%	0.2%	2.7%

Under base-case utility characterizations:

- PV reduces utility revenues, collected largely based on customer sales and demand, by a *greater* amount than it reduces utility costs
- Utility shareholders experience revenue erosion and lost earnings opportunities, leading to reduced ROE and achieved earnings
- Ratepayers experience increase in average retail rates, though those effects are generally less pronounced than shareholder impacts

Mitigation analysis overview

Objective: Explore the efficacy and potential tradeoffs associated with regulatory and ratemaking measures for mitigating the impacts of PV

Mitigation Measure	Revenue Erosion	Lost Earnings Opportunities	Increased Rates
Revenue-per-Customer (RPC) Decoupling	●		○
Lost Revenue Adjustment Mechanism (LRAM)	●		○
Shareholder Incentive		●	○
Shorter Rate Case Filing Frequency	●		○
No Regulatory Lag	●		○
Current & Future Test Years	●		○
Increased Demand Charge & Fixed Charge	●		○
Utility Ownership of Customer-Sited PV		●	○
Customer-Sited PV Counted toward RPS			●

● Primary intended target of mitigation measure
○ May exacerbate impacts of customer-sited PV

- Mitigation scenarios borrow from measures implemented with energy efficiency programs, though are not an exhaustive set of options
- Mitigation analysis focuses on impacts under 10% PV trajectory, for illustrative purposes

Future Electric Utility Regulation Series

- Concept papers that explore key policy and electric utility regulatory issues with increasing levels of distributed energy resources
  - Industry thought leaders will prepare concept papers; LBNL will convene and manage Advisory Group and may contribute to some papers
  - We expect to use a point-counterpoint format for some topics
- Objectives
  - Advance discussion on future electric utility regulation
  - Explore and analyze *incremental as well as more fundamental changes* to COS regulation
  - Examine proposals for new utility regulatory paradigms and resulting business models
- Multi-year funding from DOE OE National Electricity Delivery Division

Concept Papers: Example Topics

A short introductory paper by LBNL will kick off the series.
An asterisk following the topic indicates a possible point-counterpoint format.

1. Key Policy Questions: Electric System Functions, Role of Monopoly Utility, Role of Markets and Market Design

- What functions does the electric system of the future need, and how can we find the best entities to perform those roles? What are the monopoly functions that preserve the public interest in a high DER future?*
- How can state utility regulators foster competition for value-added electricity products and services while allowing utilities to play new roles?*
- Independent distribution system operators vs. open network: Which structure best aligns with a high DER future?*

2. Analysis of Incentive Regulation Models

- Performance-based regulation: How should performance metrics be designed to align with public policy goals for DER, and how can performance be measured?
- Can the U.K. RIIO model work in the U.S.?*

Concept Papers: Example Topics (continued)

3. Transitioning From Traditional COS Regulation

- Evolutionary toolbox for COS regulation: Which tools work best for regulating utilities as they evolve into wires and services companies?*
- What's the best way to recover utilities' fixed costs and meet policy goals and customer needs?*
- Risks and rewards: Should utility shareholders be exposed to more risk, with opportunities for greater returns, to motivate utilities to offer innovative and value-added DER services?

4. Reviewing Implementation Experience

- What value-added electricity services are consumer- and investor-owned utilities offering now, and what are the lessons learned, current issues and solutions?
- U.S. experience with PBR: What can we learn from the energy and telecommunications industries?

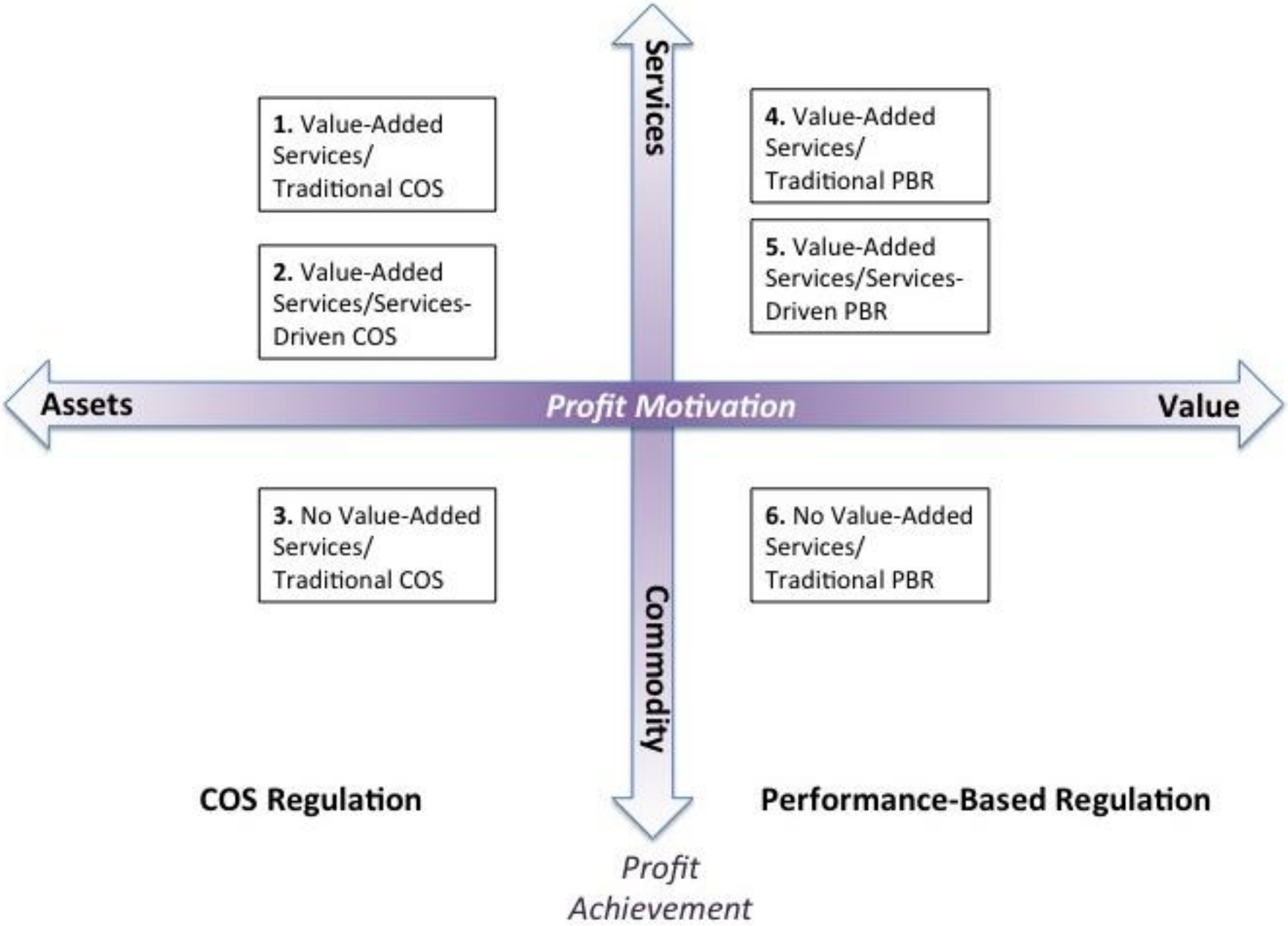
5. Discrete Technical Inquiries

- How should distribution system services be unbundled and priced?*
- How is tax code driving changes in utility structure?

LBNL Report: Typology of Utility Business Models

- Lays out a typology of utility business models in a future with high levels of distributed energy resources
  - Characterize utilities by market structure/asset ownership (vertically integrated vs. distribution utilities)
  - Describe four fundamental characteristics
    1. Profit motivation
    2. Profit achievement
    3. Role in providing value-added electricity services that enable distributed energy resources
    4. Openness of utility networks to 3rd party service providers
  - Discuss risk exposure, utility incentives and disincentives related to value-added electricity services, and transition strategies as COS regulation evolves

- Planned for release in fall 2014



Models #1-6 for vertically integrated utilities, #7-12 same but for distribution utilities

LBNL – EE Business Model Quantitative Financial Analysis

- Satchwell, A., P. Cappers, and C. Goldman (2011). “Carrots and Sticks: A Comprehensive Business Model for the Successful Achievement of Energy Efficiency Resource Standards.” Utilities Policy; Volume 19, Number 4 (218-225).
- Cappers, P., A. Satchwell, C. Goldman, and J. Schlegel (2010). “Benefits and Costs of Aggressive Energy Efficiency Programs and the Impacts of Alternative Sources of Funding: Case Study of Massachusetts.” LBNL-3833E. August.
- Cappers, P. and C. Goldman (2009). “Empirical Assessment of Shareholder Incentive Mechanisms Designs under Aggressive Savings Goals: Case Study of a Kansas ‘Super-Utility.’” LBNL-2492E. August.
- Cappers, P., C. Goldman, M. Chait, G. Edgar, J. Schlegel, and W. Shirley (2008). “Financial Analysis of Incentive Mechanisms to Promote Energy Efficiency: Case Study of a Prototypical Southwest Utility.” LBNL-1598E. March.
- Cappers, P., C. Goldman, M. Chait, G. Edgar, J. Schlegel, and W. Shirley (2008). “Quantitative Analysis of Alternative Energy Efficiency Shareholder Incentive Mechanisms.” LBNL-2590E. August.

LBNL – DER Valuation and Business Model Quantitative Financial Analysis

- Satchwell, A., A. Mills, G. Barbose, R. Wiser, P. Cappers, and N. Darghouth (Forthcoming). “Financial Impacts of Net-Metered PV on Utilities and Ratepayers: A Scoping Study of Two Prototypical U.S. Utilities.”
- Mills, A. and R. Wiser. (2014) “Strategies for Mitigating the Reduction in Economic Value of Variable Generation with Increasing Penetration Levels.” LBNL-6590E. March.
- Darghouth, N., G. Barbose, and R. Wiser (2013). “Electricity Bill Savings from Residential Photovoltaic Systems: Sensitivities to Changes in Future Electricity Market Conditions.” LBNL-6017E. January.
- Darghouth, N., G. Barbose, and R. Wiser (2012). “The Potential Impact of Increased Renewable Energy Penetration Levels on Electricity Bill Savings From Residential Photovoltaic Systems.” LBNL-6188E. November.

LBNL – Future Regulatory and Utility Business Models

- Schwartz, L., P. Cappers, A. Satchwell, and C. Goldman (Forthcoming). "A Typology of Current and Future Electric Utility Regulatory and Business Models"

Presentations

- California Municipal Utilities Association Annual Conference. April 2, 2014. Utility Business Models in a Low Load Growth/High DG Future. Napa, CA
- Legislative Energy Horizon Institute. October 24, 2013. State/Province Regulation in 2030: Gazing Into the Crystal Ball? Washington, D.C.
- CA Energy Efficiency Industry Council's Member Forum. September 17, 2013. Utility Business Models in a Low Load Growth/High DG Future. San Francisco, CA.
- NGA Policy Institute. September 11-12, 2013. Emerging Ideas to Modernize Utility Business Models. Denver, CO
- NARUC Summer Committee Meeting. July 23, 2013. Utility Business Models in a Low Load Growth/High DG Future. Denver, CO.
- WIEB Committee on Regional Electric Power Cooperation/State-Provincial Steering Committee Meeting. April 10, 2013. Utility Business Models in a Low Load Growth/High DG Future: Gazing Into the Crystal Ball? Boise, ID.

Questions/Comments

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