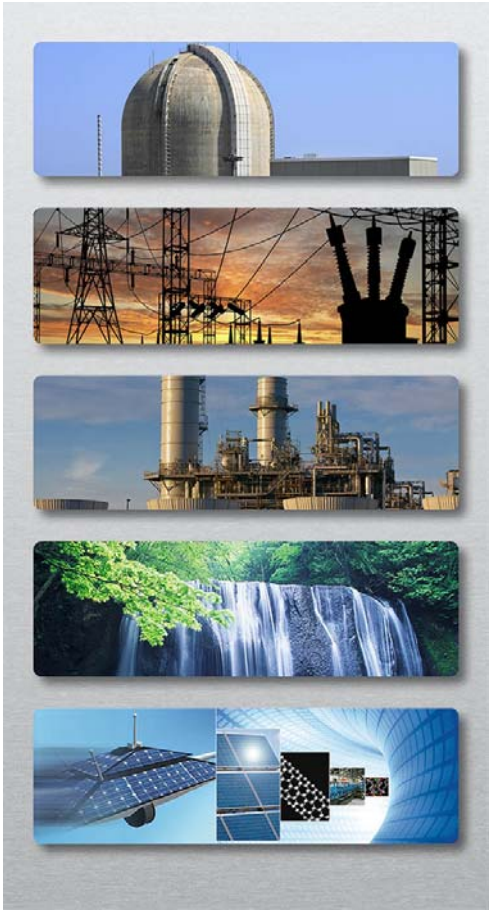

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Costs and Benefits of the Smart Grid

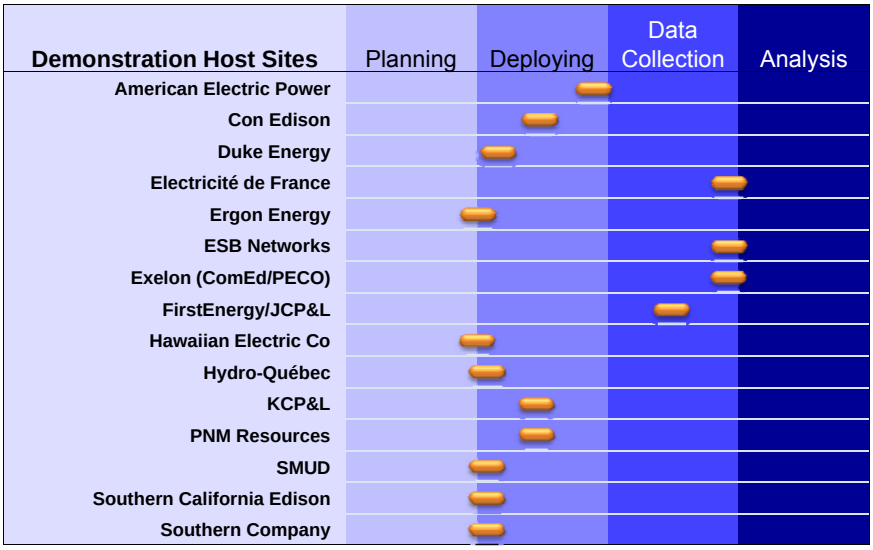
EU-US
Smart Grid Assessment Methodologies
November 7, 2011

Jeffrey D. Roark
Sr Project Manager
Smart Grid Demonstrations

EPRI Smart Grid Demonstration Initiative

Publicly Available:
Product ID 1023411

Status of Host-Site Demonstrations



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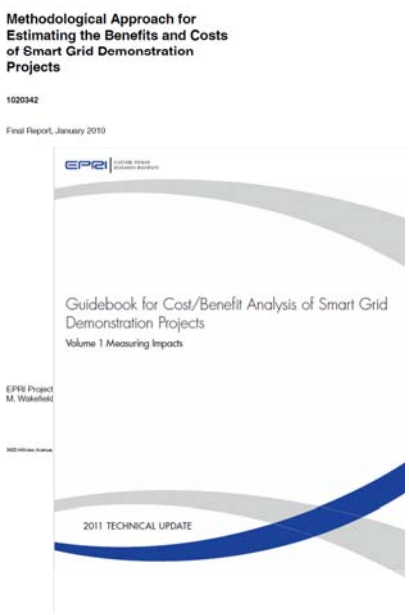
Cost-Benefit Analysis Guiding Documents

- **"Methodological Approach," published Jan, 2010**
  - Jointly funded by DOE and EPRI
  - Provides framework for estimating benefits & costs
  - Provides definitions, concepts and data sources
  - Publicly available: Product ID 1020342

- **"CBA Guidebook, Volume 1: Measuring Impacts," published May, 2011**
  - provides a manual for practical application with step by step instruction
  - provides guidance for documenting the project in detail and approach to perform a CBA,
  - includes templates for working through the process.
  - Publicly available: Product ID 1021423



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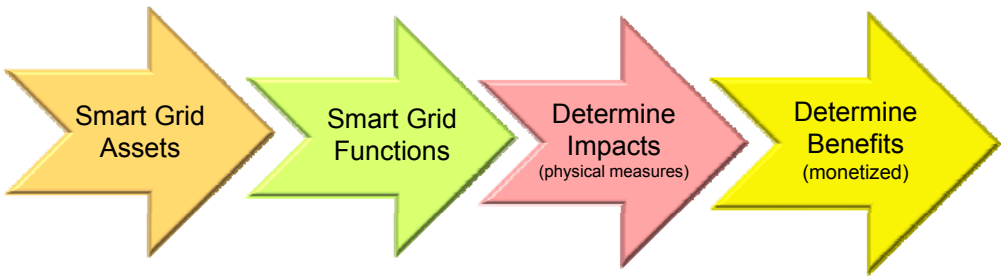
Goal of the CBA Process: Maximizing Learning

- **Maximize *learning* from Smart Grid projects by**
  - Advancing understanding of where, how, and why Smart Grid technologies perform as they do
  - Promoting transferability of results
- **For *learning* to be maximized:**
  - Methodologies must be credible
  - Results must be verifiable by others

We address these goals by applying the Scientific Method:

Formulating, testing, and modifying hypotheses through experimentation, observation, and measurement.

Overview of Smart Grid Evaluation Process



- List Technologies, Devices, & Systems

Examples:
- AMI/Smart meters
- Distribution Automation
- 2-way communication
- Smart Appliances
- Intelligent Electronic Devices (IEDs)

- Describe Systems' Intended Functions

Examples:
- Volt/VAR control
- Dynamic Capability Rating
- Flow control
- Intelligent line switching
- Real-time load management

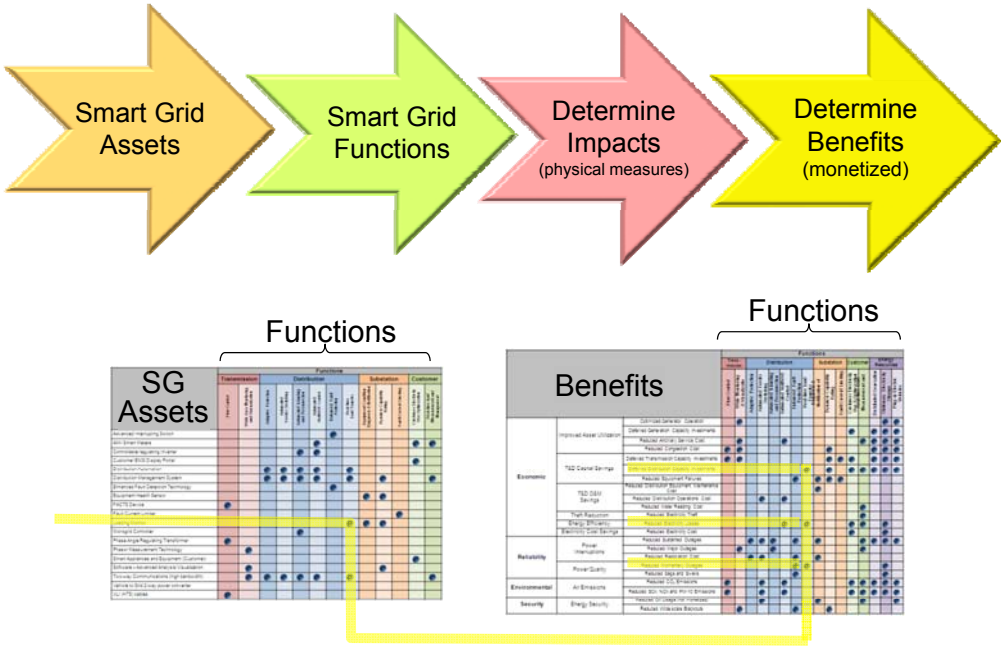
- Compare project performance to baseline case

Example measures:
- kWh reduction
- Peak kW reduction
- Loss reductions
- Outage reductions
- Improved asset utilization

- Monetize physical measures

Example metrics:
- Fuel savings
- Capacity savings
- Reduced outage costs
- Customer bill reductions
- Reductions in CO_2, Hg, etc.

Overview of Smart Grid Evaluation Process



Tables 4-4 and 4-8 in "Methodological Approach" and Tables 5-1 and 5-2 in "CBA Guidebook"

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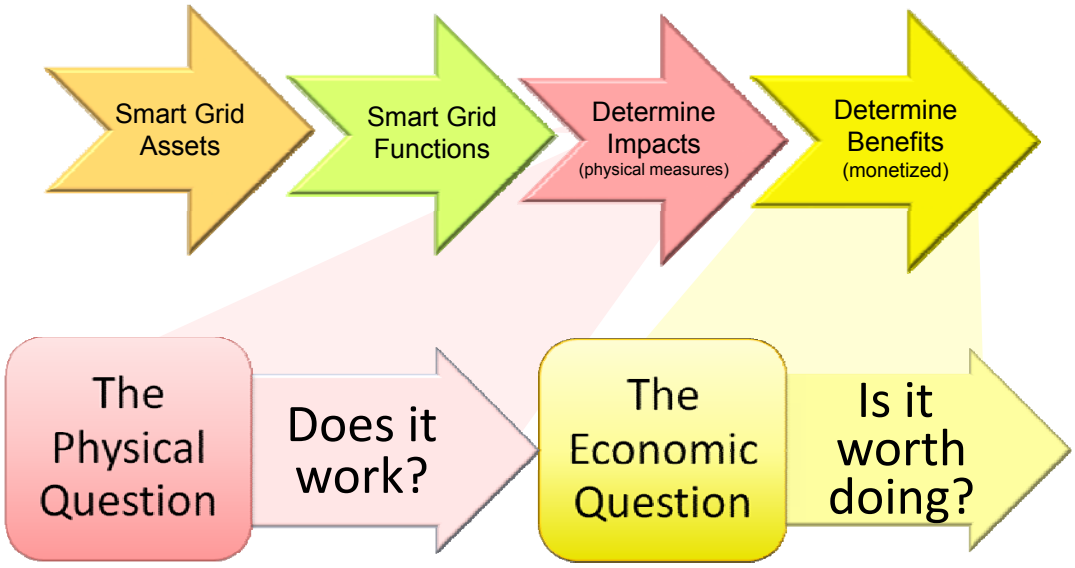
Cost/Benefit Analysis Guidebook for SG Demos
Overview of Smart Grid Evaluation Process



Demonstrate *physical impacts* of technologies in *specific applications*.

Estimate *economic viability* of the *demonstrated applications*.

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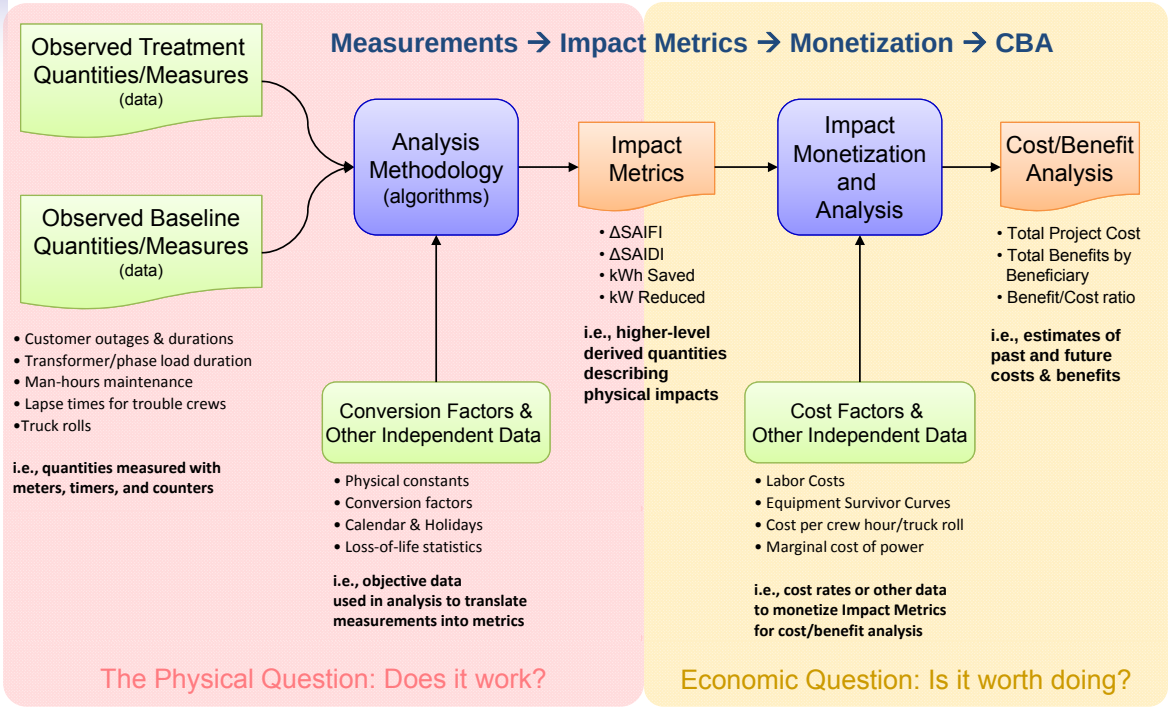
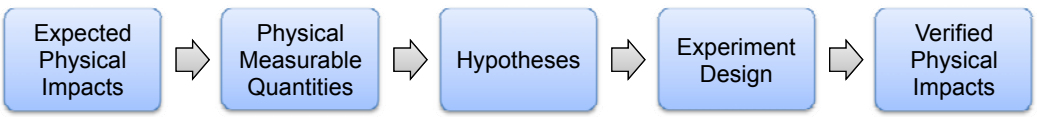
Completing the Cost/Benefit Analysis



Hypotheses Drive Experiment Design

- Some benefits occur far from site of deployment.
- Prior to experimentation and measurement, impacts and benefits must be traced back to physical, measurable quantities local to the project.
- Hypotheses for experimentation are developed to drive experimental design, to expose measurable quantities.



Issues

- Monetizing Benefits
- Timing of Costs and Benefits
- Hard and Soft Benefits
- Who pays, and who benefits?
- Marginal rates and marginal costs (the “Lost Revenue” problem)

	Beneficiaries		
	Utilities	Customers	Society
Economic			
Environmental			
Reliability & Power Quality			
Security & Safety			

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QUESTIONS?

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