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Office of Electricity  
Delivery & Energy  
Reliability



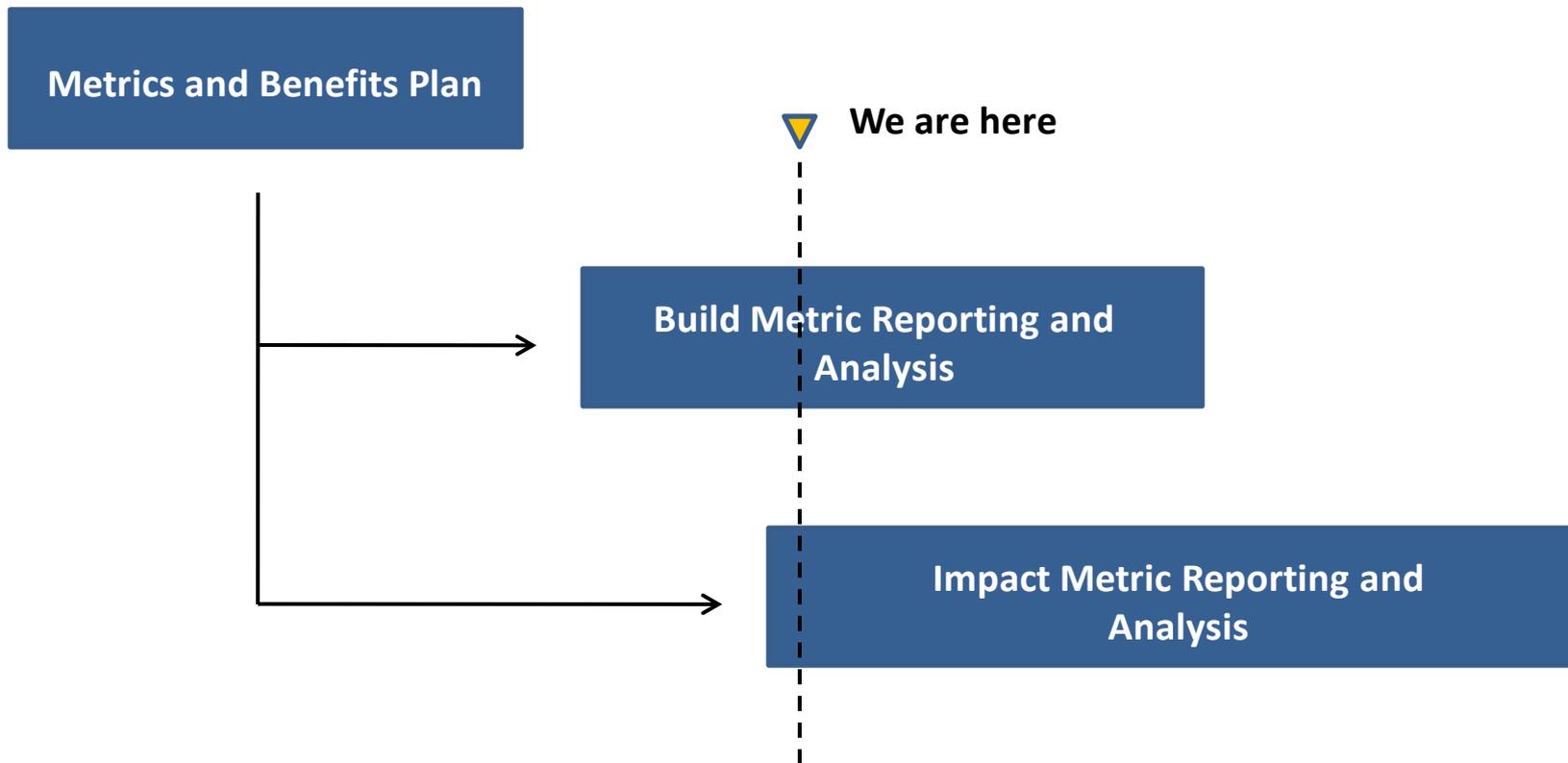
# Collaboration and Interaction on Smart Grid Metrics and Benefits

## Impact Analysis



# Introduction

The DOE Metrics and Benefits work is transitioning into the reporting and analysis of impact metrics. Build metric reporting and analysis will continue.





# DOE Analytical Approach

*What are Smart Grid technologies?*

*What does the Smart Grid do?*

*How does it do that?*

*What "goodness" results?*

*What is the goodness worth?*

Assets

Functions

Mechanisms

Benefits

Monetary Value

Example

- Capacitor controls
- Distribution Management System

Automatic Voltage and VAR Control

Improves feeder voltage regulation

Reduced feeder losses worth \$60 per MWh

\$6000



# Continued Communication

**The DOE Metrics and Benefits Team (MBT) is working with recipients on data reporting and analysis issues.**

## Reporting issues

- The MBT is sorting out reporting questions, issues and concerns regarding the impact metrics data that have been requested.

## Analysis Approaches

- There are multiple ways to determine impacts and calculate benefits from projects and we are interested in working together to capture these approaches and compare alternatives.

## Impact Analysis

- DOE is determining the underlying factors that contribute to the impacts being observed and will convey the results.

## Group Discussions

- Continue to work one-on-one, but consider convening focus groups where there is interest to address questions, examine results, and share lessons-learned. Peer-to-peer exchange is encouraged.



# Six Primary Analysis Focus Areas

Among the numerous smart grid projects six main topics have emerged, each of which presents an opportunity for analysis across projects.

## Peak Demand and Electricity Consumption

- Advanced Metering Infrastructure
- Pricing Programs and Customer Devices
- Direct Load Control

## Operations and Maintenance Savings from Advanced Metering

- Meter Reading
- Service changes
- Outage management

## Distribution System Reliability

- Feeder switching
- Monitoring and health sensors

## Energy Efficiency in Distribution Systems

- Voltage optimization
- Conservation voltage reduction
- Line losses

## Operations and Maintenance Savings from Distribution Automation

- Automated and remote operations
- Operational Efficiency

## Transmission System Operations and Reliability

- Application of synchrophasor technology for wide area monitoring, visualization and control



# Participation in the DOE Analysis

**DOE analysis in each area is moving forward with the aim of producing important insights into smart grid implementation.**

- DOE is thinking about quarterly conference calls to report on the status of analysis in each area and to present an opportunity for information exchange among recipients.
- The aim is to make the analysis accurate while revealing the appropriate insights, lessons-learned, and best practices.
- DOE will not share any commercially sensitive information unless given permission by a project team.



# Peak Demand and Electricity Consumption

**How and to what extent does advanced metering infrastructure (AMI), customer systems, and pricing programs, as well as demand load control, affect peak and overall demand reduction?**

## **Analysis Objectives:**

- Evaluate the influence of smart meters, pricing information, customer devices such as programmable controllable thermostats, in-home displays, and direct load control devices, on:
  - Change in peak demand;
  - Peak shift; and
  - Electricity conservation.
- Quantify how changes in electricity usage patterns and pricing affect consumer electricity bills, fuel mix for electricity generation, and power plant emissions.



# Operations and Maintenance Savings from Advanced Metering

**How and to what extent does advanced metering infrastructure (AMI) reduce costs and improve operations?**

## **Analysis Objectives:**

- Determine the amount of savings in operations and maintenance costs that are achieved by the application of AMI, including supporting communications and data management systems.
- Understand the contribution of different technologies and meter functionality to improved operations.



# Distribution System Reliability

**How and to what extent does smart grid technology improve distribution system reliability, e.g., by reducing outage duration and the number of customers affected?**

## **Analysis Objectives:**

- Determine the reduction in outage duration and scope within distribution systems through the application of technology used to identify outages and reconfigure faulted segments of distribution feeders.
- Determining the effect on reliability from equipment health monitoring technology.
- Determine what technology configurations are most important for delivering measurable results.



# Energy Efficiency in Distribution Systems

**How and to what extent do combinations of assets reduce energy consumption and losses within distribution systems?**

## **Analysis Objectives:**

- Determine the improvement in energy efficiency from the application of technology used to optimize circuit voltage and implement conservation voltage reduction.
- Determine what technology configurations are most important for delivering measurable results.
- Quantify the value of energy and capacity savings for utilities, electricity savings for customers, and lower emissions.



# Operations and Maintenance Savings from Distribution Automation

**How and to what extent does distribution automation technology reduce costs and improve operations?**

## **Analysis Objectives:**

- Determine the amount of savings in operations and maintenance costs that are achieved by the application of technologies used to automate distribution systems.
- Understand the contribution of different technologies and the enhanced capability they provide for improving operations.



# Transmission System Operations and Reliability

**How and to what extent does synchrophasor technology improve the operation and reliability of the transmission system?**

## **Analysis Objectives:**

- Determine the extent to which the transmission system is observed with synchrophasor technology.
- Determine how the technology is changing control room operations.
- Determine how grid reliability and security are being improved as a result.
- Determine improvements in energy efficiency.



# Target Kickoff Dates

**DOE would like to hold kickoff meetings to present the analytical objectives and approach within each area.**

Target Kickoff Dates by Collaboration Area	
Collaboration Topic	Target Date
Peak Demand and Electricity Consumption	Nov 29, Dec 6
Energy Efficiency in Distribution Systems	Nov 30, Dec 7
Distribution System Reliability	Dec 8, Dec 15
Operations and Maintenance Savings from Advanced Metering	Dec 13, Dec 20
Operations and Maintenance Savings from Distribution Automation	Dec 14, Dec 21
Transmission Systems Operations and Reliability	TBD



# Discussion

**QUESTIONS?**