U.S. Department of Energy

Office of Electricity Delivery and Energy Reliability

Data Collection and Reporting for Metrics and Benefits

Smart Grid Investment Grant Program

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An Opportunity for Transformation

Investments

- Equipment Manufacturing
- Customer Systems
- Advanced Metering Infrastructure
- Electric Distribution Systems
- Electric Transmission Systems
- Integrated and/or Crosscutting Systems

Transformation

Customer Empowerment

Advanced Grid Functionality

Results

- Job Creation and Marketplace Innovation
- Reduced Peak Load and Consumption
- Operational Efficiency
- Grid Reliability and Resilience
- More Distributed and Renewable Energy
- Lower Carbon Dioxide Emissions

Primary Intent Is to Determine SGIG Program Impact

Secondary Intent Is to Learn (to Address Uncertainty)

~~**Project-Based Cost/Benefit Analysis**~~

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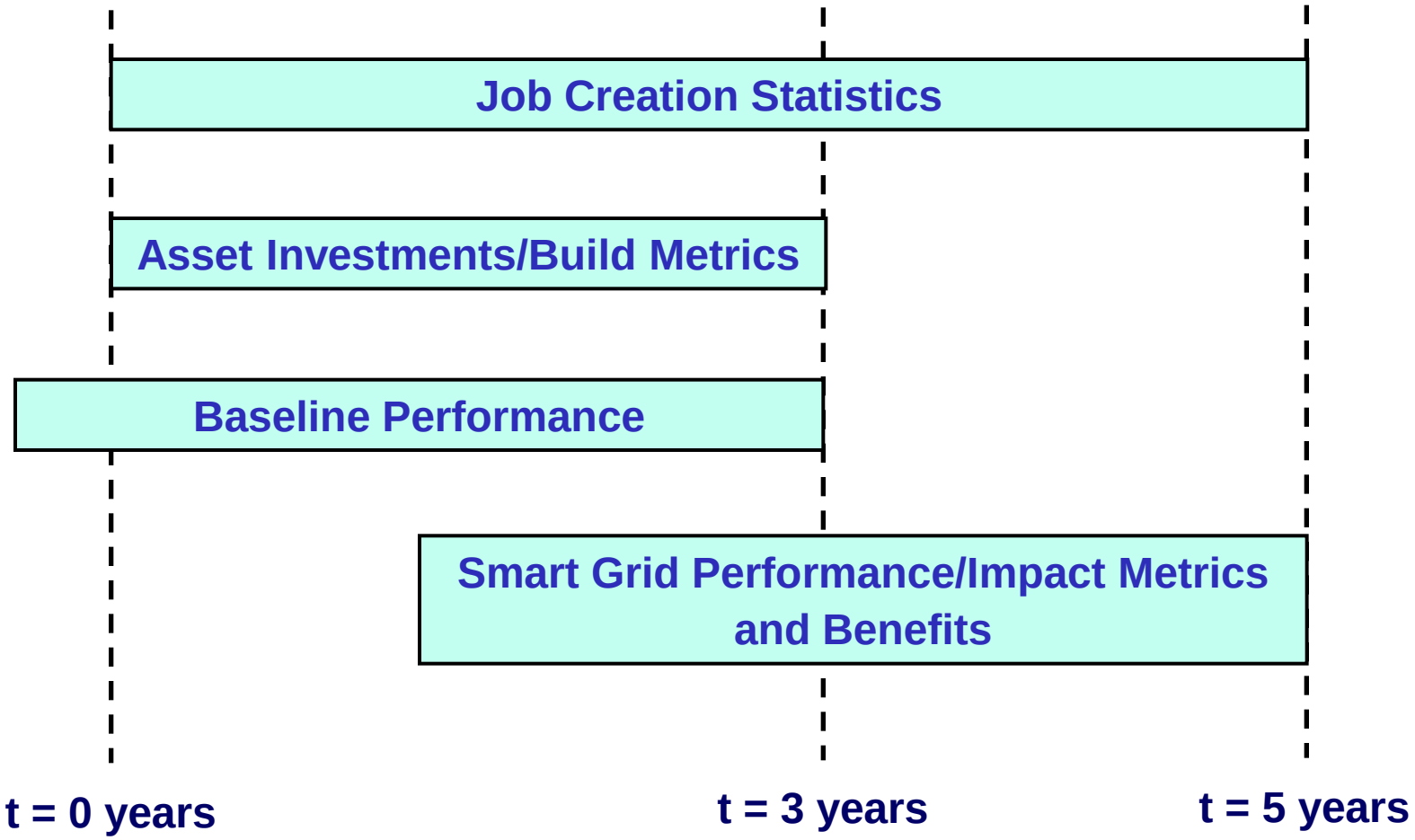
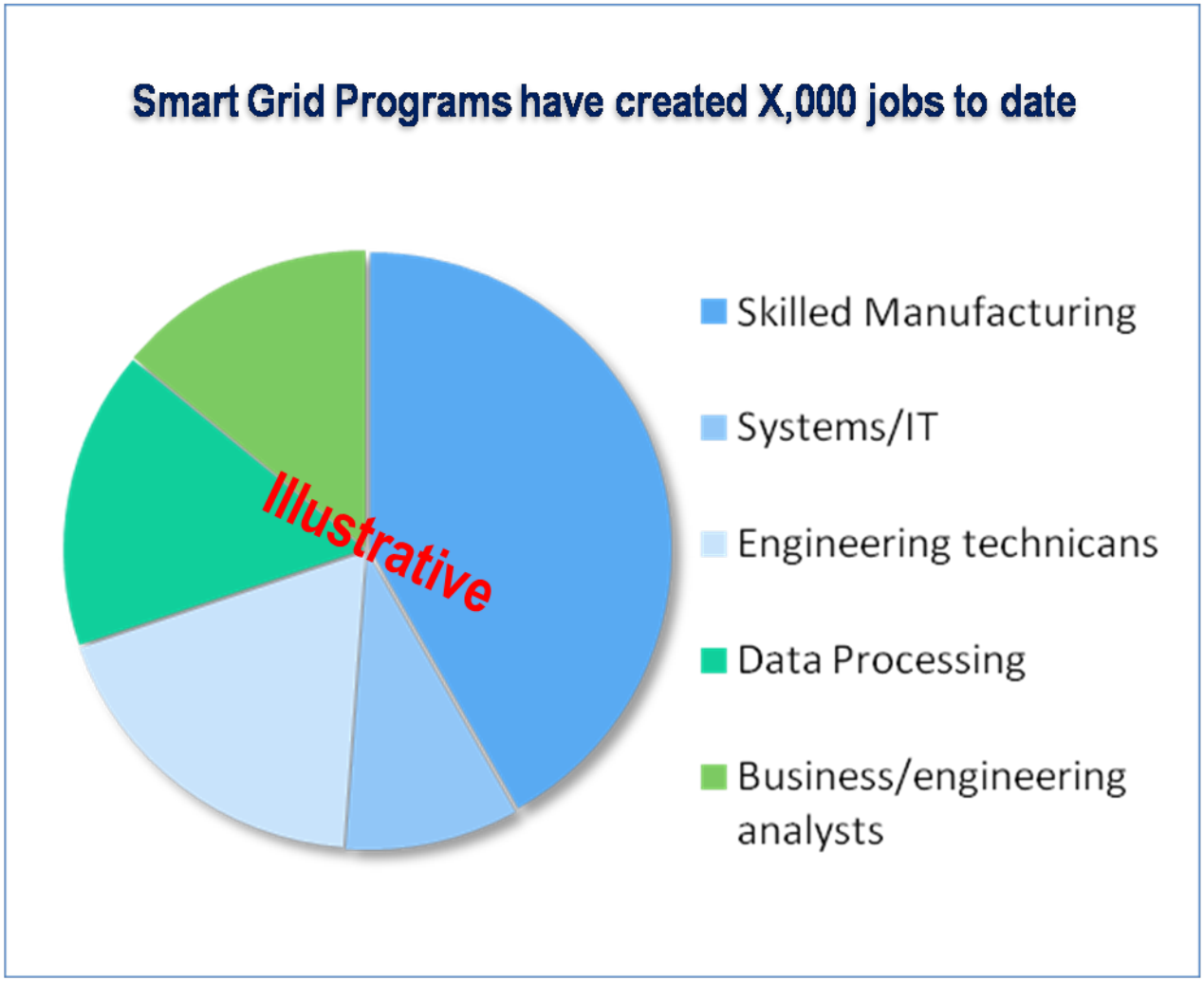
SGIG Program – Building the Smart Grid, Impacts, Benefits

Key Components for Information Gathering



Job Creation Statistics



Build Metrics

Customer Empowerment

- Over XX million customers involved
- YY different pricing programs tested
- Over $X billion in related investment

Key Assets
▪ Number of in-home energy displays
▪ Number of customer web portals
▪ Number of customers with smart appliances
▪ Number of PEV charging stations
▪ Number of smart meters
▪ Number of meter data management systems

Advanced Grid Functionality

- Over XX,000 advanced grid devices deployed
- YY grid management systems in operation
- Over $X billion in related investment

	Key Assets
Distribution	▪ Number of substations with automation ▪ Number of feeders with sensing/automation ▪ Number of distribution management systems ▪ Number of advanced feeder switches
Transmission	▪ Number of phasor measurement units ▪ Number of phasor data concentrators ▪ Number of grid visualization systems ▪ Number of lines with dynamic ratings

Measuring Smart Grid Performance – Impact Metrics and Benefits

Shared Responsibility between Project Teams and DOE

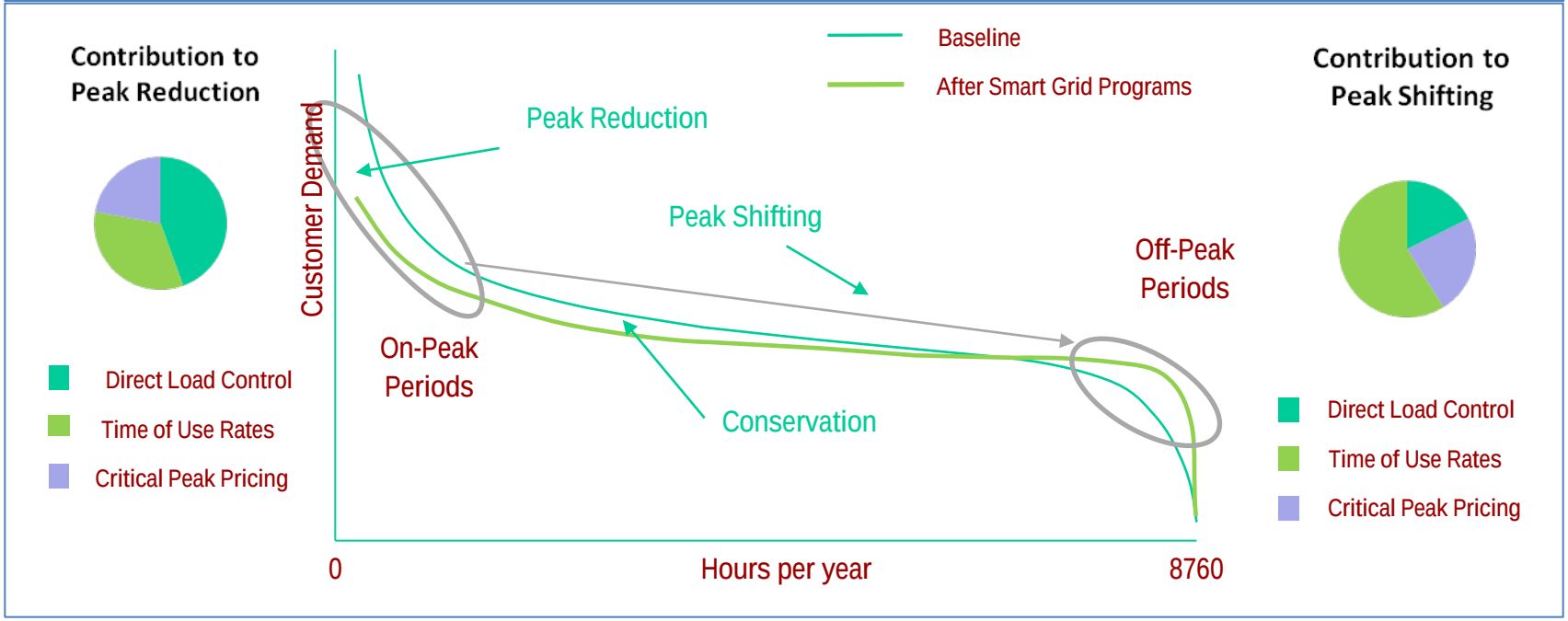
Data → **Impact Metrics** → **Benefits**

AMI Example:

▪ Electricity consumption by customer class per pricing program and technology ▪ Cost of generation to serve load	▪ Peak load reduction ▪ Peaking generation reduction ▪ Transmission and generation capacity deferral	▪ Economic: T&D capital and O&M savings; electricity cost savings ▪ Environmental: Reduced carbon dioxide emissions ▪ Energy Security: Reduced consumption of oil

Impact on Peak Load and Total Consumption

Technologies and pricing programs designed to reduce peak demand and electricity consumption have modified the load curve



Understanding the Impact of Dynamic Pricing on Customer Behavior

Special Case: AMI, Dynamic Pricing and Randomization

- Nine projects currently have submitted "acceptable" study plans; others may participate
- DOE will work with the project teams to ensure that data collection and analysis efforts will satisfy goals (elasticity of demand)
  - Valid control and treatment groups
  - Customer demographic information for consistent segmentation of results into cohorts
- Rich dataset correlating demand, rate tariff design, and customer-level information

Metrics and Benefit Estimation Plans Due 30 Days After Award

- **DOE will provide standard templates for data collection (to define build/impact metrics with mapping to benefits)**
- **Each project team will customize the template according to the assets and systems deployed**
- **DOE will provide assistance to project teams in developing final plans**
- **Formal plans will be required 30 days following project award**