



Integrated Resource Plan

TVA'S ENVIRONMENTAL AND ENERGY FUTURE

Establishment of Peak Demand Reduction Goal

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Chattanooga, TN





Evolution of Targets

Assumptions/Influences

Potential gap between load growth and TVA-owned generation

National Action Plan for Energy Efficiency
(July 2006)

TVA Strategic Plan (May 2007)

CEO Establishes 1,200 MW Target (August 2007)

PA Consulting Delivers 1,400 MW Potential Plan
(March 2008)

FY 2010-12 Business Planning (May 2009)

Actions

TVA Team Created to Review DSM Options

Served in Leadership Group
TVA Demand Reduction Potential Study
(September 2006)

Draft TVA 500 MW Potential Plan (June 2007)
Obtain Input from External Stakeholders (June 2007)

Board Creates Separate Organization
(October 2007)
PA Consulting Hired to Develop
1,200 MW Plan (December 2007)

TVA Conducts Power Distributor &
Public Review Sessions (April-May 2008)
TVA Conducts Program Design Process
(June 2008 - February 2009)
Market Tests Launched (April 2009)

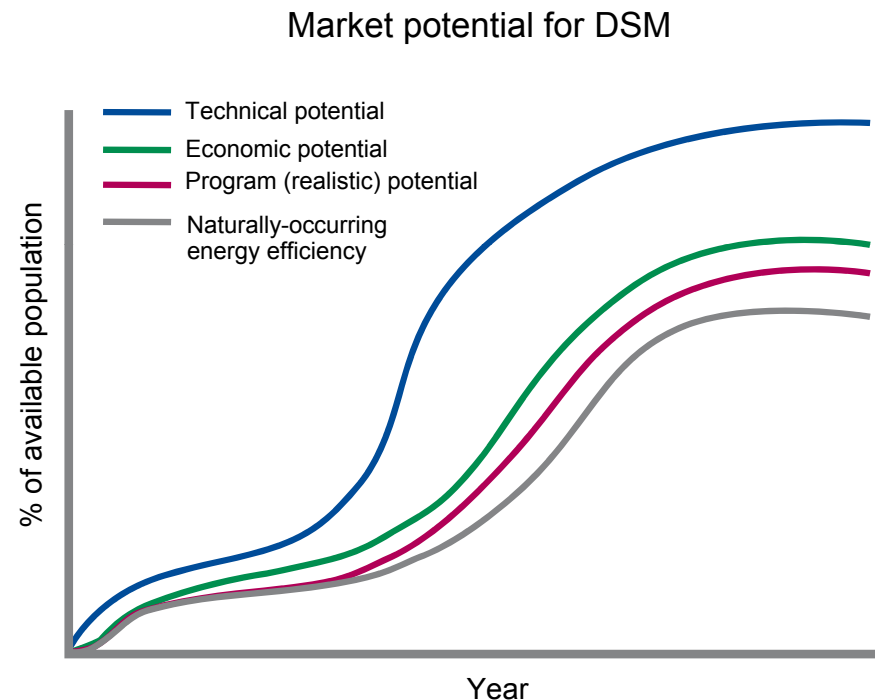
TVA-Designed 1,400 MW Potential Design
(July 2009)

Design will continue to evolve in response to new assumptions, influences, research and market testing results



Potential for Energy Efficiency

- **Technical potential** – the maximum penetration of a technology. This is considered unachievable and represents the upper limit of penetration.
- **Economic potential** – the penetration of a technology in the marketplace based on purely economic criteria (for the customer) with current pricing and energy savings estimates applied.
- **Program (realistic) potential** – the penetration of a technology assumed to be applicable for new promotional programs for a technology, tempered by technical and economic and participation estimates.
- **Naturally-occurring DSM** – the penetration of a technology as it is occurring currently, with regular market forces working.
- Terminologies, definitions, and methodologies vary slightly in estimating these potentials



Illustrative Only



Potential Reduction Estimates

	National	South	Valley
EPRI	218 GW (EEDR) ¹ 473 TWh	205 TWh (EEDR) ²	--
Georgia Tech (compilation of national studies)	--	242 TWh (EEDR)	--
FERC	188 GW (DR)	32 GW ³ (DR)	--
McKinsey	1,080 TWh	0.498 TWh	
TVA	--	--	10 GW ⁴

- 1) Maximum Achievable Potential demand reduction, Economic Potential Energy Savings relative to DOE's Annual Energy Outlook 2008 Reference Case
- 2) Regional Realistic Potential in 2030
- 3) Demand Response Potential for East South Central Census division (2019)
- 4) Maximum Technical Potential for the Valley, EEDR Potential

1,000 kWh = 1MWh; 1 million kWh = 1 GWh; 1 billion kWh = 1 TWh
 EEDR = Energy Efficiency and Demand Response
 DR = Demand Response

Electricity Energy Efficiency Potential¹

There is no single “right” answer. Although estimates may vary, close examination can reveal explanation of differences.

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EEDR Portfolio

Residential

- New Homes
- *energy right* Home e-valuation®
- Residential In-Home Energy Evaluation (IHEE)
- Manufactured Homes
- HVAC
- HVAC Maintenance*

Demand Response

- Demand Response
- Air Conditioner Direct Load Control*
- Water Heater Direct Load Control*
- Conservation Voltage Regulation*

Consumer-owned Clean Generation

- Biodiesel Generation*
- Clean Generation*

Commercial & Industrial

- Major Industrial
- Industrial Efficiency Advice and Incentives
- Commercial Efficiency Advice and Incentives
- Direct Installation (Small Commercial)*
- Retro/Re-Commissioning*
- White Tags*
- Internal Energy Efficiency

Consumer-owned Renewable Generation

- Biomass Generation
- Landfill Gas Generation
- Large Solar Generation
- Micro Hydro Generation
- Residential Solar Generation
- Wastewater Treatment Generation
- Wind Generation

* Program is in development



Dynamic Portfolio

- **Portfolio Not Complete**

- Pricing
- Advanced Metering Infrastructure (AMI) Related Programs
- Appliances
- Programs Under Development

- **Program Emphasis Shifts Based on Success/Challenges**

- Reliance on New Construction shifted due to declining housing market

- **Changing System Needs**

- Slow down in sales and shift in demand growth

- **Legislative Mandates**

- Higher manufacturing requirements, codes, etc. require higher program standards (above minimum) and often raise costs

Financial Analysis

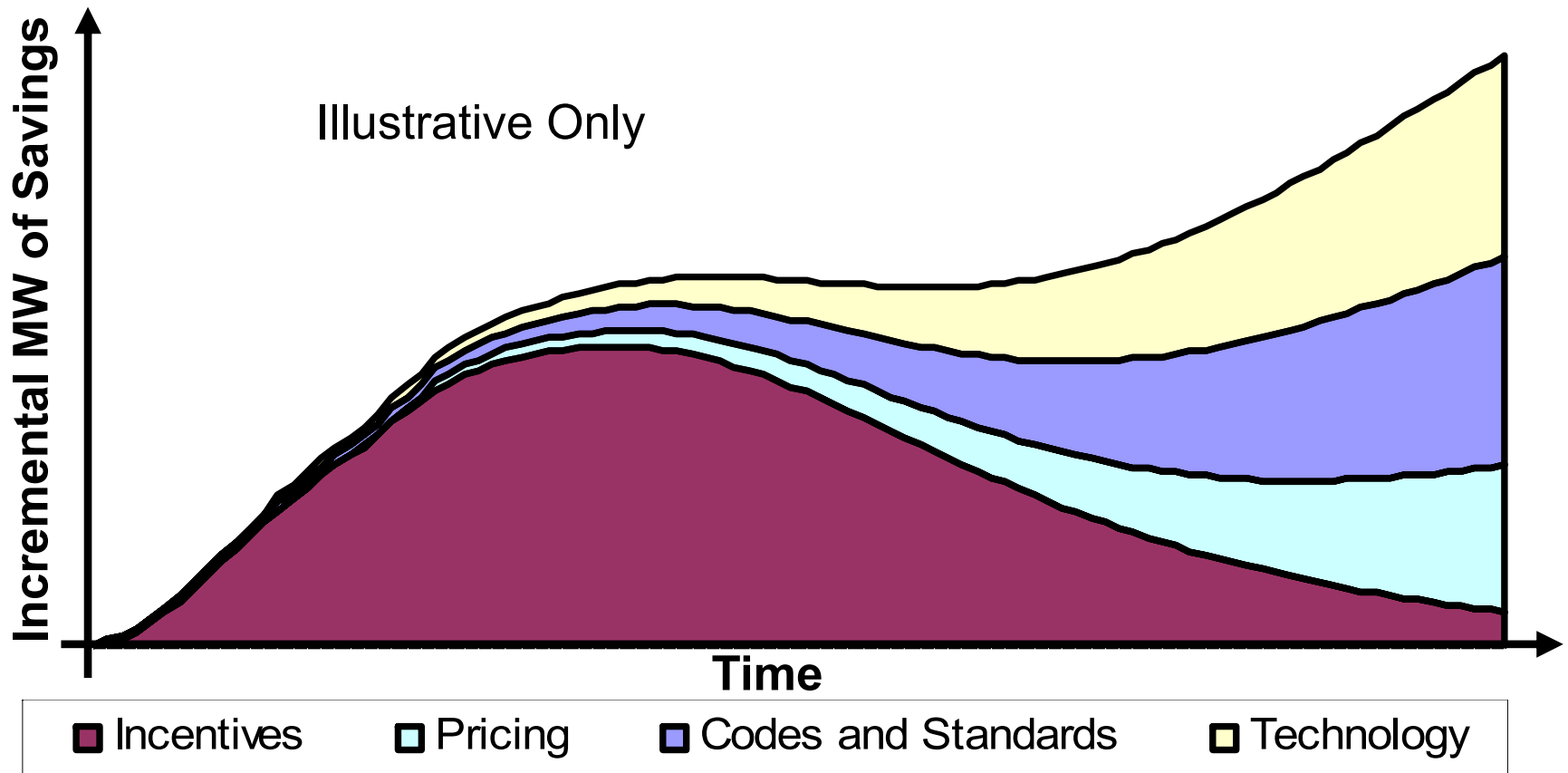
- Inputs
 - Program Costs
 - Estimates of Demand & Energy Impacts
 - Load Shapes
- Financial Services Analysis
 - Net Present Values
 - Rate Impacts
 - Comparative Total Resource Costs*

*Does not yet include consumer costs



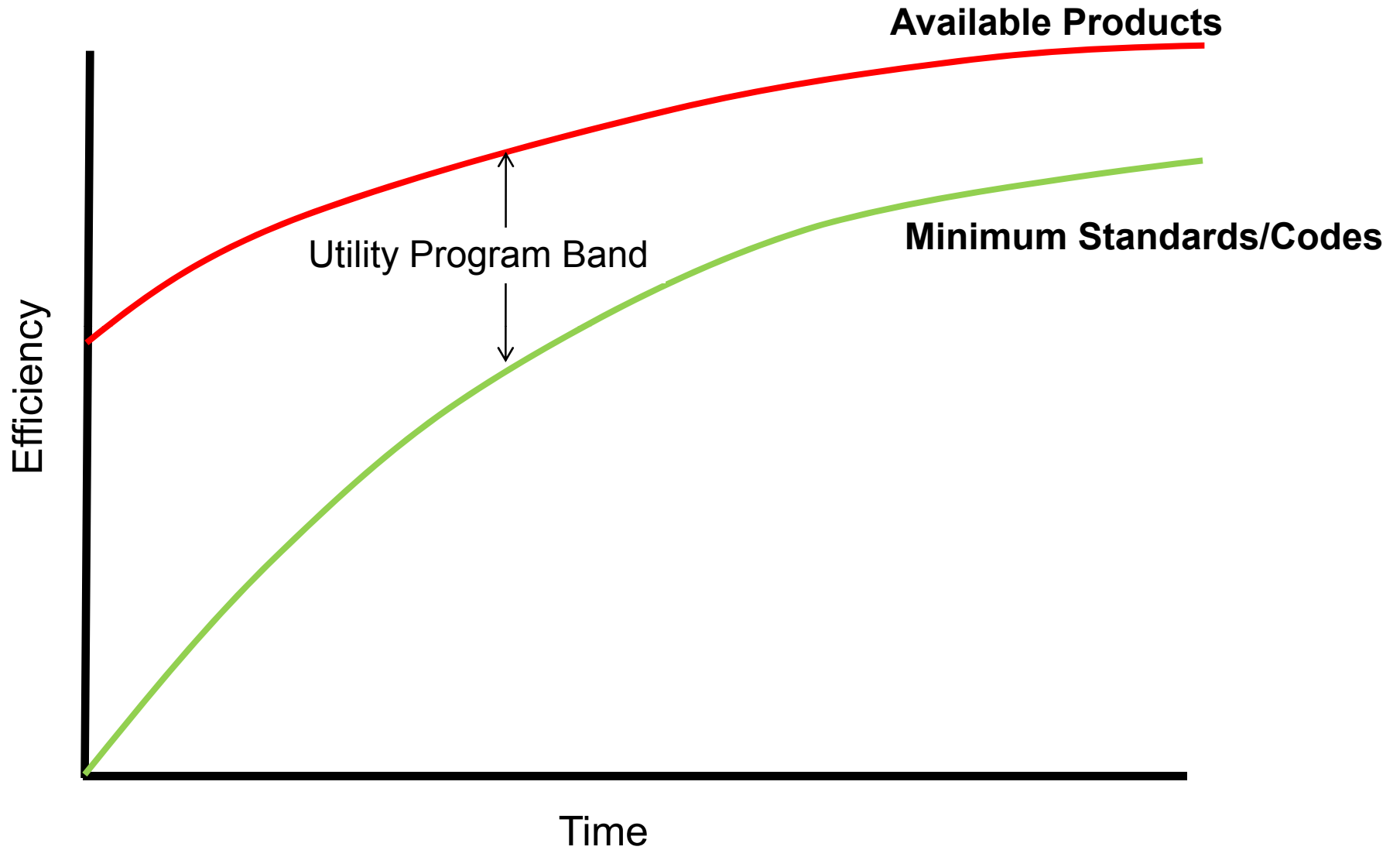
Drivers of Incremental MW Savings

In the short run, we buy reductions through incentives. Over time, market forces such as pricing structure, code enforcement, and emergent technologies drive reductions.





Legislative Impacts



Illustrative Only



Sources of Planning Assumptions

Design Criteria

- ENERGY STAR
www.energystar.gov
- National Action Plan for Energy Efficiency
www.epa.gov/cleanenergy/energy-programs/napee
- Other Utilities (Duke, Southern, PG&E, etc.)
www.duke-energy.com/kentucky/savings.asp www.pge.com/myhome/saveenergymoney
www.southernco.com/corporateresponsibility/electricity/championing.aspx

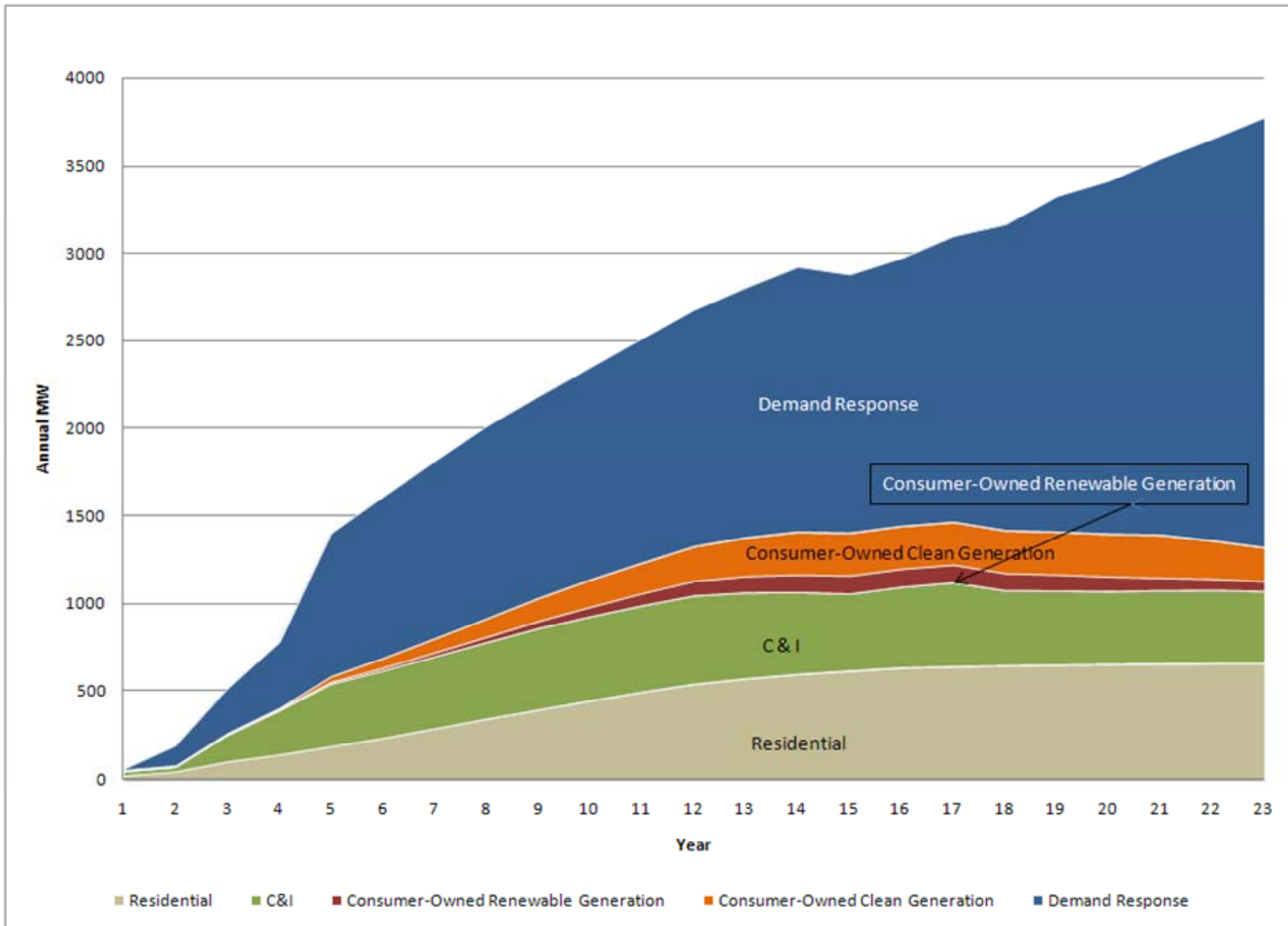
Program Implementation Parameters

- Past Programs
- Surveys
- Other Utilities (Duke, Southern, PG&E, etc.)
- Studies/Databases (DSIRE and E Source)
www.dsireusa.org/ www.esource.com

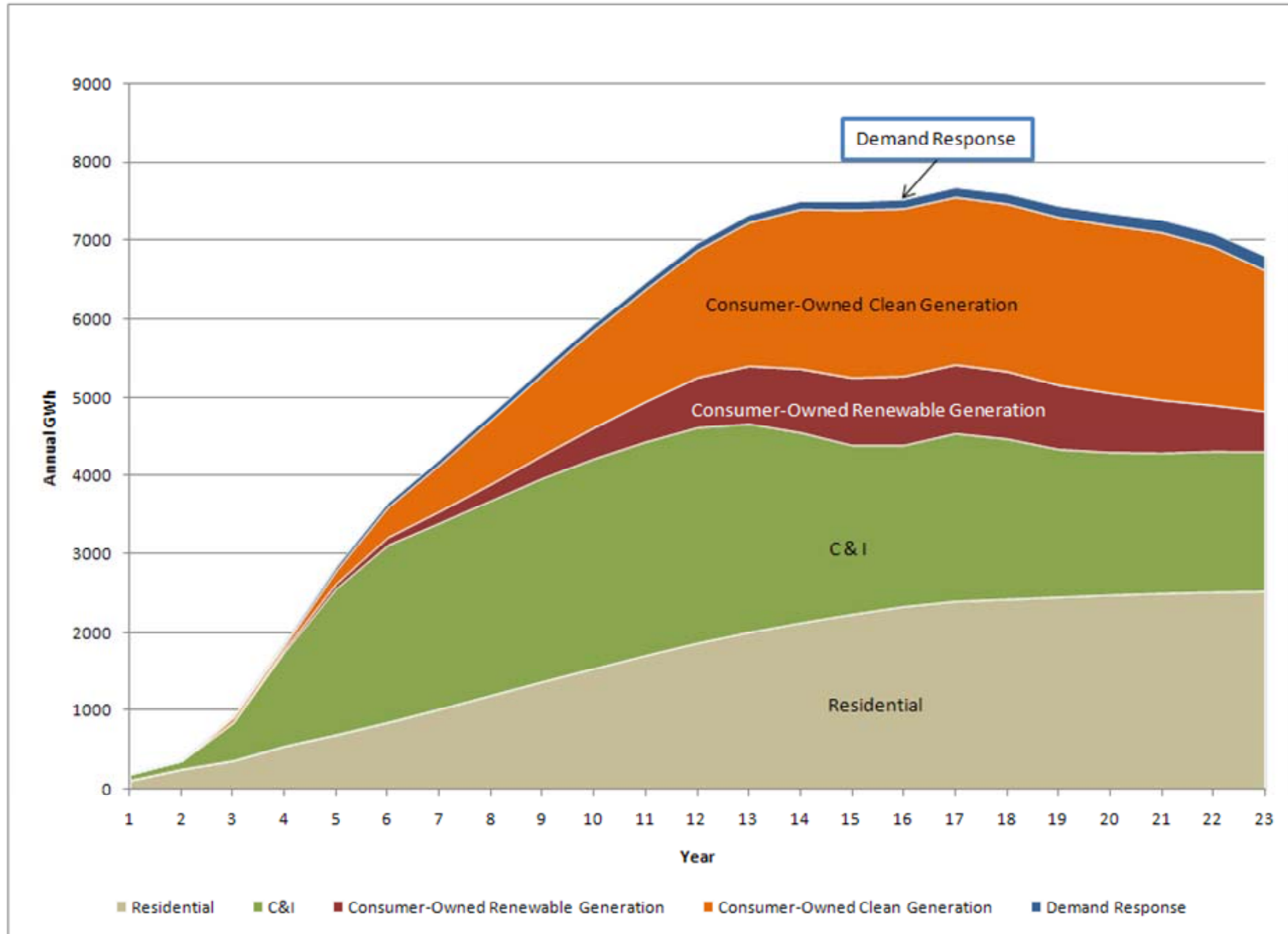
Impacts

- Demonstrations (4 Community Test)
- Modeling (eQUEST, EZ Sim, and Manual J)
www.doe2.com/eQUEST/ www.ezsim.com/ www.hvacloadcalculations.com/
- Other Utilities (Duke, Southern, PG&E, etc.)
- Studies/Databases (DEER)
www.deeresources.com
- Ongoing Data Collection

TVA Portfolio Potential Demand Impacts (MW)



TVA Portfolio Potential Energy Savings (GWh)





Measurement and Verification Planning

- **KEMA has been hired to develop overall M&V protocols and execute onsite verifications**
- **M&V of programs will be based on sampling plans established by protocols**
- **Onsite verifications, primarily metering and compliance checks, will be coupled with participant surveys to establish impact estimates within accepted error ranges**
- **Overall M&V protocols will evolve to comply with legislative requirements as those are solidified**
- **Estimates of degradation, product persistence, and product implementation will be continuously refined with ongoing research and surveys**