

Integrated Resource Plan

TVA'S ENVIRONMENTAL AND ENERGY FUTURE

Energy Efficiency / Demand Response
Strategy

December 10-11, 2009



Energy Efficiency / Demand Response Background

Background

- ◆ TVA has been conducting energy efficiency and demand response programs since the 1970s
 - During the 1970s and 80s, TVA was a national leader in energy efficiency improvements, conducting programs such as home energy audits and energy-efficient equipment and weatherization installations

- ◆ During this period, TVA had a direct impact efficiency in the Valley by:
 - Conducting more than a million free on-site energy surveys
 - Installing 64,000 heat pumps to replace resistance heat
 - Integrating more than 50,000 air conditioner and water heater cycling devices
 - Reducing demand by 1,200 MW and annual energy by 3,200 GWh

- ◆ In the 1990s, TVA's emphasis shifted toward the promotion of energy efficient electro-technologies
 - The aim was for end-users to adopt these technologies when it made economic sense in terms of their total energy cost
 - These programs also delivered demand reduction benefits

- ◆ From 1996 to 2008, TVA programs offered in conjunction with distributors resulted in a cumulative demand reduction of over 545 MW

Energy Efficiency / Demand Response Strategy

- ◆ “In partnership with others, TVA will strive to be a leader in energy-efficiency improvements and peak demand reduction over the next five years. Improving energy efficiency and peak demand reduction are significant actions that help slow demand growth in a cost-effective manner while addressing air pollution and global climate change” (TVA Strategic Plan 2007)

- ◆ TVA’s strategy is to ensure DSM programs move toward a self-sustaining future by:
 - Stimulating and transforming the marketplace instead of “buying the market” with incentives
 - Supporting development of efficiency standards and regulations
 - Providing incentives for demand reduction in conjunction with proper pricing signals
 - Enabling automatic metering and direct load control
 - Expanding and supporting clean end-use generation

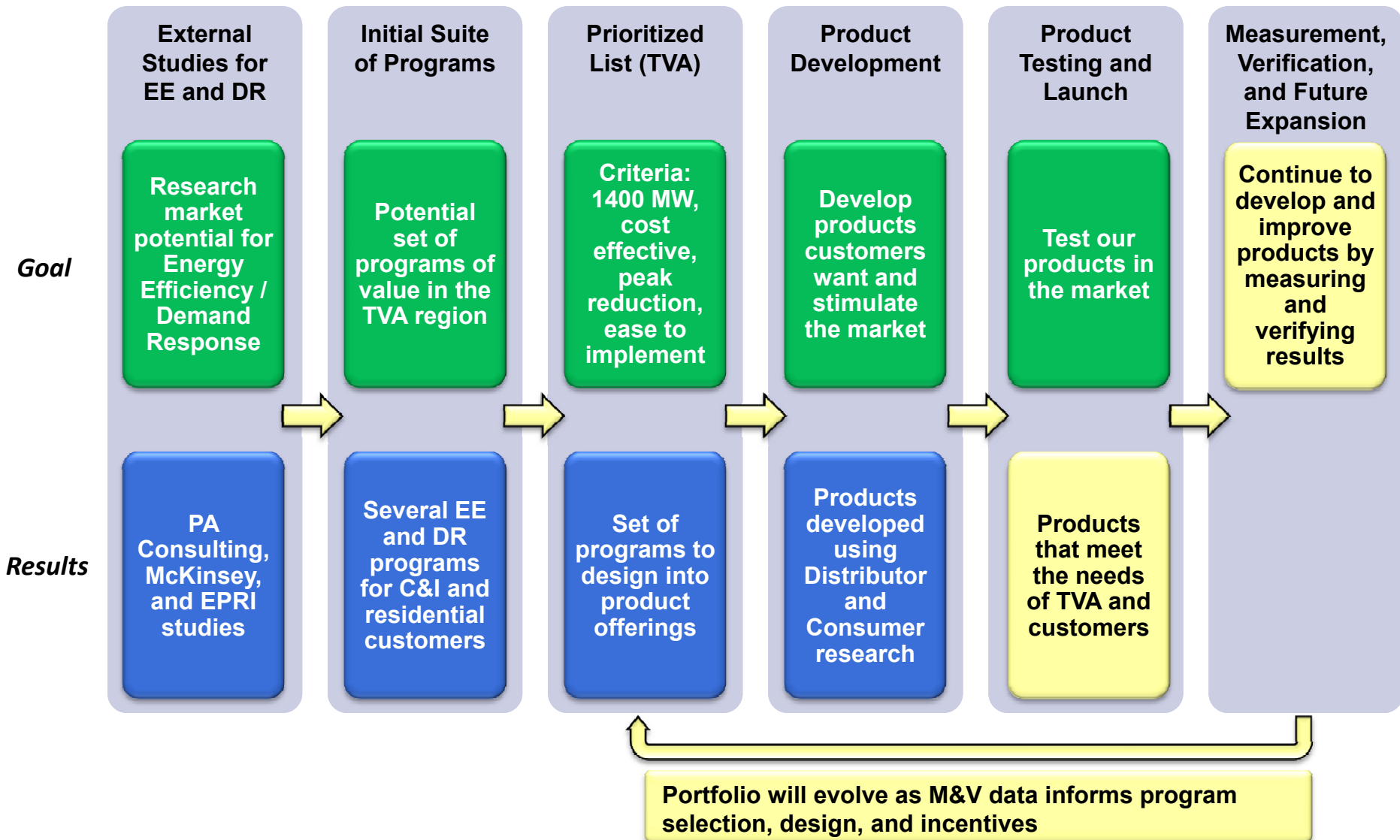
- ◆ TVA has established a short-term goal to reduce peak demand 1,400 MW by 2012
 - TVA has intentionally targeted demand-side management programs that lower demand during the hours when it is highest
 - Energy-efficiency programs will reduce energy consumption over all hours of the day, but they will be targeted for maximum effect on the peak periods in the early years of the plan
 - TVA does not have an energy reduction goal at this time

- ◆ TVA’s long-term approach is to capture reasonable, cost-effective energy efficiency and demand reduction



Energy Efficiency / Demand Response Portfolio Development

The following diagram outlines TVA's progression in developing the current energy efficiency / demand response portfolio within the service territory.



Items highlighted in yellow are in process



Energy Efficiency / Demand Response Portfolio Development (Cont'd)

Use of External Reports

- ◆ PA Consulting presented potential demand-side management programs designed to reduce summer peak demand by 2012
 - PA’s program recommendations were culled from a review of industry programs and evaluated on economic capability
 - TVA reviewed PA’s designs for applicability to the TVA market and prioritized programs to be further customized to the demographic and climatic parameters of the Valley
 - PA’s proposed programs did not include evaluation of customer (distributor and end-use) input
- ◆ McKinsey’s estimate of potential energy savings were used as a comparative yardstick, not a design target
- ◆ EPRI’s results (as presented earlier) represent the maximum achievable GW and annual TWh reductions in the Valley

Project Prioritization

- ◆ TVA used a qualitative assessment of available programs to prioritize them for development
- ◆ Prioritization was based on using TVA experience and expertise to rank programs on the weighted factors shown in the table to the right
- ◆ Objective was to identify high-potential programs for concept and program development

Prioritization Criteria	
Factor	Weight
Addressable Peak Demand (MW)	3
Distributor Need	2
Consumer Need	2
Energy Reduction (MWh)	1
Cost (\$/kW)	3
Technical Capability and Infrastructure	3
Speed to Market	2
Ease of verifications	2
Self-sustaining	2



Energy Efficiency / Demand Response Portfolio Development (Cont'd)

Project Prioritization (Cont'd)

- ◆ Results of the prioritization are shown in the table to the right
- ◆ Programs highlighted in yellow were selected for concept and program development based upon distributor and consumer research
 - TVA has a unique business structure, and the insight into distributor partner and consumer perspective is integral to successful design
- ◆ TVA has not screened or eliminated any programs or products from consideration

Results

- ◆ A portfolio of programs that is on track to deliver by 2012
 - 1,400 MW summer peak demand reduction
 - 2,800 GWh annual energy savings
- ◆ Portfolio is projected to achieve by 2030
 - 3,790 MW summer peak demand reduction
 - 6,800 GWh annual energy savings

Prioritization Scores	
Factor	Total
Res HVAC Replacement	51
Res In-Home Energy Audit	48
Res Loan Program	47
C&I Lighting & HVAC	47
Energy Efficient Schools	46
C&I Demand Response	45
Energy Star Appliances	45
Res HVAC Tune-Up	45
Energy Right Redesign	40
Low-Income	39
Lighting (CFL)	39
Ind Efficiency Prescript Rebate	39
Ind Efficiency – Holistic	38
Home e-Val & EE Starter Kit	37
Commercial Efficiency	37
Residential DLC	36
Green Power Switch	33
C&I DLC	27



Energy Efficiency / Demand Response Portfolio Development (Cont'd)

Measurement, Verification, and Future Expansion

- ◆ TVA is collaborating with KEMA to develop overall Measurement and Verification (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

- ◆ M&V data will be used to:
 - Evaluate current programs
 - Validate key assumptions in program design
 - Document verifiable program impacts
 - Influence new program development

- ◆ Current designs are part of a continuously evolving portfolio intended to cost-effectively provide demand-side impacts to meet system needs
 - Future iterations of DSM portfolio will advance TVA's progress in capturing reasonable, cost-effective demand and energy reductions in the Valley

Energy Efficiency / Demand Response Long-Term Plan

- ◆ TVA's view is that energy efficiency and demand reduction improvement over the long-term ultimately must be accomplished through a transformation in the marketplace that increases consumer demand for energy-efficient products and services and provides the delivery channels to meet their needs

- ◆ Transformation will not be made through TVA purchasing the marketplace, but rather accomplishing important supporting mechanisms, including:
 - Educating the public to make educated choices about their energy use and energy-related purchases
 - Electricity rates that send appropriate price signals to encourage consumers to reduce usage during periods of high demand
 - Advanced electric metering and other technologies that allow communication between end-users and their power provider
 - Support for uniform building codes and enforcement that require energy efficient new construction
 - A strong, vibrant infrastructure for end-use generation technologies
 - A robust network of commercial providers offering a wide array of energy-efficient products and services