

Integrated Resource Plan

TVA'S ENVIRONMENTAL AND ENERGY FUTURE

Stakeholder Review Group
Workshop

November 18, 2010
Murfreesboro, TN



| | | |
|-------------|-------------------------------------|---------------|
| 9:30-9:45 | Introduction | Randy McAdams |
| 9:45-10:15 | Considerations of Risk | |
| 10:15-11:00 | Load Forecast | |
| 11:00-12:00 | Renewable Energy Additions | |
| 12:00-12:30 | Lunch | |
| 12:30-1:00 | Commodity Prices | |
| 1:00-2:00 | Energy Efficiency / Demand Response | |
| 2:00-2:15 | Break | |
| 2:15-3:15 | Regulatory Outlook | |
| 3:15-3:30 | Wrap-Up | Randy McAdams |



Format for Today's Discussion

The purpose of today's discussion is to enable an in-depth discussion of relevant inputs and solicit stakeholder insights about the implications of differing viewpoints

- ◆ In order to fulfill this purpose, each agenda topic will be presented as a module that follows a similar approach

- ◆ The module approach will touch each of the following:
 - TVA market view and key drivers
 - Current forecast and external sources referenced
 - Emerging trends in the market (i.e., risks and issues)
 - Stakeholder insights
 - Open discussion of emerging trends

- ◆ All input received will be taken under consideration and carefully evaluated for implications for the IRP and future planning efforts
 - TVA will communicate how today's input was incorporated in the December working session

◆ Today's dialogue is intended to create understanding around relevant inputs and to discuss alternative viewpoints, but not be used to reach consensus

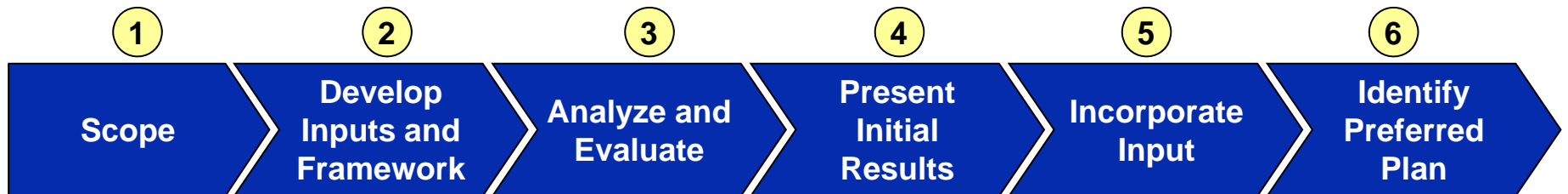
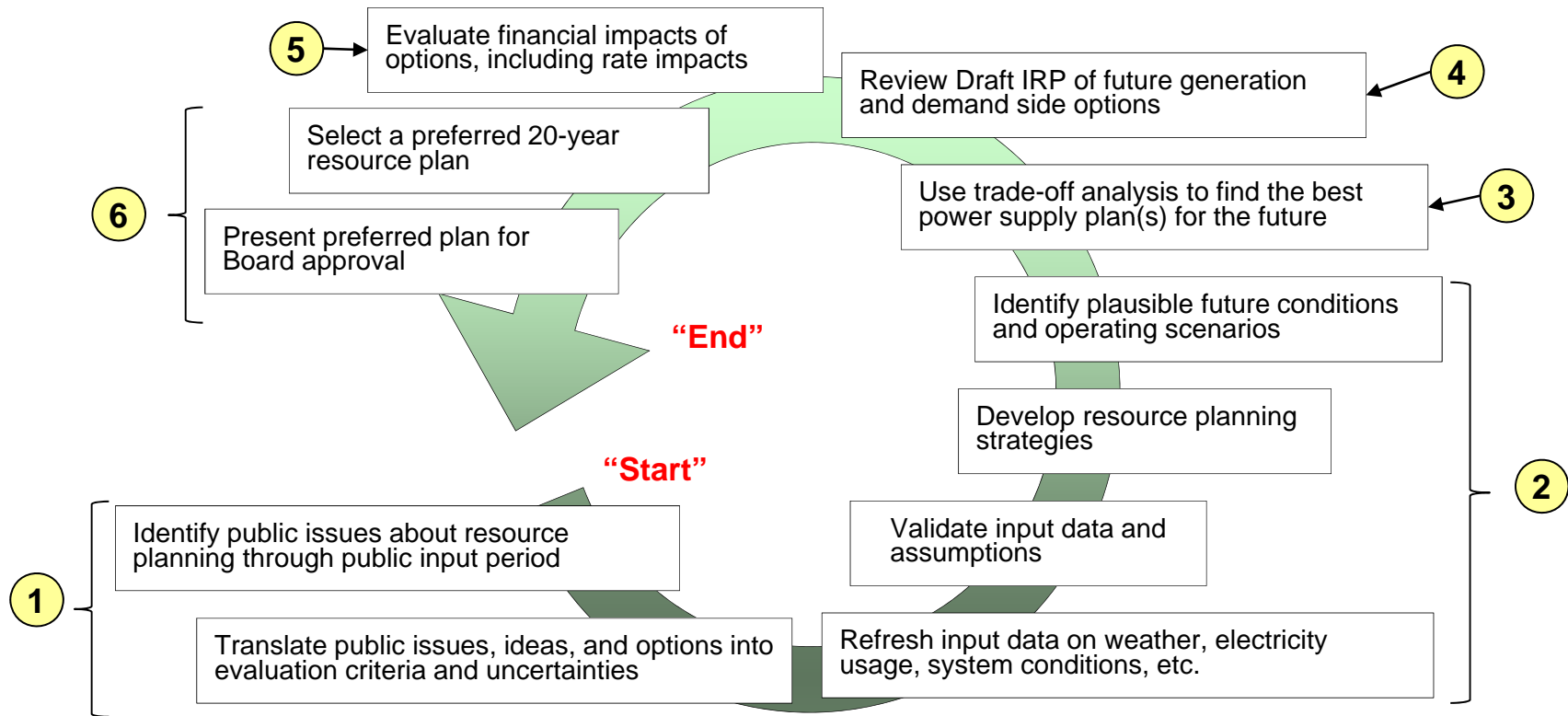
SRG Purpose

- ◆ Provide TVA with in-depth ongoing discussion and input from different stakeholder viewpoints
- ◆ Serve as a source of information, a coordination mechanism, and a professional review group
- ◆ Build efficiency into the study process by providing real-time public input to IRP issues and processes
- ◆ Validate the various steps in the IRP process

SRG Meeting Types

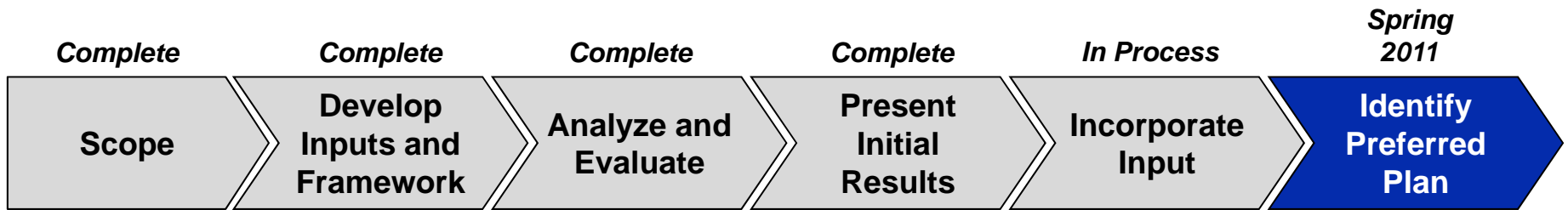
- ◆ *Working Sessions* – regular meetings that are not open to the general public
- ◆ *Workshops* – the SRG, by majority vote, can request TVA hold additional “workshops” to provide more in-depth information on specific topics to those members who are interested in attending
- ◆ *Public Comment Sessions* – by majority vote, the SRG may host a public comment session to receive input on specific topics

The IRP process that has been previously shared can be summarized into six high-level steps





The SRG has reviewed and provided input on the following topics:



- ◆ Planning process
- ◆ Key uncertainties
- ◆ Updated scenario/worlds
- ◆ Demand-side resource options
- ◆ Supply-side resource options
- ◆ Busbar screening results for supply-side resource options
- ◆ Load forecast
- ◆ Environmental outlook
- ◆ Commodity price forecasts
- ◆ Financial parameters
- ◆ Energy efficiency and demand response
- ◆ Planning strategies
- ◆ IRP scorecard and evaluation metrics
- ◆ Preliminary model results

Legend:

- Complete or In Process
- Not Started



- ◆ Today's session is a workshop that was approved by majority vote of the SRG in the October 28th Working Session

- ◆ The following are a few reminders of the process for a workshop
 - The majority of the day will be devoted to discussion rather than presentations
 - Up to two staff members may accompany SRG members to a workshop
 - The discussion is closed to the public

- ◆ Please be patient and courteous with one another during the discussion
 - Only one person speaks at a time; please refrain from interrupting while someone is speaking
 - Everyone will be allowed to contribute their input, but we ask for your help in moving the discussion along so we can cover all the topics today

- ◆ Some TVA staff have juggled calendars to be with us today and may be arriving late and/or departing early to fulfill other commitments

- ◆ Today's discussion will cover some confidential information
 - SRG members and staff that have not signed confidentiality agreements will be asked to leave the room during those discussions

“A scenario is an internally consistent view of what the future might turn out to be - not a forecast, but one possible future.”

Michael Porter

“Scenario planning is that part of strategic planning which relates to the tools and technologies for managing the uncertainties of the future.”

Gill Ringland



Considerations of Risk in Planning Processes

- ◆ All planning processes with time components must begin with a single step. We sometimes refer to this single step as the *base case*, or *expected* value. The base case is the result of all forecasts and inputs into the planning process being significantly realized
- ◆ Of course, forecasts, by their very nature, are seldom significantly realized, and our best hope is to be relatively close
- ◆ The *base case* provides a reasonable starting point in the development of all long-range plans, by helping to anchor key decisions while recognizing that it is only one of an almost infinite number of potential future outcomes
- ◆ The key to success in long range planning is understanding the risks - what is likely to go wrong, what the best response will be, and how to recognize when a key assumption is deviating from forecast so that action can be taken
- ◆ Long term planning risks can be placed into three basic categories:
 - **Stochastic**
 - **Scenario**
 - **Paradigm Shift**

| Risk | Feature | Approach | Example |
|----------------|---|--|---------------------------------------|
| Stochastic | ◆ Can be quantified using statistical methods | – Appears explicitly in analysis as a random variable, empirical | Load forecast, commodity prices, EFOR |
| Scenario | ◆ Can be measured, but may be difficult to quantify | – Represented as a separate case and compared to a baseline to assess impacts | Carbon Cap and Trade program |
| Paradigm Shift | ◆ Can be described, but not easily quantified | – Can be addressed qualitatively through <i>war games</i> and other techniques | Deregulation of the Industry |

- ◆ Stochastic analysis provides a basis for better understanding of quantifiable risks like changes in fuel prices, breakdowns in correlations, sales growth deviating from plan
 - Stochastic models utilize empirical information to estimate probability distributions of variables rather than single point estimates, and then allowing those variables to change over time by simulating large numbers of future potential outcomes

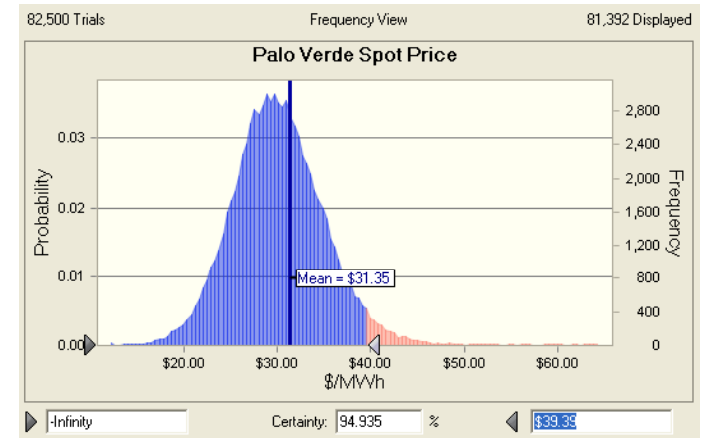
- ◆ Common modeled variables include:

| | |
|---|---|
| <ul style="list-style-type: none"> — Gas prices — Coal prices — CO₂ allowance prices — SO₂ allowance prices — NOx allowance prices — Electricity demand — Electricity prices | <ul style="list-style-type: none"> — Interest rates — O&M costs — Capital costs — Hydro generation — Fossil availability — Nuclear availability |
|---|---|

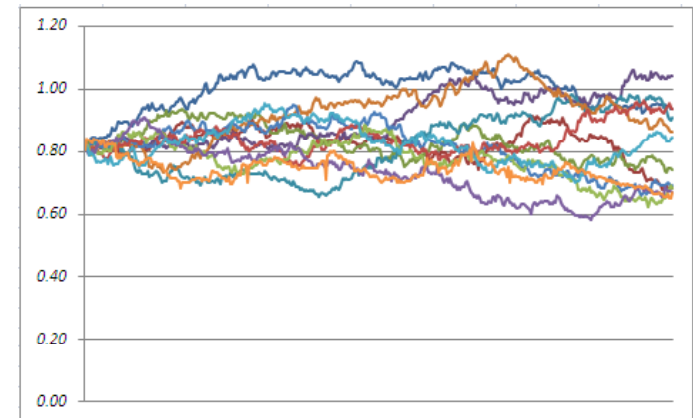
- ◆ Outputs of stochastic analysis are incorporated into risk measures in the IRP scorecard
 - Risk ratio: likelihood of exceeding expected PVRR divided by expected value of PVRR
 - Risk/benefit ratio: likelihood of exceeding expected PVRR divided by likelihood of being below the expected value

- ◆ Goal is to identify those portfolios with greater risks, particularly relative to expected costs, to recognize trade-offs that usually exist between cost and risk

Palo Verde Spot Prices \$/MWh



Aluminum Prices \$/Pound





Scenario Risks

- ◆ Scenario risk may be made up of other, more granular risks (uncertainties)

- ◆ Scenario planning provides:
 - An understanding of how near-term and future decisions would change under different conditions
 - Near-term decisions that are common across different scenarios may imply that these decisions are less “risky”
 - Major differences in near-term decisions across scenarios may imply possibility of future regret

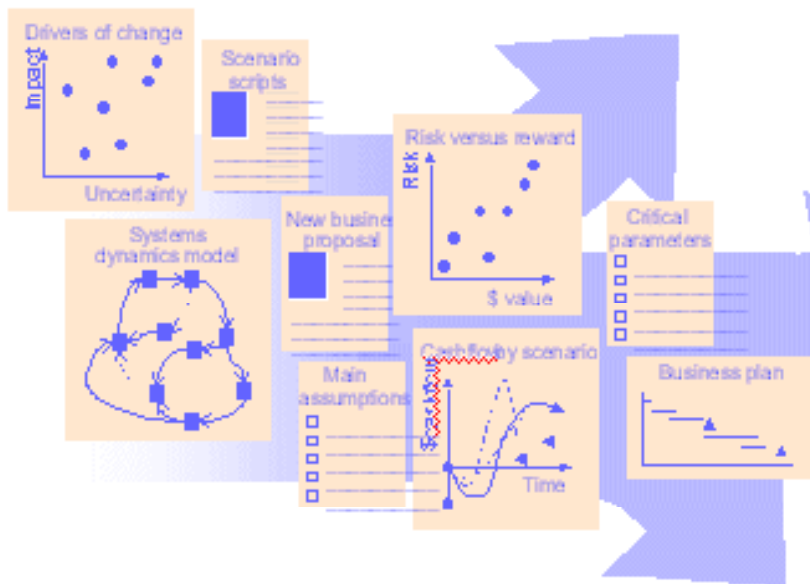
- ◆ The objectives of scenarios were to assess how key uncertainties may be affected by:
 - Economic conditions
 - Legislative and regulatory mandates
 - Significant technology advancements
 - Societal and customer concerns

- ◆ Key aspects of scenarios:
 - Are distinct and reflect plausible, meaningful risks (e.g., uncertainties related to cost, regulation, environment) to TVA
 - “Stress” resource selection to provide a foundation for analyzing the combination of various supply and demand options (capacity plans)
 - Reflect key stakeholder interests, to the extent possible

Scenarios need to be supported by numerical analysis, which should:

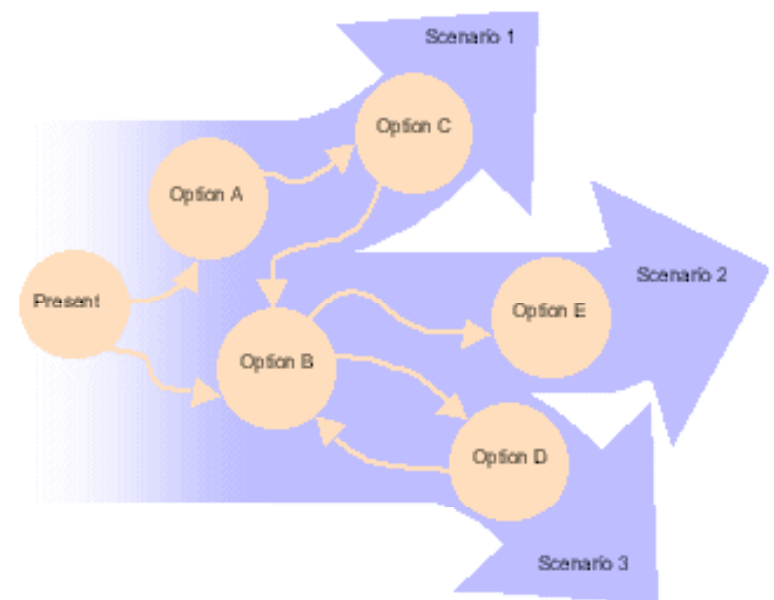
- ◆ Test the credibility of each scenario
- ◆ Explore the magnitude of changes in the environment
- ◆ Evaluate the impact of those changes and create a flexible strategic plan composed of multiple options. We can then move forward by shifting weight between these options, and adapt business plan to the ever-changing environment

From This...



**Metrics
Provide
Bridge
Between
Analysis
and
Planning**

To This...



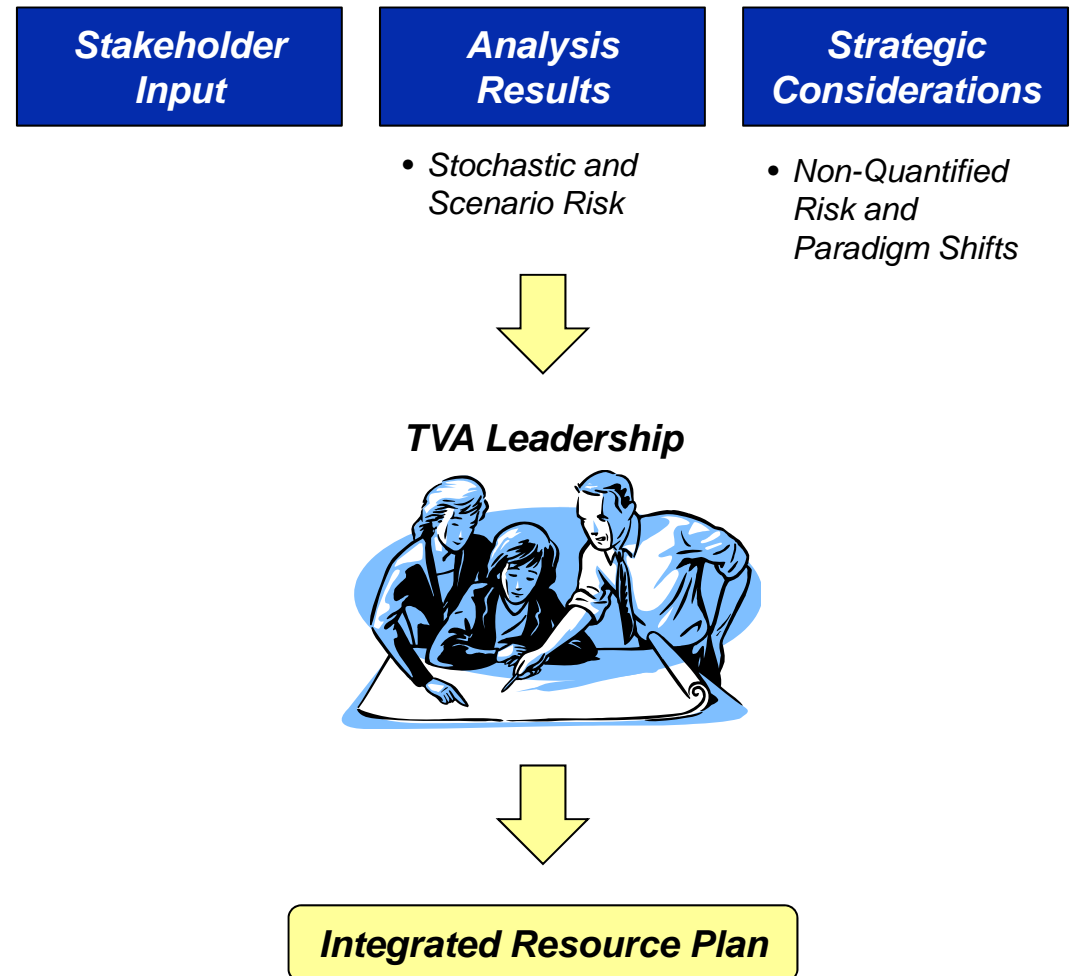


Non-Quantified Risks and Paradigm Shifts

Examples of the broader and non-quantified risk considerations include but are not limited to:

| Other Risk Considerations | Potential Implications |
|--|--|
| <ul style="list-style-type: none"> Establishing a successful partnership with diverse distributor group to administer EEDR programs and deliver forecasted energy savings and demand reductions | <ul style="list-style-type: none"> Planning strategies with higher EEDR targets will have a greater exposure to this risk |
| <ul style="list-style-type: none"> The ability of EEDR programs to stimulate customer participation and deliver forecasted energy savings and demand reductions | <ul style="list-style-type: none"> Planning strategies with higher EEDR targets will have a greater exposure to this risk |
| <ul style="list-style-type: none"> The ability to achieve schedule targets for licensing/permitting, developing and constructing large baseload generation | <ul style="list-style-type: none"> Risks of meeting schedule targets will likely increase as the number and complexity of construction projects increase Projects with more extensive licensing/permitting requirements may have greater exposure to schedule risk |
| <ul style="list-style-type: none"> The timely build-out of transmission and distribution (smart grid) infrastructure to support future resources | <ul style="list-style-type: none"> Risks will likely increase as the amount of construction required increases and if that construction is undertaken by entities other than TVA |
| <ul style="list-style-type: none"> The ability to maintain appropriate operational flexibility after significant changes in resource mix | <ul style="list-style-type: none"> Risks of limiting operational flexibility increase as the magnitude of changes in baseload, dispatchable, and non-dispatchable resources change |

- ◆ Risk is a vital consideration in the decision and planning processes
- ◆ Scenario analysis is used to bound the impacts of scenario risk and serves as the framework for analysis and as a means to understand optimal responses; to paraphrase Lord Baden Powell, ***be prepared***
- ◆ Qualitative discussions of risks that are not quantified in the analysis will also be considered by TVA leadership
- ◆ Long term plans are implemented in the near term through tactics. Robust long term plans allow for tactical shifts in response to new information in an orderly fashion, as opposed to reactive
- ◆ While we would like to plan to a single point, deterministic target, it is more important to understand the boundaries that define the optimal “*envelope*” of tactics so that we can smoothly shift between the boundaries as new information becomes available





The “Great Recession” and Now

The “Great Recession”

- ◆ Since 2008 TVA energy requirements have dropped over 11,000 GWh (-6.4%)
- ◆ By contrast, neither of the last two recessions (1991 and 2001) resulted in a reduction of energy requirements; growth only slowed
- ◆ The 1990 recession was followed by a period of strong growth led by the expansion of the auto industry
- ◆ The 2001 recession resumed about 1.0% growth until the slowdown in 2009

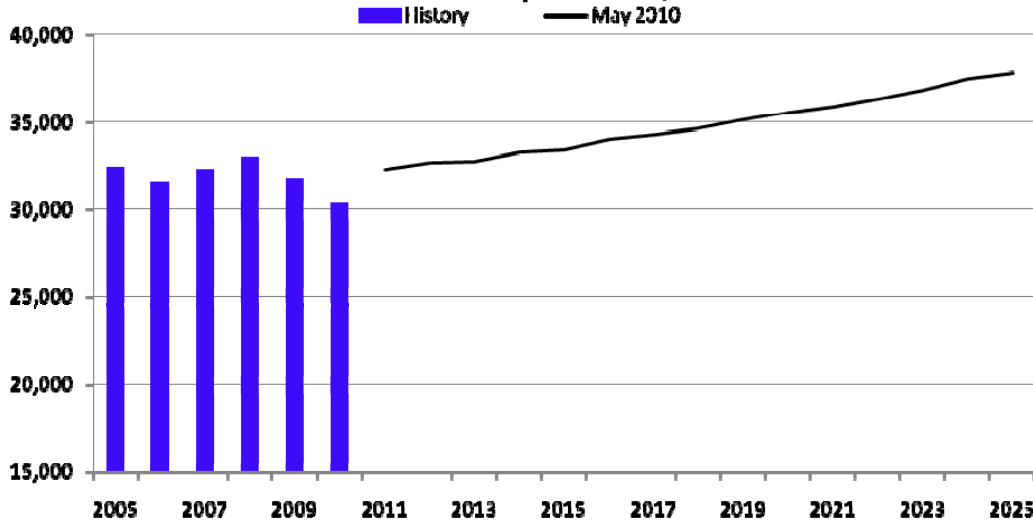
Now

- ◆ 2010 TVA energy requirements grew 0.6% over the low reached in 2009 after adjusting for non-normal weather
 - Including the impacts of the colder than normal winter and warmer than normal summer, 2010 energy grew at over 5% from 2009
- ◆ While the growth in system energy is forecast to continue, the 2008 annual requirements level will not be reached again until 2020
- ◆ Long-term energy is forecast to grow at a slightly lower rate than previously forecast
- ◆ Future growth includes the addition of new customer loads, including solar-related industries (i.e., Hemlock Semiconductor, Wacker Chemie and Confluence Solar), to the TVA region



May 2010 TVA System Peak & Energy Forecast

Fiscal Year Annual System Peak, MW



| System Peak – Average annual growth rate: | |
|---|-------------|
| | May 2010 |
| 1990-2000 | 2.6% |
| 2000-2010 | 0.7% |
| 3 yr: 2011-2014 | 1.0% |
| 10 yr: 2011-2021 | 1.0% |
| 19 yr: 2011-2030 | 1.1% |

Peak Demand, Adjusted for non-normal weather:

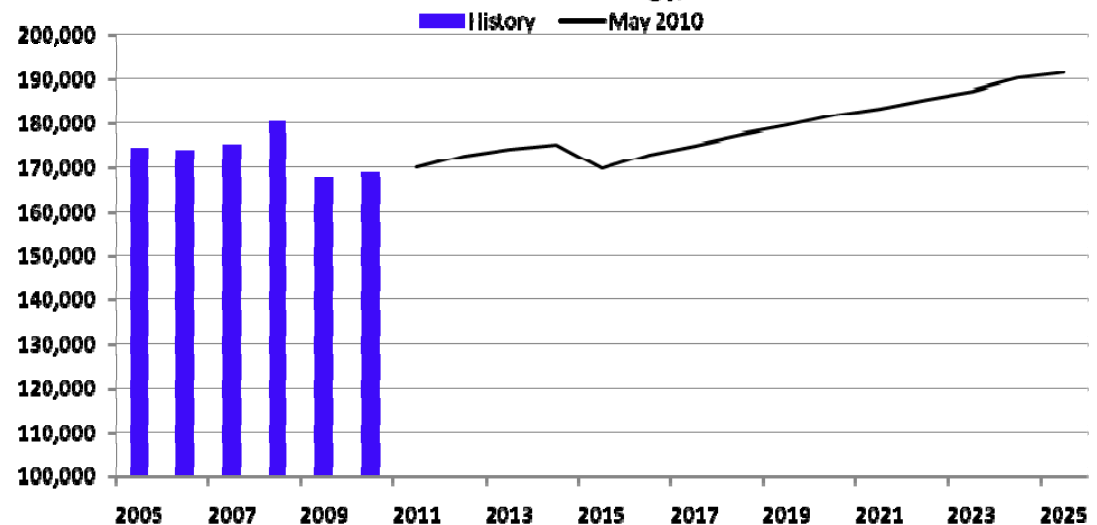
- Growth in the less energy intensive sectors, particularly residential, leads to stronger peak growth than energy growth.
- Peak is forecast to surpass the 2008 level by 2014.
- Historical, Year-ahead MAPE: 2.5%

| System Energy – Average annual growth rate : | |
|--|-------------|
| | May 2010 |
| 1990-2000 | 2.6% |
| 2000-2010 | 0.8% |
| 3 yr: 2011-2014 | 1.0% |
| 10 yr: 2011-2021 | 0.8% |
| 19 yr: 2011-2030 | 0.9% |

Annual Energy, Adjusted for non-normal weather:

- Short-term recovery as economic conditions improve (GRP 3.8%, Employment 1.8%).
- Long-term growth reflects recent historical usage patterns and economic growth (GRP 2.6%, Employment 0.8%).
- Energy levels do not reach 2008 levels until after 2019.
- Historical, Year-ahead MAPE: 1.8%

Fiscal Year Annual Energy, GWH



TVA Load Forecast Detailed Assumptions: May 2010

Economic Drivers: Both the near-term and long-term economic outlooks include an economic recovery. Industrial Production index grew more than expected in the first half of FY10 but has since moderated.

Prices: Retail Electric rates include updated FCA and new revenue requirements, which result in rates being slightly higher. Wholesale rates are forecast and then converted to retail using historically-based estimates of distributor mark-ups.

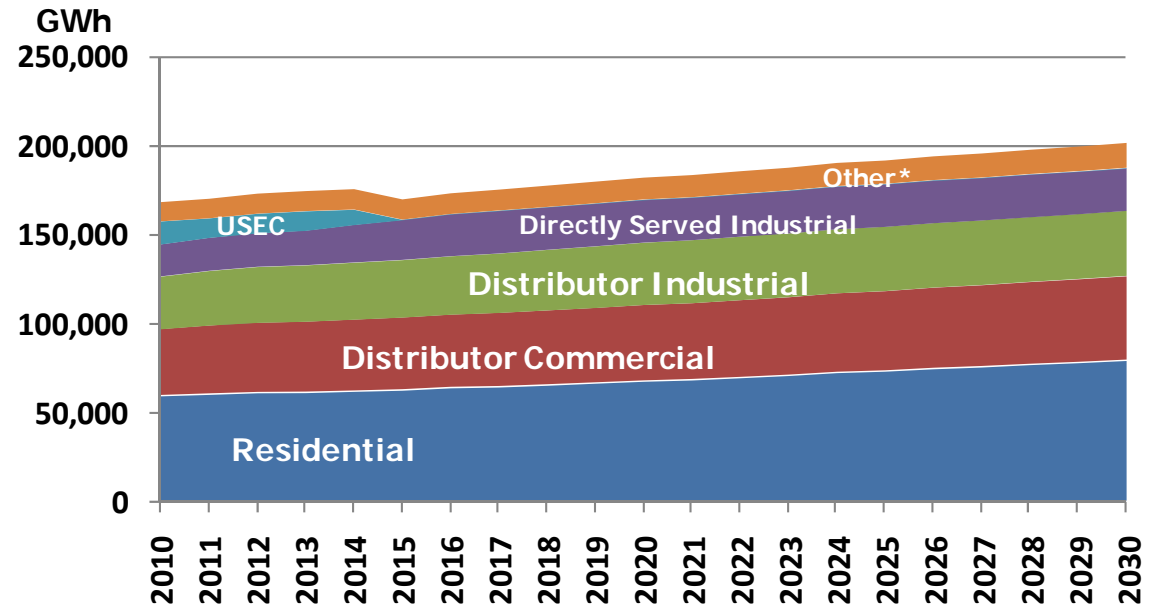
USEC Assumption: Sales of around 11,100 GWh in FY11-FY13 falling to 8,700 GWh in FY14. A 260 GWh maintenance load begins in FY18. Versus the previous assumption, this is about 2,200 GWh lower FY11-FY13, 4,400 GWh lower in FY14 and FY17 and over 10,300 GWh lower in FY15-16.

Large Customers: Sales to directly-served industrial customers are recovering faster than anticipated at the beginning of the year.

- Alcoa load includes only the rolling mill; potlines are not assumed to return to service.
- New customers, HSC and Wacker Chemie, plan to come online beginning in FY12 and FY13, respectively.

Energy Efficiency & Demand Response (EE/DR) Programs: Load forecast does not account for TVA initiated programs because they are treated as supply-side resource.

Time of Use (TOU): Impacts of seasonal on/off peak pricing programs are included. On an annual basis, there are no energy impacts. Coincident summer peak reductions between 270-370 MW.



*Other includes outdoor lighting, interdivisional and distribution & transmission losses

Short-term: Average energy growth expected to be just under 1% per year while system peak is expected to grow at 1% per year over the next 10 years.

FY10 energy consumption was just over 5% higher than FY09. Of this, more than 4% was due to the impacts of non-normal weather.

May 2010 Load Forecast Average Annual Growth Rate

- 3 Year (2011-2014): 1.0%
- 10 Year (2011-2021): 0.8%
- 19 Year (2011-2030): 0.9%



Load Forecast Risk & Uncertainty

Near-Term (1-2 years) Risks

- ◆ Timing and strength of the economic recovery and its impact on electricity sales
- ◆ Sales to large directly-served industrial customers (including Alcoa)
- ◆ USEC contract negotiations and sales assumptions (- 2,500 GWh)
- ◆ Weather variation from normal forecast assumption (+/- 3,000 GWh)

Longer-Term Forecast Uncertainty

- ◆ Future values of the input drivers
- ◆ Relationships between the various input drivers
- ◆ Alternative load forecasts are developed with varying levels (high, medium, low) for key variables
- ◆ Quantitative models are used to evaluate major causal factors and their impacts on future electricity consumption
- ◆ Evaluations are made for impacts of changes in assumptions for large customers, such as USEC and Alcoa
- ◆ Resulting high and low forecasts help to bound these uncertainties



Forecast Uncertainty – System Energy and Summer Peak Load

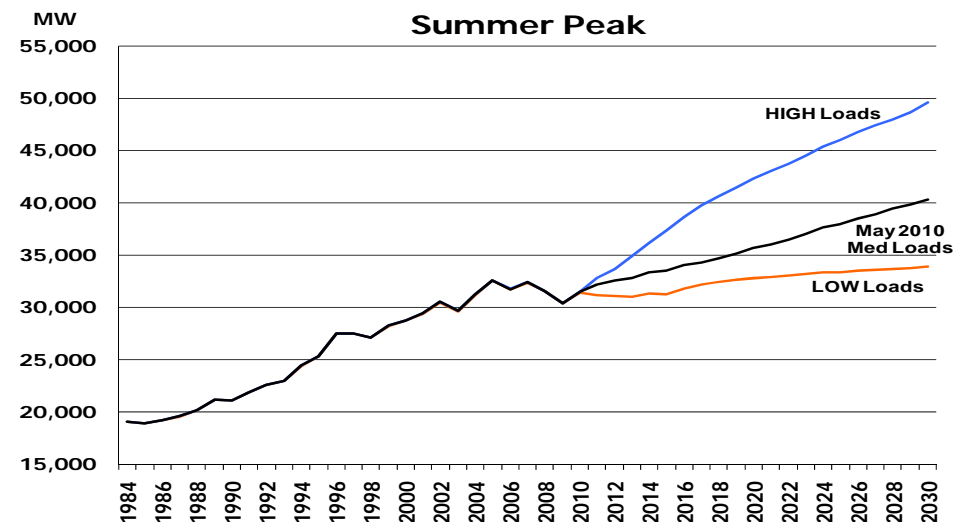
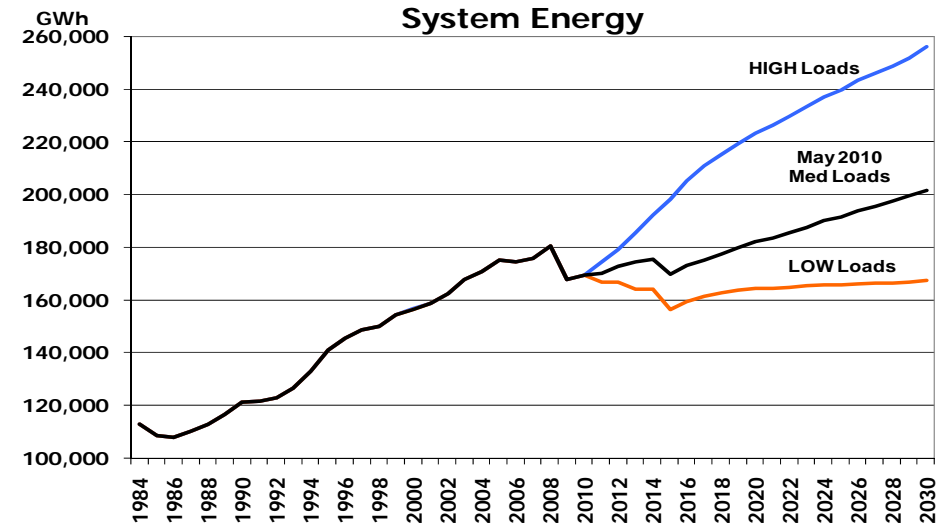
- ◆ High and Low forecasts are estimates of 90th and 10th percentile uncertainty cases from modeled effects of high and low major inputs:

- Economic forecast
- Electricity prices
- Natural gas prices
- Direct served sales

- ◆ High and Low forecasts bracket uncertainties such as:

- Planned new direct serve customers have timing uncertainty
- Growth in the less energy intensive sectors, particularly residential, leads to stronger peak growth than energy growth

| | Annual Energy | | Summer Peak | |
|------------------|---------------|---------|-------------|---------|
| | FY10-15 | FY10-30 | FY10-15 | FY10-30 |
| High Case | 1.8% | 2.0% | 2.9% | 2.1% |
| Base Case | 0.1% | 0.9% | 1.0% | 1.2% |
| Low Case | -3.3% | -0.2% | -0.8% | 0.1% |

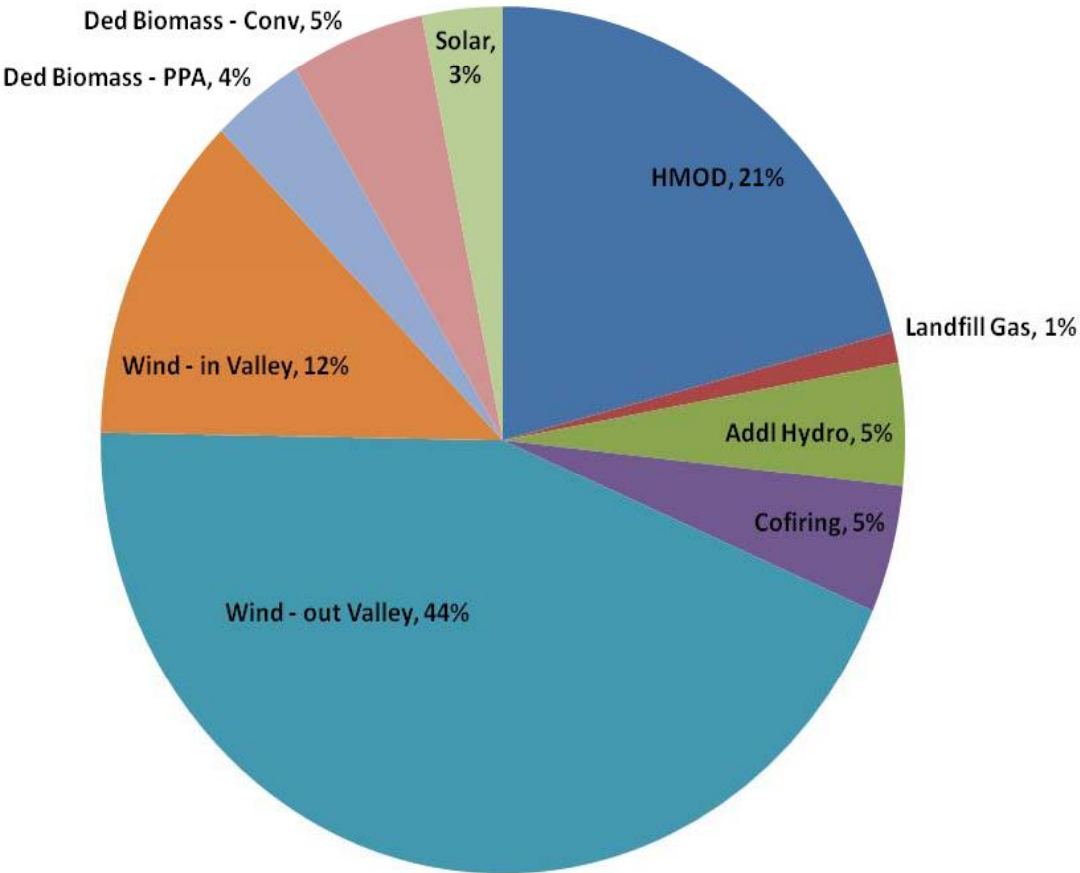


TVA Board Approved Items

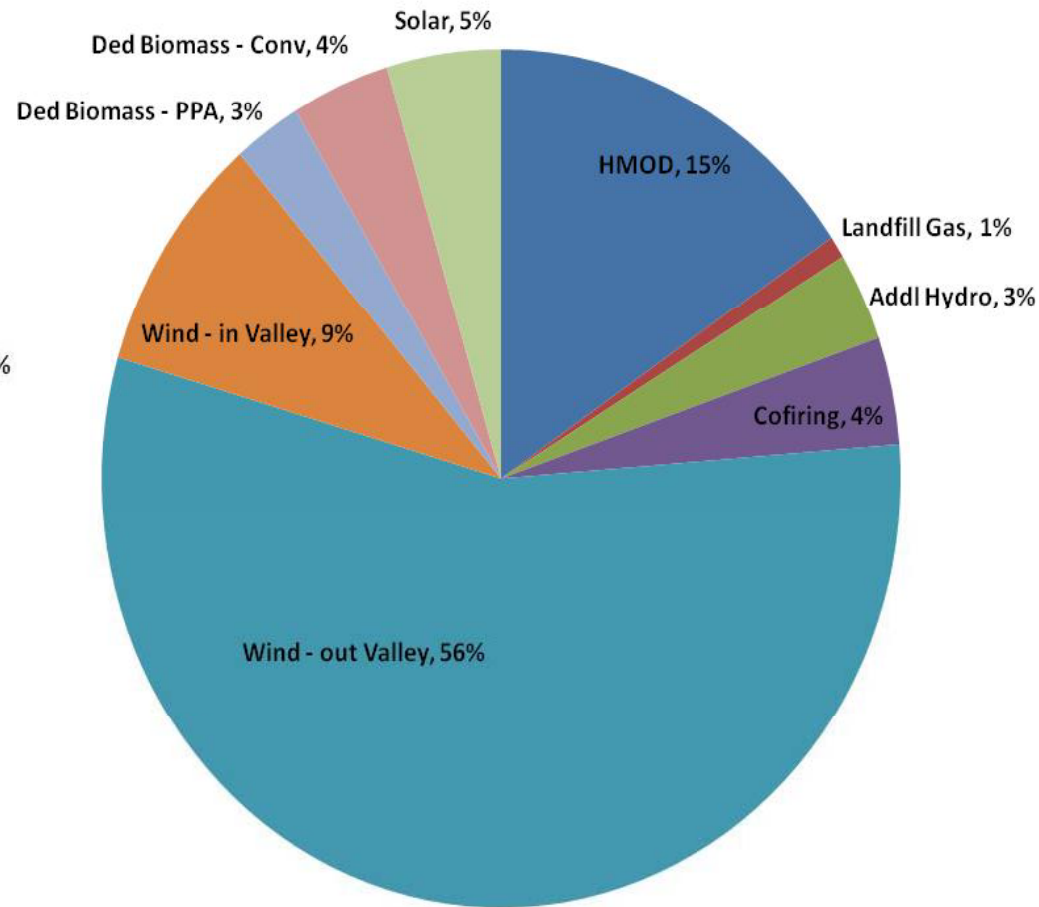
- February 2008 – TVA Federal RPS Compliance Obligation for Distributors/Customers
- May 2008 – Renewable & Clean Energy Guiding Principles
- May 2008 – 2008 Environmental Policy
- April 2009 – Board approval to purchase up to 2,000 MW of renewable energy
- November 2010 - Revised Feb 2008 RPS Compliance Obligation to include state RPS programs

- Three renewable energy addition portfolios exist in the IRP process:
 - 1,300 MW Capacity additions by 2020
 - 2,500 MW Capacity additions by 2020
 - 3,500 MW Capacity additions by 2020
- TVA has contracted for up to 1,581 MW of wind power since issuing a RFP in December 2008 for up to 2,000 MW of renewable energy; additional LFG and solar
- Issued 100 MW Renewable Energy Standard Offer
- TVA is currently exceeding the lowest portfolio in the IRP (1,300 MW)
- TVA has developed potential renewable energy portfolios (2,500 and 3,500 MW) that expand beyond current Board-approved renewable energy capacity levels

2,500 MW Portfolio

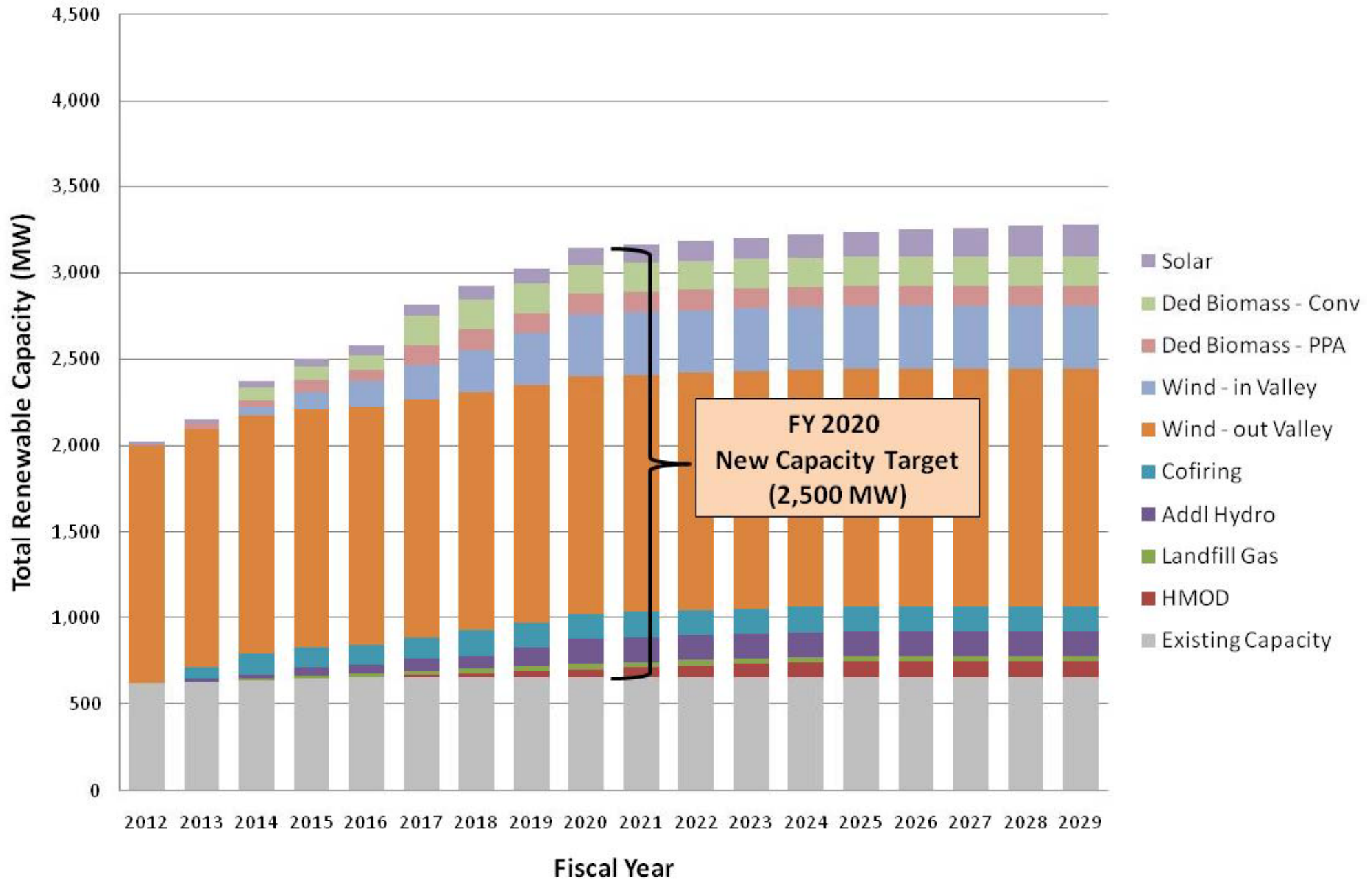


3,500 MW Portfolio



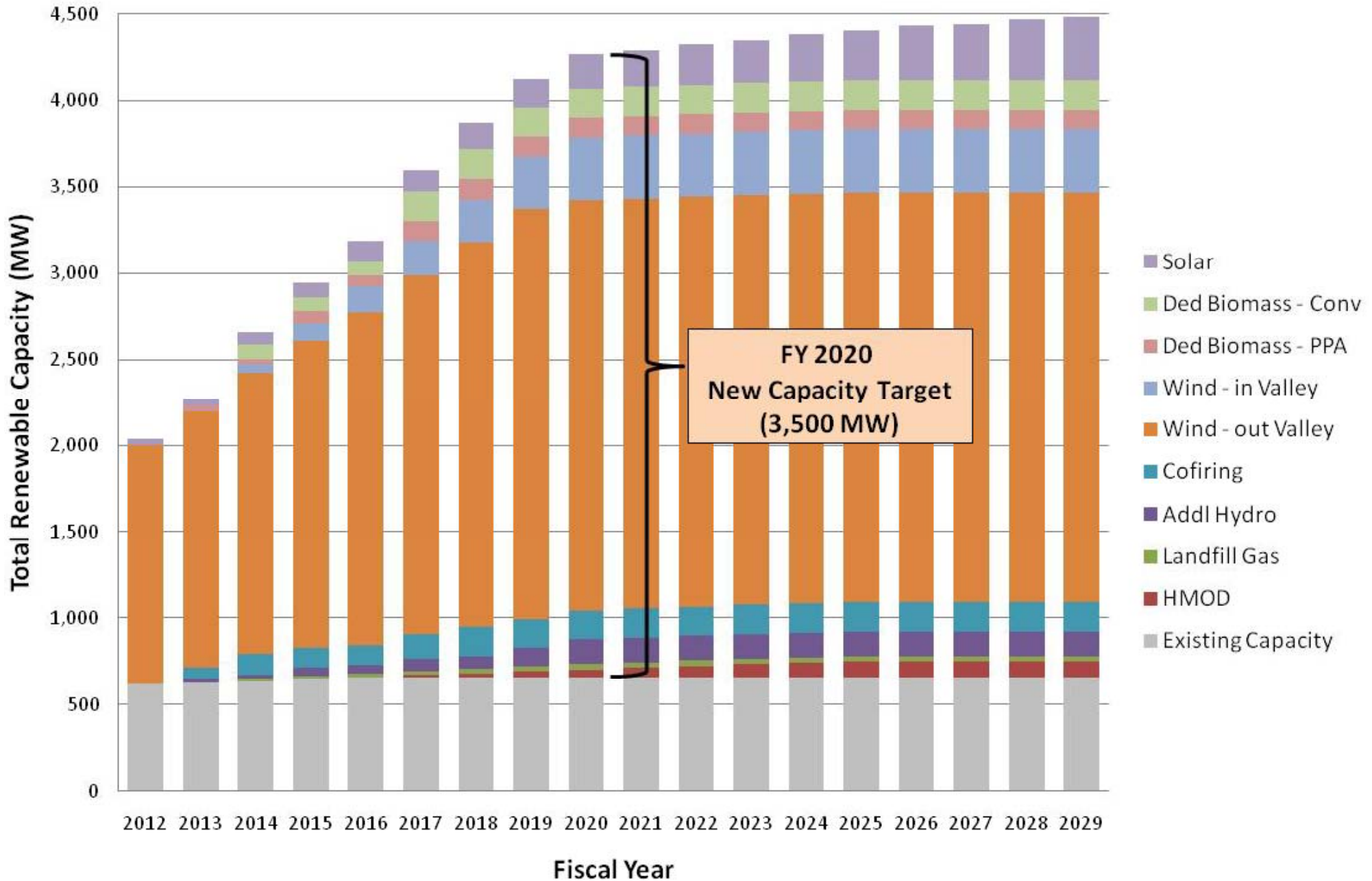


Capacity Additions – 2,500 MW Portfolio





Capacity Additions – 3,500 MW Portfolio





Comparing Portfolios

| | 2,500 MW Portfolio | | | | | | | | | |
|--------------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------|
| FY: | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| HMOD | | | | | | 10 | 20 | 32 | 43 | |
| Landfill Gas | 2 | 4 | 12 | 16 | 18 | 21 | 25 | 28 | 30 | |
| Addl Hydro | | 24 | 24 | 49 | 49 | 76 | 76 | 108 | 144 | |
| Cofiring | | 60 | 118 | 118 | 118 | 118 | 146 | 146 | 146 | |
| Wind - out Valley | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 |
| Wind - in Valley | | | 50 | 100 | 150 | 200 | 250 | 300 | 360 | |
| Ded Biomass - PPA | | 35 | 35 | 67 | 67 | 117 | 117 | 117 | 117 | |
| Ded Biomass - Conv | | | 80 | 80 | 80 | 170 | 170 | 170 | 170 | |
| Solar | 20 | 25 | 40 | 45 | 60 | 65 | 80 | 85 | 100 | |
| Sum | 1,402 | 1,528 | 1,739 | 1,854 | 1,922 | 2,157 | 2,264 | 2,365 | 2,490 | |

| | 3,500 MW Portfolio | | | | | | | | | |
|--------------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|
| FY: | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | |
| HMOD | | | | | | 10 | 20 | 32 | 43 | |
| Landfill Gas | 2 | 4 | 12 | 16 | 18 | 21 | 25 | 28 | 30 | |
| Addl Hydro | 0 | 24 | 24 | 49 | 49 | 76 | 76 | 108 | 144 | |
| Cofiring | 0 | 60 | 118 | 118 | 118 | 141 | 169 | 169 | 169 | |
| Wind - out Valley | 1,380 | 1,480 | 1,630 | 1,780 | 1,930 | 2,080 | 2,230 | 2,380 | 2,380 | |
| Wind - in Valley | | | 50 | 100 | 150 | 200 | 250 | 300 | 360 | |
| Ded Biomass - PPA | 0 | 35 | 35 | 67 | 67 | 117 | 117 | 117 | 117 | |
| Ded Biomass - Conv | 0 | 0 | 80 | 80 | 80 | 170 | 170 | 170 | 170 | |
| Solar | 35 | 45 | 75 | 85 | 115 | 125 | 155 | 165 | 195 | |
| Sum | 1,417 | 1,648 | 2,024 | 2,294 | 2,527 | 2,940 | 3,212 | 3,468 | 3,608 | |

Renewable energy growth assumptions are based primarily upon current renewable energy landscape:

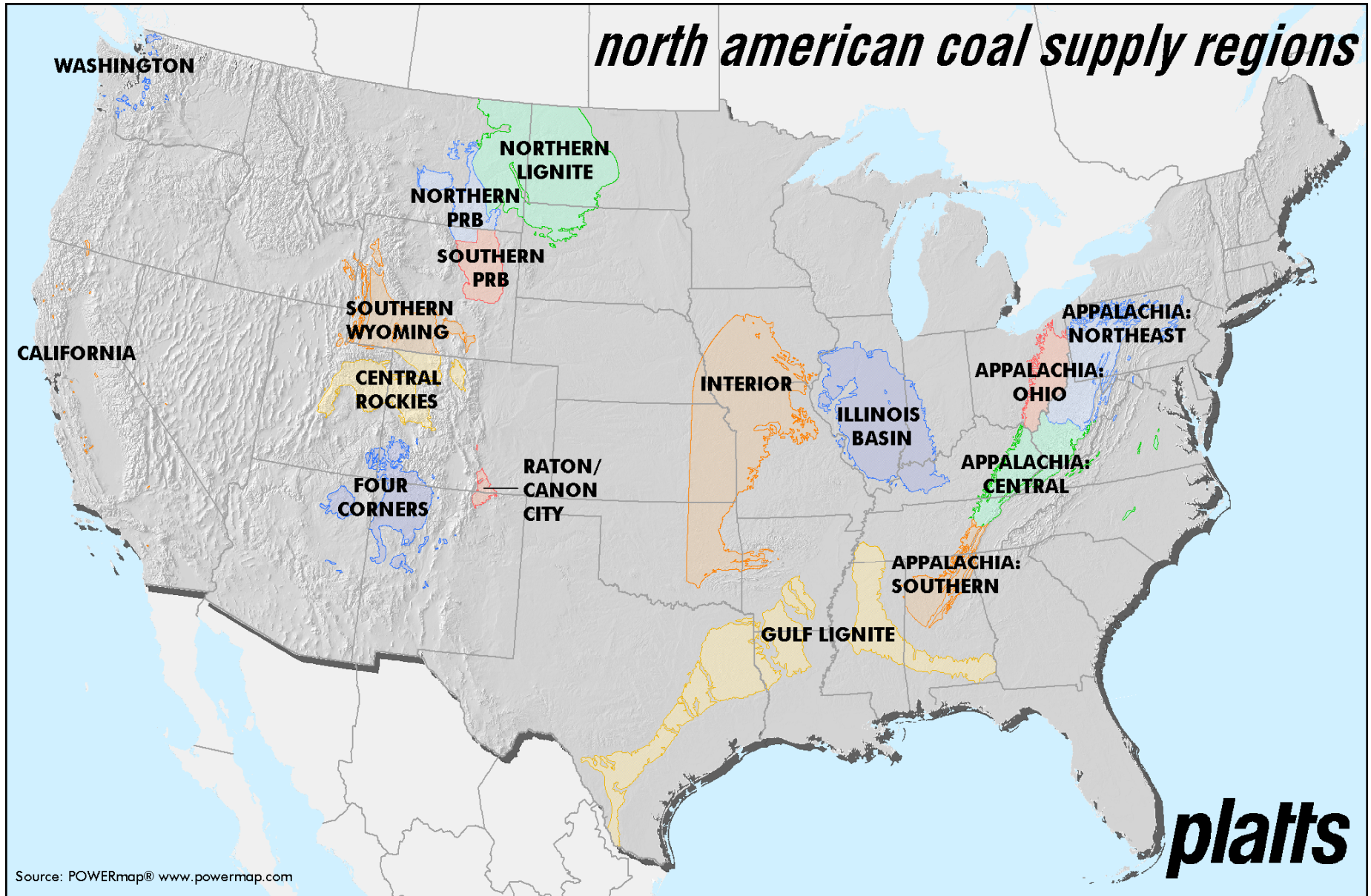
- Technology maturity
- Levelized cost
- Regional renewable resource potential
- Diversified portfolio approach

- **Hydro**
 - HMOD – Continued optimization of existing hydro units
 - New Hydro – Limited opportunity for additional conventional hydro turbines in-Valley; hydrokinetics need further development (maturity of technology/market)
- **Landfill Gas** – Potential to take advantage of several in-Valley resource locations; total potential is limited
- **Biomass (Co-firing & Dedicated)** – Good regional resource potential; supply infrastructure & resource allocation requires further development; regulatory uncertainty
- **Wind** – Potential for in-Valley wind resource at higher elevations (80 & 100 m); siting challenges and interconnection costs
- **Solar** – Capital cost decline rate promising compared to other renewable energy technologies; cost declines largest among Chinese manufacturers

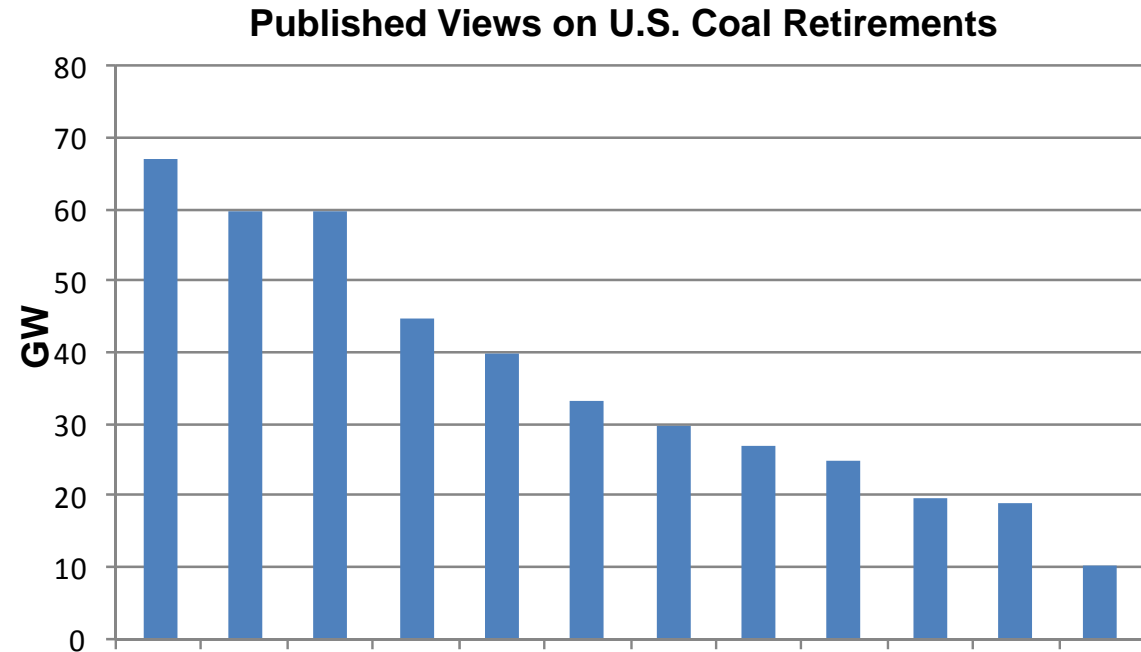


Commodity Forecasts Include

| Commodity | Price Forecasts | Comments |
|----------------------|---|---|
| Emissions Allowances | SO ₂ , NO _x , CO ₂ | Based on TVA regulatory outlook assumptions |
| Coal | CAPP, NAPP, ILB, PRB, Uinta | TVA coal selections based on basin pricing and TVA fuel mix |
| Natural Gas | Henry Hub | NYMEX Henry Hub and specific spot by location |
| Electricity | On-peak, Off-peak | Into -TVA |



- Current snapshot of range of U.S. Coal Capacity to be retired between 2015 and 2030
- No general consensus on outcome, utilities evaluate on a unit by unit basis
- Cost of compliance with clean air regulations will determine the economics of existing coal plants
- Controls are costly and require many factors to be economic in the long term





Integrated Resource Plan Stakeholder Review Group Workshop

November 18, 2010

Ed Colston

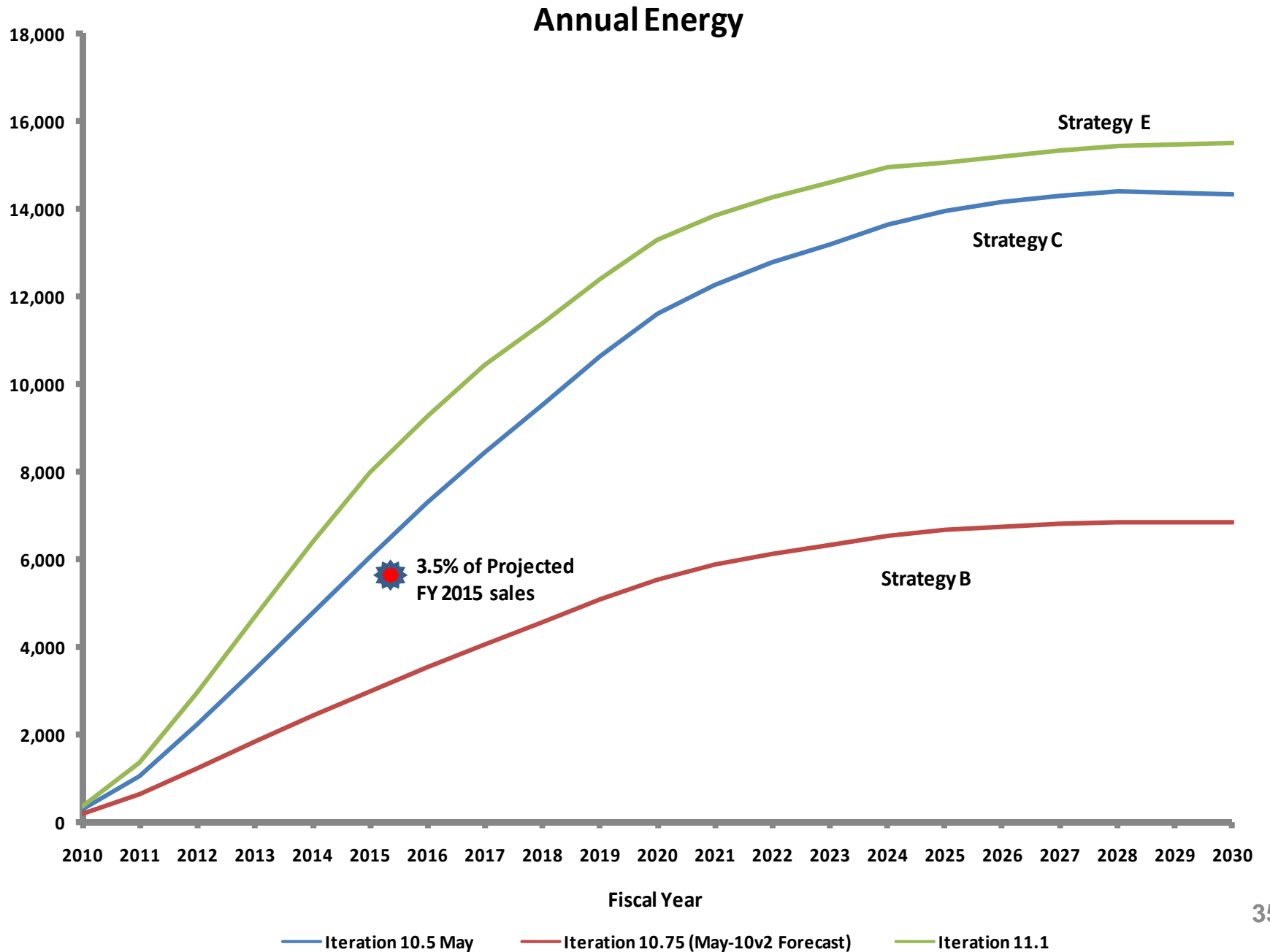
Senior Manager

Market & Program Analysis

Energy Efficiency and Demand Response

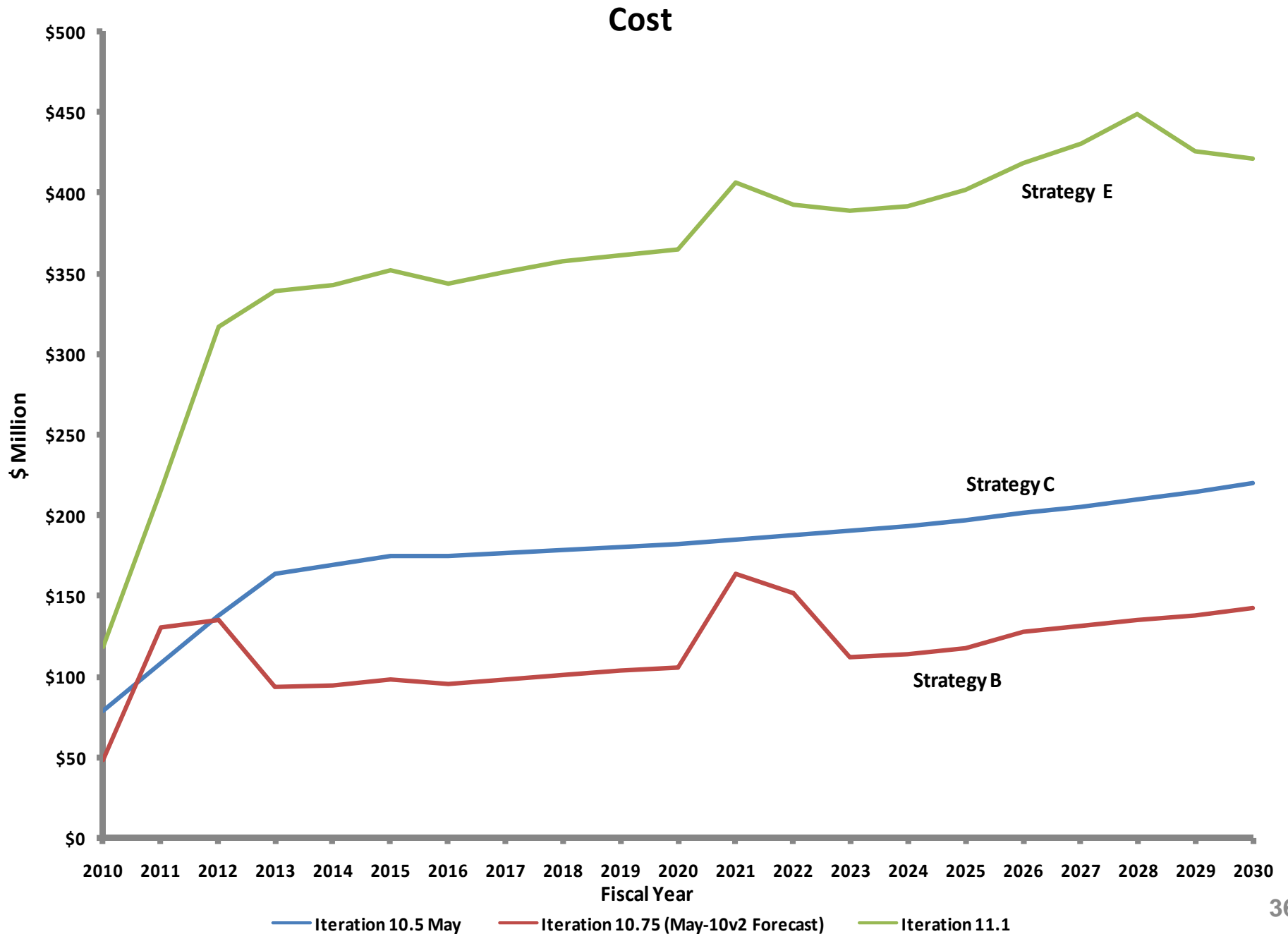


EEDR Inputs to IRP





EEDR Inputs to IRP





EEDR Inputs to IRP Strategy C

| Program Names | Programs | |
|---------------|----------|---|
| | | |
| | R1 | New Construction |
| | R2 | Self/Electronic Audit |
| | R3 | In Home Energy Efficiency |
| | R4 | Manufactured Homes |
| | R5 AC | Air Conditioner Retrofit |
| | R5 HP | Heatpump Retrofit |
| | R6 | HVAC Mainance/Duct Sealing |
| | R7 | Low Income-Weatherization Assistance Program |
| | R8 | Refrigerator Replacement/Haul-a-Way |
| | R9 | ENERGY STAR Manufactured Homes |
| | C1 | Major Industrial |
| | C2 | Industrial Efficiency Advice and Incentives |
| | C3 | Commercial Efficiency Advice and Incentives |
| | C4 | Direct Installation (Small Commercial) |
| | C5 | Retro/Re-Commissioning |
| | C6 | White Tags |
| | C7 | New Construction |
| | C8 | Retro/Re-Commissioning Lite |
| | C9 | Major Commercial |
| | C10 | Commercial Prescriptive |
| | C11 | Industrial Prescriptive |
| | D1 | Demand Response |
| | D4 | Conservation Voltage Regulation Program |



TVA Renewed Vision

- TVA Board adopted a renewed vision to become one of the nation's leading providers of low-cost and cleaner energy by 2020 at its meeting on Friday, August 20, 2010

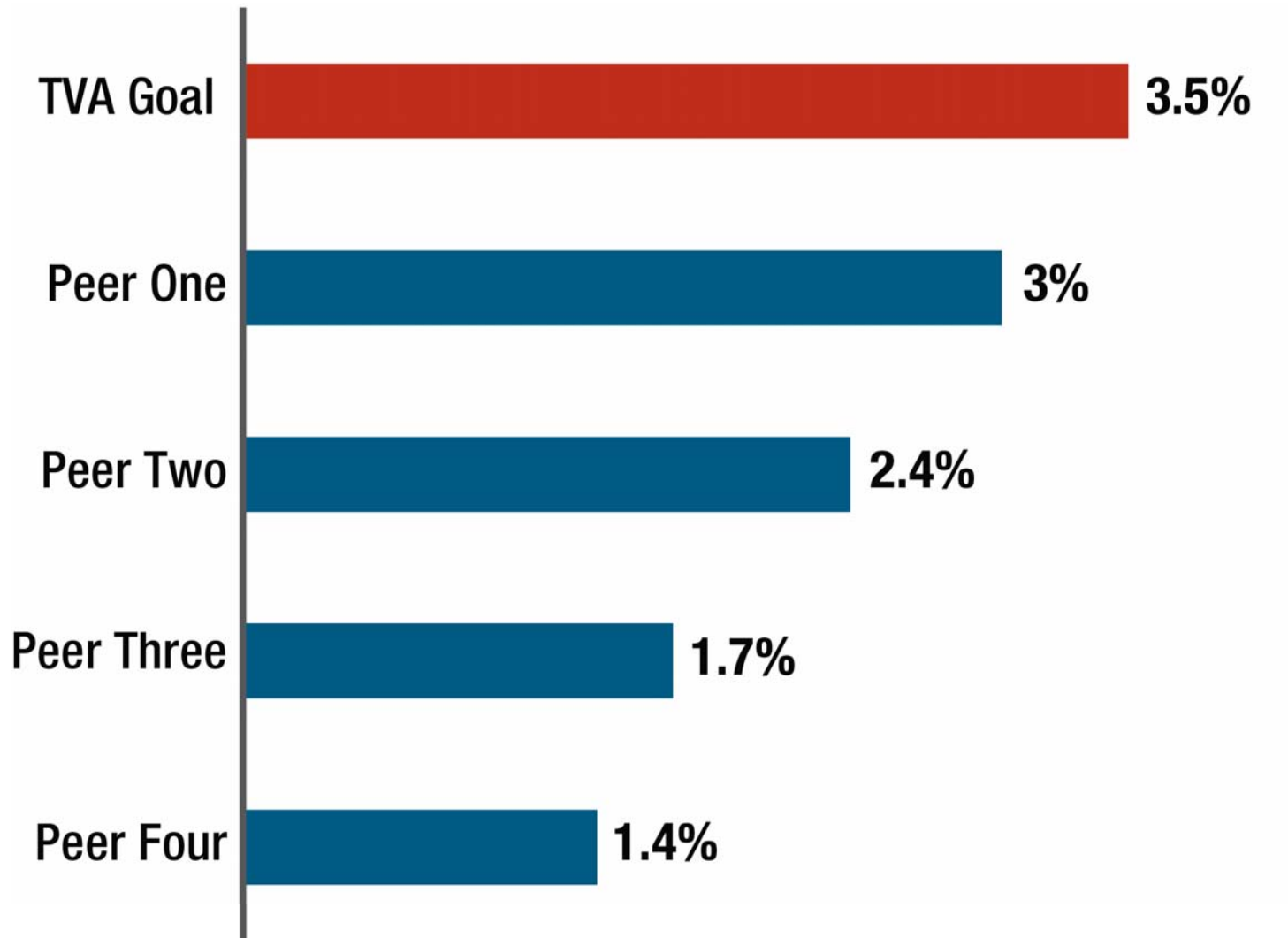
- TVA intends to:
 - lead the nation in improving our air quality
 - lead the nation in increased nuclear production
 - lead the Southeast in increased energy efficiency
 - ***By increasing EE performance to 3.5% of sales by 2015***

- Vision will be guided by the Integrated Resource Plan, with initial results released for public comment September 16 through November 15, 2010 following Valleywide public briefings



Defining Leadership

*Energy Efficiency Savings as a Percent of Sales
2010 to 2015*





Fiscal Year 2010 Highlights

- Exceeded demand reduction goal for third year in a row of 102 MW versus 114 MW of incremental reduction achieved. Major Contributors:
 - Residential – 33 MW
 - Commercial & Industrial – 15 MW
 - EnerNOC – 27 MW
 - TD HUD – 36 MW
- Achieved 205 GWh of full-year energy savings through program efforts
- Executed 10-year agreement with EnerNOC to add 400 MW of peak reduction by FY 2012
- Generation Partners executed over 350 new contracts and reached milestone of 4 MW of renewable generation
- Celebrated 10-year anniversary of Green Power Switch and sold 93,480 MWh
- TVA Board's Renewed Vision and draft results of IRP dovetail to set challenging goal of 3.5% energy savings by FY 2015



FY 2010 Performance

| Program | Installations | MW | GWh |
|---|---------------|-----------|------------|
| New Homes | 3,567 | 3.7 | 25.9 |
| Self Audit/Kits – Online/Paper | 28,885 | 10.5 | 48.5 |
| In-Home Energy Evaluation | 9,428 | 5.7 | 8.8 |
| Manufactured Homes | 1,616 | 0.6 | 11.6 |
| Heat Pump | 10,662 | 11.4 | 35.1 |
| Weatherization Assistance Program (State of Tennessee) | 2,101 | 0.8 | 5.9 |
| EE Appliance Rebate (State of Tennessee) | 2,209 | 0.4 | 0.6 |
| Residential TOTAL | 58,468 | 33 | 137 |



FY 2010 Performance

| Program | MW | GWh |
|---|-----------|-----------|
| Major Industrial | 2.4 | 8.8 |
| Industrial Efficiency Advice & Incentives | 1.0 | 6.1 |
| Commercial Efficiency Advice & Incentives | 11.1 | 37.0 |
| Major Commercial/Other | 0.6 | 5.4 |
| Commercial & Industrial TOTAL | 15 | 57 |

TD HUD – 36 MW

| Program | MW | GWh |
|----------------------------------|-----------|-----------|
| EnerNOC | 27.4 | 5.4 |
| Biomass | 0.8 | 6.7 |
| Solar | 1.4 | 4.0 |
| Demand Response/EUG TOTAL | 30 | 16 |



FY 2011 – Transition

- FY 2011 will mostly be a year of planning
 - No significant changes in budget or program content
 - But, with new GWh target, current programs will be ramped up and additional programs will be added
- Conduct in-depth analysis of energy efficiency potential for TVA area to better understand how far we can go with EEDR programs and associated costs to achieve certain levels
 - Begin analysis in early Fall
 - Utilize initial results for FY 2012 budget planning cycle
- **Develop Five-Year Plan to start moving TVA from current achievement levels to align with 3.5% vision**



Energy Efficiency Changes for FY 2011

Residential and Major Industrial

- In-Home Energy Evaluation
 - Minor program modifications (Approved by ESC in October)
 - Add CFL direct-install
- Minor Water Heater Program Change
 - Begin collecting Energy Factor (EF) data
- Major Industrial Program
 - New energy (kWh) goal and incentive of \$0.05 per first-year kWh savings (Approved by ESC in October)
 - Cap at 50 percent of project costs (Approved by ESC in October)



Energy Efficiency Changes for FY 2011

Commercial & Industrial Advice and Incentives

- Change name to *EnergyRight Solutions for Business*
- Expand the “Advice” to include industrial
- Provide incentives beyond lighting and HVAC
- Adding standard rebate (simple \$ per widget)
- Adding custom incentive (customer unburdened)
- Offer is the same across C&I (advice and incentive)
- Moving from peak kW incentive to kWh incentive (\$0.05/kWh first year savings – consistent with MIP)
- Working with TVPPA Energy Services Committee:
 - Seeking directional approval tomorrow, November 18
 - Seeking approval of form and process changes – December 7



Renewed Vision, Renewed Strategy

Current EEDR Programs – FY 2011 Energy and Demand Goals

Residential – 164 GWh/96 MW

- New Homes
- Self Audit
- In-Home Energy Evaluation
- New Manufactured Homes
- HVAC Replacement
- ARRA Weatherization Assistance

Commercial & Industrial – 244 GWh/39 MW

- Major Industrial
- Industrial Efficiency Advice & Incentives
- Commercial Efficiency Advice & Incentives
- Major Commercial
- Commercial Prescriptive
- Industrial Prescriptive

Demand Response – 75 GWh/269 MW

- EnerNOC
- Direct Load Control A/C
- Direct Load Control WH
- Conservation Voltage Regulation
- Dynamic Voltage Regulation
- SureGrid
- Meter Data Management
- Advanced Metering Infrastructure

End Use Renewables – 67 GWh/2 MW

- Green Power Switch
- Generation Partners
 - Biomass
 - Biogas
 - Solar
 - Micro-Hydro
 - Wind

| | |
|----------------------|----------------|
| Total Energy: | 550 GWh |
| Total Demand | 403 MW |



Renewed Vision, Renewed Strategy

Individual Program Targets – One Way to Get There

| Program | GWH | MW |
|--|---------------|---------------|
| R1 - New Homes | 15.87 | 5.96 |
| R2 - Self Audit | 71.76 | 42.51 |
| R3 - IHEE | 12.22 | 9.51 |
| R4 - Manufactured Homes | 3.85 | 0.31 |
| R5 - Heat Pump | 55.53 | 34.73 |
| R7 - WAP | 4.73 | 2.87 |
| C1 - Major Industrial | 153.30 | 17.50 |
| C2 - Industrial Efficiency Advice & Incentives | 26.02 | 5.94 |
| C3 - Commercial Efficiency Advice & Incentives | 30.92 | 6.20 |
| C9 - Major Commercial | 9.56 | 1.09 |
| C10 - Commercial Prescriptive | 17.52 | 4.00 |
| C11 - Industrial Prescriptive | 6.57 | 1.50 |
| D1 - EnerNOC | 0.00 | 150.00 |
| D2 - Direct Load Control A/C | 0.00 | 8.90 |
| D3 - Direct Load Control WH | 0.00 | 4.69 |
| D4 - Conservation Voltage Regulation | 63.77 | 7.98 |
| D5 - Dynamic Voltage Regulation | 9.42 | 94.24 |
| D6 - SureGrid | 2.00 | 2.80 |
| Generation Partners | 66.94 | 1.85 |
| Total | 550.00 | 402.57 |



Likely New Energy Efficiency Programs for FY 2012

Residential:

- Retail Lighting
- Appliance Recycling
- Expanded Energy Star Manufactured Homes
- Enhanced Water Heater Program
- Energy Star Central Air-Conditioning

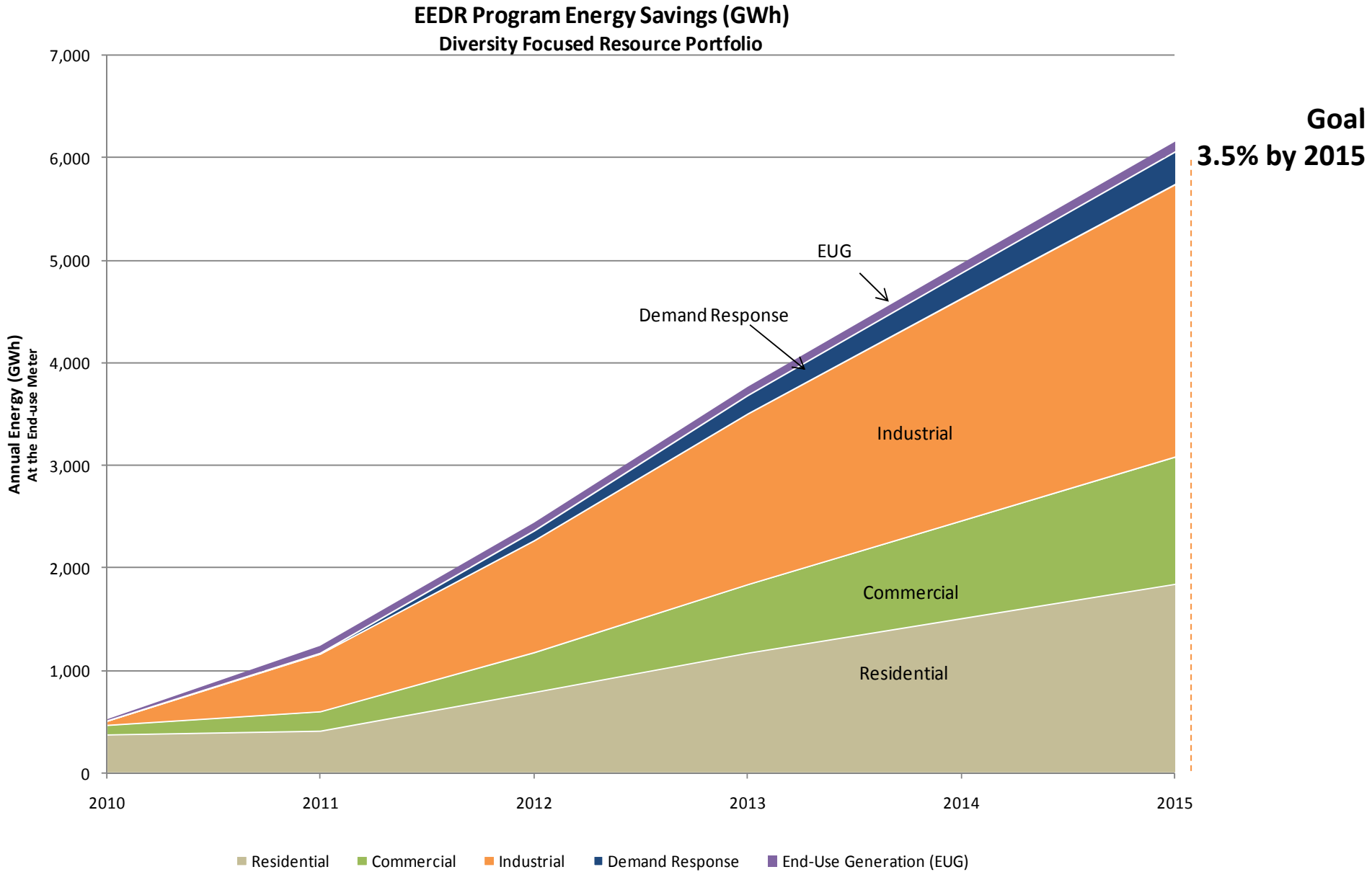
Commercial and Industrial:

- Small Commercial Direct Install
- Existing Building Commissioning
- Commercial New Construction

- Additional Programs Subject to Five-Year Plan Development



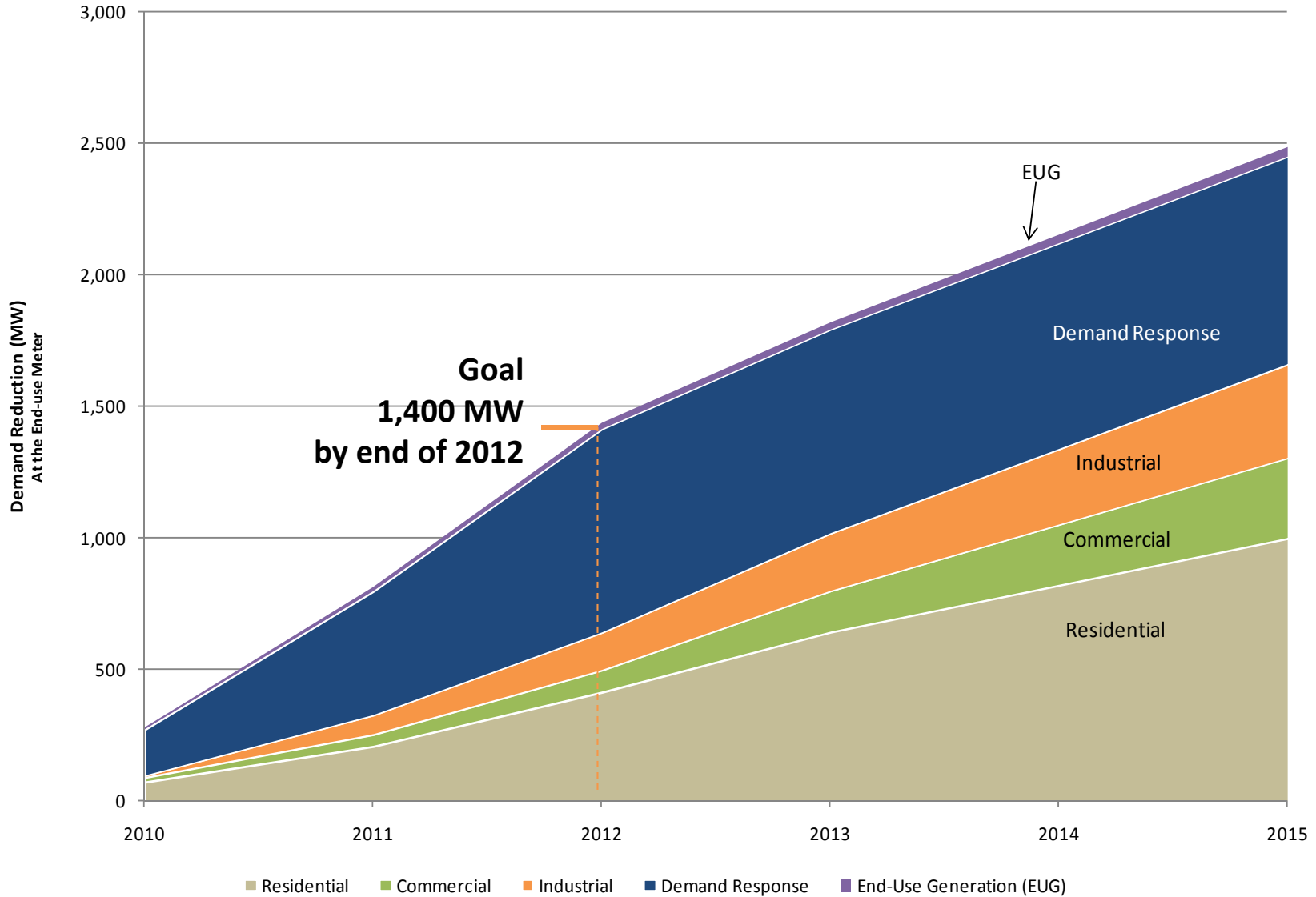
A Path to Leadership





A Path to Leadership

EEDR Program Demand Reductions (MW)
Diversity Focused Resource Portfolio

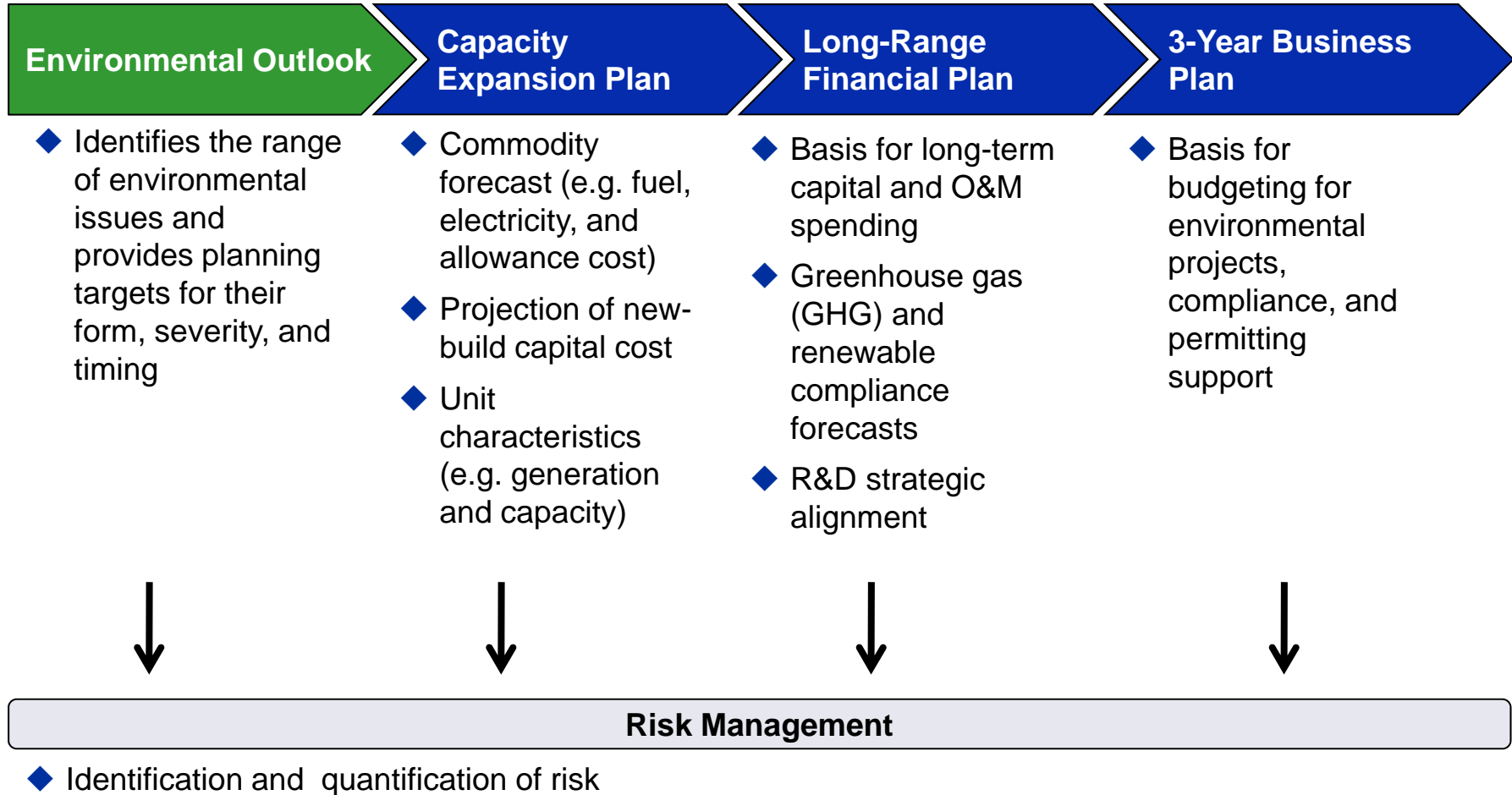




Questions



The following diagram outlines how the environmental outlook influences other planning processes:



- ◆ During the 2nd year of this Administration, EPA has proposed an array of very stringent requirements for air emissions, water discharges, and waste management

- ◆ Climate legislation has stalled, reflecting a delayed and reduced carbon forecast, yet EPA under its CAA authority is proceeding with greenhouse gas rulemaking

- ◆ EPA's aggressive schedule and stringent requirements in draft rules might soften in final rulemakings



KEY DEVELOPMENTS

- **Transport Rule:** Replaces the Clean Air Interstate Rule with proposed stringent levels for SO₂ and NO_x beginning in 2012 with some additional reductions in 2014
- **Utility MACT** - EPA expected to implement Maximum Achievable Control Technology (MACT) requirements for hazardous air pollutants, including mercury, acid gases, trace metals, and organics. Court ordered schedule, compliance expected mid-2015 with one year extension for control installation
- EPA reviewing existing **National Ambient Air Quality Standards (NAAQS)** and new tighter standards forecasted for ozone and fine particles

OUTLOOK

- Moving away from cap and trade programs for sulfur dioxide (SO₂), nitrogen oxide (NO_x), and mercury (Hg) emissions to command-and-control requirements with emission standards specific to units
- SO₂ and NO_x emissions to be set by state programs to attain NAAQS and will drive aggressive controls on coal-fired units
- EPA to issue a “Utility MACT” for HAPs likely requiring strict rate-based limits on each plant to control mercury, acid gases, and metals
- Other new, very stringent hourly SO₂ and NO₂ NAAQS make new or modified source permitting very difficult



Environmental Outlook: Water and Waste

WATER – KEY DEVELOPMENTS

- **316(b)** Cooling Water Intakes - EPA to propose 316(b) regulations in February 2011
- Closed cycle cooling (CCC) likely for saltwater and sensitive freshwater environments. For freshwater, cost- benefits analysis will determine need for CCC
- **316(a)** Hydrothermal discharge limits – Additional regulatory scrutiny and biological justification to support current alternate limits at all plants
- **Effluent Guidelines** - EPA collecting information. stringent metals limits will require treatment system upgrades

WASTE – KEY DEVELOPMENTS

- **Coal Combustion Residuals:** June 21, EPA proposed rule with two primary options – hazardous or non-hazardous management options

WATER - OUTLOOK

- Hydrothermal releases and plant intakes to require re-focused biological analysis and, in some cases, additional cooling capacity (i.e., cooling towers)
- Likely requirement to deploy new screen technology at all plants
- Likely upgrade wastewater treatment systems with advanced wastewater treatment systems at all coal plants
- Curtail fly ash sluicing

WASTE – OUTLOOK

- Liners and groundwater monitoring at new expansions of CCR landfills
- CCRs go into products through beneficial reuse or into “Subtitle D- non-hazardous” disposal facilities
- Wet sluicing of CCRs eliminated over next several years



Environmental Outlook: Climate Change and Renewables

CLIMATE CHANGE – KEY DEVELOPMENTS

- In 2009, both the U.S. House of Representatives and the Senate's Environment and Public Works Committee passed separate energy and climate change bills
- In 2010, legislative priorities shifted and economy-wide climate legislation stalled. Senate proposals focus on utility-only cap-and-trade programs in summer 2010
- EPA is actively promulgating regulations relating to greenhouse gas emissions (e.g., CO₂)
- Carbon-constrained world likely for utilities

RENEWABLES – KEY DEVELOPMENTS

- Continued state actions to implement state mandates and goals
- No significant developments occurred in the U.S. Senate. Focus has been on extending renewable energy tax credits and incentivizing advanced clean energy manufacturing facilities

CLIMATE CHANGE – OUTLOOK

- Proxy GHG cap-and-trade program begins in 2017 with:
 - Retail electric suppliers initially receiving direct allocations of emission allowances, gradually phasing out over time and transitioning to full auction of allowances
 - Significant uncertainty associated with allowance prices and overall cap-and-trade costs

RENEWABLES – OUTLOOK

- Combined efficiency and renewable electricity standard with a required annual percentage of 6% in 2014 of adjusted retail sales escalating to 15% by 2021