Presentation to
GLOBAL CHANGE EDUCATION PROGRAM ORIENTATION

June 12, 2008

John W. Myers
Tennessee Valley Authority
Living conditions, 1935
Flooding at Chattanooga, May 1935
Pre-rural electrification of the Tennessee Valley, C. 1934
Rural electrification, c. 1935

Enjoying her refrigerator, c. 1937
TVA at a glance

- 49 dams for integrated river management
- 11,000 miles of reservoir shoreline
- $376 million in tax-equivalent payments to Valley states and counties
- $2.4 billion spent in Valley states for goods, fuel, and services
- Over 17,000 miles of transmission lines
TVA at a glance

- $9.2 billion in annual revenue
- 80,000-square-mile service area
- 158 distributors, 8.7 million residents
- 62 directly-served large industrial and federal customers
- Financially self-supporting
- No taxpayer support
- No stockholders
Scope of TVA’s Power System

- Generating Capacity of 33,128 Megawatts (MW)
  - 109 Hydro units (3,526 MW)
  - 4 Pumped storage units (1,618 MW)
  - 59 Coal-fired units (15,081 MW)
  - 6 Nuclear units (6,925 MW)
  - 83 Combustion turbines (5,960 MW)
  - 9 Diesel generators (13 MW)
  - Renewable (wind, solar, methane gas) (5 MW)
TVA’s Generation Mix - 2007

- Fossil (coal, gas, oil): 63%
- Nuclear: 31%
- Hydro: 5%
- Other: 1%
TVA ENVIRONMENTAL POLICY

ENERGY

Cleaner, Reliable, Still Affordable Energy

ECONOMIC DEVELOPMENT

Sustainable Economic Development

ENVIRONMENT

Proactive Environmental Stewardship

Natural Resource Management

Climate Change Mitigation

Sustainable Land Use

Air Quality Improvement

Waste Minimization

Waste Resources Improvement
Environmental Principles

• TVA is committed to:
  – Sound Natural Resource Management
  – Sustainable Land Use
  – Waste Minimization
  – Protection and Improvement of Water Resources
  – Improvement of Air Quality
  – Climate Change Mitigation
I. Climate Change Mitigation

• **Environmental Objective**
  Stop the growth in the volume of emissions and reduce rate of carbon emissions (intensity) by 2020

• **Includes**
  Reducing load growth by at least one-fourth in five years through energy efficiency and demand response while meeting the remaining growth through lower carbon-emitting energy options
I. Climate Change Mitigation

- **Volume**: TVA is among top carbon emitters among power generators – **Stop growth by 2020 CO$_2$ emissions**
  
  *volume = millions of tons per year*

- **Emission Rate**: TVA’s carbon intensity (tons/MWh) is about the same as the national average – **Reduce intensity by 2020**

  **CO$_2$ intensity**
  
  *Rate=tons per MWh*

  - 22%
**TVA IS ONE OF THE LARGEST CO2 EMITTERS IN THE COUNTRY**

Top 15 CO2 emitters in the U.S., 2005-2007 average

<table>
<thead>
<tr>
<th></th>
<th>Total emissions</th>
<th>Emissions per MWh</th>
<th>Emissions per customer</th>
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<tbody>
<tr>
<td></td>
<td>Million Tons</td>
<td>Ton/MWh</td>
<td>Tons/end user</td>
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<tr>
<td>AEP</td>
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<td>0.88</td>
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<td>Southern</td>
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<td>TVA</td>
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<tr>
<td>DTE Energy</td>
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<td>0.88</td>
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</table>

*The end-user customer number is not available for NRG*

Timing and Severity Comparison of Various Bills

This graph depicts emissions targets from some of the major climate change bills in Congress. Targets are based on comparison with historical year emissions. Kerry-Snowe, Sanders-Boxer, and Waxman specify future emissions as a percentage of 1990 emissions. For Lieberman-McCain, Udall-Petri, and Bingaman-Specter, emissions targets for covered sectors are related to historical emissions for those sectors, and total emissions are assumed to match those in the corresponding historical year.

1 Bill contains flexibility mechanisms which allow actual emissions to rise above the target.
CO₂ Allowance Price for Lieberman-Warner based on economic models

![Graph showing CO₂ Allowance Price for Lieberman-Warner based on economic models. The graph includes various models and their projections for different years. The x-axis represents the years from 2015 to 2050, and the y-axis represents the Allowance Price (2005$ per metric ton). The models include CRA, no banking, CRA high, CRA low, CRA banking, CRA high, MIT-LW, MIT-LW +15% offsets, EPA ADAGE, EPA IGEM, CATF, EPRI, EIA, and ACCF-NAM. The trends show varying degrees of increase in allowance prices over the years.]
Growth in Demand and Capacity
Renewable Guiding Principles

- TVA’s goal is to mitigate our impact on climate change, with renewable energy usage as one of many options.
- Renewable energy and energy efficiency should be part of a clean energy portfolio, which has a zero or near-zero carbon emission rate.
- Renewable energy targets mandated legislatively will be met with the lowest cost options available (with preference for regional assets).
- Technology innovation should be considered to address the intermittency issue associated with many renewable options.
- Market and educational opportunities will be created for end-user and supplier participation.
- Educational initiatives will be supported to foster public participation.
Renewable Energy

• **Definition**
  TVA’s renewable energy will be defined as energy production that is sustainable and often naturally replenished

• **Examples**
  Wind, solar generation, landfill methane, biomass co-firing, dedicated biomass, geothermal, incremental hydro, or existing hydro
Clean Energy

• **Definition**
  TVA’s clean energy portfolio will be defined as energy that has a near-zero carbon emission rate or energy efficiency improvements.

• **Examples**
  Nuclear, renewables (including hydro), demand reduction, or waste heat recovery.
Renewable and Clean Energy Portfolio

- 2008: 35%
- 2010: 42%
- 2015: 55%
- 2020: 57%

TVA’s Portfolio >50% Renewable and Clean Energy
II. Air Quality Improvement

- TVA’s Air Emissions continue to decline
  - Since 1977 $\text{SO}_2$ emissions reduced by 83%
  - Since 1995 $\text{NO}_X$ emissions reduced by 81%
  - Since 2000 Mercury emissions reduced by 30%
II. Air Quality Improvement

• **Environmental Objective**
  Continue efforts to reduce $\text{SO}_2$, $\text{NO}_X$, Mercury, particulate emissions

• **Includes**
  Installing emissions controls and using technologies on more than 80% of coal-fired generation in the next 10 years
TVA’s Cumberland Fossil Plant (near Clarksville, TN)
TVA Emissions Trends
Sulfur Dioxide (SO$_2$)
TVAs Clean Air Progress

Through 2007
- Clean air capital expenditures were $4.8 billion
- SO₂ emissions were 82% below 1977 levels
- Ozone season NOₓ emissions were 81% below 1995 levels
- Total generation had increased 52% since 1975