# The Clear Skies Act of 2003

## Arizona and Clear Skies

# Highlights of Clear Skies in Arizona

- **Arizona sources would reduce emissions of $NO_x$ by 63%, and mercury by 69% by 2020 due to Clear Skies. $SO_2$ emissions remain unchanged,**

- **The health benefits in the West would total $8.6 billion annually ($1.6 billion under the alternative estimate) and include approximately 1,100 fewer premature deaths (600 under the alternative estimate) and 2,500 fewer hospitalizations/emergency room visits each year.[1]**

- **In addition, Western states would continue to enjoy good air quality and visibility even in the face of increasing demand for electricity.**

- **Clear Skies does not significantly impact electricity prices. With or without Clear Skies, electricity prices in the electricity supply region that includes Arizona are expected to remain below 2000 prices.**

1. For the purposes of this analysis, the West includes all states that would be affected by the Zone 2 cap for $NO_x$ under Clear Skies. These states are WA, OR, CA, UT, AZ, ID, MT, WY, CO, NM, TX, OK, KS, NE, ND, and SD.

# Clear Skies: An Innovative Approach to Improving Human Health and the Environment

## Why Clear Skies?

- **Air quality has improved, but serious concerns persist**
  - Utah's citizens suffer ill effects from air pollution, including asthma attacks and premature death
- **Electricity generation sector remains a major emissions source**
  - Very cost-effective to control the power sector, relative to other sources
  - Sources are concerned about upcoming complex and burdensome regulations

## Advantages of the Clear Skies Approach

- **Guarantees significant nationwide emissions reductions – beginning years before full implementation**
  - Utah sources would reduce or hold the line on emissions of $SO_2$, $NO_x$, and mercury
  - Delivers dramatic progress towards achievement of critical health and environmental goals
- **Uses proven, market-based flexible approach with incentives for innovation**
  - Recognizes environmental needs as well as industry constraints, allowing industry to better manage its operations and finances while lowering risks to the public
  - Sources are projected to install pollution controls to enable continued reliance on coal
- **Increases certainty across the board for industry, regulators, and consumers**

# Under Current Clean Air Act Power Plants Would Face a Complex Set of Requirements

**NSR Permits** for new sources & modifications that increase emissions

**Ozone**

1-hr Serious Area Attainment Date

OTC $NO_x$ Trading

$NO_x$ SIPs Due

Designate areas for 8-hr Ozone NAAQS

1-hr Severe Area Attainment Date

$NO_x$ SIP Call Red-uc-tions

Marg-inal 8-hr Ozone NAAQS Attain-ment Date

8-hr Ozone Attain-ment Demon-stration SIPs due

Assess Effectiveness of Regional Ozone Strategies

Possible Regional $NO_x$ Reductions ? (SIP call II)[1]

Moderate 8-hr Ozone NAAQS Attainment Date

Serious 8-hr Ozone NAAQS attainment Date

99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18

Mercury Determination

Proposed Utility MACT

Final Utility MACT

Compliance with Utility MACT

Compliance for BART Sources

Compliance for BART sources under the Trading Program

Phase II Acid Rain Compliance

Designate Areas for Fine PM NAAQS

New Fine PM NAAQS Implementation Plans

Latest attainment date for Fine PM NAAQS [3]

Second Regional Haze SIPs due

Interstate Transport Rule to Address $SO_2$/ $NO_x$ Emissions for Fine PM NAAQS and Regional Haze

Regional Haze SIPs due

**Acid Rain, $PM_{2.5}$, Haze, Toxics**

**Note**: Dotted lines indicate a range of possible dates.

[1] Further action on ozone would be considered based on the 2007 assessment.

[2] The SIP-submittal and attainment dates are keyed off the date of designation; for example, if PM or ozone are designated in 2004, the first attainment date is 2009

EPA is required to update the new source performance standards (NSPS) for boilers and turbines every 8 years

In developing the timeline of current CAA requirements, it was necessary for EPA to make assumptions about rulemakings that have not been completed or, in some case, not even started. EPA's rulemakings will be conducted through the usual notice-and-comment process, and the conclusions may vary from these assumptions.

# Clear Skies Sets a Firm Timeline for Emission Reductions

The existing Title IV $SO_2$ cap-and-trade program provides an incentive and a mechanism to begin reductions upon enactment of Clear Skies years before regulatory action under the current Act.

**2004: The NOx SIP call (summertime NOx cap in 19 Eastern States + D.C.)** → **2004**

**2008: Clear Skies NOx Phase I (2.1 million ton annual cap assigned to two Zones with trading programs)** → **2008**

**2010: Clear Skies Hg Phase I (26 ton annual cap with a national trading program)**

**2010** ←

**2010: $SO_2$ Phase I (4.5 million ton annual cap with a national trading program)**

**2018: Clear Skies NOx Phase II (1.7 million ton annual cap assigned to two Zones with trading programs)** → **2018**

**2018: Clear Skies Hg Phase II (15 ton annual cap with a national trading program)**

**2018** ←

**2018: Clear Skies $SO_2$ Phase II (3.0 million ton annual cap with a national trading program)**

# Clear Skies Builds Upon the Work of the WRAP

- Clear Skies is designed to support the WRAP goals and process; in addition to a national constraint on $SO_2$, the bill ensures that the WRAP's emissions reduction goal for nine states is achieved:
  - If for any reason the regional reduction goal set by the WRAP for 2018 (271,000 tons for the power sector) is not achieved, a separate WRAP cap-and-trade program is triggered to ensure that the regional reductions are preserved.
    - This special cap-and-trade program is based on the framework established in the WRAP process.
  - This special cap can also be triggered by 2013 if States determine there is sufficient evidence that the target will not be met by 2018.

**Clear Skies Western (Zone 2) States**

Note: Yellow states are states involved in the WRAP voluntary emissions reduction program

# The West Faces Unique Challenges

- Environmental effects of power plant emissions – including visibility impairment and acid deposition – are broadly distributed
  - Increasing ground-level ozone concentrations in national parks
  - Particle-related haze in national parks and wilderness areas
  - Nitrogen deposition in high elevation ecosystems (e.g., Colorado Front Range)
  - Brown clouds in major cities

- Few western non-attainment areas are due to stationary source emissions

# As the West Grows, Clear Skies Protects Human Health and the Environment

## The West Will Continue to Grow...

- Population is projected to grow more than 20% from current levels by 2020
- Electricity demand is expected to grow more than the national average
    - More than 10% over national average in the Pacific States
    - More than 30% over national average in the Mountain States

## ...While the Environment Is Protected

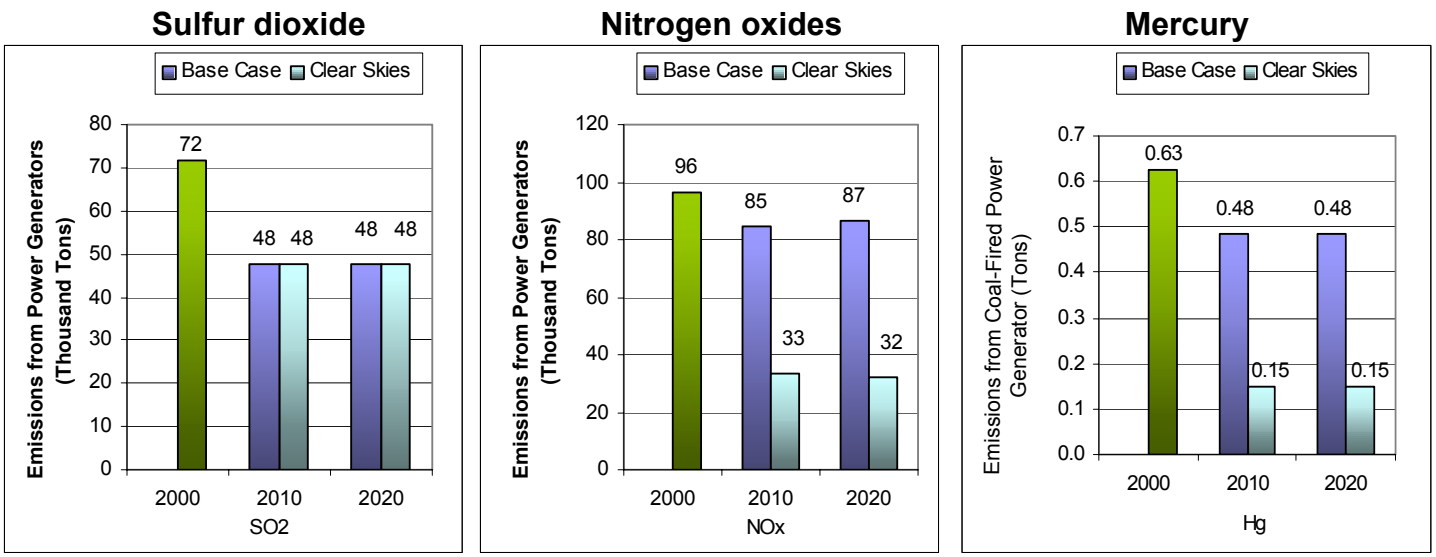
- Clear Skies would protect air quality by lowering or halting increases in air emissions throughout the West from today's levels:
    - Prevent degradation of visibility in parks.
    - Help counties remain in attainment with health-based air quality standards, reducing the burden on state and local governments.
    - Ensure nitrogen deposition does not increase and reduce mercury deposition.

# Emissions in Arizona under Clear Skies

**Emissions in Arizona (2020) would be significantly reduced from 2000 levels**:

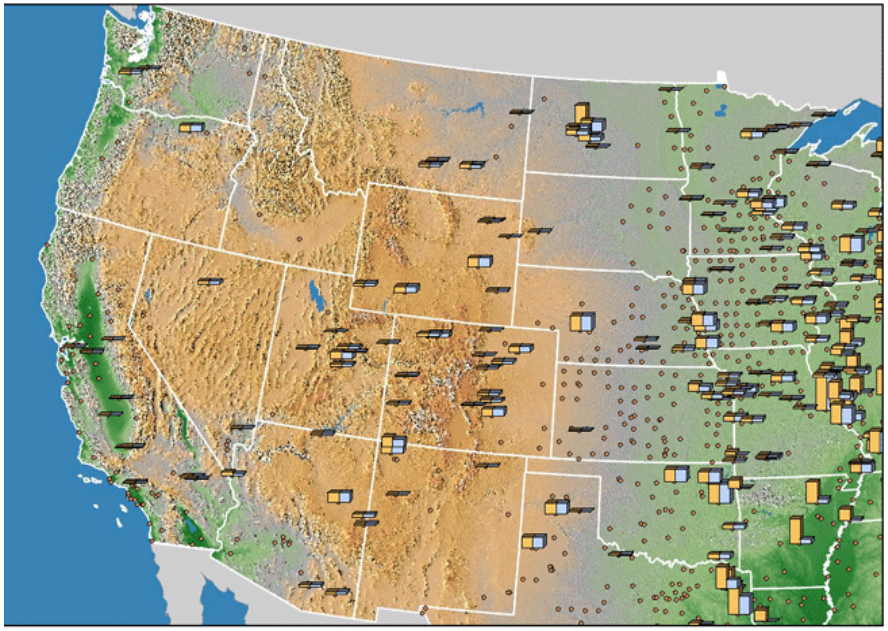
- 33% reduction in $SO_2$ emissions
- 67% reduction in $NO_x$ emissions
- 76% reduction in mercury emissions

**Emissions: Current (2000) and Existing Clean Air Act Regulations (base case*) vs. Clear Skies in Arizona in 2010 and 2020**



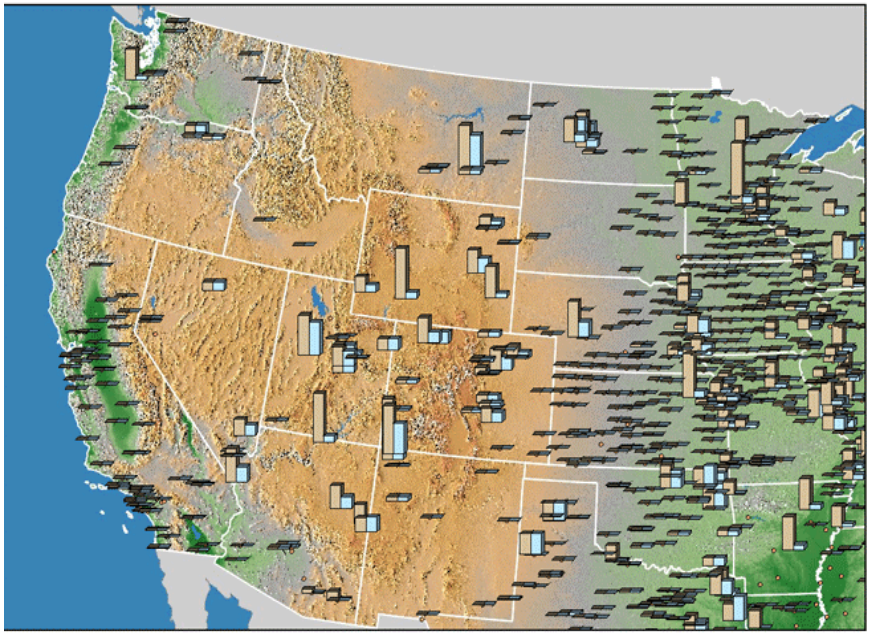

Note: The base case using IPM includes Title IV, the $NO_x$ SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current ambient air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated.

# $SO_2$ and $NO_x$ Emissions Reductions under Clear Skies



**Projected $SO_2$ Emissions from Power Plants with the Base Case and Clear Skies (2020)**
**West**

75,000 tons
Base Case Power Plant $SO_2$
Clear Skies Power Plant $SO_2$
Fossil Power Plants with Negligible $SO_2$ Emissions



**Projected $NO_x$ Emissions from Power Plants with the Base Case and Clear Skies (2020)**
**West**

22,000 tons
Base Case Power Plant $NO_x$
Clear Skies Power Plant $NO_x$
Fossil Power Plants with Negligible $NO_x$ Emissions

Note: The base case using IPM includes Title IV, the $NO_x$ SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current ambient air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated. Emissions from new sources in 2020 are not reflected.

# Clear Skies Health and Air Quality Benefits in the West

## Improve Public Health

- **Reduced ozone and fine particle exposure** by 2020 would result in public health benefits of:
  - approximately 1,100 fewer premature deaths each year [1]
  - approximately 800 fewer cases of chronic bronchitis each year
  - approximately 1,800 fewer non-fatal heart attacks each year
  - approximately 2,500 fewer hospital and emergency room visits each year
  - Approximately 150,000 fewer days workers are out sick due to respiratory symptoms each year
  - approximately 19,000 fewer school absences each year

- Reduced mercury emissions would reduce exposure to mercury through consumption of contaminated fish, resulting in additional, unquantified benefits to those who eat fish from lakes and streams in the West.

**By 2020, the West would receive approximately $8.6 billion in annual health benefits from reductions in fine particle and ozone concentrations alone due to Clear Skies.[1]**

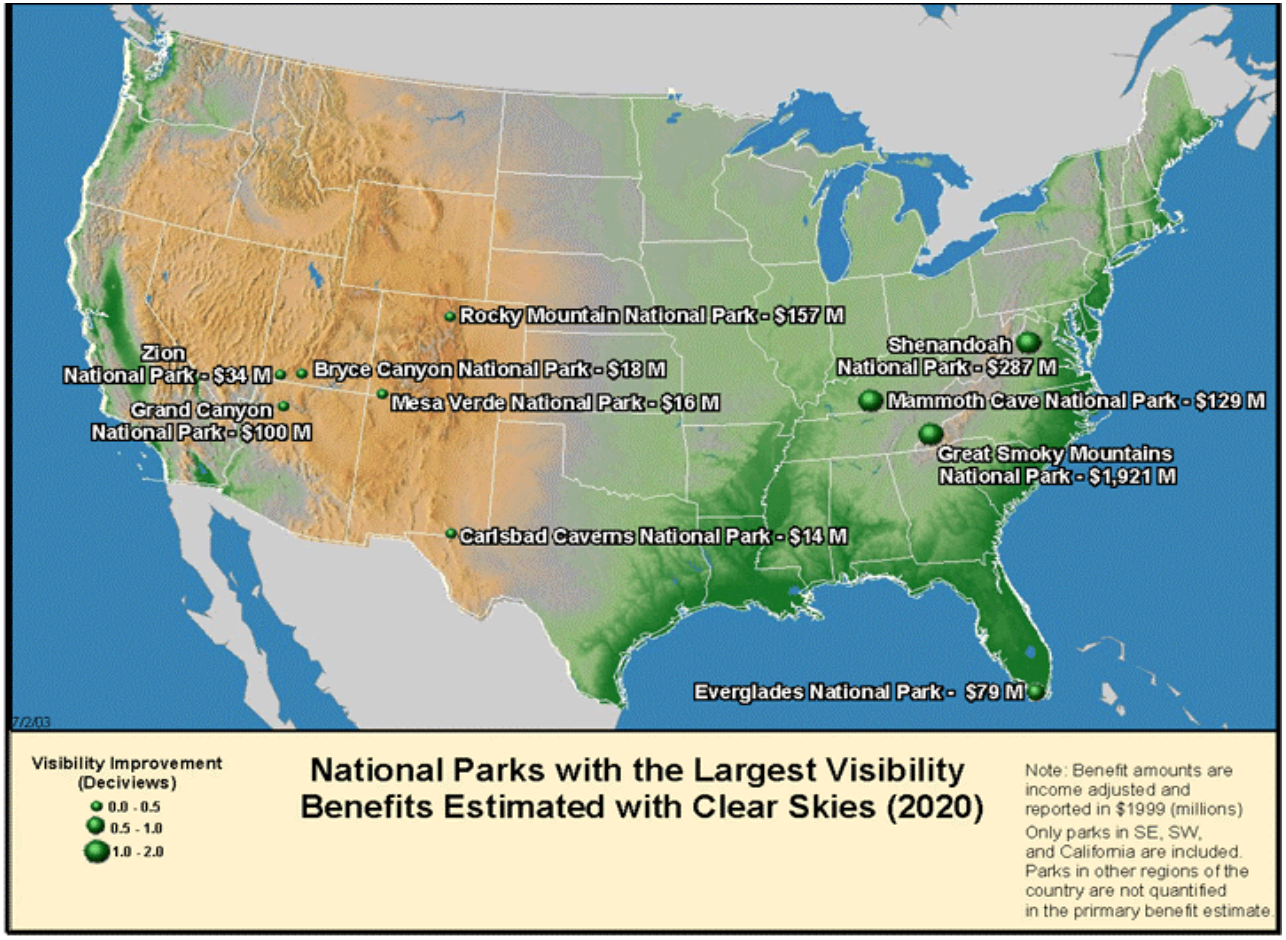
## Help Maintain Health-Based Air Quality Standards[2]

- Currently, all but one Arizona county meets the 8-hour ozone standard; all counties meet the fine particle standard.
- Existing programs would bring Maricopa County into attainment with the 8-hour ozone standard.
- Clear Skies would further reduce concentrations of ozone and fine particles throughout Arizona.

1. An alternative methodology for calculating health-related benefits projects approximately 600 premature deaths prevented and $1.6 billion in health benefits each year in the West by 2020.

2. Based on 1999-2001 data for counties with monitors that have three years of complete data.

# Clear Skies Would Provide Important Environmental Benefits in the West



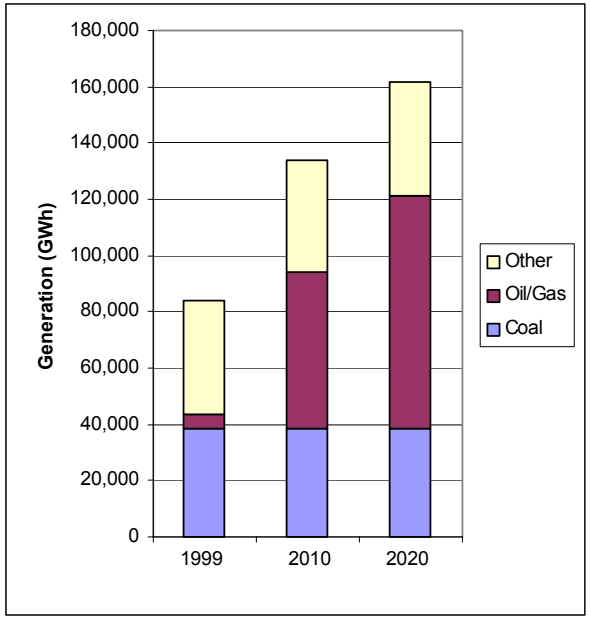

Clear Skies would produce significant visibility benefits in highly visited national parks and wilderness areas in the West.

- Quantifiable visibility benefits in just 5 parks (Grand Canyon, Rocky Mountain, Zion, Bryce Canyon, and Mesa Verde National Parks) total over $300 million.
- Visibility benefits in the Grand Canyon alone are estimated to be $100 million annually by 2020.
- Visibility improvements are also projected to improve tourism.

- In comparison to existing programs, nitrogen deposition would decrease by 5-20% in the intermountain West, and in some areas, such as the Four Corners region, by up to 35%. Sulfur and mercury deposition would not increase despite growth in electricity demand.

# Electricity Generation in Arizona under Clear Skies

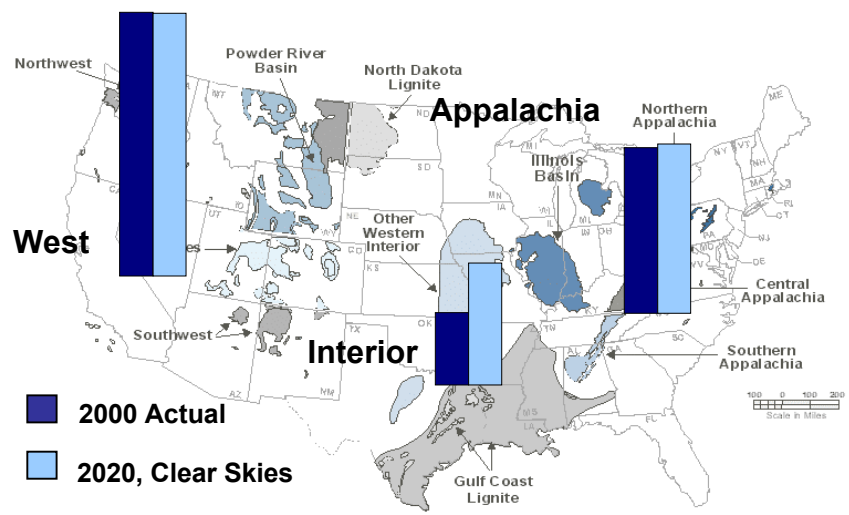
**Current and Projected Generation by Fuel Type in Arizona under Clear Skies (GWh)**




- **Arizona's sources are projected to reduce their emissions through the installation of emission controls, rather than through a switch from coal to natural gas.**
  - In 2010, 92% of Arizona's coal-fired generation is projected to come from units with advanced $SO_2$ and/or $NO_x$ control equipment that also substantially reduce mercury emissions; in 2020, the percentage is projected to increase to 95%.
  - No coal-fired units in Arizona are projected to be removed from operation as a result of Clear Skies.

- **Arizona's electricity growth is projected to be met by increases in gas-fired and coal-fired generation. Clear Skies does not significantly alter this projection.**
  - Electricity from coal-fired generation will increase by 1% from 1999 to 2020.

**Current and Projected Coal Production for Electricity Generation**




**Scale: Appalachia 2000 = 299 million tons**

# Emission Controls in Arizona under Clear Skies

- **Under Clear Skies by 2020...**
  - 74% of coal-fired capacity would install SCR
  - None would install scrubbers

- **The major generation companies in Arizona include:**
  - Arizona Public Service Company
  - Salt River Project
  - Tucson Electric Power Company
- **Total coal-fired capacity in Arizona is projected to be 5,201 MW in 2010.**

**Units in Arizona Projected to Be Retrofitted Due to Clear Skies by 2020**

| Plant Name | Unit ID | Technology |
|---|---|---|
| APACHE STATION | 2 | SCR* |
| APACHE STATION | 3 | SCR* |
| CHOLLA | 4 | SCR* |
| CORONADO | U1B | SCR* |
| CORONADO | U2B | SCR* |
| IRVINGTON | 4 | SCR |
| NAVAJO | 1 | SCR* |
| NAVAJO | 2 | SCR* |
| NAVAJO | 3 | SCR* |

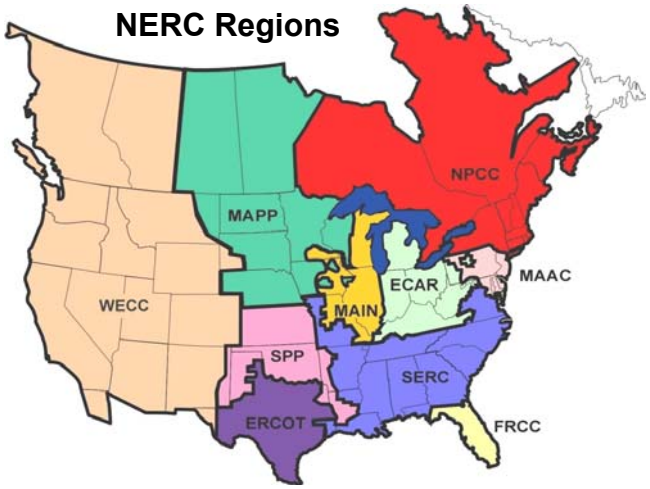
* Retrofit was installed under Clear Skies by 2010

Note: Retrofits and total coal-fired capacity apply to coal units greater than 25 MW.

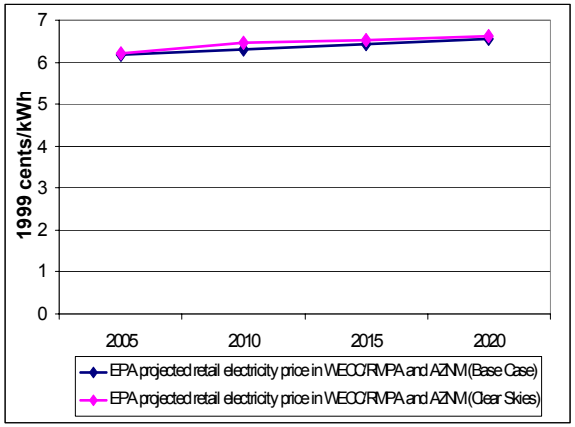
# Electricity Prices in Arizona under Clear Skies

- **With or without Clear Skies, retail prices in the North American Electric Reliability Council (NERC) WECC/RMPA and AZNM region (the electricity supply region that contains Arizona) are projected to increase between 2005 and 2020.**
- **With Clear Skies, retail prices are projected to be approximately 0.6 – 2.6% higher between 2005 and 2020 than in the absence of the legislation.**

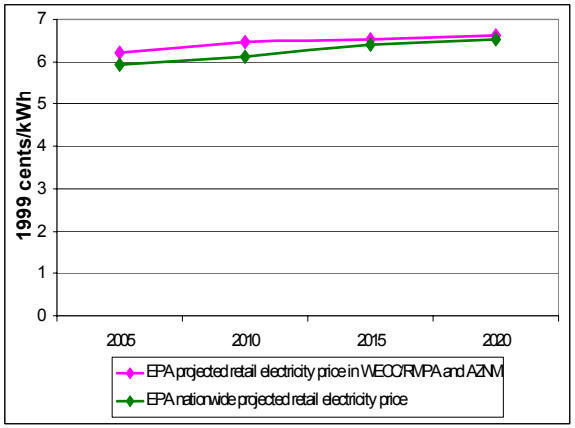
**NERC Regions**




**Projected Retail Electricity Prices in Arizona under the Base Case and Clear Skies (2005-2020)**




**Projected National Retail Electricity Prices and Prices in Arizona under Clear Skies (2005-2020)**




**In 2000, the average retail electricity price in Arizona was approximately 7.2 cents/kWh, which was above the average *national* retail price of approximately 6.7 cents/kWh.**

Note: The base case using IPM includes Title IV, the $NO_x$ SIP Call, NSR settlements, and state-specific caps in CT, MA, MO, NC, NH, TX, and WI. It does not include mercury MACT in 2007 or any other potential future regulations to implement the current ambient air quality standards or other parts of the Clean Air Act. Base case emissions in 2020 will likely be lower due to state and federal regulatory actions that have not yet been promulgated.

# Costs and Benefits in Arizona under Clear Skies

## Benefits Outweigh the Costs

- **In Arizona, Clear Skies is projected to cost approximately $189 million annually by 2020, and $1.2 billion throughout the West, while providing health and visibility benefits totaling approximately $9.5 billion annually region wide.**
- **The increases in production costs under Clear Skies represent only a small percentage of total retail electricity sales revenue in Arizona.**
  - Retail electricity sales revenue in Arizona was almost $4.4 billion in 2000.
  - Adjusting these sales revenues by the same growth rate used for the modeling of costs would result in revenues of almost $6.8 billion annually in 2020.
- **Nationwide, the projected annual costs of Clear Skies (in $1999) are $4.3 billion in 2010 and $6.3 billion in 2020; the nationwide benefits of Clear Skies are expected to be over $113 billion annually by 2020.**
  - An alternate estimate projects annual health benefits totaling $23 billion.

**Clear Skies….**

- **Guarantees significant emissions reductions – beginning years before full implementation**
- **Uses a proven and flexible market-based approach with incentives for innovation**
- **Increases certainty across the board for industry, regulators, and consumers**

Note: Costs include capital costs, fuel, and other operation and maintenance costs (both fixed and variable) associated with the achievement of the emissions caps in the legislation (for example, the installation and operation of pollution controls). These state-level production costs are estimates; they do not account for the costs associated with the transfer of electricity across regions, nor the costs or savings that could be associated with allowance movement between sources.

# Notes on EPA's Analysis

- The information presented in this analysis reflects EPA's modeling of the Clear Skies Act of 2003.
  - EPA has updated this information to reflect modifications:
    - Changes included in the Clear Skies Act of 2003.
    - Revisions to the Base Case to reflect newly promulgated rules at the state and federal level since the initial analysis was undertaken.
  - The Clear Skies modeling results presented include the safety valve feature
- This analysis compares new programs to a Base Case (Existing Control Programs), which is typical when calculating costs and benefits of Agency rulemakings.
  - The Base Case reflects implementation of current control programs only:
    - Does not include yet-to-be developed regulations such as those to implement the National Ambient Air Quality Standards.
  - The EPA Base Case for power sector modeling includes:
    - Title IV, the $NO_x$ SIP Call, NSR settlements, and state-specific caps in Connecticut, Massachusetts, Missouri, New Hampshire, North Carolina, Texas, and Wisconsin finalized before March 2003.
  - For air quality modeling, the Base Case also includes federal and state control programs, as well as the Tier II, Heavy Duty Diesel, and Non-Road Diesel rules.

- **For more information regarding the Clear Skies Act, please visit the EPA website:**

**(http://www.epa.gov/clearskies)**

CLEAR SKIES
Better Health, Brighter Future