



EPA Carbon Regulation Impacts: Reliability & Cost Concerns

Electric Cooperatives of Arkansas

June 3, 2014



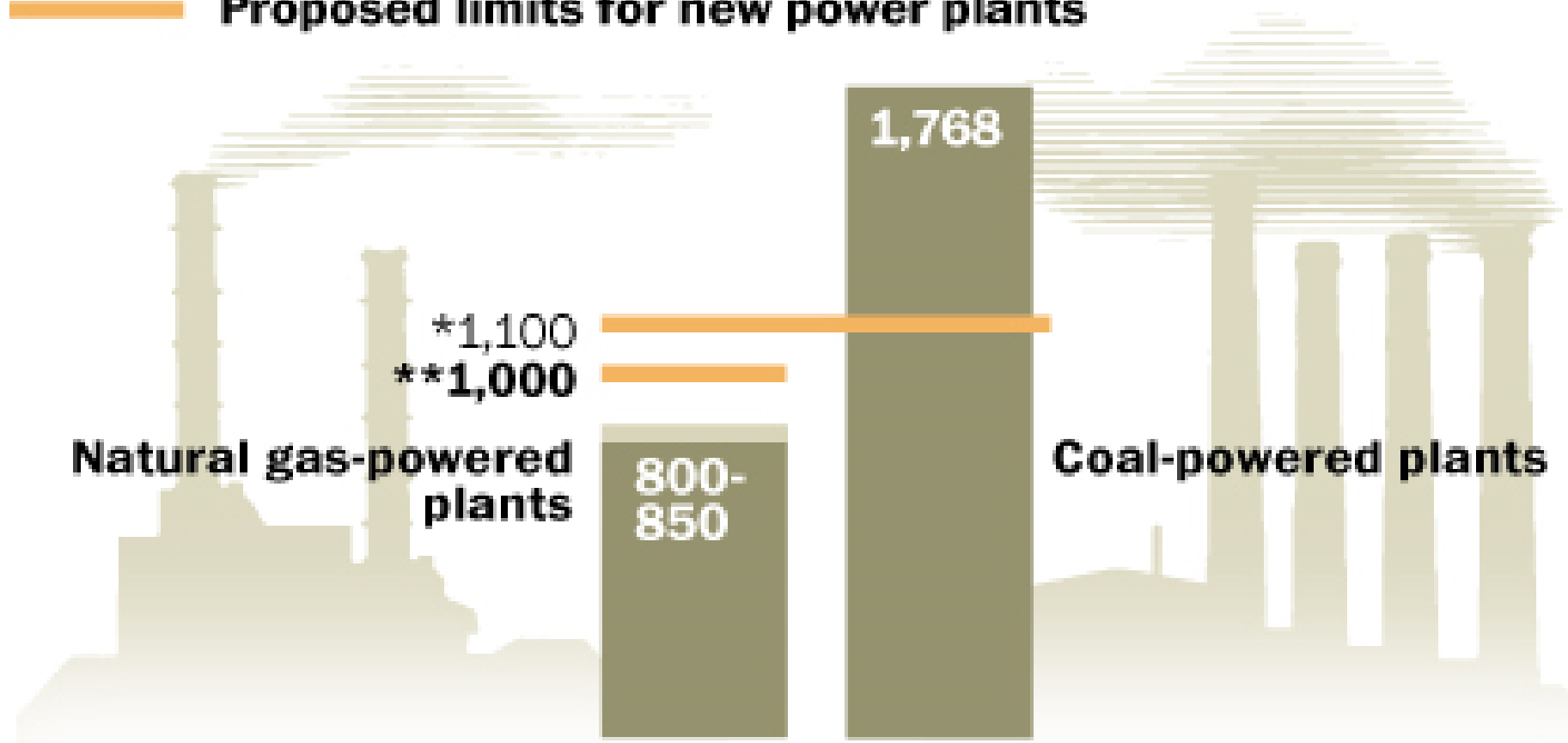
Electric Cooperatives
of Arkansas
We Are Arkansas

Legal Background for EPA Rules

- In 2007, the U.S. Supreme Court affirmed EPA's ability to regulate carbon dioxide under the Clean Air Act (CAA), provided the EPA finds that CO₂ emissions “endanger the environment”
- In 2009, EPA issued its “Endangerment Finding”
- In June of 2013, President Obama issued an Executive Order to the EPA: Reduce CO₂ emissions from new and existing generation sources so the U.S. can “contribute to global CO₂ reduction”
- Only congressional action can reverse EPA's efforts by way of a statutory change. Not feasible with current Congress.

■ Average emission per megawatt-hour, in pounds of CO₂

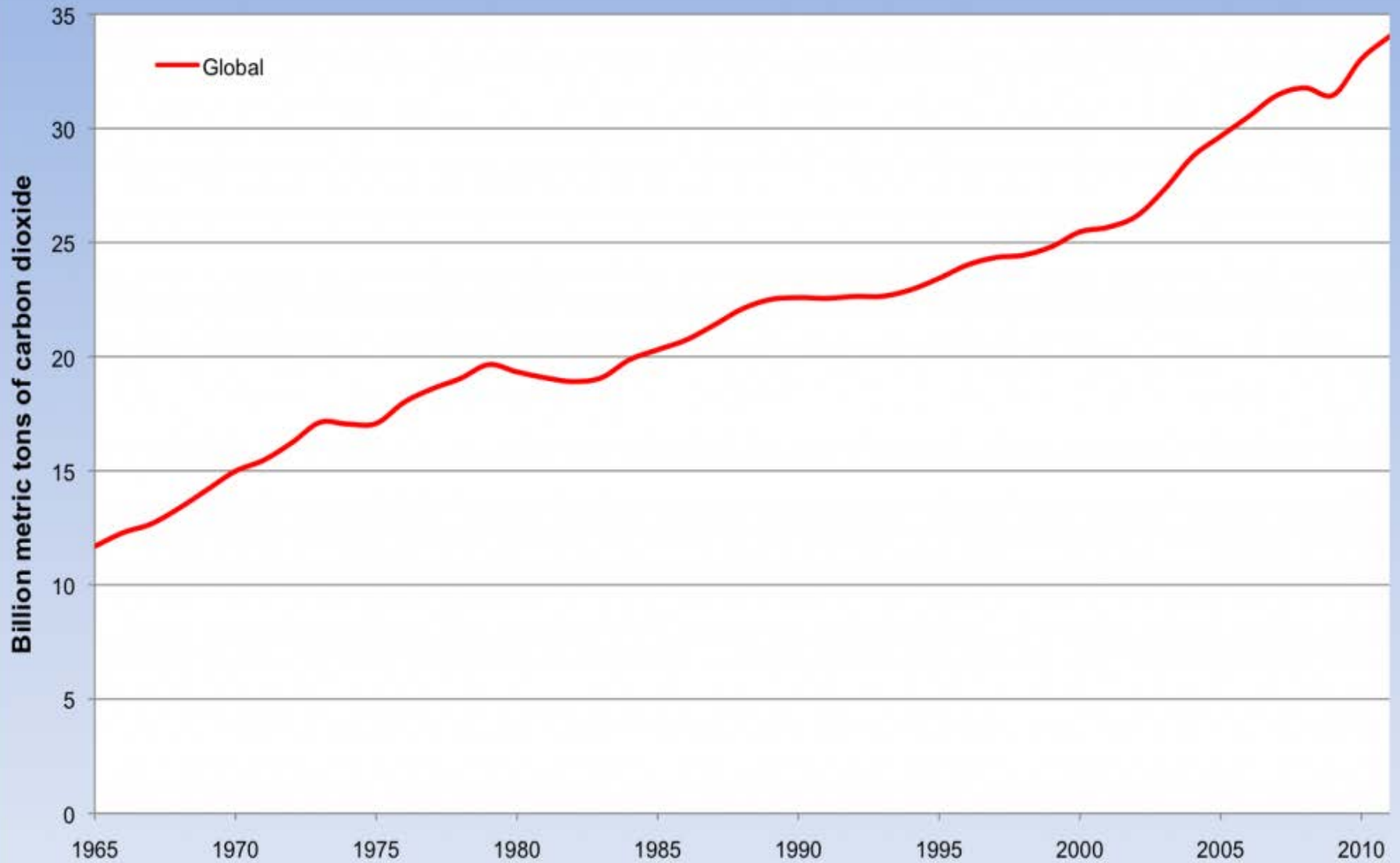
— Proposed limits for new power plants



* For gas-powered plants with small turbines and all coal-powered plants

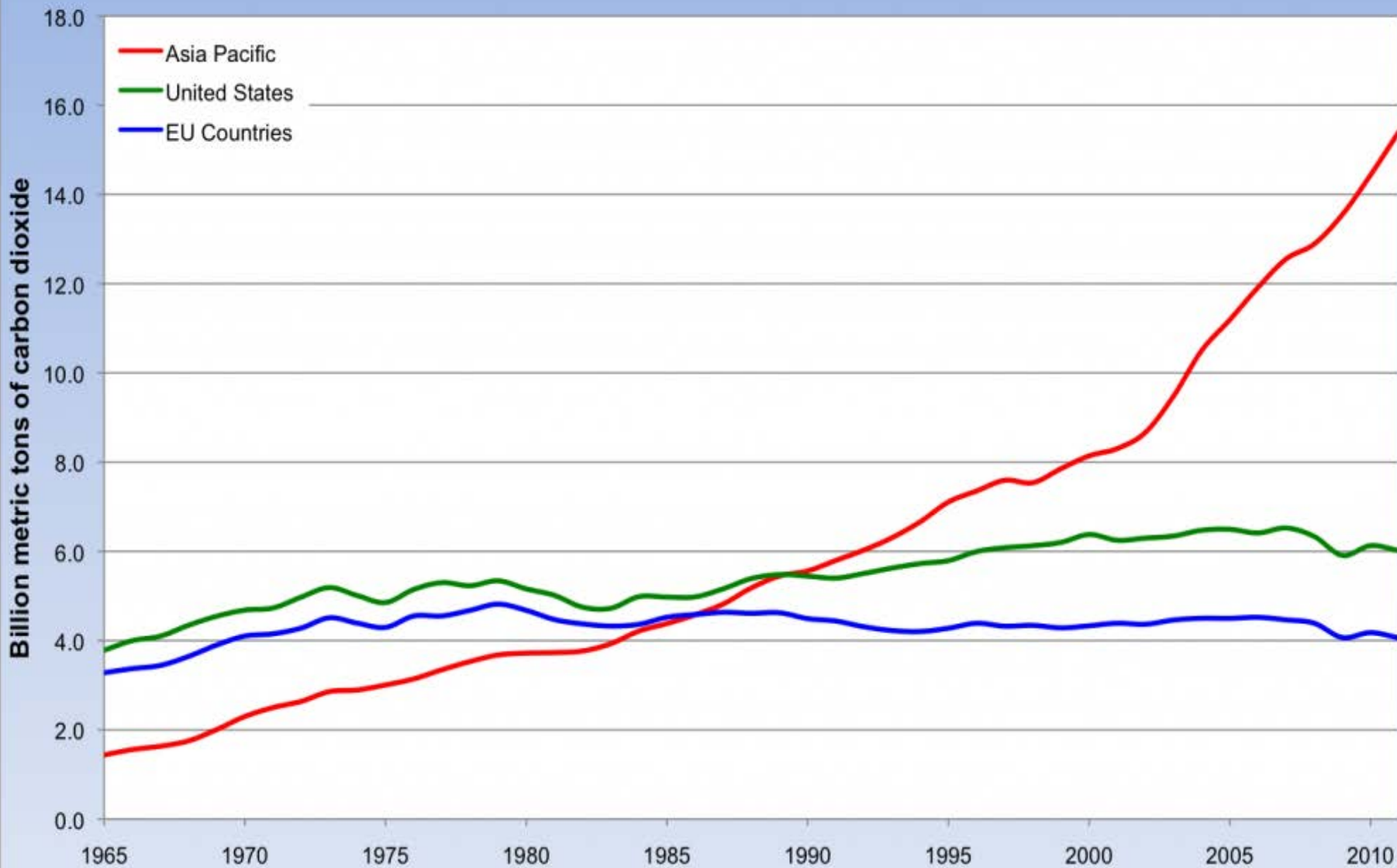
** For large gas powered plants

CO₂ Emissions 1965-2011



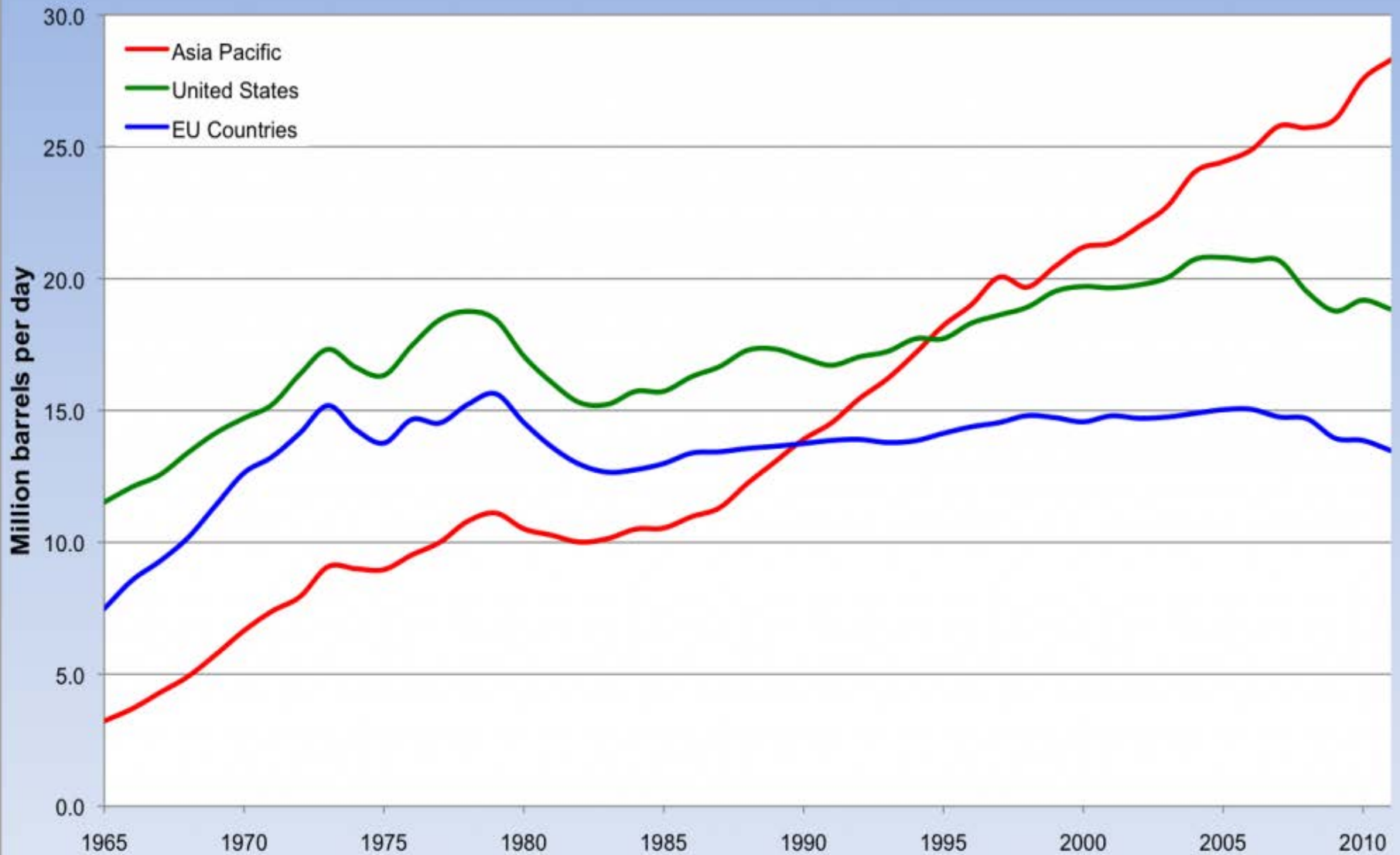
Data source: 2012 BP Statistical Review of World Energy

CO₂ Emissions 1965-2011



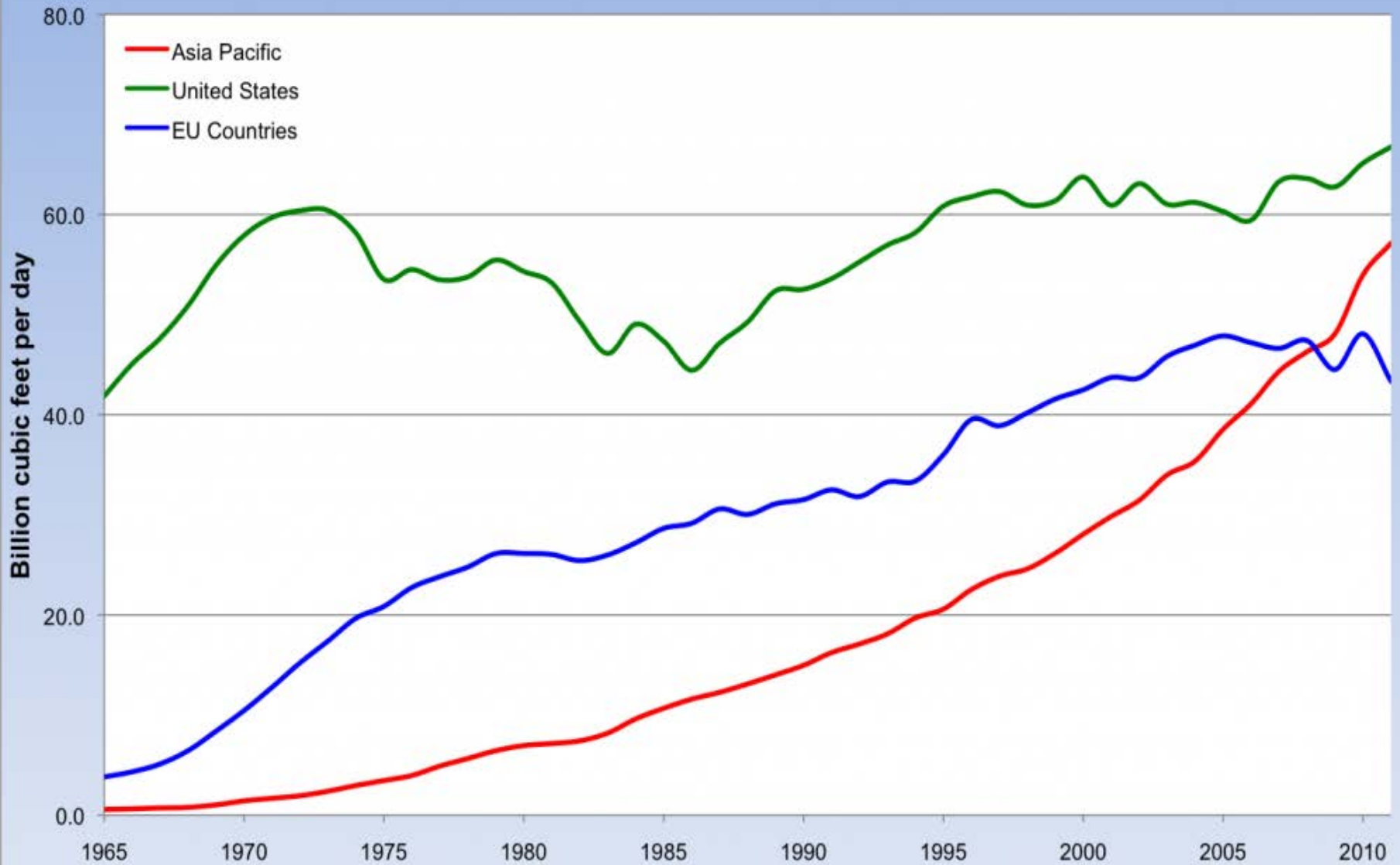
Data source: 2012 BP Statistical Review of World Energy

Oil Consumption 1965-2011



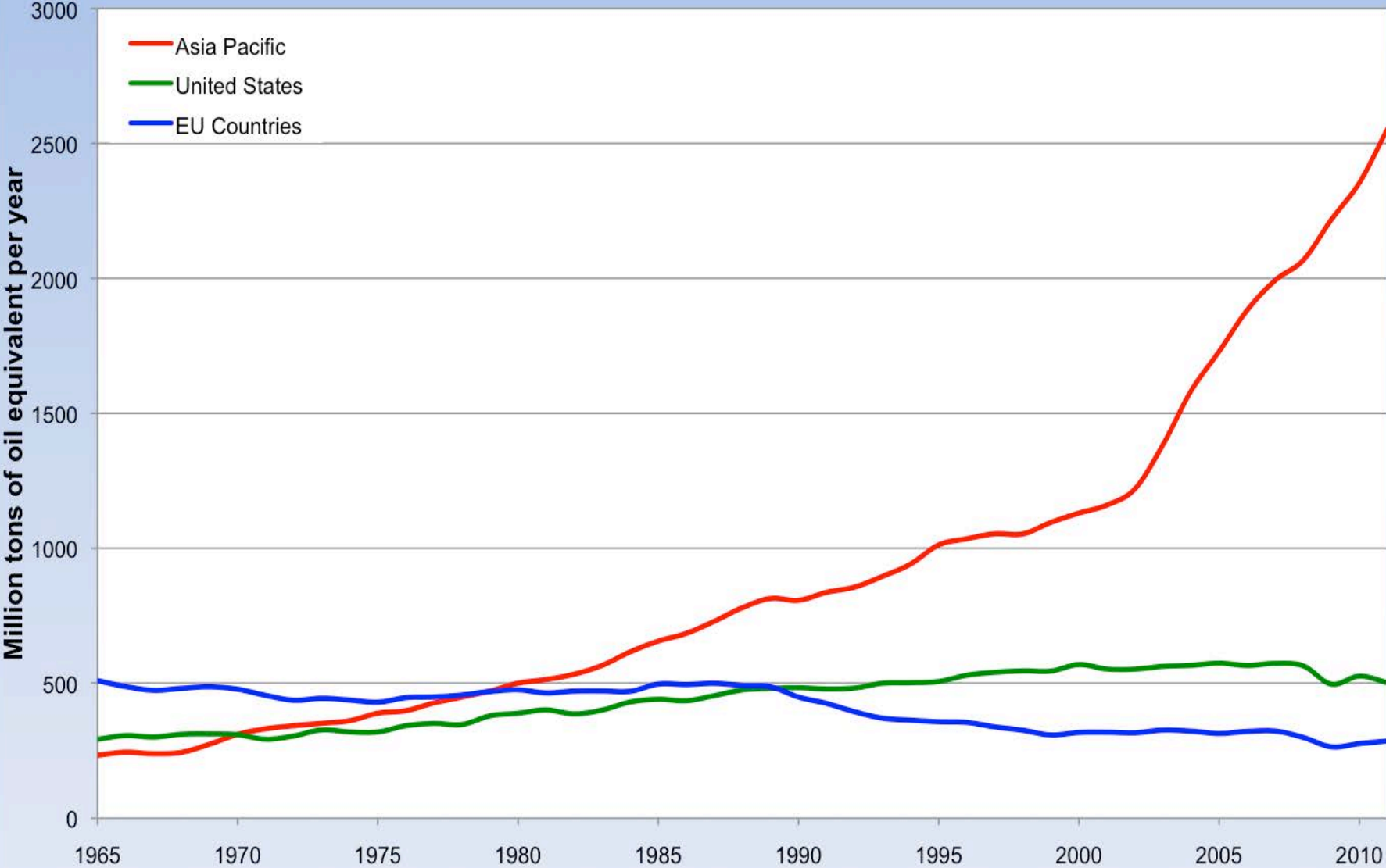
Data source: 2012 BP Statistical Review of World Energy

Natural Gas Consumption 1965-2011



Data source: 2012 BP Statistical Review of World Energy

Coal Consumption 1965-2011

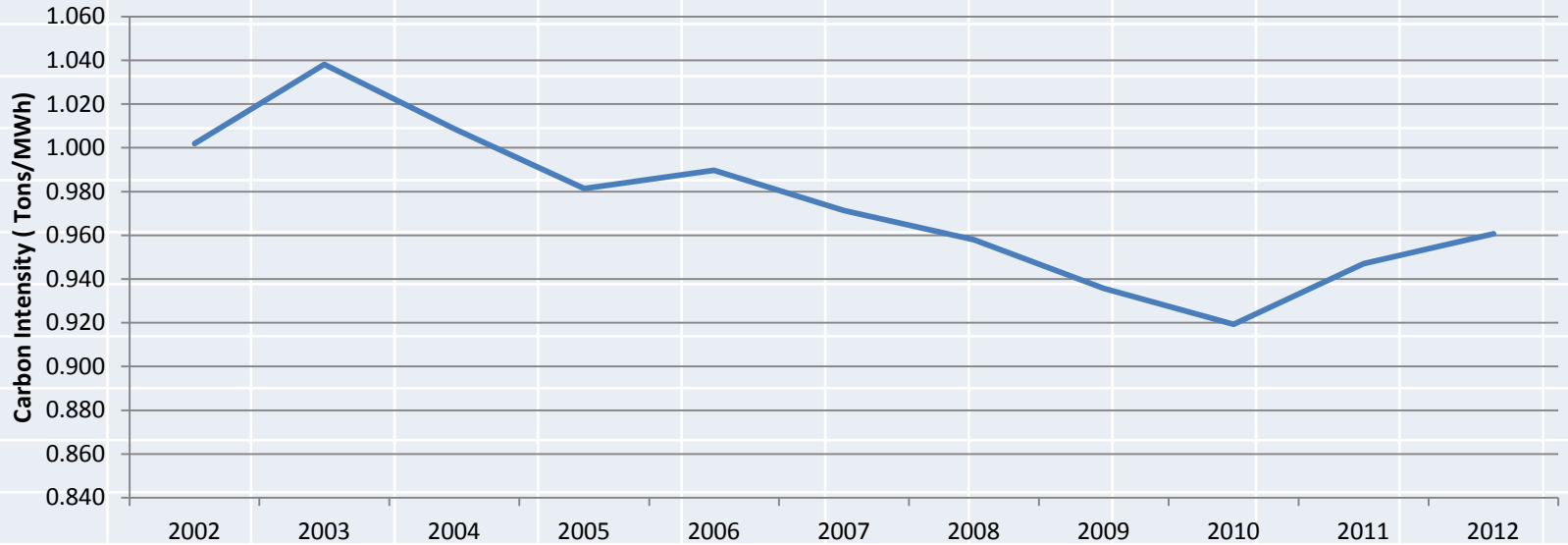


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AECC EGU Carbon Emissions

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| CO2 (tons) | 10,084,064 | 10,343,673 | 11,071,381 | 9,995,878 | 10,469,593 | 11,036,481 | 10,843,524 | 10,098,736 | 10,926,787 | 10,992,213 | 10,892,380 |
| Gross Load (MWh) | 10,064,501 | 9,964,438 | 10,975,947 | 10,185,045 | 10,578,295 | 11,362,212 | 11,319,041 | 10,792,044 | 11,886,565 | 11,606,156 | 11,337,409 |
| Intensity (tons/MWh) | 1.002 | 1.038 | 1.009 | 0.981 | 0.990 | 0.971 | 0.958 | 0.936 | 0.919 | 0.947 | 0.961 |
| Intensity (lbs/MWh) | 2,004 | 2,076 | 2,017 | 1,963 | 1,979 | 1,943 | 1,916 | 1,872 | 1,839 | 1,894 | 1,921 |

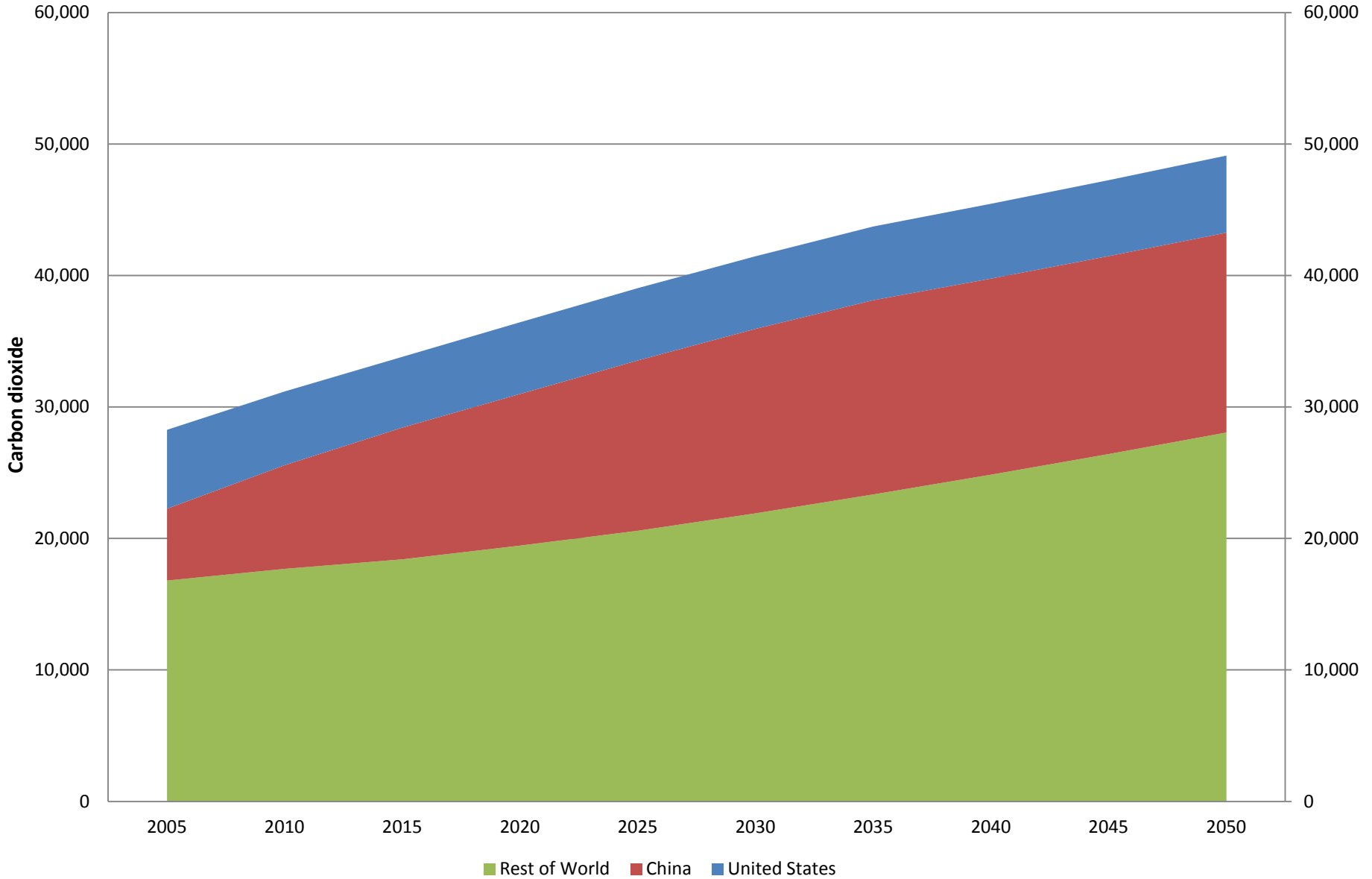
Carbon Intensity



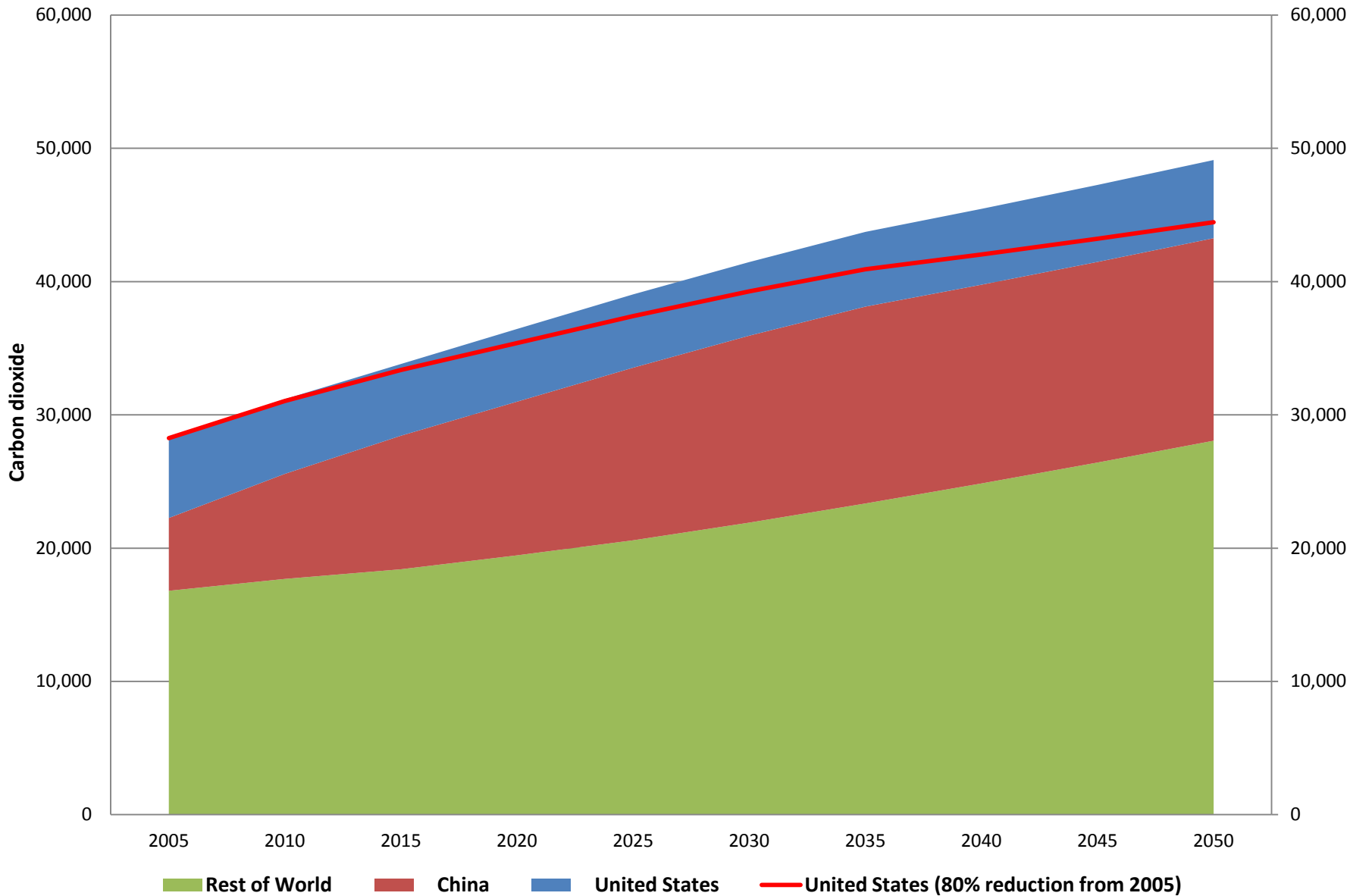
*Oswald Generating Station was purchased in 2006

** Magnet Cove Generating Station was added in Sept. 2012

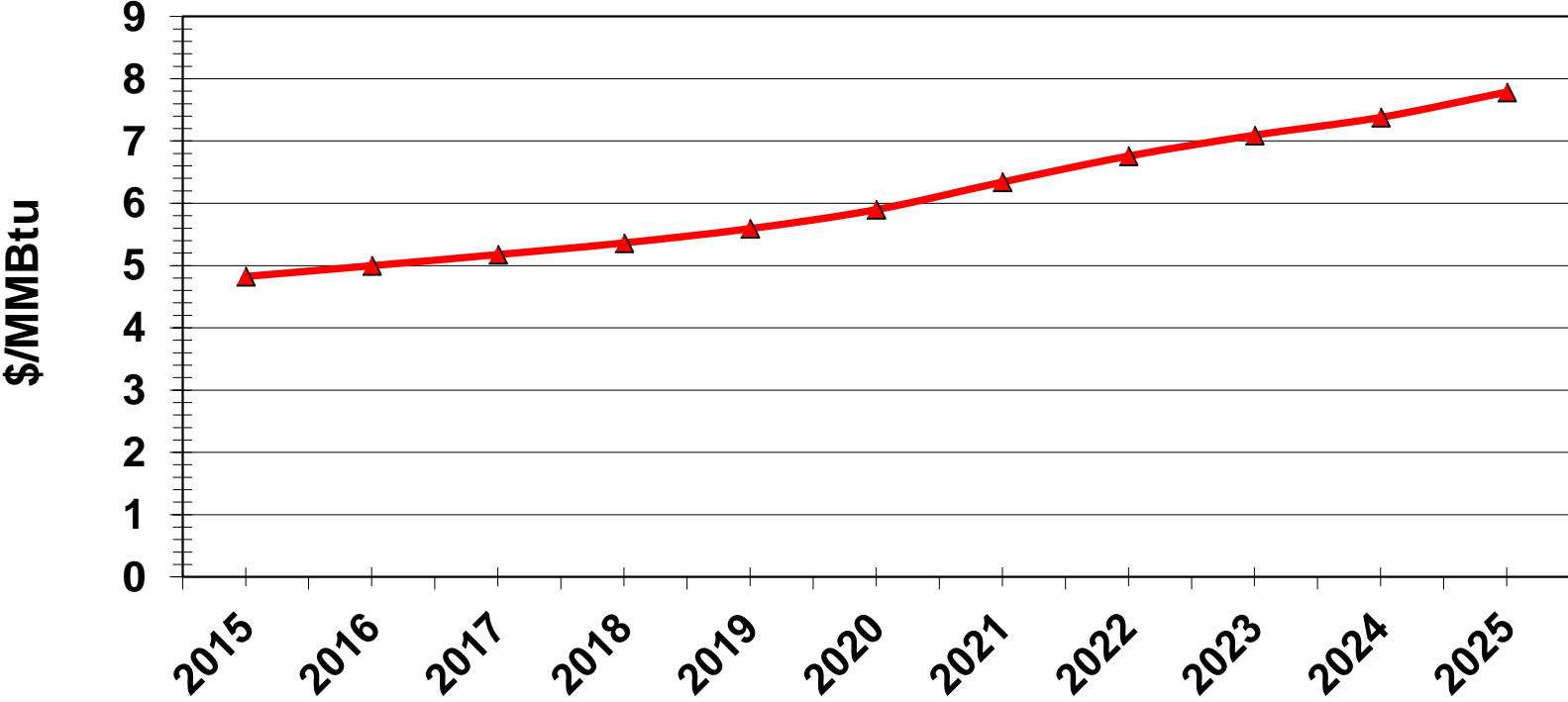
World Carbon Dioxide Emissions Million Metric Tons



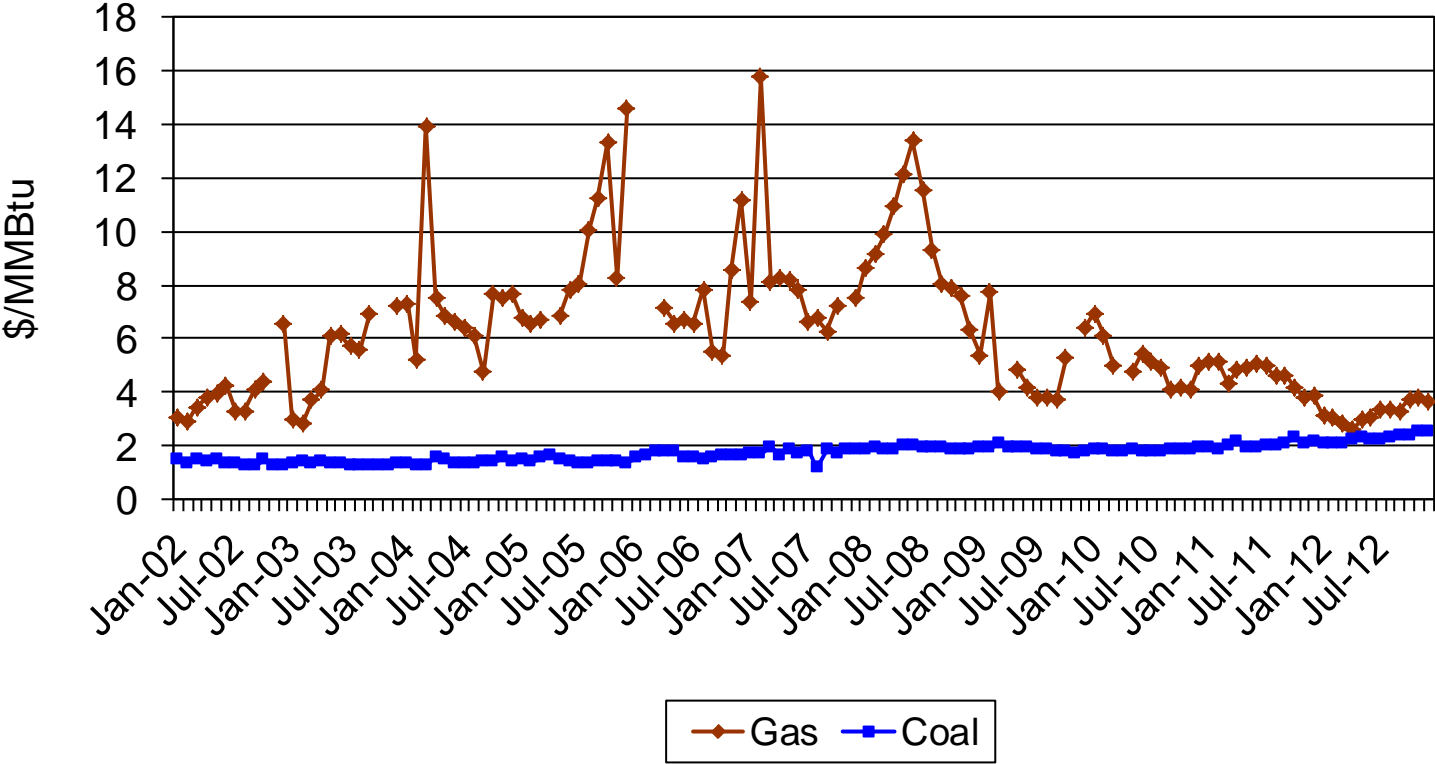
World Carbon Dioxide Emissions Million Metric Tons



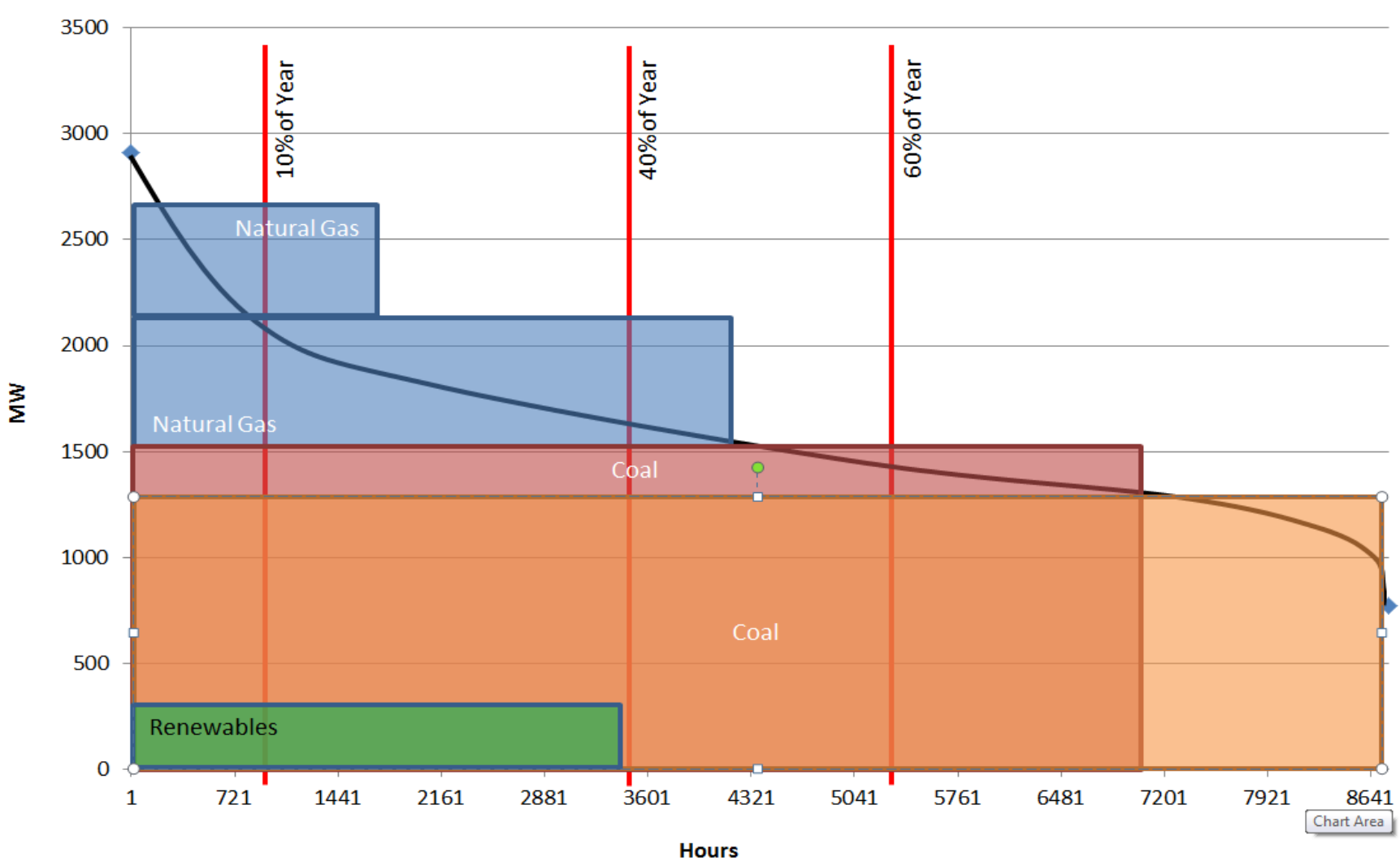
Gas Price Nominal



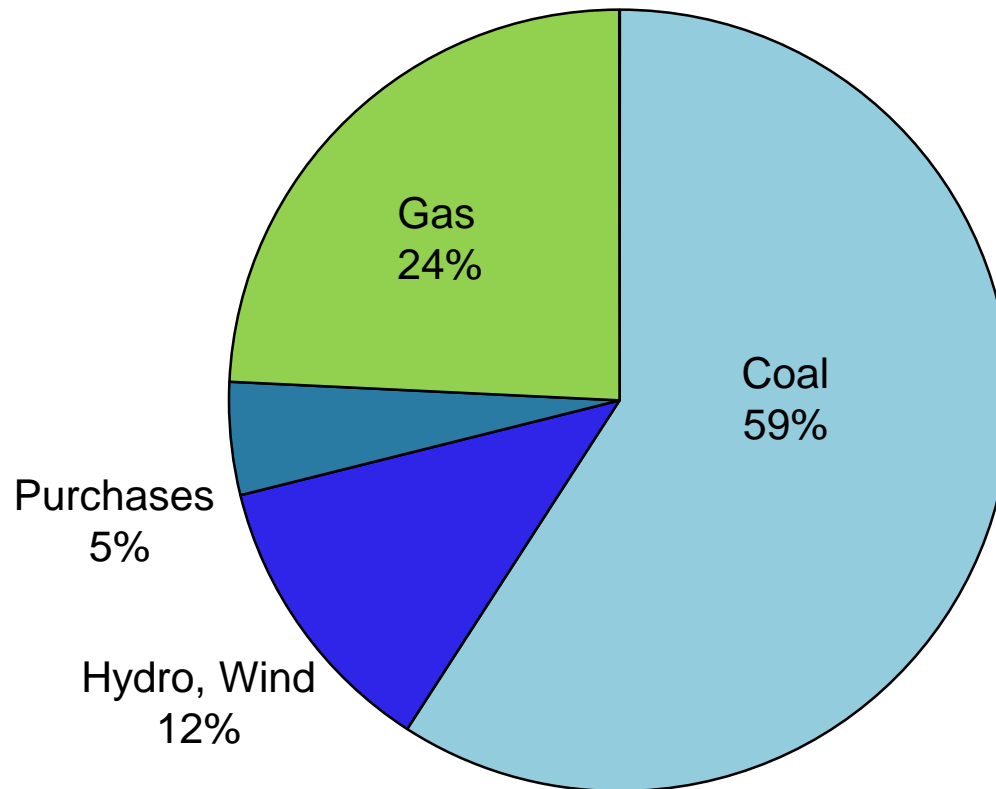
Gas and Coal Costs for AECC Owned Plants



AECC Load 2012 Duration with Resource Stack



Forecast of Source of Energy for Sales to Members, 2020



Hydro includes purchased hydro from SWPA (3%)

Impacts of Reduced Coal Use

- Many of the nation's coal plants will be shut down; the figures range from 20% (already announced) to 50%. Almost half of the nation's electricity comes from coal.
- 70% of the energy that serves electric cooperative members comes from our coal plants. Existing and new natural gas plants will have to replace that electricity; yet gas is (currently) 2-3 times more expensive than coal.
- Gas prices are very volatile and have huge price spikes in periods of great demand (\$1,000 per MWH on peak days)
- Grid reliability will be reduced: 92% of the electricity needed to meet the surge in winter demand came from coal-fired plants; many of these are units that are scheduled to be retired due to the EPA rules
- “Economic Dispatch” will be replaced by “Environmental Dispatch”; completely reversing over 100 years of utility regulatory law

Global Benefits of EPA Rule

- Atmospheric CO₂ concentrations would be reduced by 1.52 ppm, or less than 1 percent, in 2050.
- Global average temperature increase would be reduced by 0.016 degrees Fahrenheit in 2050.
- Sea level rise would be reduced by 0.03 millimeter (the thickness of three sheets of paper), or 1/100th of an inch.
- The non-US, global CO₂ increase by 2030 will be 10,161 Mt --- *more than 18 times the EPA CO₂ reductions.*