

THE FUTURE FOR COAL IN KENTUCKY

What is Happening to Markets for Kentucky's
Coal?

Kentucky's Energy Landscape

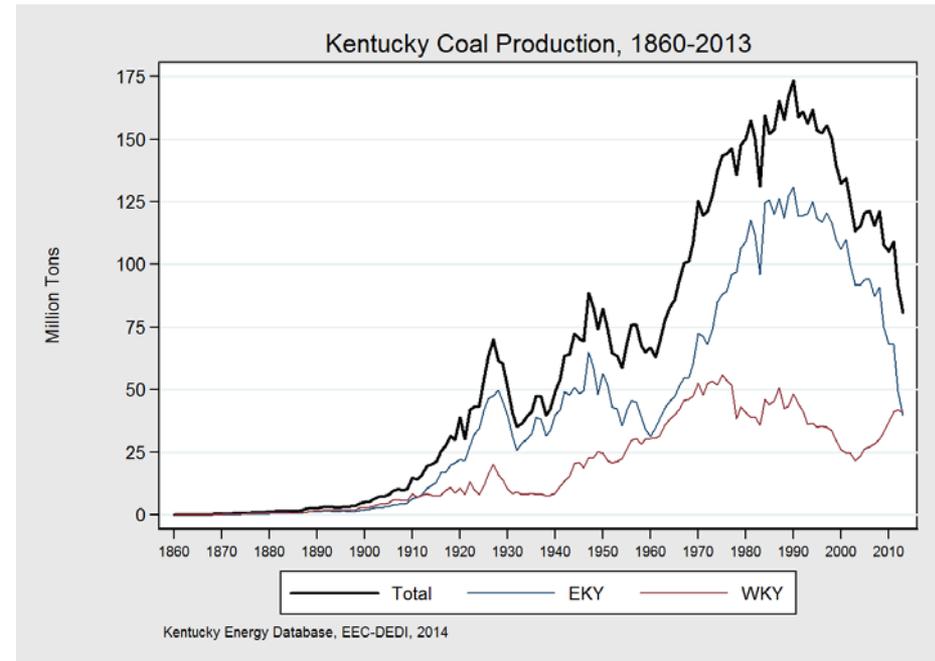
- More than 92 percent of electricity generation is coal-fired—but this is changing.
- Kentucky's electric utilities consume only about 30 percent of the coal mined in the state.
- Kentucky is the 3rd largest coal-producing state (although we account for less than 10% while Wyoming is almost 40%).
- We have among the lowest electricity rates in the nation; however, as with the rest of the nation, rates are increasing.
- Our large manufacturing sector employs more than 220,000—these jobs are vulnerable to electricity price increases.
- Kentucky is the third largest light-duty vehicle manufacturer; produces 30% of the nation's stainless steel; and 40% of U.S. aluminum.

Looking Back

- “These are interesting times for the world of energy, and I know that you are concerned about the various issues facing us in the commonwealth regarding energy production and use.” Remarks I made at PEM August 2010.
- Other observations at the time:
 - Stationary source GHG regulations from EPA are already coming into play (Tailoring Rule had been proposed).
 - Other EPA rules (transport rule and mercury/air toxics) will likely lead to closures of older coal-fired power plants.
 - Natural gas is being called the bridge fuel away from coal.
 - Central Appalachian coal will be the most affected by market and regulatory forces.
 - A diverse electricity portfolio allows us to reduce GHGs so that the full brunt of reductions does not have to come from coal utilization.

Significant Changes in Recent Years

- More than 17,000 mining employees in the state in 2010; Today, employment is around 11,700.
- In 2010, production was around 105 million tons; today it is around 80 million tons.
- Eastern Kentucky accounts for most of the declines in employment and production.
- Kentucky's energy portfolio is also changing.



What is behind these numbers?

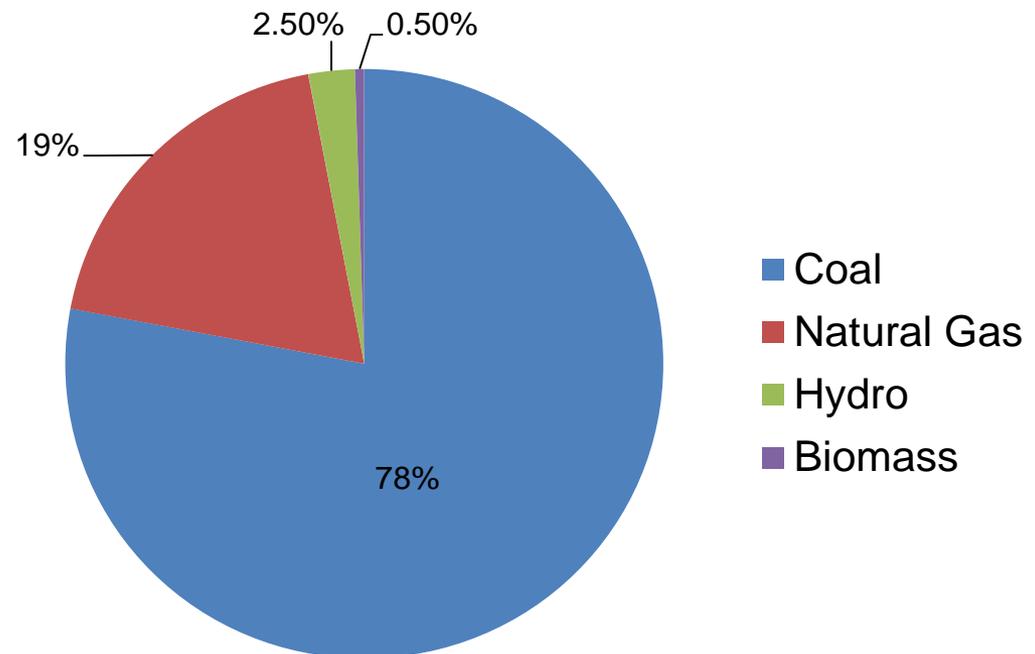
- Low-priced natural gas
- Decreasing productivity in eastern Kentucky mining operations; higher costs relative to all other sources of coal within the United States
- Utilities switching to higher-sulfur coal upon installation of scrubbers
- Other market forces, such as moderate electricity demand growth
- Environmental regulations affecting coal production and use

Will there be a turn-around?

Ky's Changing Electricity Profile

- Forty percent of the coal units in Kentucky have been retired or have retirements planned by 2016.
- With GHG regulations affecting construction of new fossil power plants, Kentucky's options to replace retiring units are limited.
- Even without GHG regulations, our generating fleet is going from 92% coal to...

Kentucky's 2020 Projected Electricity Generation (w/o any GHG regulations)
Avg. fleet emissions rate will be approximately 1,890 lbsCO₂/MWh



Coal power plant closures in Kentucky

- Nov. 2013—TVA announced plans to close 2 coal-burning units at Paradise, replace capacity with natural gas. TVA's future fleet: 40% nuclear, 20% coal, 20% natural gas, 20% renewables.
- Oct. 2013, Kentucky Power (AEP) filed plan to convert coal unit at Big Sandy to natural gas—company says the conversion is the “least-cost option to meet environmental requirements.”
- Oct. 2013, LG&E/KU announced plan to close coal unit at Green River plant in Muhlenberg Co, replace capacity with natural gas. Company's reliance on coal to be reduced from current 73% to 59% by 2018.
- April 2014—East Kentucky Power Cooperative announced plans to deactivate its coal-fired Dale Station, stating the plant does not comply with Mercury and Air Toxics rule that will go into effect in April 2015.

- What do these plants have in common?
 - Dale—60 years old
 - Big Sandy—50 years old
 - Paradise—50 years old
 - Green River—54 years old

Average age of coal-fired units in Kentucky is 43.

The Bigger Picture: Federal Non-GHG Regulations Affecting Electric Utilities

- Utility MATS—has accounted for large portion of recent and pending coal plant retirements. In May, a Federal court upheld EPA's authority on Utility MATS.
- Cross State Air Pollution Rule—April 29, 2014, U.S. Supreme Court upheld EPA's rulemaking.
- Ozone standard—EPA has a Dec. 1 court deadline to decide on whether to propose a revised standard; scientific panel and EPA staff have proposed a much more stringent standard.
- Water intake limitations issued August 2014—Enviro groups have filed suit challenging the rule as not being stringent enough.
- Coal Combustion Residuals (coal ash)—EPA under pressure to act; depending on approach EPA takes, could require costly compliance for utilities.

EPA Greenhouse Gas Proposed Rules

Proposed Rule for New Sources under CAA Section 111(b)	Proposed Rule for Existing Sources under CAA Section 111(d)
<p>Issued Sept. 20, 2013. Published January 8, 2014.</p>	<p>Issued June 2, 2014. Published June 18, 2014.</p>
<p>Sets limits (NSPS) for natural gas-fired power plants at 1,000 lbsCO₂/MWh & for coal at 1,100 lbsCO₂/MWh.</p>	<p>Establishes state-specific CO₂ intensities.</p>
<p>Requires partial CCS for coal to meet the standard.</p>	<p>Provides multiple pathways for compliance.</p>
<p>EPA retains more authority; states adopt the rule.</p>	<p>States will establish implementation plans, working with stakeholders and legislature.</p>

Court Actions Leading to CAA Section 111 Rulemakings

- 2007 Supreme Court Ruling – *Massachusetts vs. EPA*
- December 2009 – Endangerment Finding
- May 2010 – GHG Light-Duty Vehicle Rule
- June 2010 – GHG Tailoring Rule
- June 2012 – Court of Appeals for D.C. Circuit rejects petitioners' claims (against EPA's endangerment finding and its Light Duty and Tailoring Rules) and upholds all EPA actions.
- June 23, 2014—Supreme Court decision on Tailoring Rule—implications unclear, but upholds EPA authority to regulate GHGs under the Clean Air Act.

EEC Comments: Section 111(b) New Source Rule is Flawed

- EEC stressed that CCS is not adequately demonstrated on a commercial scale.
- Rule inappropriately sets energy policy and constitutes a significant energy action.
- Emission standard for coal unreasonable – EEC recommended a standard that can be achieved with super-critical coal and ultimately with ultra-supercritical coal.
- EPA did not properly consider costs and economic impacts.

Features of Proposed 111(d) Existing Source Rule

- Emissions targets vary among the states, reflecting existing resource mix and other factors.
- Proposed Kentucky Statewide Fleet Average:
 - 1844 lbsCO₂/MWh – Interim Goal 2020-2029
 - 1763 lbsCO₂/MWh – Final Goal 2030
- The rule also establishes guidelines for states to follow in developing their plans.
- Allows a range of options (including multi-state approaches; energy efficiency; and fuel switching such as natural gas, nuclear, and renewables) for compliance.
- Does not appear to force stranding of existing EGU assets.

Stakeholder meetings to discuss 111(d) proposed rule

- EEC has met with 21 stakeholder groups to date.
- Some common concerns/issues:
 - Unrealistic heat-rate (6%) for boiler efficiency improvements
 - Complex multi-state issues and issues surrounding the role of ISOs and RTOs
 - Uncertainty over conversion of rate to mass emissions
 - How will end-use energy efficiency be measured and verified?
 - Legal questions—inside the fence versus building blocks approach to determining the emissions rate for the states; Impact of HB 388
 - Unrealistic timeframe for developing state plans

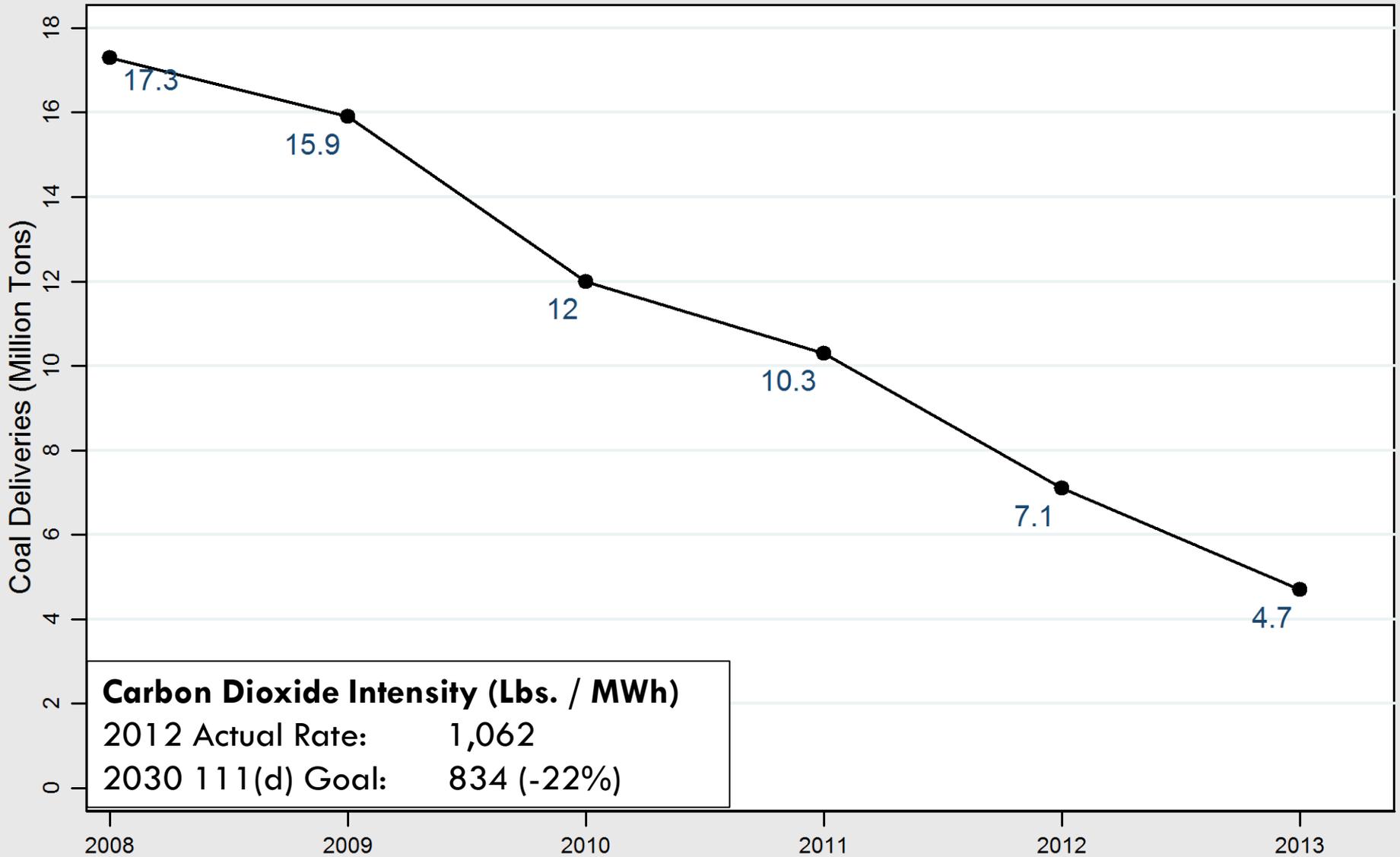
Planning the future amid legal uncertainties

- Note: The courts have been generally favorable to the EPA on GHGs and other regulations affecting coal-fired electricity generation.
- How the legal issues surrounding 111(b) and 111(d) play out will not be known for years.
- In the meantime, as the agency responsible for carrying out EPA regulations, the EEC has to be in a planning mode.
- Comments on 111(d) are due Oct. 16, 2014.
- EPA will issue final rule for existing sources by June 3, 2015. We will have one year following that to develop an implementation plan.

Outlook for Coal

- Coal-plant retirements will continue. Even plants that have made costly investments in emission control technology in recent years are at risk.
- According to EIA, coal-fired capacity retirements are concentrated in the Southeast and the Midwest.
 - These regions account for 65% of the coal-fired EGU capacity in the United States.
 - And, these two regions account for MOST of eastern Kentucky's coal shipments out of state.
- Nationally, we are locking ourselves in with natural gas power plants.
- If the national coal market were to rebound, Appalachian coal is still the least cost-competitive relative to all other coal basins.

Kentucky Coal Deliveries to Georgia, 2008-2013



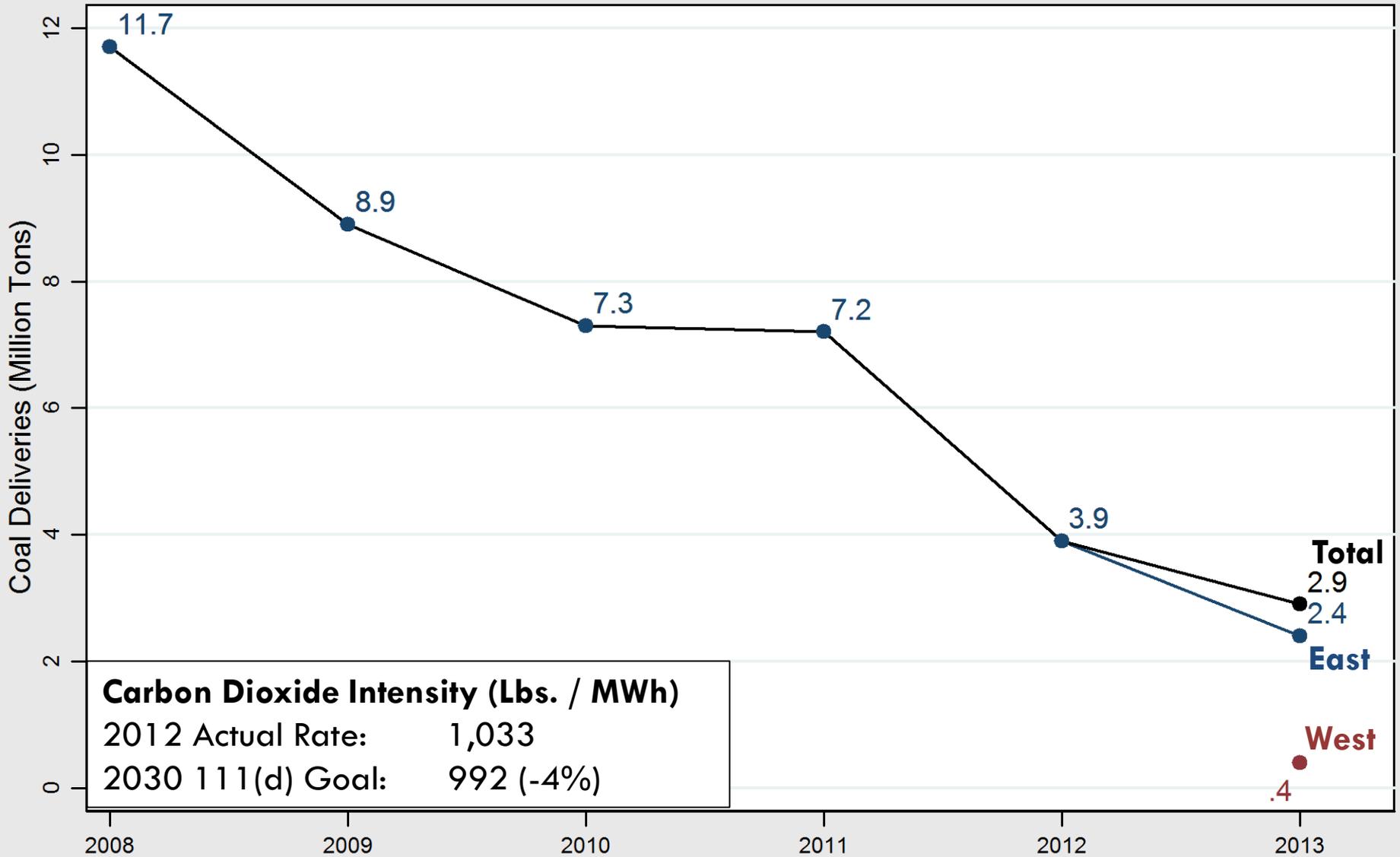
Carbon Dioxide Intensity (Lbs. / MWh)

2012 Actual Rate: 1,062
2030 111(d) Goal: 834 (-22%)

Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

Kentucky Coal Deliveries to North Carolina, 2008-2013



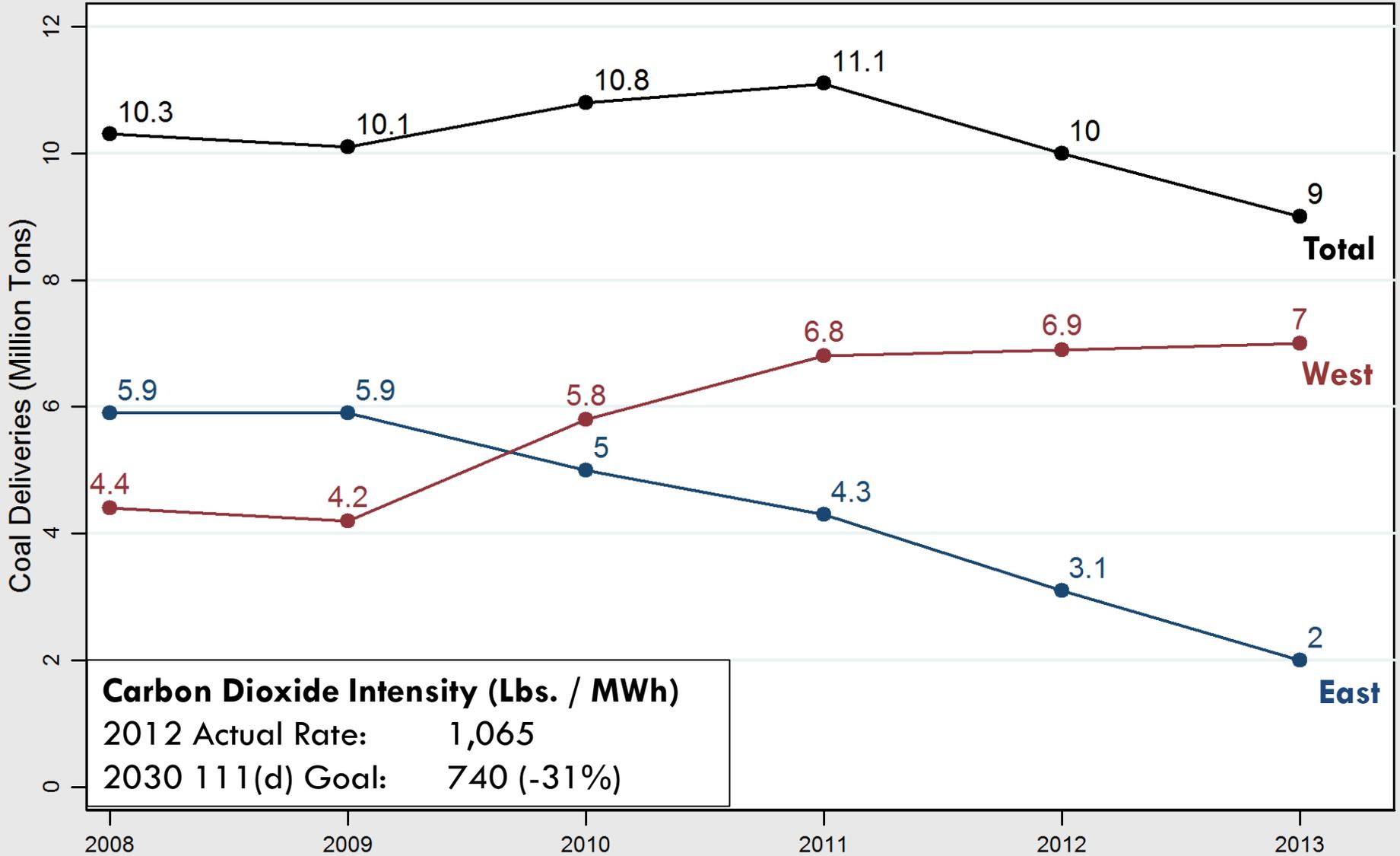
Carbon Dioxide Intensity (Lbs. / MWh)

2012 Actual Rate: 1,033
 2030 111(d) Goal: 992 (-4%)

Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

Kentucky Coal Deliveries to Florida, 2008-2013



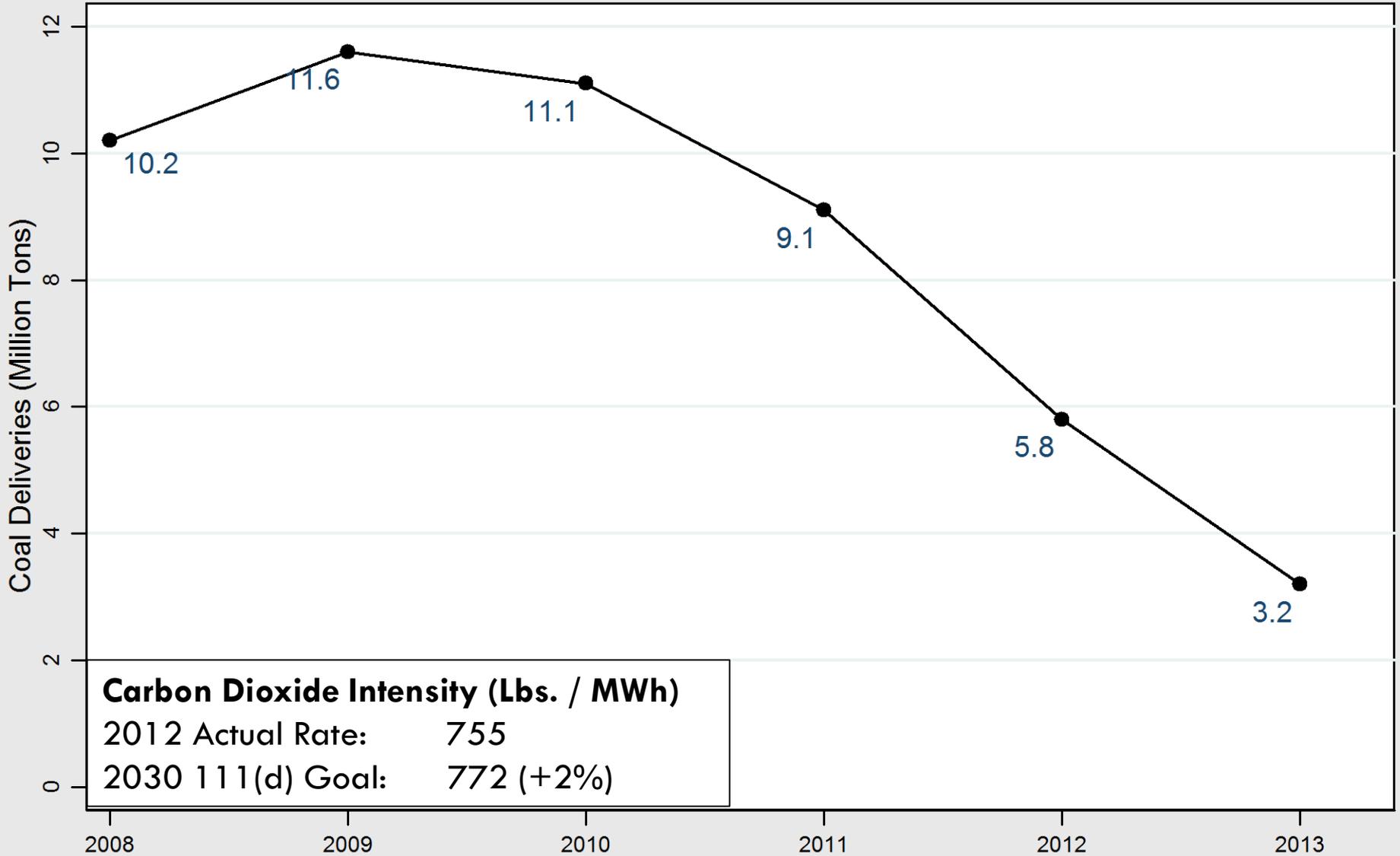
Carbon Dioxide Intensity (Lbs. / MWh)

2012 Actual Rate: 1,065
 2030 111(d) Goal: 740 (-31%)

Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

Kentucky Coal Deliveries to South Carolina, 2008-2013



Carbon Dioxide Intensity (Lbs. / MWh)

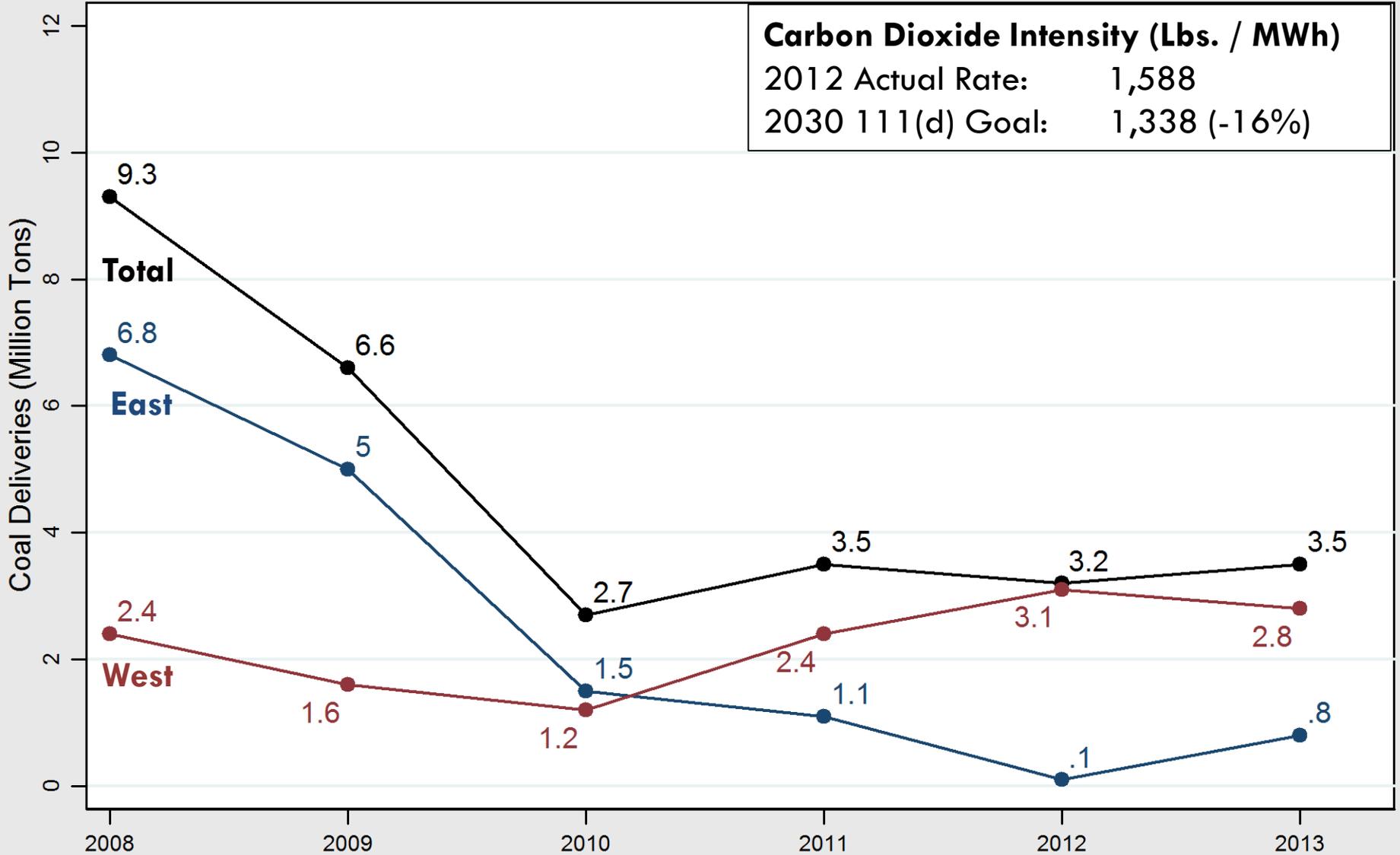
2012 Actual Rate: 755

2030 111(d) Goal: 772 (+2%)

Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

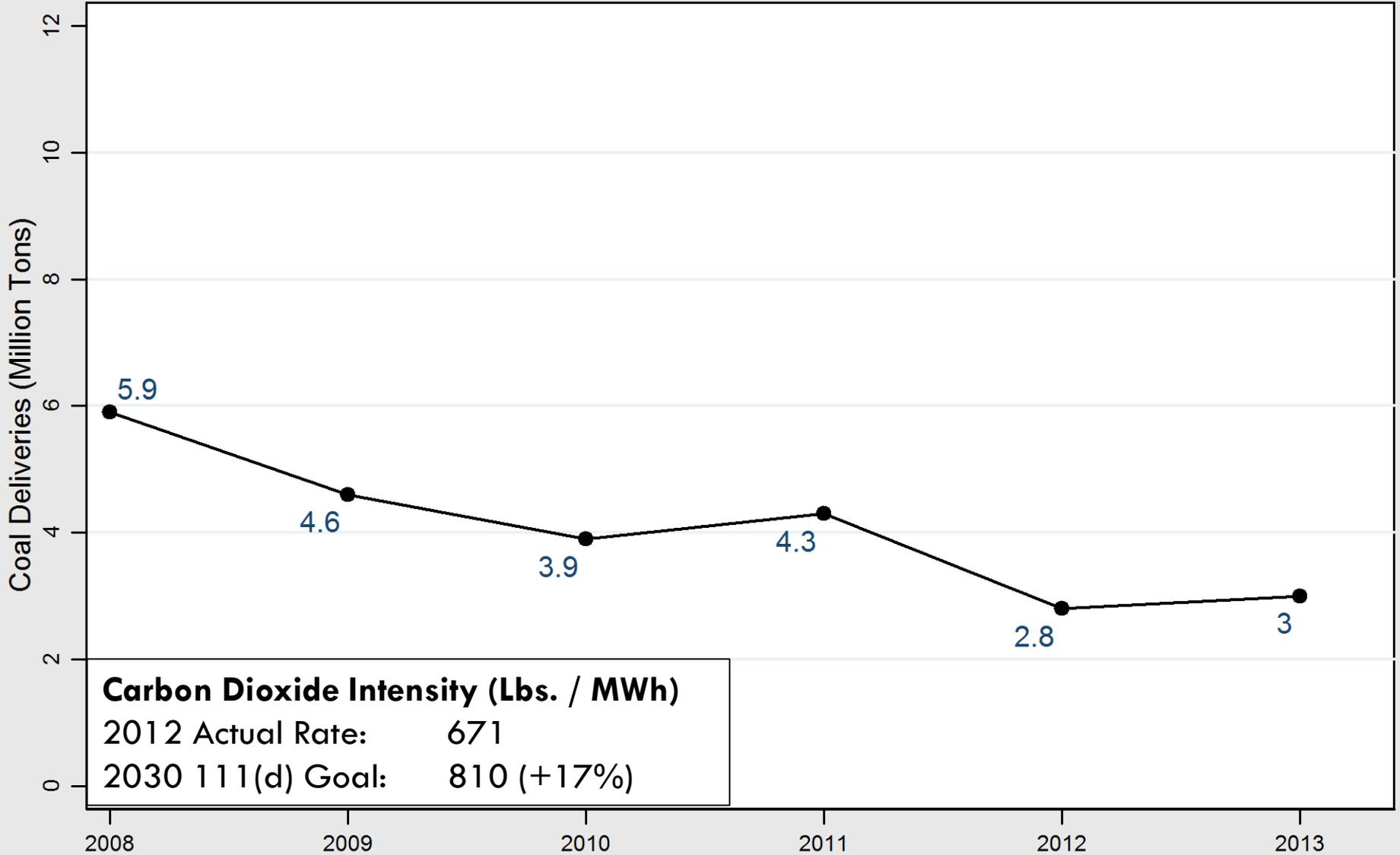
Kentucky Coal Deliveries to Ohio, 2008-2013



Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

Kentucky Coal Deliveries to Virginia, 2008-2013



Carbon Dioxide Intensity (Lbs. / MWh)

2012 Actual Rate: 671
2030 111(d) Goal: 810 (+17%)

Kentucky Energy Database, EEC-DEDI, 2014

Data Source: Forms EIA-923 & FERC-423

Conclusions

- A turn-around for production in eastern Kentucky is unlikely given its higher cost to produce; competition from natural gas; utilities switching to either natural gas or higher sulfur coal; competition from renewables in other states; etc.
- In Kentucky, EPA's proposed GHG rule for existing sources will not likely force shut-downs of electric generating units. With an aging coal-fleet, Kentucky's electricity production using coal is going to be more greatly influenced by the rule for new sources as older units are retired.
- Actions other states take to comply with environmental rules will continue to influence markets for Kentucky coal.