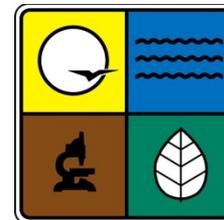


EPA CLEAN POWER PLAN PROPOSAL

Controlling CO₂ Emissions From Existing Power Plants

Mark Leath, P.E.
Air Quality Planning Section
Air Pollution Control Program
August 28th, 2014



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

President's Directive to EPA:

Develop CO₂ emission standards, regulations or guidelines, as appropriate, for:

1. New power plants

» Proposed: January 8, 2014

2. Modified and reconstructed power plants

» Proposal: June 2014

» Final: June 2015

3. Existing power plants

» Proposed Guidelines: June 2014

» Final Guidelines: June 2015

» State Plans due: June 2016

Background: Clean Air Act Section 111(d) Best System of Emission Reduction (BSER)

- Previous EPA rules under 111(d) have considered “add-on” control technologies – like scrubbers -- that are technically feasible to deploy at virtually any facility
- Under this rule, EPA considered a variety of ways to reduce CO₂
- EPA considered the following Clean Air Act factors in determining BSER in light of the interconnected nature of power generation:
 - Costs
 - Size of reductions
 - Technology
 - Feasibility

General Overview of the Proposed Rule

- Proposal sets an interim (2020-2029) and final goal (2030) for affected EGUs in each state to reduce CO₂ emissions
 - Rate-based performance level (lbs CO₂/MW-h)
- EPA is not prescribing measures states need to implement to meet the goal
- The state goals were developed based on a consistent national formula (Four Building Blocks)
- Because each state's energy portfolio is different, the goals vary from state to state

The Form of State Goals

Statewide CO₂ Emissions from covered fossil fuel fired power plants (lb.)

State electricity generation from covered fossil plants + RE + Nuclear_(AR&UC) + EE (MW-h)

- Numerator – sum of CO₂ emissions at covered power plants
- Denominator – electricity generation in state, including
 - Covered fossil sources,
 - Existing and new renewable energy (RE) (excluding existing hydro),
 - New nuclear and ~ 6% of existing nuclear fleet's generation, and
 - Energy Efficiency (EE) accounted for as zero-emitting MW-h
- Proposed state goal – adjusted average statewide rate in units of pounds of CO₂ per Megawatt-hour (lbs CO₂/MW-h)



EPA's Proposed Goals for Missouri (lbs CO₂/MW-h)

**2020 – 2029
Interim Goal**

**2030 and Beyond
Final Goal**

1,621

1,544

Missouri's 2012 Adjusted Average Statewide Rate: 1,963 lbs CO₂/MW-h



EPA Identified Likely Affected Missouri Sources

Plant Name	Owner/Operator
Labadie Meramec Rush Island Sioux	Ameren (Union Electric Company)
New Madrid St Francis Energy Facility Thomas Hill	Associated Electric Cooperative, Inc.
Chamois	Central Electric Power Cooperative and Associated Electric Cooperative, Inc.
Sikeston Power Station	City of Carthage, Sikeston Bd. of Municipal Utilities, City of Fulton, and City of Columbia
Columbia	City of Columbia
James River Power Station John Twitty Energy Center	City of Springfield, MO
Dogwood Energy Facility	Dogwood Energy, LLC and North American Energy Services
Asbury State Line Combined Cycle	Empire District Electric Company
Iatan	Empire District Electric Company, KCP&L, KCP&L GMO, and Missouri Joint Municipal Electric Utility Commission
Blue Valley	Independence Power and Light
Hawthorn Montrose	KCP&L
Lake Road Sibley	KCP&L GMO

The Four Building Blocks

Proposed rule establishes best system of emission reduction (BSER) to be a combination of four building blocks, which are applied to each state's current (2012) electricity generation portfolio to calculate the state goal:

- (1) measures to make coal plants more efficient,
- (2) increased use of high efficiency, natural gas combined cycle (NGCC) plants,
- (3) generating electricity from low/zero emitting facilities, and
- (4) demand-side energy efficiency

The Four Building Blocks in Missouri

Building Block	Strategy EPA Used to Calculate the State Goal	State Goal
1. Make fossil fuel-fired power plants more efficient	Efficiency Improvements for coal-fired general	6% Heat rate improvement
2. Use lower-emitting power sources more	Dispatch changes to existing natural gas combined cycle (NGCC)	70% Utilization NGCC
3. Build more zero/low-emitting energy sources	Renewable Energy (Also preserve "at risk" nuclear)	6%  per year in RE generation RE (MO) = 3% of total generation in 2030
4. Use electricity more efficiently	Demand-side energy efficiency programs	1.5%  per year in MW-h reduction

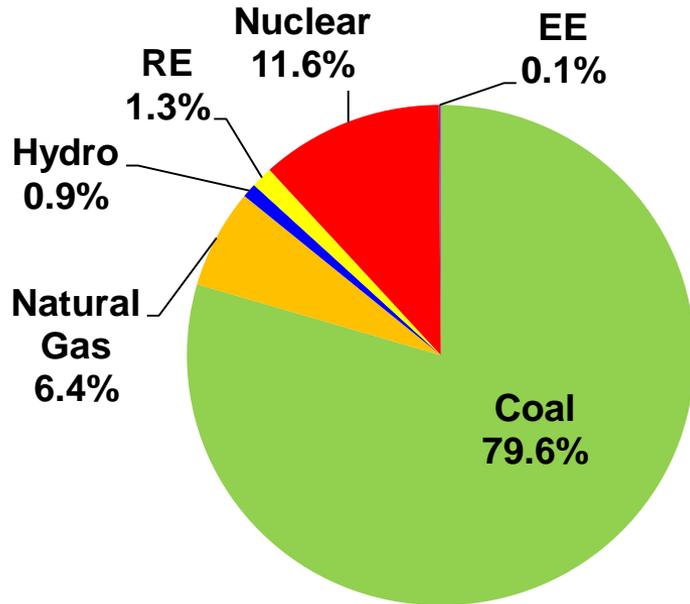
Overview of Missouri's 2030 Goal Calculation

Step		Rate (lbs CO ₂ /MW-h)	
Starting rate	2012 statewide adjusted average emission rate	1,963	} - 114 lbs/MW-h (6%)
After Block 1	Reduce CO ₂ emissions 6% due to heat rate improvements at MO's coal fleet on average	1,849	
After Block 2	Re-dispatch generation from coal to existing NGCC fleet (70% utilization)	1,742	} - 107 lbs/MW-h (5%)
After Block 3	Increase generation from zero- and low-emitting sources	1,711	
After Block 4	Increase cumulative benefits of energy efficiency programs	1,544	} - 31 lbs/MW-h (2%)
			} - 167 lbs/MW-h (9%)

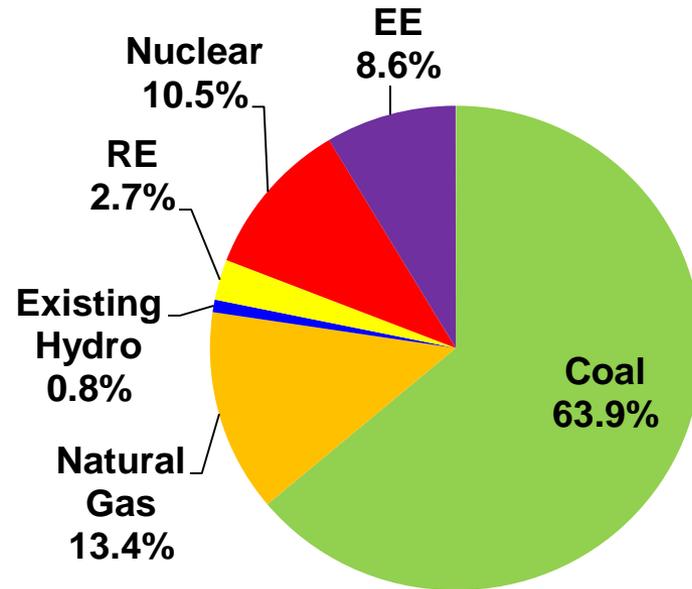
Proposed 2030 goal of 1,544 lbs/MW-h is ~21% reduction from 2012 emission rate

Missouri Fuel Mix Comparison

Actual 2012 Generation



2030 Scenario Based on Application of EPA's Building Blocks as Proposed



Note: This is for illustrative purposes only. The 2030 pie chart depicts one possible scenario based on applying EPA's building blocks exactly as proposed. EPA is not prescribing this approach; Missouri's 111(d) plan can be based on any mix of measures provided the goals are met in the established timeframe.

Compliance Options

Four Building Blocks

- Improve efficiency at the plant level
- Redispatch generation to lower emitting sources
- Increase renewable energy
- Demand-side energy efficiency projects

Can do more or less of any building block

Other Options

- Co-fire natural gas at coal units
- Combined heat and power
- Build new nuclear
- Build new NGCC units
- Transmission/distribution improvements
- Renewable Energy Credits?
- Biomass?

States have Flexibility

- States choose form of the goal
 - Rate-based: meet statewide average rate (lbs CO₂/MW-h)
 - Mass-based: meet a statewide budget (tons CO₂)
- States can use averaging or trading with both rate- or mass-based approaches
- Existing State EE/RE programs can be recognized

Rate-Based Considerations

- Growth is not limited as long as the goal is met
 - No need to project electricity demand
- Measures that avoid EGU emissions, such as EE/RE, can be credited
 - Requires evaluation, measurement, and verification (EM&V), which is administratively complex
- Credits/Allowances are based on generation
 - Not known each year
- EGU compliance is determined on an annual basis (or less)

Mass-Based Considerations

- Growth in existing unit generation can be accounted for, but forecast must be accurate
 - Emissions budget cannot change after plan approval
- Administratively straightforward
 - No EM&V
- Credits/Allowances are based on statewide cap
 - Known number of allowances
- EGU compliance is determined using a 3-year average (or less)

MDNR's Schedule for Power Plant 111(d)

Timeframe	Action
October 16, 2014	Deadline to submit comments to EPA for proposed rule
Now to June 2015	Review proposed rule, comment if applicable, stakeholder meetings
June 2015	EPA promulgates final rule
Early 2016	Public Hearing for initial plan (30-day comment period)
Spring 2016	Adoption of initial plan
June 2016*	State submits initial plan to EPA
June 2017*	Submittal deadline for the full plan and rule if Missouri does not partner with another state
June 2018*	Submittal deadline for the full plan and rule if Missouri partners with another state(s)
January 2020	Compliance period begins for affected sources
2030 and beyond	Compliance with final goal required

* Note: Proposed rule requires an initial plan to be submitted by June 2016, and allows for 1 or 2 year extensions for the full plan and rule submittal

Partners in State Plan Development

- We're working with MO Division of Energy and Public Service Commission throughout process
- We want stakeholder input too! Keep up with the latest developments by signing up for email notifications at:

<http://dnr.mo.gov/env/apcp/airadvisory/apcpstakeholder.htm>





MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

40
years

Celebrating 40 years of taking care of Missouri's natural resources.

Questions?

Mark Leath, P.E.
Air Pollution Control Program
Air Quality Planning Section
Phone: 573-751-4817
Email: mark.leath@dnr.mo.gov

Division of Environmental Quality Director: Leanne Tippett Mosby

Date: 7/14/14

Nothing in this document may be used to implement any enforcement action or levy any penalty unless promulgated by rule under chapter 536 or authorized by statute.