EPA’s Final 111(d) Emission Guidelines

Stakeholder Meeting
Iowa DNR Air Quality Bureau
September 9, 2015
EPA’s Final 111(d) Emission Guidelines

• Key Changes between the proposed and final guidelines
  – Iowa’s 2030 and Interim Goals
  – Summary of Best System of Emission Reductions (BSER)
  – Plan Pathways
# Key Changes to EPA’s Final CPP Rule

<table>
<thead>
<tr>
<th>Topic</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing</td>
<td>Interim compliance period extended 2-years, starting in 2022.</td>
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<tr>
<td>Initial compliance</td>
<td>EPA has added three stepped goals for interim compliance period: 2022-2024, 2025-2027, 2028-2029.</td>
</tr>
<tr>
<td>Baseline</td>
<td>Still 2012, but with some adjustments (such as outages) for some states – (none for Iowa)</td>
</tr>
<tr>
<td>Emission Limit Approach</td>
<td>Best System of Emission Reduction (BSER) now a performance rate determined using a regional basis based on NERC electricity interconnections.</td>
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<tr>
<td>Emission Limit Basis</td>
<td>Includes heat rate improvement, increased existing NGCC dispatch, and renewables. Adds new utility-scale renewables based on potential beginning in 2013. EPA removed existing nuclear and energy efficiency.</td>
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<tr>
<td>Goal Type</td>
<td>Emission rate (lbs./CO₂ Net-MWh) or EPA-determined mass cap (tons).</td>
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<tr>
<td>Early reduction credits</td>
<td>EPA added the Clean Energy Incentive Program (CEIP) to incentivize early investments that generate wind and solar power or reduce end-use energy demand during 2020 and 2021.</td>
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<tr>
<td>Reliability</td>
<td>EPA requires demonstration in state plan that reliability was considered and provides safety valve for unforeseen emergencies.</td>
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Timeline

- Interim compliance period starts two years later, in 2022.

State Plan Development and Approval
- State Plan or Initial Submittal 9/6/16
- Progress Update for states with extensions 9/6/17
- Final Plan submittal for states with extensions 9/6/18
- EPA has 12 months to approve/disapprove

Interim Compliance (2022 – 2029)
- Must meet interim goal on-average over 8-year period, plus interim steps:
  - Step 1 (2022-2024)
  - Step 2 (2025-2027)
  - Step 3 (2027-2029)

Final Goal (2030)
- Compliance begins 1/1/30
- Ongoing 2-year compliance periods:
  - Period 1 (2030-2031)
  - Period 2 (2032-2033)
  - Period 3 (2034-2035)
  etc.
Extension for Submitting Final Plan

- States may receive a 2-year extension, regardless of whether they are submitting an individual state plan or participating in a multistate plan.

- The criteria for receiving an extension have been reduced to 3 components:
  1. Identification of final plan approaches under consideration, and progress made to date;
  2. Why additional time is needed; and
  3. Demonstration of opportunity for public comment and meaningful stakeholder engagement.

- EPA has 90 days to deny - no news is good news.
Affected Units

• Affected units are any steam generating unit, IGCC, or stationary combustion turbine that commenced construction on or before 01/08/2014 and:

  1. Serves as a generator connected to a utility power distribution system with a nameplate capacity of 25 MW-net or greater;
  2. Has a base load rating greater than 250 MMBtu/hour heat input fossil fuel; and
  3. Stationary combustion turbines that meet the definition of either a combined cycle or combined heat and power combustion turbine.

• Iowa’s list of affected facilities has not changed (21), but we believe the number of affected units has been reduced from 42 to 37 units.
Affected Units (continued)

- EGUs may be excluded from being affected units per §60.5850 if they are:
  - Subject to the 111(b) standards (40 CFR 60 Subpart TTTT) because of their date of construction or became subject to Subpart TTTT because of modification or reconstruction.
  - Steam units and IGCC units that are currently and have always been subject to a federally enforceable permit limiting annual net-electric sales to 1/3 or less of its potential electric output, or 219,000 MWh or less;
  - Non-fossil units that have always historically limited the use of fossil fuels to 10% or less of the annual capacity factor, or are subject to a federally enforceable permit limiting fossil use to 10% or less of the annual capacity factor.
IPL—Lansing

IPL—Dubuque

MidAmerican Energy—M.L. Kapp

MidAmerican Energy—Fair Station

MidAmerican Energy—Summit Lake

Muscatine Power & Water

CIPCO—Fair Station

MidAmerican Energy—Louisa

MidAmerican Energy—Greater Des Moines

IPL—Ottumwa

IPL—Burlington

CIPCO—Summit Lake

Pella Municipal

MidAmerican Energy—Walter Scott, Jr.
Iowa Goals
New Iowa Goals

- New “subcategory” Emission Performance Rates - nation-wide
  - **1,305 lbs. CO₂/MWh** for fossil fuel-fired steam generating units
  - **771 lbs. CO₂/MWh** for stationary combustion turbines

- New Iowa Goals:

<table>
<thead>
<tr>
<th>Goal Type</th>
<th>Timing</th>
<th>Units Covered</th>
<th>Proposed</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Interim (2022-29)</td>
<td>existing affected units</td>
<td>1,341 lbs./MWh*</td>
<td>1,505 lbs./MWh*</td>
</tr>
<tr>
<td>Rate</td>
<td>2030 Final</td>
<td></td>
<td>1,301 lbs./MWh*</td>
<td>1,283 lbs./MWh*</td>
</tr>
<tr>
<td>Mass</td>
<td>Interim (2022-29)</td>
<td>existing affected units</td>
<td>24,088,889 tons</td>
<td>28,254,411 tons</td>
</tr>
<tr>
<td>Mass</td>
<td>2030 Final</td>
<td></td>
<td>23,358,609 tons</td>
<td>25,018,136 tons</td>
</tr>
<tr>
<td>Mass</td>
<td>Interim (2022-29)</td>
<td>existing affected units + new source complement</td>
<td>-</td>
<td>28,553,345 tons</td>
</tr>
<tr>
<td>Mass</td>
<td>2030 Final</td>
<td></td>
<td>-</td>
<td>25,281,881 tons</td>
</tr>
</tbody>
</table>

*net generation
Iowa has the 9th least stringent goal in the contiguous U.S.

Source: NACAA
Glide Path – Rate-based Goals

Iowa Rate Goals (lbs./MWh)

2012 = 2,195 lbs./MWh

Source: EPA CPP State Goal Visualizer
Iowa Rate Goals

![Graph showing emission rate goals]

**IA Final Clean Power Plan Emission Rate Goals**

- **2012 IA Baseline**: 2,195 lbs CO2/Net MWh
- **IA Interim Goal (2022-2029)**: 1,505 lbs CO2/Net MWh
- **IA Final Goal (2030)**: 1,283 lbs CO2/Net MWh

Reduction from 2012:
- IA 31%
- IA 42%
Glide Path – Mass-based Goals

Iowa Mass Goals (million short tons)

2012 = 38,135,454 tons

Source: EPA CPP State Goal Visualizer
Iowa Mass Goals

IA Clean Power Plan Mass Goals

- **2012 IA Baseline**: 38.1 million tons of CO2
- **IA Interim Goal (2022-2029)**: Reduction IA 26%, 28.3 million tons of CO2
- **IA Final Goal (2030)**: Reduction IA 34%, 25.0 million tons of CO2
Best System of Emission Reduction
Best System of Emission Reduction (BSER)

- State-level data is aggregated to the regional level – 3 interconnections
- The building blocks are then applied at the regional level, not the state level.
- EPA then determined individual “subcategory” performance rates for fossil steam and natural gas combined cycle (NGCC) for each region, and selected the least stringent as BSER.
- BSER and the goal calculations may be a topic for a future stakeholder meeting.

### Heat Rate Improvement
- 4.3% East
- 2.3% West
- 2.1% Texas

### Add New Utility-Scale Renewables
(technical/economic potential after 2012)

### Increase Dispatch of Existing NGCC
(75% Net Summer Capacity)

### EPA’s BSER Performance Rate for 111(d) Units (lbs CO2/Net-MWh)

<table>
<thead>
<tr>
<th>Region</th>
<th>Existing Coal</th>
<th>Existing NGCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>1,305</td>
<td>771</td>
</tr>
<tr>
<td>Western</td>
<td>360</td>
<td>690</td>
</tr>
<tr>
<td>Texas</td>
<td>237</td>
<td>697</td>
</tr>
</tbody>
</table>
Building Block #1 - Heat Rate Improvement (HRI)

• Heat rate is the amount of fuel energy input needed to produce 1 KWh of net electrical output.

• HRI changed from 6% in proposed rule to a separate rate for each interconnection:
  • Eastern Interconnection: 4.3%
  • Texas Interconnection: 2.3%
  • Western Interconnection: 2.1%

• HRIs were calculated by using 2012 as a baseline, then comparing it to the best historical gross heat rate of each EGU in the region.

• EPA stresses that Block 1 should be implemented in combination with the other building blocks.
Building Block #2 – Shifting Generation from Fossil Steam to Existing NGCC

• Proposed Rule:
  – 70% **nameplate capacity** factor for existing and under construction natural gas combined cycle (NGCC)
  – Achieved by 2020

• Final Rule:
  – 75% **summer capacity** factor for existing and under construction NGCC
    • Represents a unit producing ¾ of the electricity it could have produced in that time had it utilized its entire capacity
  – Achieved in 2030, with glide path from 2020
  – Applied after Building Block 3 when setting goals
Building Block #3 – Shifting Generation to Renewables

• Proposed Rule:
  – No retirement of “at risk” nuclear capacity; included under construction nuclear
  – Regional RE generation targets derived from existing RPS goals and applied to each state

• Final Rule:
  – Used on-shore wind, utility scale solar photovoltaic, concentrating solar power, geothermal, and hydropower
  – Nuclear is no longer included in BSER (can use as compliance option)
  – Incremental RE only
    • Used National Renewable Energy Laboratory (NREL) studies
    • 25% increase in RE potential; based on economic modeling
    • Applied at regional interconnection level
    • Incremental RE was calculated using 7 steps (see p. 755 of final rule)
Building Block #4— No longer exists

• Proposed Rule:
  – Annual improvement of 1.5% demand-side energy efficiency

• Final Rule:
  – Demand-side Energy efficiency was not included in BSER
  – Can still be used as a compliance option
Goal Calculations (continued)

- Recommend looking at the **Clean Power Plan State Goal Visualizer Tool** located in EPA’s Clean Power Plan Toolbox
EPA’s New BSER Goal Calculation

- National “subcategory” performance rates were applied to each state based on 2012 generation mix.
  - Iowa’s 2012 mix was 96% coal and 4% natural gas

Iowa Calculation

\[
\text{Iowa Calculation} = (1,305 \text{ Fossil Steam national rate } \times 96\%) + (771 \text{ NGCC national rate } \times 4\%) = 1,283 \text{ lbs. CO}_2/\text{MWh}
\]
State Plan Pathways
State Plan Pathways

1. Emission Standards Plan –
   - Federally enforceable emission standards on affected EGUs
     • Can use CO$_2$ “subcategory” emission performance rates, state goal, or varied emission rates

2. State Measures Plan –
   - State includes, at least in part, measures implemented by the state that are not included as federally enforceable emission standards
   - Designed to achieve the state mass-based goal
   - Ready path forward for states currently implementing mass-based trading programs
   - May require legislation
   - Includes federally enforceable measures as a backstop
     • Emission standards that would go in effect if state measures aren’t meeting the goal
Rate-based Plans Overview

• Sources must meet emission standard set by the final rule.
• If sources emit above the emission standard, they must acquire a sufficient number of emission rate credits (ERCs) to bring them into compliance.

• Emission Rate Credits (ERCs)
  – Unit of trade for a rate-based program, produced in MWh for:
    • Low or no-emissions resources installed in 2013 or thereafter, or
    • Affected unit generation below subcategory rate, or
    • Incremental NGCC generation (gas-shift ERCs)
  – ERCs only accrue after 2022 (Earlier if participating in CEIP)
  – ERCs can be banked indefinitely
  – Gas-shift ERCs can only be used by coal units in a plan using subcategory rate goals
Rate-based Plans (continued)

• ERCs may be issued to:
  – Measures that are installed after 2012, but
  – Only the quantified and verified MWh of electricity generation or electricity savings they produce in 2022 and future years can be used to adjust a CO$_2$ emission rate.
  – Examples:
    • Renewables (wind, solar, geothermal, hydro, wave, tidal),
    • New or uprated nuclear, Qualified biomass,
    • Waste-to-energy, Combined heat and power,
    • Energy efficiency, Transmission & distribution improvements
  – Cannot be issued to energy storage or new stationary sources.

• The final rule also includes the Clean Energy Incentive Plan (CEIP), which gives additional credits to early investments that generate wind and solar power or reduce end-use energy demand during 2020 and 2021

• ERCs may be a good topic for a future meeting.
Using ERCs to Achieve Compliance

**CO₂ Emission Rate =**

\[
\text{Measured CO₂ emissions (pounds)} / \text{Total net energy output (MWh) + ERC replacement generation for an EGU (MWh)}
\]

Hypothetical Example:

A coal-fired unit emits 230,000,000 pounds of CO₂ during the compliance period, generates 100,000 MWh of net electricity and owns ERCs from renewable sources equal to 100,000 MWh.

The unit’s adjusted CO₂ Emission Rate = \( \frac{230,000,000 \text{ lbs.}}{(100,000 + 100,000) \text{ MWh}} \)

= 1,150 lbs. CO₂/MWh*

Emission rate would otherwise be 2,300 lbs. CO₂/MWh* without ERCs

*net generation
Rate-based Plan Pathways

1. Use Subcategorized CO₂ Emission Performance Rates
   (771 lbs./MWh for turbines; 1305 lbs./MWh for steam generating units - nationwide)
   - Trading Options:
     - Intrastate trading ???
     - Interstate trading - Trading Ready
   - **EPA Model Rule**
   - Plan must include:
     - Evaluation measurement & verification (EM&V)
     - Measurement & verification (M&V) and documentation of EE/RE savings

2. Use State CO₂ Emission Goal Rate for Existing Units
   (1,283 lbs./MWh for all affected units - Iowa)
   - Trading Options:
     - Intrastate
     - Interstate - with multistate plan (weighted average)
   - Plan must include:
     - Evaluation measurement & verification (EM&V)
     - Measurement & verification (M&V) and documentation of EE/RE savings
Rate-based Plan Pathways (continued)

3. Use Varied CO₂ Emission Rates Among Existing Units
   - Trading Options:
     • Intrastate trading
   - Plan must include:
     • Projection that plan will achieve the goal
     • Evaluation measurement & verification (EM&V)
     • Measurement & verification (M&V) and documentation of EE/RE savings
Mass-based Plans Overview

• EPA gives state an emissions budget of how many tons of CO\textsubscript{2} can be emitted by affected EGUs.

• State can choose how to distribute the allowances.
  – 1 allowance = 1 short ton of CO\textsubscript{2} emitted during compliance period.

• EGUs must have a sufficient number of allowances at the end of the given compliance to cover their actual emissions.

• Allowances may be traded and banked; a portion of allowances may be set-aside by the state.

• If using the new source complement, leakage does not have to be addressed.
Mass-based Plan Pathways

1. EPA Mass Goal for Existing Units with EPA New Unit Complement (25,281,881 tons)
   - Trading Options:
     • Intrastate ???
     • Interstate: Trading Ready
   - EPA Model Rule???

2. EPA Mass Goal for Existing Units Only (25,018,136 tons)
   - Trading Options:
     • Intrastate
     • Interstate: Trading Ready
   - EPA Model Rule
   - Plan must address potential leakage
     • Where shifts in generation to unaffected fossil fuel-fired sources result in increased emissions, relative to what would have happened had generation shifts consistent with the BSER occurred
     • Results in higher emissions
Mass-based Plan Pathways (continued)

3. State Measures, Can Include Mass Limit for Existing and New
   – Ideal for states that are already trading – RGGI and California
   – Trading Options: Can be made Trading Ready
   – Plan must:
     • Address potential leakage
     • Include projection that it will achieve the goal
     • Include backstop emission standards in case state measures fail to achieve compliance
   – Additional reporting required
Multistate Coordination

• States may participate in more than one multistate plan.

• A subset of affected EGUs in a state may participate in a multistate plan.

• Midcontinent States Environmental and Energy Regulators (MSEER)
  – Regional stakeholder workshop on October 19th in Little Rock, Arkansas
Reliability

• Plan must include demonstration that the reliability of the electrical grid has been considered (new).

• Reliability safety valve (new)
  – Triggered when there is conflict between the requirements of the state plan and maintaining electric system reliability due to catastrophic or unforeseen events
    • When triggered, a source is exempted from the applicable emission standards for 90 days.
    • During the 90 days, the source must meet an alternative emission standard that will not jeopardize grid reliability.
  – If the reliability issue cannot be resolved, the state must revise their plan to address the reliability issue.
Current Litigation

• West Virginia, No. 15-1277 filed in U.S. Court of Appeals for the DC Circuit
  – Emergency request by 15 states to stay the Clean Power Plan
  – EPA argues premature because the CPP has not been published in the Federal Register
  – DC Circuit rejected a similar challenge to the proposed CPP because a final rule had not been published yet
For More Information

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DNR Website:
http://www.iowadnr.gov/111d

EPA Clean Power Plan Website:
http://www2.epa.gov/carbon-pollution-standards

EPA Toolbox (including Visualizer Tool)
http://www2.epa.gov/cleanpowerplantoolbox