

# Bridger Conversion Options and Modeling Details

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# List of Acronyms and Terms

- Capacity Factor – Average Output / Nameplate
- EPA – Environmental Protection Agency
- BSER – Best System of Emissions Reduction
- CCS – Carbon Capture and Sequestration
- SCCT – Simple Cycle Combustion Turbine
- CCCT – Combined Cycled Combustion Turbine
- EGU – Electrical Generating Unit
- Mg – Megagram equivalent to Metric Ton
- IRC – Internal Revenue Code
- OFA – Over Fire Air
- NO<sub>x</sub> – Nitrogen Oxides
- CO<sub>2</sub> – Carbon Dioxide
- SCR – Selective Catalytic Reduction (NO<sub>x</sub> control)
- MW – Megawatt
- MWh – Megawatt-hour
- kW - Kilowatt

# Agenda

- Review of updated 111(d) rule impacts to Bridger
- 2025 IRP Modeling Options
- Carbon Capture and Sequestration Initial Assessment

# Background Details



Location: Point of Rocks, WY	Bridger 1	Bridger 2	Bridger 3	Bridger 4
Year Built and Capacity	1974, 177MW	1975, 180MW	1976, 174MW	1979, 175MW
Technology	Natural Gas Boiler	Natural Gas Boiler	Coal Boiler	Coal Boiler
Fuel Supply	Opal gas hub	Opal gas hub	Bridger Coal Mine	Bridger Coal Mine
Ownership Structure	1/3 Idaho Power 2/3 PacifiCorp	1/3 Idaho Power 2/3 PacifiCorp	1/3 Idaho Power 2/3 PacifiCorp	1/3 Idaho Power 2/3 PacifiCorp
Emission Controls	Low-NOx Burners	Low-NOx Burners	Low-NOx Burners Flue gas desulfurization Electrostatic Precipitator SCR	Low-NOx Burners Flue gas desulfurization Electrostatic Precipitator SCR
Current Emissions Constraints	42% Annual capacity factor cap for Regional Haze	42% Annual capacity factor cap for Regional Haze		

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# Existing Gas Boiler Units

**BSER:** routine methods of operation and maintenance with associated degree of emission limitation:

**Base load unit standard:**

(annual capacity factors greater than 45%) 1,400 lb CO<sub>2</sub>/MWh-gross

**Intermediate load unit standard:**

(annual capacity factors greater than 8% and less than or equal to 45%) 1,600 lb CO<sub>2</sub>/MWh-gross.

**Low load units:**

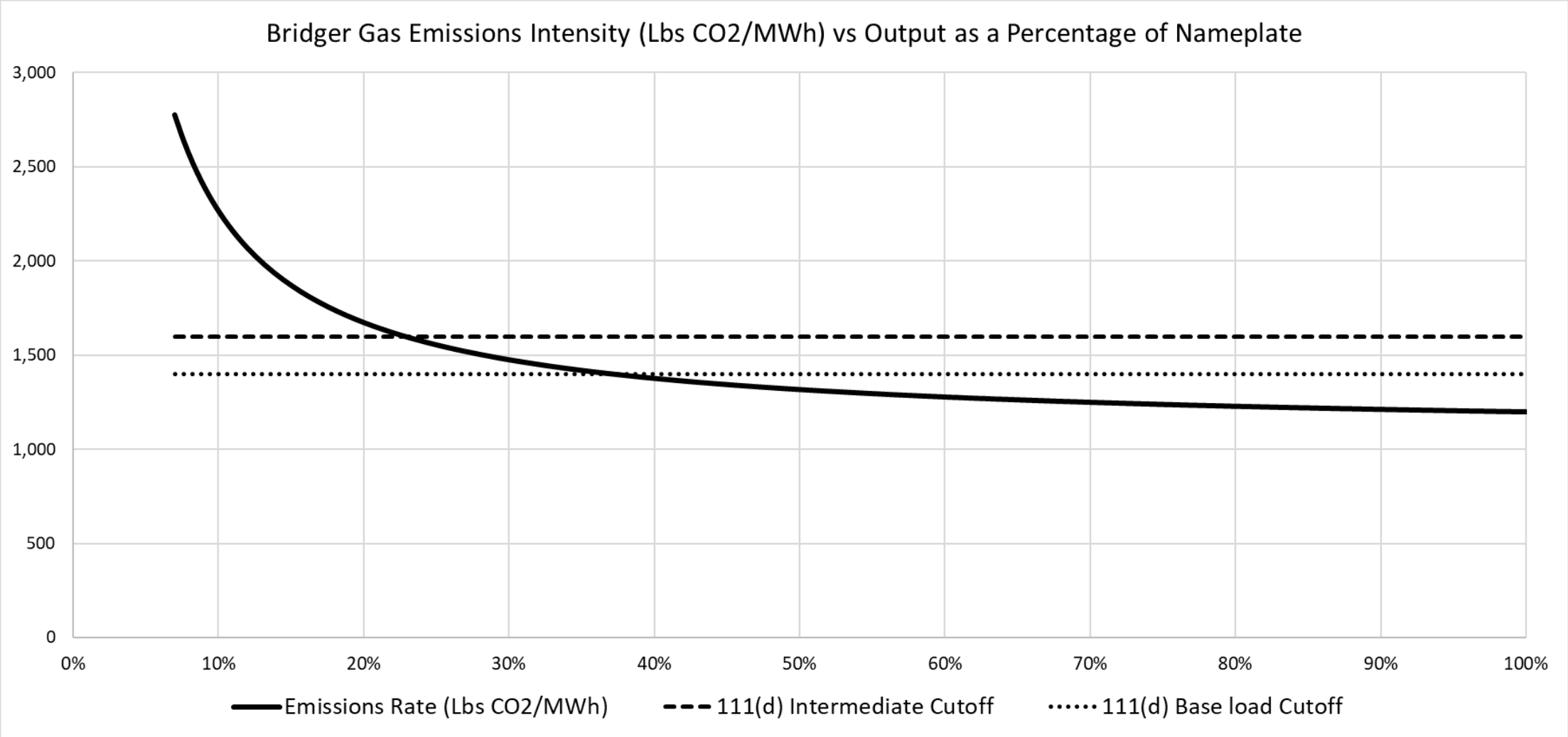
(annual capacity factors less than 8%) a uniform fuels BSER and a presumptive input-based standard of 170 lb CO<sub>2</sub>/MMBtu for oil-fired sources and a presumptive standard of 130 lb CO<sub>2</sub>/MMBtu for natural gas-fired sources.

Compliance date of January 1, 2030

<https://www.epa.gov/system/files/documents/2024-04/cps-table-of-all-bser-final-rule-4-24-2024.pdf>

- Bridger 1 & 2
  - Low Load – In compliance
  - Intermediate Load – In compliance minor adjustments
  - Base Load – Units limited to ≈42% Capacity Factor for Regional Haze compliance
- Bridger 3 & 4 (if converted)
  - Low Load – In compliance
  - Intermediate Load – In compliance minor adjustments
  - Base Load – Could comply with limited flexibility

# Bridger Gas Emissions Curve



## Coal-Fired Boilers

**Long-term subcategory:** For units operating on or after January 1, 2039

**BSER:** CCS with 90 percent capture of CO<sub>2</sub> (88.4% reduction in emission rate lb/MWh-gross) by January 1, 2032

**Medium-term subcategory:** For units operating on or after Jan. 1, 2032, and demonstrating that they plan to permanently cease operating before January 1, 2039

**BSER:** co-firing 40% (by heat input) natural gas with emission limitation of a 16% reduction in emission rate (lb CO<sub>2</sub>/MWh-gross basis) by January 1, 2030

For units demonstrating that they plan to permanently cease operating before January 1, 2032

Units are exempt from the rule. Cease operations dates finalized in state plans for exemption purposes are federally enforceable.

<https://www.epa.gov/system/files/documents/2024-04/cps-table-of-all-bser-final-rule-4-24-2024.pdf>

# Existing Gas Boiler Units

- Bridger 1 & 2
  - As converted gas boilers, not affected by these rules
- Bridger 3 & 4
  - Without a gas conversion
    - Close by year end 2031
    - Add carbon capture before 2032
  - With gas conversion (prior to 2030)
    - Complies with these rules



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# Bridger Units 1 and 2 Scenario Options



Legend
Coal
Gas
Retirement Eligible
Coal to Gas
Retired
CCUS Coal

Bridger 1 and 2 Timeline and Options																				
Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
General																				
Early Retirement																				
Clean 2045																				

*Timings are preliminary and subject to change.*

# Bridger Units 3 and 4 Scenario Options



Legend
Coal
Gas
Retirement Eligible
Coal to Gas
Retired
CCUS Coal

Bridger 3 and 4 Timeline and Options																					
Year	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	
General	Coal				Coal	Gas															
No Conversion Validation	Coal				Retired																
Carbon Capture	Coal				Coal	CCUS Coal															
Clean 2045	Coal				Coal	Gas														Gas	
PRB Coal Conversion Only	Coal				Coal																

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# Carbon Capture 45Q Tax Credit



Method	Eligibility Requirements	Dates	Base Credit	Prevailing Wages and Apprenticeship Credit
Geologically Sequestered CO <sub>2</sub>	75% of Qualified CO <sub>2</sub> must be captured and sequestered in secure geological storage	Construction must begin prior to 1/1/2033. Once operating, eligible for 12-years	\$17 per Megagram of CO <sub>2</sub> inflation adjusted after 2026	\$85 per Megagram of CO <sub>2</sub> inflation adjusted after 2026
Geologically Sequestered CO <sub>2</sub> With Enhanced Oil Recovery (EOR)	75% of Qualified CO <sub>2</sub> must be captured and injected underground as part of EOR	Construction must begin prior to 1/1/2033. Once operating, eligible for 12-years	\$12 per Megagram of CO <sub>2</sub> inflation adjusted after 2026	\$60 per Megagram of CO <sub>2</sub> inflation adjusted after 2026

# Carbon Capture Viability



# Rough CCS Numbers for Idaho Power's Share of Bridger 3 and 4

- Bridger 3 and 4 coal-fired emissions intensity:  $\approx 1$  Mg CO<sub>2</sub>/MWh
- Annual energy at 90% capacity factor: 2,756 GWh
- Gg CO<sub>2</sub> captured per year at 90% capture rate: 2,413 Gg/year
- Annual tax credit at \$85/Mg: \$205MM
- Annual tax credit at \$60/Mg: \$144MM
- Total tax credit over 12-year life at \$85/Mg: \$2.5B
- Total tax credit over 12-year life at \$60/Mg: \$1.7B

# Cost Of and Operational Changes Due to CCS Conversion

- Costs (2022 USD):
  - Overnight capital cost: \$2,343/kW or ≈\$332MM per unit
  - Fixed O&M: \$150/kW-yr or ≈\$26MM per unit per year
  - Variable O&M: \$16.73/MWh or ≈\$23MM per unit per year at 90% capacity factor
  - Ignoring time-value of money: ≈\$924MM per unit for the 12-year life
- Operational Changes:
  - Net-output penalty: -22.2% or ≈80MW
  - Heat-rate penalty: 28.6%



# Carbon Capture Qualitative Risk

- Operational Viability?
  - Can CCS be constructed?
  - What operational constraints will CCS have?
  - Adequate coal supply long term?
    - ≈2MM tons annually for 12+ years
- Policy Viability?
  - Will tax credits persist?
  - Will corporate taxes change and limit the ability to use credits?

# How to Provide Additional Feedback on Bridger Modeling

[Idahopower.com/IRP](https://idahopower.com/IRP)

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Idaho Power has begun work on its 2025 *Integrated Resource Plan* (IRP). The IRP examines the company's projected need for additional electricity over the next 20 years and the resources that will best meet that need while balancing reliability, cost, environmental responsibility, efficiency and risk. The plan is updated every two years and includes a series of public meetings that help guide our planning process.

Idaho Power enlists the assistance of its customers in developing the IRP through an advisory panel — the Integrated Resource Plan Advisory Council (IRPAC).

The IRPAC includes major industrial customers, the environmental community, irrigation representatives, state and local elected officials, public utility commission representatives and other interested parties.

The IRPAC meets with Idaho Power regularly over a period of several months during the development of the company's IRP. These meetings are public. The advisory council's responsibilities include:

- Representing the interests of Idaho Power's more than 630,000 customers
- Participating in open and active discussions of relevant issues, and
- Working with Idaho Power to develop ways to engage the public in the IRP process.

## Public Input

IRPAC meetings are virtual and open to the public. Links to attend meetings via Webex will be posted [here](#).

## Q & A

Submit questions or comments using [the form on this page](#) or [email](#) our IRP team.