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HOW CAPPED ENTITIES WOULD EARN BRIDGE FUEL CREDITS

This document provides four examples of how the Bridge Fuel Credit (BFC) program would work and describes the types of capped entities that would be eligible to receive BFCs.

The examples include an award of BFCs for: (1) retiring an older coal-fired power plant; (2) co-firing a coal plant with natural gas; (3) fuel-switching to natural gas at an industrial facility; and (4) building a new combined heat and power (CHP) plant. In all these examples, the amount of the BFCs received is equal to the difference between the emissions that would have been projected under a business-as-usual scenario versus the reductions that are incentivized by BFCs.

A sample electric utility system: “CleanGen”

The first two examples are based on a hypothetical electric utility named “CleanGen.” CleanGen has five electric generating units in its system. CleanGen’s units, listed in the order in which they are dispatched in response to customer demand for electricity, include:

- two 500-megawatt coal-fired units that were built in the 1980s
- two 150-megawatt coal-fired units built in the 1960s
- a 500-megawatt gas turbine unit (combined-cycle) built in the 1990s

CleanGen’s newer coal units are much more efficient than its smaller, older coal units. CleanGen’s new, combined cycle gas turbine is the most efficient unit in its system (and has the lowest emissions of CO₂ and conventional pollutants per megawatt hour of electricity produced), but it is utilized less than the coal units—even the two older coal units—because currently coal costs less per BTU than natural gas for CleanGen, and CleanGen (like other utilities) dispatches its cheapest units first.

Example 1: Retiring a coal-fired electric generating unit

With BFCs, it becomes economical for CleanGen to shut down one of its older coal units (“Old Coal 1”). CleanGen documents what its business-as usual (BAU) scenario would have been (i.e., without the BFC incentives) through production cost modeling that is used throughout the utility industry and for filings with CleanGen’s State Public Utility Commission (PUC). If it shuts down Old Coal 1, CleanGen will shift most of this displaced generation to its gas turbine and the remaining small portion to its other coal units.¹

CleanGen would be eligible to receive BFCs from Old Coal 1's retirement date (which CleanGen schedules for 2015) until the termination of the BFC program in 2025 (ten years later). Under BAU forecasts, OldCoal 1 would have produced approximately 750,000 megawatt hours (MWh) per year from 2015 through 2025. This baseline generation is multiplied by OldCoal 1's emission factor (measured in tons of CO₂/MWh) to form OldCoal 1's "Emission Baseline" for CO₂.

To determine the quantity of BFCs that CleanGen would receive, from shutting down OldCoal 1, the MWhrs forecast for this unit are allocated among its remaining units according to forecasting models, multiplied by the respective CO₂ emission factors of the receiving units, and the total represents the "Project Emissions." The difference between the Emission Baseline and the Project Emissions, measured in tons of CO₂, is the amount of the BFC allotment. Upon approval of those projections by EPA and appropriate milestones (e.g., the unit being retired), CleanGen receives its BFC allotment, which is deducted from the total available pool of BFCs.²

Example 2: Co-firing a coal generating unit with natural gas (fuel switch)

Under this scenario, CleanGen realizes that, with BFCs, it is cost-effective to co-fire one of its large, 500 megawatt, newer coal units with some natural gas. In a co-firing scenario, this unit's Emission Baseline would be calculated the same way as above, based on its projected generation over the BFC period and the unit's CO₂ emission rate based on its existing fuel use (e.g., coal).

In this second example, Project Emissions are calculated by multiplying this projected generation by the new, lower CO₂ emission rate based on using a combination of natural gas and coal. Again, the difference between the Emission Baseline and the Project Emissions, measured in tons of CO₂, is the amount of the BFCs allotted to this project. This difference relates to the different carbon intensity of coal versus natural gas. In this situation, the CleanGen unit's BAU projected CO₂ emissions are approximately 4 million tons per year (tpy) per year. Co-firing with 20% natural gas will reduce 400,000 tpy of CO₂. If allowances are valued at \$20, this may generate up to \$8 million per year worth of BFCs.

CleanGen may receive BFCs in advance of this project, to pay for the capital costs of the co-firing (which may include connecting to a gas transmission line, and retrofitting burners and other equipment), subject to appropriate milestones and commitments by CleanGen to ensure that the co-firing will occur. However, co-firing differs from the first scenario where an OldCoal unit is retired (e.g. rendered inoperable), as CleanGen may reduce the share of natural gas co-firing (e.g., from 20% to some lesser amount) as part of ongoing operations. Accordingly, EPA may reduce the share of BFCs that may be allocated in advance for a co-firing project. Additionally, EPA may require that projections of business-as-usual fuel use be updated annually, to reflect changing prices of coal, natural gas and competing generation, so that the BFCs are only allocated to incentivize a level of co-firing that is beyond business-as-usual. Ongoing data provided by CleanGen to EPA to show that the emission reductions from co-firing have occurred shall include data on utilization of the unit, natural gas fuel consumption data,

and emission factors. Following this demonstration on a year-by-year basis, EPA shall provide the held-back BFCs to CleanGen on a pro rata basis through the end of the BFC period.³

Example 3. Fuel switch at an industrial facility

A company called “BuildCo” has a large manufacturing facility that uses a coal-fired boiler to generate steam for process heating, to operate certain equipment and for facility heating. BuildCo could generate BFCs by switching to a natural gas-fired boiler. BuildCo’s Baseline Emissions are the CO₂ emissions that would occur each year under its projected BAU operations (using the coal-fired boiler) during the BFC period – say 100,000 tons per year, from 2015-2025 (ten years). Its Project Emissions using gas are about half that, approximately 50,000 tons per year, due to the differing carbon intensity of coal versus natural gas. Thus, BuildCo can obtain 50,000 BFCs per year for 10 years, or approximately 500,000 BFCs. At an allowance price of \$20 each, this would provide BuildCo \$10,000,000, which can help to finance BuildCo’s new boiler.

Ongoing data provided by BuildCo to EPA following the fuel switch shall include operational data such as natural gas fuel consumption data and emission factors, to show that the emission reductions that generated the BFCs have occurred. BuildCo, like CleanGen, can receive BFCs in advance of the project, subject to appropriate milestones, contractual commitments, and EPA holding back a share of the BFCs until the successful implementation of the project (and a repayment obligation by BuildCo if the project is not implemented as projected).

Example 4. New greenfield CHP plant

In this example, BuildCo plans to build a new manufacturing plant in CleanGen’s service territory. Under BAU, BuildCo would include, as part of the manufacturing facility, an oil-fired boiler to generate steam for process heating, equipment operation and facility heating. BuildCo would also purchase electricity for facility operations under BAU. However, the BFCs provide BuildCo an incentive to include, as part of the new facility, a gas-fired CHP plant that would generate both steam and electricity for facility operations. The Baseline Emissions include the BAU CO₂ emissions that would be generated by BuildCo’s BAU oil-fired boiler, plus the CO₂ generated by CleanGen in producing electricity that would be sold to BuildCo (which electricity is from a mixture of coal and gas-fired generation), from the new plant’s planned commencement of commercial operations through the remainder of the BFC period.

The Project Emissions are the tons of CO₂ generated by the gas-fired CHP facility over that same time period. BFCs again are awarded for the difference between the Baseline Emissions versus the Project Emissions. In this instance, BFCs are generated from CO₂ emission reductions in several ways, including: (1) the CHP’s electricity is solely gas-fired, which has a lower carbon intensity than the electricity supplied by CleanGen (which still has some coal in its generation mix), and (2) waste heat from producing electricity is used to generate steam, eliminating the need for a separate (oil-fired) boiler to generate steam and resulting in an overall more efficient use of energy.

Again, BFCs can be awarded in advance of the new plant being operational, subject to appropriate milestones, contractual commitments, hold-back, repayment obligation, and ongoing monitoring of the emission reductions once the project is operational.⁴

Other examples

The EPA should be authorized to award BFCs for additional project types consistent with the above principles and legislative language provided by Congress. For instance, EPA may allow BFCs to be awarded to incentivize: changes in dispatch from coal to gas-fired units within existing utility systems (e.g., CleanGen using its large coal units less and its gas turbine more); and the replacement of existing gas-fired units with larger and more efficient gas-fired units that increase gas utilization and reduce the carbon intensity of the grid.

Beyond that, EPA's rules should also promote BFC-eligible activities by residential, small industrial and commercial users of natural gas that are not themselves covered entities with a compliance obligation but receive natural gas from a local distribution company (LDC). LDCs should be allowed to "bundle" BFC-eligible projects undertaken by such smaller customers, make the application for BFCs on behalf of such customers, and (after allowing for administrative costs) compensate such customers either by distributing BFCs to them or providing a rate adjustment.

Endnotes

¹ Many utilities, like CleanGen, can shift generation from coal to gas-fired generating units because they have underutilized natural gas units. The average capacity factor for a combined cycle combustion turbine in the United States has been calculated at 42%. See <http://www.eia.doe.gov/cneaf/electricity/epa/epata6.html>. Capacity factors at the 20 largest coal-fired power plants (based on generation) in the United States have averaged approximately 82%. See <http://downloads.pennnet.com/pnet/surveys/elp/elpbinder.pdf>. Capacity factor is the ratio of the actual output of a power plant over its output if it had operated at full nameplate capacity the entire time.

² Under the first scenario (retirement of OldCo 1), retiring a power generation unit may require a utility to build new capacity sooner if customer demand for electricity is growing. Projections of such future needed generation during the BFC period would be determined by CleanGen (and approved by EPA and CleanGen's PUC) at the time CleanGen applies for BFCs. If new capacity is projected to be needed within the BFC period (before 2025), the MWh generation required due to the unit retirement, times the carbon intensity of the new generation source (including any power purchases from third parties), would be deducted from the BFCs awarded for the retirement. If the replacement power is wind, solar, or nuclear, no BFCs would be deducted. The initial BFC allotment to CleanGen for retiring its unit would only be recouped if CleanGen builds new generation or purchases power, inconsistent with its projections at the time of it applying for the BFC credits, that is more carbon-intensive than natural gas. This recoupment would be due and payable on the startup or purchase of that new power. In all scenarios, emissions calculations are based on the on-site emissions (e.g., on-site combustion of coal, natural gas or other fuels), and "upstream" sources of emissions such as the exploration, production, and transport of fuels (including coal, natural gas and other fuels) are not considered because they are better addressed through other regulatory mechanisms.

³ The second scenario (where a coal unit is co-fired with natural gas) is based on a 500mw unit with a capacity factor of 82% (per the above, the average capacity factor of the 20 largest coal generators). This scenario assumes that the projected generation of the unit is the same before and after the change. To avoid triggering air permit reviews under existing provisions of the Clean Air Act, including the Prevention of Significant Deterioration (PSD) review, it is expected that retrofits to allow co-firing would occur at larger, newer coal plants that already have installed Best Available Control Technology (BACT) and already have high-levels of utilization that are not likely to significantly increase. Additional legislative clarifications on the treatment of BFC-eligible projects under existing Clean Air Act regulations may be warranted. Indeed, if projected generation increases, a retrofitted unit may displace generation from remaining, less-efficient coal units (such as at CleanGen), thereby *reducing* CO₂ emissions. Accordingly EPA regulations, may wish to allow for BFCs to be further available for these additionally reduced emissions, and specifically exempt these retrofits from PSD and other air permit review.

⁴ If a CHP facility generates excess power that is sold back to the grid, it may generate additional BFCs if the electricity supplied by the grid is more carbon intensive (e.g., has a large share of coal-fired generation). In this case, before applying for BFCs, the CHP project developer confirms with the state PUC the expected future sources of power in the applicable electric service territory over the BFC period (and the relevant emissions rates), and uses this information to calculate the Emissions Baseline. The Project Emissions are CO₂ emissions produced in generating the electricity that the CHP sells to the grid. BFCs may then be obtained for the difference between the Baseline Emissions of electricity on the grid versus the Project Emissions of the cleaner electricity that the CHP sells to the grid. In the event the grid's electricity become less carbon intensive (e.g., a previously unplanned nuclear facility or substantially more

renewables are built than the state PUC projected), the CHP still gets to retain its BFCs as long as the developer built operated the CHP project as planned.