



NETL Life Cycle Inventory Data

Process Documentation File

Process Name: EXPC Plant CCS Retrofit, Construction
Reference Flow: 1 Pcs of EXPC CCS Infrastructure
Brief Description: Material inputs for retrofitting an existing pulverized coal (EXPC) power plant with carbon capture and sequestration (CCS)

Section I: Meta Data

Geographical Coverage: USA **Region:** Midwest
Year Data Best Represents: 2008
Process Type: Manufacturing Process (MP)
Process Scope: Gate-to-Gate Process (GG)
Allocation Applied: No
Completeness: Individual Relevant Flows Captured

Flows Aggregated in Data Set:

Process Energy Use Energy P&D Material P&D

Relevant Output Flows Included in Data Set:

Releases to Air: Greenhouse Gases Criteria Air Other

Releases to Water: Inorganic Organic Emissions Other

Water Usage: Water Consumption Water Demand (throughput)

Releases to Soil: Inorganic Releases Organic Releases Other

Tracked Input Flows:

Concrete, ready mix, R-5-0 [Valuable substances] *[Technosphere] Amount of concrete required to retrofit EXPC power plant with CCS*

Steel cold rolled (St) [Metals] *[Technosphere] Amount of steel required to retrofit EXPC power plant with CCS*

Stainless steel (cold rolled) [Metals]

[Technosphere] Amount of stainless steel required to retrofit EXPC power plant with CCS

Tracked Output Flows:

EXPC CCS Infrastructure [construction processes]

Reference flow

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *Stage-3-C-EXPC_CCS_Retrofit.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

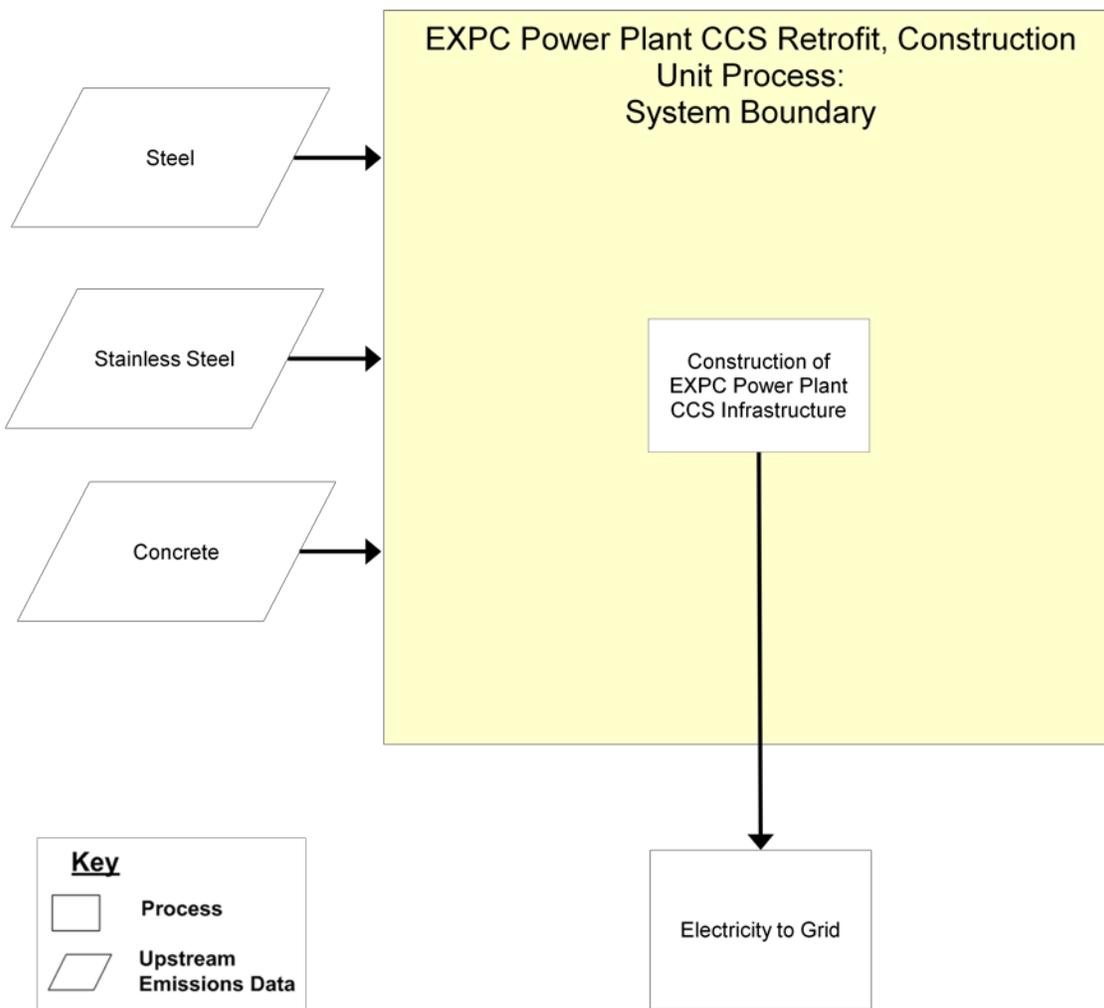
Goal and Scope

This unit process provides a summary of relevant input and output flows associated with retrofitting an existing coal pulverized coal (EXPC) power plant with a carbon absorber and stripper with auxiliary piping and support. Most notably excluded from this process are CO₂ compression and pipeline material requirements. The reference flow of this unit process is: 1 Pcs of EXPC CCS Infrastructure.

Boundary and Description

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the CCS retrofit are not included in this study. Upstream emissions from the production of raw materials used for the construction of the power plant (e.g., concrete) are calculated outside the boundary of this unit process, based on proprietary profiles available within the GaBi model.

Figure 1: Unit Process Scope and Boundary



Data for the construction of the CCS retrofit was taken from one study which listed the amounts of concrete, steel, and stainless steel (Koornneef et al., 2008). The amount of each construction material for carbon capture infrastructure given in the study was adjusted for the EXPC plant CO₂ flow (NETL, 2007).

Table 1: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Concrete, ready mix, R-5-0 [Valuable substances]	2,350.14	kg
Steel cold rolled (St) [Metals]	232,540.03	kg
Stainless steel (cold rolled) [Metals]	81,141.63	kg
Outputs		
EXPC CCS Infrastructure [construction processes]	1	Pcs.

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows.

Embedded Unit Processes

None.

References

- Koornneef, J., van Keulen, T., Faaij, A., & Turkenburg, W. (2008). Life cycle assessment of a pulverized coal power plant with post-combustion capture, transport and storage of CO₂. *International Journal of Greenhouse Gas Control*, 2(4), 448-467. doi: 10.1016/j.ijggc.2008.06.008
- NETL. (2007). *Carbon Dioxide Capture from Existing Coal-Fired Power Plants*. (DOE/NETL-401/110907). National Energy Technology Laboratory, from <http://www.netl.doe.gov/energy-analyses/pubs/CO2%20Retrofit%20From%20Existing%20Plants%20Revised%20November%202007.pdf>



Section III: Document Control Information

Date Created: September 20, 2012

Point of Contact: Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

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