

Business Case Analysis

Guidance and Expectations

Eric Grol

Federal Project Manager –Technology Development Center

Broad Agency Announcement 3605/ Notice of Funding
Opportunity 3606 Kickoff



U.S. DEPARTMENT of ENERGY

October 6, 2026



The U.S. Department of Energy is making an investment in the existing coal-fired generation fleet. What is the return on that investment? The business case analysis will answer that question.

That return on investment should be expressed in both technical (e.g. capacity/MW, capacity factor $\uparrow$, heat rate $\downarrow$, etc.) and economic (e.g. ROI, NPV, cost of electricity (\$/MWh)) terms.

Business Case Analysis (BCA) - Purpose



U.S. DEPARTMENT
of ENERGY



Broad Agency Announcement (BAA) 3605

- Modernize the plant, improve efficiency, reduce the cost of generation (see [IIJA §40103 \(c\)\(2/3\)](#))

(c) ENERGY IMPROVEMENT IN RURAL OR REMOTE AREAS.—

(1) **DEFINITION OF RURAL OR REMOTE AREA.**—In this subsection, the term “rural or remote area” means a city, town, or unincorporated area that has a population of not more than 10,000 inhabitants.

(2) **REQUIRED ACTIVITIES.**—The Secretary shall carry out activities to improve in rural or remote areas of the United States—

(A) the resilience, safety, reliability, and availability of energy; and

(B) environmental protection from adverse impacts of energy generation.

(3) **FEDERAL FINANCIAL ASSISTANCE.**—The Secretary, in consultation with the Secretary of the Interior, may provide Federal financial assistance to rural or remote areas for the purpose of—

(A) overall cost-effectiveness of energy generation, transmission, or distribution systems;

(B) siting or upgrading transmission and distribution lines;

(C) reducing greenhouse gas emissions from energy generation by rural or remote areas;

(D) providing or modernizing electric generation facilities;

(E) developing microgrids; and

(F) increasing energy efficiency.

Notice of Funding Opportunity (NOFO) 3606

- Increasing performance of coal/gas EGUs; reduce use and manage discharge of water in operations (see 42 U.S.C. 16292(b)(3)(A) and (C)(ii))

(b) Carbon capture technology program

(1) In general

The Secretary shall establish a carbon capture technology program for the development of transformational technologies that will significantly improve the efficiency, effectiveness, costs, emissions reductions, and environmental performance of coal and natural gas use, including in manufacturing and industrial facilities.

(3) Program goals and objectives

In consultation with the interested entities described in paragraph (6)(C), the Secretary shall develop goals and objectives for the program to be applied to the transformational technologies developed within the program, taking into consideration the following:

(A) Increasing the performance of coal electric generation facilities and natural gas electric generation facilities, including by—

(i) ensuring reliable, low-cost power from new and existing coal electric generation facilities and natural gas electric generation facilities;

(ii) achieving high conversion efficiencies;

(iii) addressing emissions of carbon dioxide and other air pollutants;

(iv) developing small-scale and modular technologies to support incremental capacity additions and load following generation, in addition to large-scale generation technologies;

(v) supporting dispatchable operations for new and existing applications of coal and natural gas generation; and

(vi) accelerating the development of technologies that have transformational energy conversion characteristics.

(C) Decreasing the non-carbon dioxide relevant environmental impacts of coal and natural gas production, including by—

(i) further reducing non-carbon dioxide air emissions; and

(ii) reducing the use, and managing the discharge, of water in power plant operations.

1. The BCA should quantify:

- i. Heat rate reduction (Btu/kWh)/return to baseline (design) efficiency
- ii. Improvement in the cost of generation (\$/MWh)
- iii. Any other relevant metrics as negotiated with your agreement officer/federal project manager (outage rate, availability, etc.)

2. Technical, narrative discussion of the projects conducted during award

- i. Equipment description, performance, vintage, redundancy, etc.

3. In order to show a net improvement, need to establish the starting point

4. BCA is not a static, one-off submission; it matures as engineering designs become physical installations and pre-outage estimates are replaced by verified test data

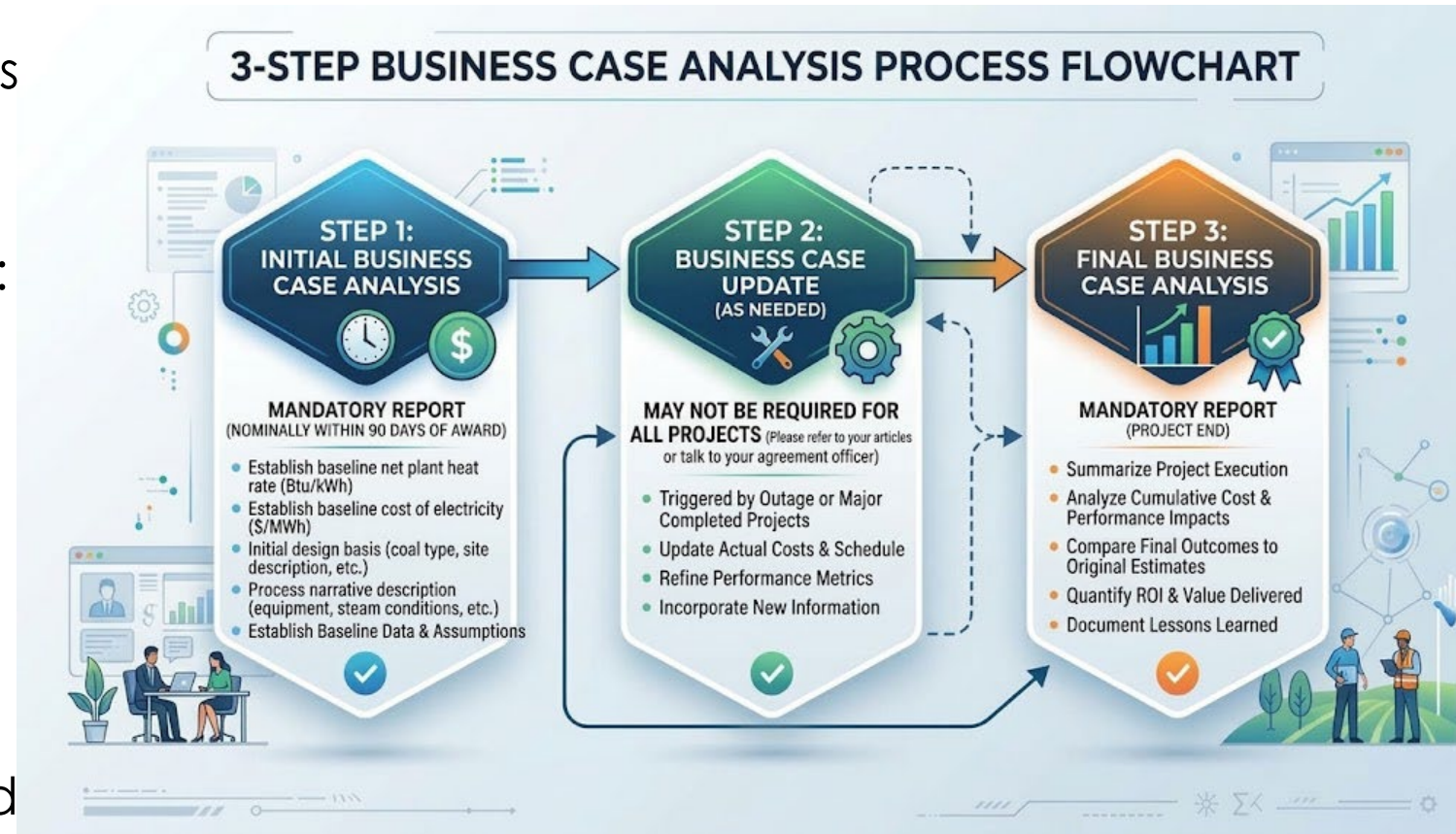
Business Case Analysis – Reporting Lifecycle



U.S. DEPARTMENT
of ENERGY



- Initial/Phase I BCA: Establish baseline plant data (cost/performance), economic assumptions, design basis (fuel costs, heating value, etc.)
- Milestone BCA updates (if needed): Submitted as major capital projects reach completion using actual procurement/installation costs, and validated, improved plant performance (Phase II/III of 3606 as needed)
- Final BCA: Synthesizes all completed subprojects into a cumulative, facility-wide performance and financial evaluation



Business Case Analysis – Technical Narrative and Baseline Design Basis



U.S. DEPARTMENT
of ENERGY



Establishing the baseline at the beginning of the project

1. Pre-project configuration (narrative/technical description):
 - i. Nameplate rating: Gross/net capacity (summer vs winter rating)
 - ii. Boiler design: Operating temperatures/pressures, vintage, OEM/manufacturer
 - iii. Turbine/generator sets: Stage configuration, vintage, operating hours, historical thermal fatigue
 - iv. Environmental controls (AQCS): Existing FGD, SCR, particulate controls, wastewater treatment, age, etc.
2. Fuel & Operational Baseline:
 - i. Coal source, rank, delivered heating value (Btu/lb), ash/moisture/sulfur content.
 - ii. Starting baseline heat rate (Btu/kWh), capacity factor, etc.
3. Documenting a clear pre-project baseline is critical to substantiating subsequent project benefits

Business Case Analysis – Subproject Technical and Operational Impacts



U.S. DEPARTMENT
of ENERGY



Updating the business case analysis as the project proceeds

1. As the project progresses, the business case analysis should be modified/expanded
2. Each individual project at your plant (e.g. boiler maintenance, turbine refurbish, etc.) should be its own section in the BCA. Required narrative elements should include:
 - i. Problem statement: Degraded conditions, thermal fatigue, mechanical failure risk, etc.
 - ii. Solution summary: Description of new hardware, materials, modernized geometries installed, etc.
3. Core impact metrics to report:
 - i. Capital expenditure: equipment procurement vs. installation labor costs
 - ii. Performance impact: Heat rate Δ (Btu/kWh), boiler efficiency, capacity increases (MW)
 - iii. O&M Impact: Reduced annual maintenance expense (\$/year or \$/MWh)
 - iv. Balance of plant effects: changes to auxiliary power load, cooling duty, water use, solid waste changes, etc.

Business Case Analysis – Economic Evaluation and Figures-of-Merit



U.S. DEPARTMENT
of **ENERGY**



1. Two economic figures-of-merit to include in your business case analysis:
 - i. Whatever you used in your application (NPV, ROI, payback period)
 - ii. Cost of electricity (\$/MWh) – please refer to reference document^A for how to calculate
2. Please document your economic assumptions (discount rate, weighted average cost of capital, capacity factor, etc.)
3. Consistency in financial metrics is encouraged: if your TEA used an 8% discount rate and evaluated NPV and IRR, maintain those same modeling parameters to enable clean apples-to-apples comparisons

A. [TECHNICAL REPORT TEMPLATE AND USER GUIDE](#), see section 3.4.1

Business Case Analysis – Sensitivity & Economic Risk Analysis



U.S. DEPARTMENT
of ENERGY



Sensitivity analysis = “What if” scenarios

1. Why Sensitivity Analysis? Real-world baseload generation economics depend heavily on evolving power market conditions
2. Key variables to stress test:
 - i. Fuel Cost Volatility: Evaluate financial return against projected shifts in coal price ($\pm 15 - 25\%$)
 - ii. Capacity Factor / Dispatch Profiles: Model high vs. moderate vs. peaking/cycling operating regimes
 - iii. CapEx Variance: Assess project financial returns against actual realized installation and procurement costs
3. Value to the Plant: Demonstrates that the efficiency and reliability gains protect project economics even under shifting power market and fuel price environments

Business Case Analysis – Final Cumulative Analysis and Review



U.S. DEPARTMENT
of **ENERGY**



1. Final business case analysis:
 - i. Consolidated capital expenditure: Total equipment & total labor across all outages
 - ii. Plant-wide cumulative heat rate reduction (Btu/kWh)
 - iii. Total impact on criteria pollutant emissions (tons/year or lb/MWh)
 - iv. Final economic analysis^A (NPV, IRR, etc.) and cost of electricity \$/MWh
2. Narrative description of changes made to the plant, cumulative equipment descriptions, etc^B.
3. BCA reports will be reviewed by project managers and NETL's analysis team – recipients should expect to receive clarifying questions

A. Recipients are encouraged to adopt the same economic analysis approach taken in their application TEAs

B. If BCA is updated as maintenance are completed throughout the life of the award, this can be used in the final BCA

1. The business case analysis is a final project deliverable and ties all milestone work together to show that the capital invested delivered the expected performance improvements and economic returns
2. The initial BCA establishes a baseline of plant configuration and performance. As the award progresses and plant maintenance is completed, the BCA is expanded to incorporate a description of the maintenance projects, costs, and validated performance improvements
3. Support is available – if you have questions, please discuss with your federal project manager. NETL's analysis team will also be involved and can answer questions

Questions & Discussion

www.NETL.DOE.gov



@NETL_DOE



@NETL_DOE



@NationalEnergyTechnologyLaboratory

CONTACT:

Eric Grol

Eric.grol@netl.doe.gov

