

Life Cycle Analysis

www.netl.doe.gov/energy-analyses/

United States Department of Energy

National Energy Technology Laboratory
626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236

www.netl.doe.gov

Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185

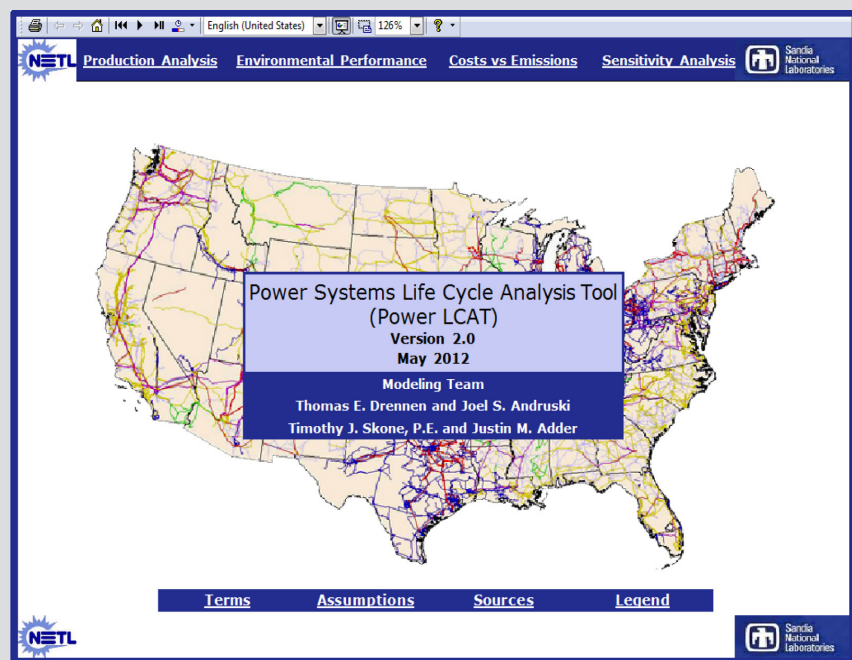
www.sandia.gov

Novel Power Systems Life Cycle Analysis Tool Enables Quicker, More Versatile Analysis of Energy Production Technologies

The Power Systems Life Cycle Analysis Tool (Power LCAT) is a high-level dynamic model that calculates production costs and tracks environmental performance for a range of electricity generation technologies: natural gas combined cycle, integrated gasification combined cycle, supercritical pulverized coal, existing pulverized coal, nuclear, and wind (with and without backup power). All of the fossil fuel technologies also include the option of carbon capture and sequestration technologies.

The technology options are based on detailed life cycle analysis reports conducted by the National Energy Technology Laboratory (NETL). For each of these technologies, NETL's detailed life cycle analyses include consideration of five stages associated with energy production: raw material acquisition, raw material transport, energy conversion facility, product transportation, and end-user electricity consumption.

Power LCAT is targeted at helping policy makers, students, and interested stakeholders understand the economic and environmental tradeoffs associated with various electricity production options.



This novel tool, developed by NETL and Sandia National Laboratories, allows quicker, more versatile analysis of energy production technologies.

Life Cycle Analysis

www.netl.doe.gov/energy-analyses/

Contacts:

Justin M. Adder

Economist
Office of Strategic Energy Analysis & Planning
National Energy Technology Laboratory
626 Cochran Mill Road
Pittsburgh, PA 15236
412-386-7309
justin.adder@netl.doe.gov

Timothy J. Skone, P.E.

Lead Physical Engineer
Office of Strategic Energy Analysis & Planning
National Energy Technology Laboratory
626 Cochran Mill Road
Pittsburgh, PA 15236
412-386-4495
timothy.skone@netl.doe.gov

Dr. Thomas E. Drennen

Senior Economist
Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185
315-781-3419
drennen@hws.edu



National Energy
Technology Laboratory

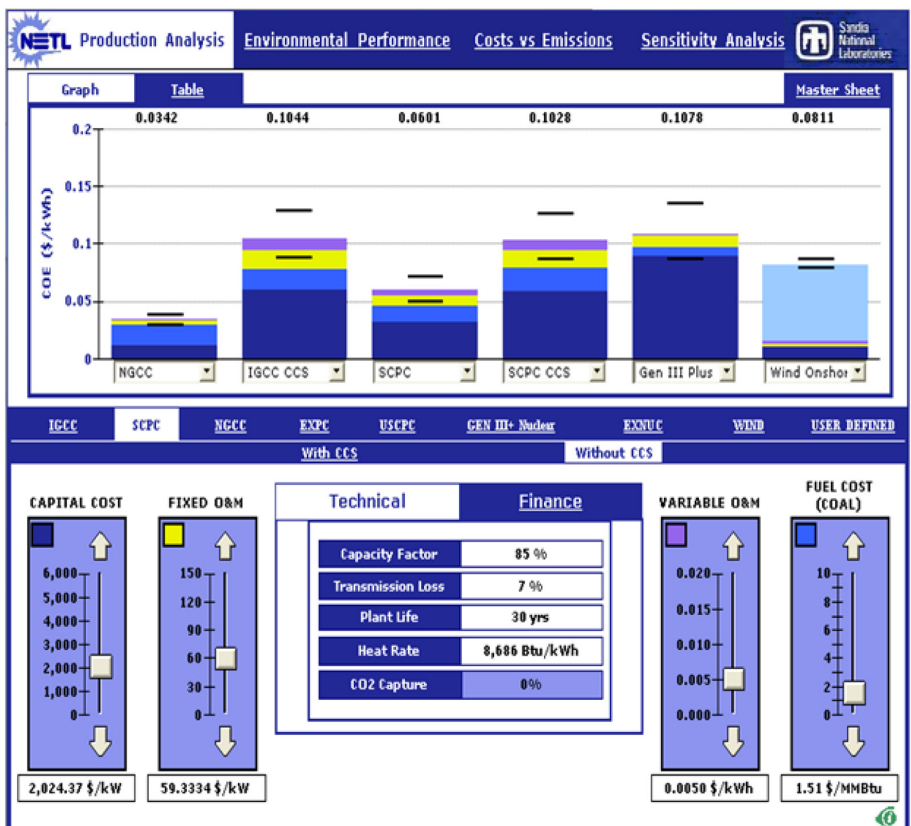
Sandia National
Laboratories

Power LCAT has four main sections that allow for quick sensitivity analysis on key technical and financial assumptions, including capital, operations and maintenance, and fuel costs; interest rates; construction time; heat rates; taxes; depreciation; and capacity factors.

- The Production Analysis section calculates the cost of electricity (in dollars per kilowatt hour) for each technology option and allows users to explore key sensitivities.
- The Environmental Performance section estimates aggregate greenhouse gas and non-greenhouse gas emissions, as well as water usage at each stage of the life cycle analysis.
- The Costs vs. Emissions section explores the tradeoffs between costs (in dollars per kilowatt hour) and greenhouse gas emissions (in kilograms of CO₂e per megawatt hour).
- The Sensitivity Analysis section offers simultaneous variations of several assumptions—such as capital costs, operations and fuel costs, interest rates, efficiency, and capacity factors—and provides graphical representation of the results.

An accompanying technical guide provides a general overview of the model's operation and initial results based on the model's default assumptions. The technical guide explains the basic methodology used to calculate production costs and to estimate environmental performance, in addition to demonstrating the wide range of options for conducting sensitivity analysis.

Power LCAT and the accompanying technical guide are available for download on NETL's website under Energy Analysis.



Power LCAT can estimate production costs based on key uncertainties for a range of electricity production technologies.