

**NEW &
IMPROVED!**



Decision tools to reduce energy costs by 20%

The Green Energy Life Cycle Assessment Tool – GELCAT (OWSO6R07c)

The Carbon Heat Energy Assessment Plant Evaluation Tool – CHEApet (OWSO4R07cT)

The Life Cycle Assessment Manager for Energy Recovery – LCAMER v2.0 (OWSO4R07T)

The Central Issue

Energy costs are second only to labor expenses at wastewater treatment plants. Subscribers needed tools to 1) evaluate alternative renewable energy technologies, 2) model treatment plant configurations for energy savings and carbon footprint, and 3) assess technologies that utilize biogas for their energy generating capability and economic viability.

Context and Background

Lowering energy costs and reducing carbon footprints are two main reasons for this research. Technologies that recover power from green resources, such as wind and solar, are among the potentially attractive solutions to augment the energy needs of wastewater treatment.

Findings and Conclusions

Three web-based or spreadsheet-based analytical tools designed to assist wastewater treatment facilities make energy-related decisions that can reduce energy costs by 20% are now available:

- Green Energy Life Cycle Assessment Tool (GELCAT)
- Carbon Heat Energy Assessment Plant Evaluation Tool (CHEApet)
- Life Cycle Assessment Manager for Energy Recovery v2.0 (LCAMER)

These tools will help facilities reduce or recover energy and improve overall operations.

GELCAT

Evaluating the effectiveness or suitability of solar, wind, or hydro power generation technologies at specific sites requires information on resource characteristics, associated technology cost and performance, and information about plant energy requirements and operating costs. GELCAT provides a spreadsheet-based screening assessment for solar photovoltaic, wind turbine generators, and

Staff at the F. Wayne Hill Water Resources Center in Georgia, used the LCAMER tool to confirm that the internal combustion engine alternative had the lowest capital cost (including replacement cost) and offered the quickest payback compared to other cogeneration alternatives.

hydro turbine generators which can provide electricity at wastewater treatment plants. The tool provides information on the electricity generated, operating cost savings, greenhouse gas reductions, and life cycle costs. The costs, including the payback time, for each of these alternative energy sources are highly dependent on the currently available tax incentives. (OWSO6R07c)

CHEApet

This web-based plant-wide energy model considers calorific, electric, thermal energy including power recovered biogas, and greenhouse gas emissions. CHEApet quantifies plant operating energy requirements and predicts the carbon footprint from wastewater treatment plants operated under an array of common process configurations. Facilities that utilize CHEApet to optimize energy consumption should be able to realize at least 20% energy cost savings, as well as reduce their environmental impact. (OWSO4R07cT)

LCAMER v2.0

First released in 2007, the Life Cycle Assessment Manager for Energy Recovery (LCAMER) is a spreadsheet-based tool which enables wastewater treatment plant owners and engineers to make informed decisions on the feasibility of recovering energy (as biogas) from anaerobic digestion of wastewater solids. It has been updated to interact with newer versions of Excel, and now provides information on Stirling engines and fuel cells. (OWSO4R07T)

Management and Policy Implications

These tools will help subscribers make informed decisions that save money by reducing energy demand and increasing the recovery of renewable energy.

Executive Summary



The Green Energy Life Cycle Assessment Tool – GELCAT
The Carbon Heat Energy Assessment Plant Evaluation Tool – CHEApet
The Life Cycle Assessment Manager for Energy Recovery – LCAMER

Related WERF Research	
Project Title	Research Focus
Decision Support System for Sustainable Energy Management (OWSO7C07)	Helps water utilities make better and more sustainable energy management decisions. The tool provides an orderly way for a utility to evaluate its present situation and potential options to reach its energy management goals in the most cost-efficient manner.
Combined Heat and Power System Evaluation Tool (CHP-SET) (U2R08b)	This spreadsheet-based calculator evaluates combined heat and power (CHP) system performance. It is intended for use by facilities already operating CHP systems. CHP-SET calculates total system efficiencies, inclusive of appurtenant equipment electrical demands, to produce electricity and collect heat. The tool also provides conversion of exhaust emissions (NO _x , CH ₄ , CO ₂ , CO, and N ₂ O) into units of mass per unit of net energy output.
Site Demonstration of the Life Cycle Assessment Manager for Energy Recovery Tool (OWSO4R07f)	Presents two case studies on the application of the Life Cycle Assessment Manager for Energy Recovery (LCAMER) developed by WERF for the purpose of onsite energy recovery using biogas. The observations, comments, and suggestions from the case studies were the basis for updating LCAMER in version 2.
Demonstration of the Carbon Heat Energy Assessment Plant Evaluation Tool (OWSO4R07g)	Presents three demonstrations of the application of the Carbon Heat Energy Assessment Plant Evaluation Tool (CHEApet) to reduce costs by 20% while still achieving treatment goals.

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