



Life-Cycle Expertise

Life-Cycle Carbon Management Services



- **Screening analyses** to identify potential life-cycle benefits or threats to companies for new and existing products or service offerings.
- **Comprehensive life-cycle analysis** to support external communication and claims of environmental performance.
- **Decision-making tools** that provide a streamlined LCA approach to GHG emissions and energy consumption resulting from the production and waste management of dozens of materials.
- **Benchmarking** life-cycle studies to measure true performance improvements over time.
- **Innovation assurance assessments** to direct product development initiatives on such issues as material selection, carbon intensity, and energy efficiency.
- **Life-cycle communication** consulting to understand key stakeholder issues and effectively communicate your position and mitigation efforts.
- **Third-party verification** of life-cycle data and external claims based on comprehensive LCAs performed by your company.

In public and private sectors, both internationally and domestically, life-cycle assessment (LCA) has emerged as the comprehensive method for determining true environmental, health, and safety benefits and impacts of competing options. LCA is an analytical tool that enables decision makers to evaluate the full spectrum of concerns for materials, products, processes, or systems over time and space. Analysis from a system perspective is the essential element of LCA that sets it apart from all other environmental decision-making methodologies. With LCA, the energy, material use, environmental releases from resource extraction to product manufacturing, consumption, and end-of-life can be quantified, the impacts assessed, and the options to reduce those impacts evaluated.

The use of LCA as a tool that informs carbon management strategies is growing, particularly with increased attention to reducing greenhouse gas (GHG) emissions throughout the supply chain. LCA can provide regulators, businesses, product designers, manufacturers, waste managers, and others with the knowledge they need to make informed decisions to reduce their overall carbon and environmental footprint.

Our Capabilities

ICF International can integrate this complex and powerful tool into your existing decision-making framework or carbon management strategy. ICF combines decades of experience working on various aspects of climate change with solutions for evaluating life-cycle-related impacts. Our team includes staff with extensive life-cycle inventory (LCI) experience, particularly as it relates to material choices, energy use, transportation, emerging technologies, and the impact of waste disposal decisions on GHG emissions and energy consumption.

We can help on a range of levels—from bringing life-cycle thinking into your operations to analyzing LCI data to conducting comprehensive LCAs. We provide expert services and advice on the assessment of materials, products, processes, facilities, and even the life-cycle impacts of the services that you may provide.

We combine methodological scientific rigor with industry-specific expertise. We explore the synergies between our staff with expertise in LCA tools and methodologies and other industry experts within the company. ICF has over 3,000 employees worldwide, and our technical expertise in products, processes, and services covers a wide range of industries: electric power, oil and gas, construction, manufacturing, transportation (including conventional and alternative fuels), and waste management.

ICF's approach is unique from our competitors because we have nearly 20 years of experience with carbon accounting and carbon markets. We apply this understanding to structure life-cycle analyses and review life-cycle impacts for the benefit of our clients. Finally, we understand how to communicate our findings in a way that is policy and stakeholder relevant.

Featured Solutions

[Comparative life-cycle analysis of Brazilian sugarcane ethanol and North American ethanol.](#) ICF conducted a study for the Canadian Renewable Fuels Association that sought to understand the environmental characteristics and, in particular, the

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Featured Solutions, cont.

emissions of GHGs of ethanol produced in North America and Brazil on a life-cycle basis. ICF performed a life-cycle comparison of the global warming potential and net energy balance between imported Brazilian sugarcane ethanol and North American ethanol (from corn, cellulosic, and wheat), including both production and distribution.

Life-cycle GHG emission factor development to inform materials management decisions. Since 1993, ICF has provided analytical support for the U.S. Environmental Protection Agency's (EPA) Climate Change and Waste program, which seeks to reduce GHG emissions by stimulating source reduction, recycling, composting, and energy recovery. For this program, ICF develops and applies life-cycle emission factors to quantify the GHG impacts of alternative waste management practices for a broad range of material types. These factors populate the Waste Reduction Model (WARM), Recycled Content (ReCon) Tool, and the Durable Goods Calculator (DGC), available online at www.epa.gov/climatechange/wycd/waste/tools.html. ICF's emission factors are widely recognized as the leading analytical tool for assessing life-cycle GHG impacts of waste management practices and have been applied in both the public and private sectors (e.g., Wal-Mart Sustainability Scorecard).

Supporting the re-development of material assessment tool for packaging designers. ICF is supporting the GreenBlue Institute in its efforts to update and expand the capabilities of the MERGE™ tool, now known as COMPASS (Comparative Packaging Assessment), that evaluates the sustainability characteristics (e.g., resource intensity, energy use, GHG emissions, recyclability) of basic packaging materials and components. This tool will inform design practices by Sustainable Packaging Coalition members. ICF is reviewing, analyzing, and verifying data received from industry and supporting GreenBlue in integrating these new data into the updated tool.

LCI/risk assessment for pollution control project. For a manufacturer of chemical products, ICF conducted an integrated environmental assessment of two alternative approaches to a remediation/pollution control project. The work involved the use of LCI, risk assessment methodology, and formal decision analysis. The result was a rigorous, comprehensive approach to environmental, health, and safety, and business decision-making. The LCI/risk

assessment provided the client with a holistic and objective view of resource use, waste production, and the associated risks in both quantitative and qualitative terms.

GHG emissions and sinks inventories. ICF has supported the EPA in the development of every annual *Inventory of U.S. Greenhouse Gas Emissions and Sinks* since 1992. ICF also has prepared emission inventories for Australia, Canada, over 50 developing countries, and for dozens of multinational companies; prepared or reviewed over 40 state GHG emission inventories; and developed tools, guidance, and protocols for GHG accounting at the national, state, regional, local, park, school, facility, and office scales. For the U.S. Inventory, ICF prepares emissions estimates for the majority of energy, industrial process, solvent and other production, agriculture, and land use, land-use change, and forestry sources.

Wells to wheels assessment of GHG emissions. For Shell Canada, ICF conducted a study comparing the life-cycle carbon footprint of Alberta oil sands to that of other marker crude oils likely to be displaced by oil sands in the U.S. Midwest. The study produced baseline information for setting GHG performance goals with respect to expanded oil sands operations. The CO₂e life-cycle footprints derived in this study included production, transportation, refining and end-use emissions. For each CO₂e estimate, ICF conducted a first-principles engineering study to size pumps, pipelines, and other equipment and quantified power usage, fuel requirements, and GHG emissions for displaced crude oils, from reservoir, through transport and refining, to end-use fuels.

LCI of freight transportation in the United States. ICF staff conducted an LCI of air emissions associated with the transportation of goods by road, rail, and air in the U.S. This study included the manufacturing, use, maintenance, and end-of-life phases of vehicles, construction, operation, maintenance, and end-of-life of transportation infrastructure, as well as oil exploration, refining, and fuel distribution. The results were published in the *International Journal of Life Cycle Assessment* (2006) and *Environment Science & Technology* (2007). Subsequently, this research generated the emission factors in ShipGreen™, an online tool that calculates carbon offsets for product life-cycle shipping.

About ICF International

ICF International (NASDAQ: ICFI) partners with government and commercial clients to deliver consulting services and technology solutions in the energy, environment, transportation, social programs, defense, and homeland security markets. The firm combines passion for its work with industry expertise and innovative analytics to produce compelling results throughout the entire program life cycle, from analysis and design through implementation and improvement. Since 1969, ICF has been serving government at all levels, major corporations, and multilateral institutions. More than 3,000 employees serve these clients worldwide. ICF's Web site is www.icfi.com.

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