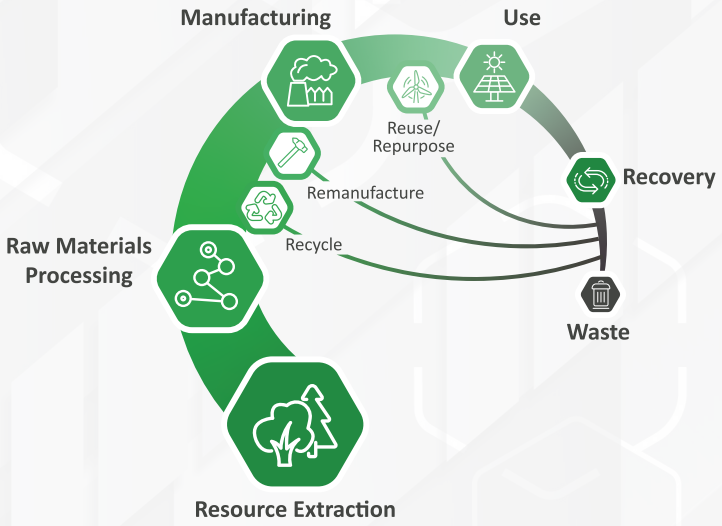
LIFE CYCLE ASSESSMENT SERVICES FOR THE FERTILIZERS INDUSTRY

BACKGROUND

Life Cycle Assessment (LCA) is a scientific approach used to quantify the environmental impacts of a product, service, or process over its entire life cycle.

By analyzing the full life cycle—from raw material extraction to disposal—organizations can better understand their environmental impacts (e.g., air emissions, energy use, water consumption, and resource depletion).

LCAs enable organizations to make informed sustainability decisions, improve efficiencies, and meet regulatory and stakeholder expectations.



SOLUTIONS FOR A LOW-CARBON FUTURE

AmSpec provides comprehensive LCA and third-party verification services that:

- **Empower** informed decisions in product management across the value chain, from feedstock procurement to product end use
- **Support** decarbonization projects, innovation, and applications for various incentives
- **Ensure** compliance with environmental, social, and governance (ESG) and low carbon regulations and transactional requirements
- **Enhance** public disclosure and communications on climate change, energy transition, and carbon reduction strategies

OUR EXPERIENCE SPANS THE FULL LIFE CYCLE

- ✓ Raw materials sourcing
- ✓ Ammonia production
  - Steam methane reforming (SMR)
  - Autothermal reforming (ATR)
  - Gasification
- ✓ Carbon capture, utilization, and storage (CCUS)
- ✓ Product transportation
- ✓ Product end use in various sectors (e.g., agriculture, chemicals, fuel)

BENEFITS OF LCA FOR FERTILIZER INCLUDE

- ✓ Apply for IRS 45Q tax credits
- ✓ Comply with EU Carbon Border Adjustment Mechanism (CBAM)
- ✓ Respond to customer requests
- ✓ Certify products as low-carbon
  - TFI's Verified Ammonia Carbon Intensity (VACI) certification
  - Environmental Product Declaration (EPD)
- ✓ Inform R&D efforts
  - Competitor benchmarking
  - Hotspot analysis
  - Decarbonization strategy support

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PAST PROJECTS

- ISO 14067 compliant product carbon footprint of hydrogen produced from methane pyrolysis; support for qualification for 45V clean hydrogen production tax credits
- Streamlined LCA of a novel waste-to-energy hydrogen production process to inform technology research and development through hotspot identification and benchmarking
- Carbon intensity analysis of hydrogen from autothermal reforming of fossil natural gas combined with carbon capture technology to produce methanol
- Third-party critical review of LCA of hydrogen production following the ISO 14071 standard
- Carbon intensity analysis of hydrogen produced from biomass gasification; support for qualification under the US Renewable Fuel Standard (RFS) program
- 45Q compliant LCA of nitrogen fertilizer produced with onsite carbon capture technology; facilitation of engagement with DOE
- Cradle-to-gate carbon intensity analysis of ammonia produced from steam methane reforming of various natural gas feedstocks following the OGMP 2.0 Framework

Gillian Dagan, PhD, MBA

EVP, Business Assurance & Sustainability
Florida, USA

- 20+ years in testing, inspection, and certification
- Agriculture and food sciences background
- Experienced in developing sustainable competitive advantages for clients

Hong Jin, PhD

Business Development Manager
Texas, USA

- 20+ years in LCA
- 3 years in consulting, 13 years in oil and gas industry
- Chemical engineering background
- Lead verifier for CA LCFS and OR Clean Fuels Programs

Alena Raymond, PhD

Senior Principal LCA Practioner
California, USA

- 9+ years in LCA, GHG accounting, climate strategy
- 4 years in consulting
- Civil and environmental engineering background
- LCA experience in energy, chemical, manufacturing, and construction industries

Natalia Román, MSc

Carbon Footprint Specialist
Montevideo, Uruguay

- 10 years in carbon and water footprinting in agriculture and livestock industries
- Agricultural engineering and atmospheric science background
- Management of national, regional and farm level projects

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