

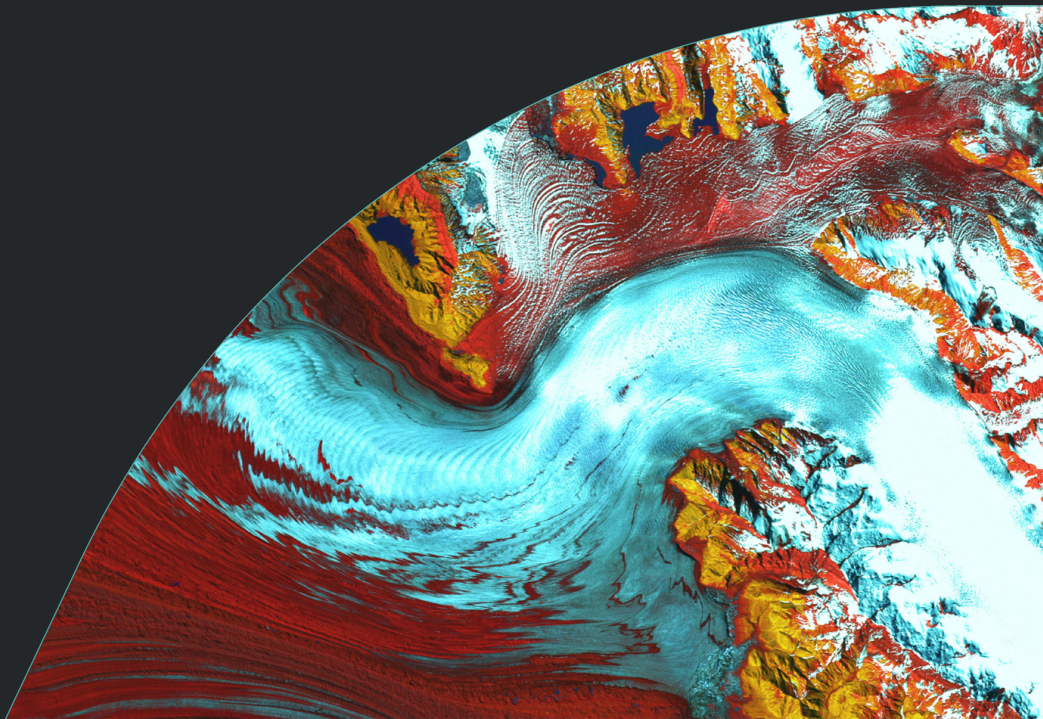


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Your Trusted Guide Through the Energy Transition

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EcoEngineers Overview of Services

EcoEngineers is a consulting, audit, and advisory firm with an exclusive focus on the energy transition. From innovation to impact, we help you navigate the disruption caused by carbon emissions and climate change.

We help you stay informed, measure emissions, make investment decisions, maintain compliance, and manage data through the lens of carbon accounting. Our team consists of engineers, scientists, auditors, consultants, and researchers with deep expertise on global fuels policy, energy and carbon markets, and alternative solutions to meet energy demands.

Eco was established in 2009 to steer low-carbon fuel producers through the complexities of emerging energy regulations in the United States. Today, our global team is shaping the response to climate change by advising businesses across the energy transition.

Together, we can create a world where clean energy fuels a healthy planet.

EcoUniversity – Stay Informed

The transition to a clean energy future requires a solid grasp of global policies, technologies, and carbon markets. EcoUniversity provides comprehensive training and information warehouse for the complex and ever-shifting world of the energy transition. There is no better way to stay informed and keep your team informed on the emerging paradigm of carbon and how it impacts your business.

Our portfolio of training and education modules empower you to make informed decisions and maintain control over your sustainability goals. EcoEngineers provides comprehensive training workshops that can be taken individually or bundled together. Our workshops, reports, and analyses are designed with you at the center - they are interactive with focused discussion of your specific goals and challenges. In an ever-evolving regulatory landscape, we provide you with the tools to navigate the energy transition and take control of the E in ESG.

Our expertise spans low-carbon and zero-emission fuels, emerging mitigation and carbon removal technologies, carbon markets and offset/inset strategies, policies and best practices for robust carbon markets, and carbon literacy and adaptation tactics.

A condensed board and management training module is also available to effectively evaluate the actual or potential material impacts of climate-related risks on a business they govern.

Interactive Workshops

Our interactive workshops have provided thousands of hours of education to leaders across all industries. They can be taken individually or bundled together for a broader training program. They are always interactive with time for open discussion of the specific goals and challenges you are facing. Topics range from high-level overviews of carbon markets, regulations, or abatement technology to information on specialized fuel or industry-specific parameters or compliance.

Market Outlooks

EcoUniversity also provides market outlooks and insights that guide policy and inform investments. Our experts help you understand carbon markets and stay on top of changing market dynamics by staying current on emerging regulatory drivers and supply-demand shifts. Our outlooks explain ongoing market dynamics and risk scenarios that inform critical boardroom decisions.

Carbon Literacy

A guiding principle for our advisory work is our belief that businesses who want to do the right thing and take control of their ESG journey have healthier operations and are more competitive over the long term. Emerging climate regulations and carbon markets and subsidies and tax credits that assist decarbonization are creating enormous opportunities to support this. The key to success for those who embark on this journey is understanding the language of carbon accounting and carbon markets.

We have created a comprehensive Carbon Literacy program to help you understand and adapt to evolving climate change issues and develop strategies to navigate and even benefit from this disruption. Our modular, customizable program will help prepare you and your team to set communicable and measurable goals for your company, and strategies to achieve them based on the science and emerging climate policies and markets. You'll become conversant with concepts such as physical, transitional, and regulatory risks, carbon market offsetting and insetting and how to use them, with the ultimate goal of helping you optimize the value of emissions reductions.

EcoConsulting – Take Action

Adapting to the new energy paradigm requires action. For businesses, this means measuring emissions footprint, making the right investment decisions, and filing reports and managing data through the lens of carbon accounting.

The first step is measurement through a thorough life cycle analysis, or an LCA; then, investing in mitigation, adaptation, or new opportunities that help you achieve your sustainability targets; and finally managing data for accurate reporting to stakeholders. The common thread running through these is understanding carbon accounting and engaging with regulators as policies are written and interpreted to reduce emissions or incentivize reductions.

EcoConsulting has helped hundreds of businesses gain control of this journey by helping them incorporate the above practices in a systematic way. We understand that you know your business best, and we climb aboard your ship to help guide it through the energy transition without disrupting your core activities.

Asset Development - Stepping into the Future

A typical clean energy project development lifecycle includes identifying investment opportunities, conducting project feasibility and market studies, assessing project partners, securing financing, feedstock and offtake agreements, applying for incentive programs, and overseeing construction and commissioning. This is a complex process and requires a solid foundational knowledge of relevant regulations, energy credit markets, commodity markets, feedstocks, and technologies.

EcoConsulting's Asset Development team provides that expertise on a variety of emerging project types - from carbon removals and sequestration or the new hydrogen economy to integrating electric vehicles (EVs) into your fleet or evaluating global markets for your fuel. We help you analyze, develop, and implement renewable energy and sustainability projects and carbon accounting frameworks to measure your results.

Our Asset Development team consists of engineers, market analysts and industry experts who can seamlessly complement your team's expertise across a variety of industries and project types. By providing a range of technical, financial, and regulatory expertise, we help clients achieve sustainability goals in a cost-effective and efficient manner.

We understand that you are the pioneers who are risking capital and reaching for a better tomorrow. Our role is to be your trusted advisor on this journey and guide with our technical knowledge, industry connections, and market intelligence.

Life-Cycle Analysis - The Praxis of Carbon Accounting

Clean energy regulations, investment opportunities in voluntary carbon markets, and incentive programs such as the U.S. Inflation Reduction Act (IRA) all have product Life-cycle Analysis (LCA) as their foundation. Therefore, in addition to measuring Scope 1, 2, 3 emissions, measuring product life-cycle carbon intensity (CI) of your inputs-outputs or a more comprehensive environmental product declaration of your inputs-outputs is one of the first steps in a successful transition to net-zero.

Life-cycle Analysis (LCA) is the praxis and application of carbon accounting. It is a systematic and comprehensive method for evaluating the environmental impact of a product, service, or system, from its inception to its end-of-life (cradle-to-grave). It assesses the environmental aspects and impacts throughout the entire life cycle of a product, including the extraction of raw materials, production, transportation, use, and disposal.

LCAs are used by regulators to create a performance-based standard for incentives or to identify compliance issues. LCAs are also increasingly popular for environmental product declarations or labeling a product's environmental footprint. EcoConsulting performs LCAs to support regulatory compliance and to inform decision-makers on priority areas to focus by identifying emissions hot spots associated with a product and their potential for improvement.

Eco's team of industry-renowned scientists, led by Dr. Zhichao Wang, has performed more than 500 carbon LCAs since 2015, on a variety of products including grains, oils, fuels, plastics, farm products, supplements, lubricants, metals, and more. Our team is fully adept at utilizing all available LCA tools such as the Argonne GREET model and its derivative CA-GREET, GHGenius, SimaPro, and OpenLCA. We advocate for establishing an international LCA standard and database for the global good.

Regulations that provide incentives to using low-carbon fuels based on an LCA:

- U.S. Renewable Fuel Standard (RFS)
- California Low Carbon Fuel Standard (LCFS)
- Oregon Clean Fuels Program (CFP)
- Canada Clean Fuel Regulations (CFR)
- British Columbia Low Carbon Fuel Standard (LCFS)
- EU Renewable Energy Directive (RED) and its implementing measures
- Brazil RenovaBio
- Emerging Voluntary Carbon Markets

Compliance - Responsible Data Management

Clean energy regulations are complicated, and the penalties are high for non-compliance or misreporting. Even when not regulated under a program or policy, penalties for making a “greenwashing” claim are steep. EcoConsulting’s compliance engagements range from registering a facility under a program, filing reports, or documenting credit purchase or sale transactions, to setting up measurement protocols, calculating and reporting carbon intensities, and ensuring mass balance. Our services span regulatory compliance and voluntary green claims.

Compliance

Our team is trained in carbon accounting frameworks and reporting structures unique to the regulatory compliance requirements of most major clean fuels and climate regulations across N. America and Europe. These include, the Inflation Reduction Act (IRA), the Renewable Fuel Standard (RFS), the California Low Carbon Fuel Standard (LCFS), the Canadian Clean Fuels Program (CFP), the European Renewable Energy Directive (RED), and others. We offer comprehensive compliance support, compliance management, and training programs that ensure strong data control and quality for reporting purposes. It is the insurance you need to protect your investment in a clean energy project.

Green Claims and Compliance

For non-regulated green claims or to report progress in addressing a climate-related risk to a business, it is critical to avoid misrepresenting your data and being accused of greenwashing. Greenwashing is making any misleading statement related to the progress made by a company in sustainability or the environmental benefits of a product.

Businesses are under pressure to be green and sustainable; they want quick results, and they may make a claim that cannot be backed up. When this happens, they can be called out for greenwashing - or worse, they may have lawsuits related to misrepresentation of their carbon footprint.

Our compliance team can identify material data sources that will pivot the results behind green claims and help you put in place protocols to monitor and report those results. A strong evidence-based data collection and reporting structure and staff trained in carbon accounting is the protection needed to prevent greenwashing claims.

Regulatory Engagement - Support for Your Strategic Projects

Policy is a product of stakeholder input; therefore, it is important to have your voice heard.

The urgency of acting against climate change has resulted in a myriad of policies trying to work together to reduce emissions. Sometimes they don't, and your operations suffer as a result. Keeping up with the bills filed in legislatures across the country or the globe is a daunting task, but it is necessary to understand risks and opportunities hidden in the emerging energy landscape.

Our Regulatory Engagement team, led by Lisa Hanke, conducts research and maintains a working relationship with fuel and climate regulators worldwide. The team stays current on key local, state, national, and international legislative, regulatory, and policy developments to help guide your regulatory strategy, to help you understand any emerging risks, and to assist you in determining your business or project's viability under new and overlapping regulatory regimes.

The carbon marketplace is a rapidly evolving sector, and actively engaging with emerging regulations and policy interpretations are vital when the investment is high, and the outcomes are unclear.

Eco provides strategic consulting across the entire spectrum of global regulations, including:

- U.S. Renewable Fuel Standard (RFS)
- California Low Carbon Fuel Standard (LCFS)
- Oregon Clean Fuels Program (CFP)
- Canada Clean Fuel Regulations (CFR)
- British Columbia Low Carbon Fuel Standard (LCFS)
- EU Renewable Energy Directive (RED) and its implementing measures
- Brazil RenovaBio
- Emerging Voluntary Carbon Markets

EcoEngineers can serve as your GHG Consultancy advisor or third-party GHG verifier but not act as both through either role.

EcoAuditing – Be Assured

Carbon reduction claims need third-party verification of carbon accounting to achieve pricing power, scale, and liquidity. EcoAuditing services ensure the integrity and accuracy of carbon declarations in the marketplace.

Our Audit plans incorporate rigorous, science based MRV (measurement, reporting, verification) protocols to account for every molecule of clean carbon used as fuel, in projects that claim tax credits or low-carbon fuel credits. We ensure compliance is fully met, so no

doubts exist on the validity of claiming public benefit. We assess and identify risks, methods of data collection and reporting, and the robustness of data management systems in place.

EcoEngineers' audit protocols are currently being reviewed by the American National Standards Institute (ANSI) to be accredited under International Organization for Standardization (ISO) as a Verification/Validation Body for greenhouse gas emissions (GHG) claims.

Many businesses are voluntarily moving towards net-zero goals. However, many lack guidance on which carbon accounting systems to use and how to get their claims verified. ISO accreditation will allow EcoEngineers to check carbon accounting where there isn't regulatory oversight. In an emerging market, it is vital to create this confidence in the marketplace that all GHG claims are properly vetted by a third party.

Our team understands the importance of protecting our clients' clean energy assets with accurate, data-driven measurement and confirmation. Our audit team has vast knowledge of new and evolving clean energy regulations and verification requirements.

We provide auditing services across a broad range of global regulations and voluntary markets, including:

- U.S. Renewable Fuel Standard (RFS)
- California Low Carbon Fuel Standard (LCFS)
- Oregon Clean Fuels Program (CFP)
- Canada Clean Fuel Regulations (CFR)
- British Columbia Low Carbon Fuel Standard (LCFS)
- EU Renewable Energy Directive (RED) and its implementing measures
- Brazil RenovaBio
- Emerging Voluntary Carbon Markets

Our EcoAuditing services include:

California Low Carbon Fuel Standard (LCFS) Validation/Verification: LCFS is a program implemented by the California Air Resources Board (CARB) to reduce the carbon intensity of fuels sold in California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits.

EcoAuditing provides LCFS validation/verification services, auditing renewable transportation fuels sold in California to comply with all requirements set forth by CARB. Our verification services are performed by qualified and trained verifiers that meet specifications for education and experience and demonstrate that there is no conflict of interest for verifying the reported

data due to current or previous relationships with the verification body (EcoEngineers). An independent third-party auditor or verifier is required to review the data and information submitted by the fuel supplier to ensure that it is accurate, complete, and is in compliance with LCFS requirements.

Renewable Fuel Standard (RFS) Quality Assurance Program (QAP) Services: Established by the United States Environmental Protection Agency (USEPA) to ensure the accuracy and reliability of the data used to demonstrate compliance with the RFS program, QAP is a federal policy aimed at increasing the production and use of renewable fuels, such as biofuels, to reduce the country's dependence on petroleum and to reduce greenhouse gas emissions.

The RFS QAP Q-RIN (Renewable Identification Number) audit process at EcoEngineers conforms with the RFS regulations and is offered to validate the Q-RINs generated by the renewable fuel producers comply with the RFS regulations. The value of active participation in our QAP is demonstrated through the assignment of a Q-RIN designation that we authorize. A Q-RIN signifies the integrity of those RINs to the producer's downstream partners and provides them with the assurance they seek.

EcoEngineers submit annually to the USEPA a General Plan and pathway specific protocols for approval. In addition, EcoEngineers also submit quarterly RFS Reports to the USEPA. EcoEngineers outlines standard operating procedures and templates for use to complete monthly review, bi-annual site audits and the quarterly desk audit report. The desk audit report is submitted to each producer. The report summarizes all items reviewed as well as a list of missing or insufficient data or documents. EcoEngineers provides an audit report to the facility on a quarterly basis and will report applicable audit results to USEPA as required.

The RFS QAP is an important component of the RFS program as it helps to ensure that the data used to demonstrate compliance with the RFS is accurate and reliable and helps to maintain the integrity of the program.

The Renewable Fuel Standard (RFS) Third-Party Engineering Reviews: We perform independent third-party reviews by engineers to assess the technical viability of a renewable fuel production facility and its production processes. The RFS Third-Party Engineering Review is typically performed as part of the compliance verification process for the RFS program.

We provide three different types of Third-Party Engineering Reviews:

1. New Facility Registration - the initial registration for a facility.
2. Three-Year Update - required by the EPA, facilities must update their registration information every three years after registration.

3. Addendums - After initial registration and before Three-Year Updates, any change to the facility that updates the facility registration, an addendum needs to be completed and submitted to the EPA.

The RFS Third-Party Review is an important component of the RFS program as it helps ensure that the renewable fuels being produced meet the requirements of the RFS program and are contributing to the reduction of greenhouse gas emissions.

EcoEngineers can serve as your GHG Consultancy advisor or third-party GHG verifier but not act as both through either role.

Carbon Expertise

EcoEngineers brings decades of experience with the complexities of carbon. This includes a broad range of carbon removal technologies, including carbon capture and sequestration, ocean technologies, and mineralization. We also have extensive experience across a wide range of carbon avoidance and displacement, through various biofuels including biogas and anaerobic digestion, ethanol from fermentation, fuels from gasification and pyrolysis, biodiesel and transesterification, and renewable diesel and hydrotreating. We are also working with leading companies displacing carbon through zero-emissions energy sources, including electricity and electrification of all things, and hydrogen as an energy source.

Voluntary Carbon Markets Strategic Consulting

Carbon markets play an important role in the energy transition. While some companies are required by state or federal regulations to manage their carbon footprints, there is a growing imperative among individuals, municipalities, and corporations to be carbon neutral or to monetize their carbon through voluntary carbon markets.

This exponentially growing world of voluntary carbon markets requires an understanding of carbon accounting, project finance, emission reduction forecasting, monitoring, reporting, verification, and the drivers for the ultimate retirement of credits. This expertise of multi-disciplinary teams is often not available in-house.

EcoEngineers helps companies navigate the quickly evolving carbon economy. Our goal is to propel organizations towards decarbonization by simplifying the market access process for projects that improve our climate.

Our team identifies, assesses, and develops projects in the voluntary and compliance carbon markets. We have experience across multiple industries - from innovative, international start-ups creating carbon-removal projects, to large-scale global energy companies developing projects to mitigate their carbon footprint or generate new streams of revenue.

We can help you reduce emissions and remove carbon in a plethora of diverse areas, such as bioenergy carbon capture and sequestration (BECCS), renewable energy, and rangeland management.

We carefully evaluate all projects to ensure they meet industry standards and establish pathways to voluntary markets. Using a creative and unbiased approach, EcoEngineers determines a project's viability and develops cutting-edge methodologies to ensure it benefits the environment.

EcoEngineers offers a comprehensive socio-environmental assessment to meet the highest standard of environmental, social, and governance (ESG), with complete Life-cycle Analysis (LCA), verification, and validation of low carbon fuel purchases, greenhouse gas (GHG) emissions inventories, carbon offset project claims, and measurement, reporting, and verification (MRV) protocols and audits according to International Organization for Standardization (ISO) requirements, GHG protocols, or carbon registry requirements.

Our services include:

- Strategic advisory services
- Climate risk and mitigation consulting
- Carbon literacy training
- Investment due diligence
- Feasibility studies
- GHG project development
- GHG project registration
- Methodology development
- White papers
- GHG accounting
- Offset purchase vetting

Carbon Markets

Carbon markets play an important role in the energy transition, and EcoEngineers identifies, assesses, and develops projects in the voluntary and compliance carbon markets across global regulations. We bring deep expertise across U.S. Renewable Fuel Standard (RFS), California Low Carbon Fuel Standard (LCFS), Oregon Clean Fuels Program (CFP), Canada's Clean Fuel

Regulations (CFR), Brazil RenovaBio, EU Renewable Energy Directive (RED) and its implementing measures. In the voluntary markets, we create methodologies for innovative carbon dioxide removal technologies, and bring science, creativity, and insights to develop rigorous removals protocols. From innovation to impact, we are the incubator for climate action.

Carbon Literacy

A guiding principle for our advisory work is our belief that businesses who want to do the right thing and take control of their ESG journey have healthier operations and are more competitive over the long term. The key to success for those who embark on this journey is understanding the language of carbon accounting and carbon markets. We have created a comprehensive Carbon Literacy training program to help you understand and adapt to evolving climate change issues and develop strategies to navigate and even benefit from this disruption. Our modular, customizable program will help prepare you and your team to set communicable and measurable goals for your company, and help you optimize the value of emissions reductions.

Carbon Accounting

Underlying a well-functioning carbon management program is a strong science-based carbon accounting framework allows projects to quantify the carbon reduction or removal in a product and state the reduction on a product label. EcoEngineers has helped develop and set up unbiased carbon accounting frameworks that account for carbon removals and avoidance relative to a baseline based on carbon intensity measurements. In addition to measuring carbon intensity (CI), our carbon accounting frameworks provide standards for project eligibility, additionality, permanence, and data monitoring, reporting and verification, so transacting and retiring serialized credits can occur per a prescribed methodology.

Carbon Removals

An effective decarbonization strategy to net zero must address avoidance methods, such as increasing renewable energy and biofuel use, improving energy efficiency, and avoiding deforestation, and carbon removal methods, such as afforestation, direct air capture, and sequestration. All global or country-specific net-zero scenarios require carbon removal - removing as much GHGs as we are putting into the atmosphere.

Carbon removals can be natural, including afforestation or natural mineralization, or technology driven methods such as direct air capture, injection into reservoirs, enhanced weathering. Carbon removal technologies are often new technologies, and they need new methodologies to ensure the highest level of scientific standard to prove that a verified volume

of CO₂ equivalent was removed permanently. Our team has the creativity, knowledge, and insights to perform a thorough review and develop rigorous removal protocols.

EcoEngineers' due diligence and science-based project evaluations is a powerful accelerator of innovation in the carbon market. Our scientists and engineers provide companies introducing new technologies the solid validation needed to attract financing and commercial offtake. We begin every new project with a scientific review of the project's ability to remove carbon from the atmosphere and then develop proper measurement, reporting, and verification (MRV) processes that meet strict carbon accounting standards. This allows the project to state its contribution to carbon reductions and the controls in place in a standard format for commercial acceptance.

EcoEngineers is working with some of the industry's leading companies on innovative project around the world, including:

- **Bioenergy Carbon Capture and Sequestration (BECCS):**
 - Ethanol
 - Woody biomass at pellet plant (sawmills, timber operations)
 - Forest waste biomass gasification to CCS

- **Carbon Removals:**
 - Biochar
 - Enhanced rock weathering
 - Macroalgae deep sea storage
 - Microbially enhanced inorganic soil carbon sequestration
 - Enhanced rock weathering
 - Biomass storage
 - Ocean alkalization
 - Ranchland soil carbon
 - Improved forest management

Carbon Capture and Sequestration

Carbon capture and sequestration (CCS) is expanding nationally under government programs and voluntary markets. Ethanol fermentation produces a pure stream of biogenic carbon dioxide that is inexpensive to capture because of its purity and concentration. The additional value created from the U.S. Federal Inflation Reduction Act (IRA) has made it economically possible to safely and permanently sequester this CO₂ in underground reservoirs. Ethanol facilities representing at least half the U.S. production and 25 million metric tons of carbon dioxide are actively investigating CCS. EcoEngineers can guide CCS projects through the

intricate regulatory, technical, and market requirements necessary for commercial success. We provide expert support from project concept to completion.

Carbon Avoidance

In addition to removing carbon from the atmosphere, there must be a robust effort to reduce and avoid emissions in the first place. After all, prevention is better than cure.

Avoidance projects can take many forms - using biofuels, increasing efficiencies of industrial processes, zero-emission vehicles, reduced consumption, reduced methane emissions from waste management, CO₂ re-utilization, efficient lighting, improved cookstoves, regenerative agriculture, solar power, etc. are all examples of avoidance.

Reduction and avoidance are the principal goals almost all low carbon fuel policies and incentive programs. These policies and programs rest on a foundation of solid measurement, reporting and verification (MRV) frameworks established by regulatory bodies or carbon registries. EcoEngineers can ensure the highest level of scientific standard to prove that a verified volume of CO₂ equivalent was avoided under all major programs.

Our experts begin every new project with a thorough review of the project's ability to qualify under the appropriate regulatory or registry MRV standards. We help the project state its contribution to carbon avoidance and put controls in place to maintain compliance. This is non-negotiable if a project wants to generate voluntary or compliance carbon credits.

EcoEngineers' due diligence and science-based project evaluations has helped hundreds of biofuel and other avoidance projects come to market and profitably sustain their operations. Sample projects include:

- Landfill gas destruction
- Livestock waste gas
- Vegetable canning waste gas
- Avoided deforestation
- Wildfire avoidance
- At-home composting
- High efficiency faucets
- Waste avoidance in apparel manufacturing
- Oil pipeline decarbonization
- Agriforestry
- Enteric fermentation inhibitor
- Low carbon steel

- Clean cookstoves
- Keeping food in the human food chain

Biofuels - Recycling Carbon

What is recycling carbon? Think of an aquifer below the ground that holds water; let's say you want to limit your dependence on it. You would try to use rainwater and other surface water as much as possible to meet your daily needs. If you can switch 100% of your water use to surface water, you will not draw any new water from the aquifer.

Recycling carbon is the same concept. By using carbon that is already on the earth's surface and the atmosphere, we are not extracting new sources of carbon from fossil fuels that have been buried in the ground for millions of years. Biofuels are made using organic matter on the earth's surface as feedstock. They reduce dependence on fossil sources of carbon buried in the ground.

Biogas and RNG - Waste Derived Fuels

Biogas and renewable natural gas (RNG) is renewable methane produced by the anaerobic action of methanogenic bacteria on organic matter. Biogas is raw RNG with impurities. RNG is purified biogas.

When organic matter such as animal manure or food waste is subject to the action of methanogenic bacteria in the absence of oxygen, the process releases biogas, which is a mixture of methane, carbon dioxide and small amounts of other compounds like hydrogen sulfide. When this biogas is captured and the non-methane compounds are removed, drop-in pipeline quality renewable methane can be produced which can be injected into a natural gas pipeline. These renewable molecules are completely fungible with fossil natural gas. The carbon in the renewable methane is recycled atmospheric carbon that was absorbed while producing the organic feedstock.

Biogas and RNG is a fuel source that recycles carbon in the atmosphere and reduces our dependence on fossil natural gas. To illustrate the point, if all the natural gas consumed was RNG, there would be no new carbon emission from fossil gas sources. The resulting Scope 1 emissions for entities burning RNG should be zero.

Common sources of biogas are landfills, municipal wastewater treatment facilities, and manure digesters. They are all effective waste management systems. To measure the full environmental benefit of biogas, we need to ask, "what would the GHG emissions of the baseline waste management process be in the absence of biogas production?"

The answer to this question varies by project type, since GHG emissions from manure management systems at animal feedlots vary from those at landfills, water treatment plants, or from food waste disposal. In some cases (e.g., landfills), legal or regulatory requirements to capture methane help establish the baseline waste management baseline. For other project types, the regulatory baseline is less clear.

RNG from biogas was authorized as a cellulosic feedstock by the USEPA in 2014, which qualified it for energy credits under the Renewable Fuel Standard (RFS). RNG is also a big player in California's Low Carbon Fuel Standard (LCFS). RNG incentivized project developers and owners to invest in projects destined for the natural gas pipeline system – and ultimately the transportation market as a low-carbon fuel.

Biogas and RNG are effective tools to reducing emissions from natural gas combustion – something that is very difficult to fully eliminate. A vast number of processes from industrial heating to plastics production depends on natural gas, and although small in size compared to the gas industry, RNG still has a big role to play.

Managing all the components and complexities of an RNG project can be a challenge. Each component must be carefully planned and coordinated to deliver a successful project, and EcoEngineers can help adapt your business to today's demands for decarbonization.

Ethanol from Fermentation

Since 2021, more than 40 ethanol plants in the Midwest have announced that they will utilize carbon capture and storage to become bioenergy with carbon capture and storage (BECCS) projects. BECCS is a key technology required to control emissions from fuel production and use. Currently, only around two metric tons of biogenic carbon dioxide are captured globally per year, relative to the 250-metric-ton removal required per year by 2030 for the Net Zero Emissions by 2050 Scenario. Ethanol plants in the Midwest have a tremendous opportunity to prove to the world that BECCS can be done. EcoEngineers is helping make this happen.

Our team of geologists, market analysts and engineers has deep knowledge of the ethanol industry and experience managing capital intensive projects. From helping with the technical aspects of subsurface gas storage to managing compliance and stacking carbon market credits with tax credits to achieve optimum economics, our work is critical to our ethanol clients as they take advantage of this opportunity.

Renewable Diesel and Hydrotreating

The first successful refining of crude oil happened in the mid 1800s, and since then, it has become one of the main drivers of the global economy – from vehicles and mobility to

refrigeration and fertilizer production or from plastics and steel production to fueling airline travel, petroleum refining has undeniably raised the standard of living across the world.

Today the global refining sector is perhaps a bit unfairly on the crosshairs of climate activism. Many major refiners and integrated oil and gas companies are pivoting to the new energy paradigm while simultaneously trying to respond to unabated global demand for their products.

EcoEngineers has helped petroleum companies measure the carbon footprint of oil and gas extraction and refining, integrate renewable feedstock to their crude mix, optimize their response to emerging energy policies, train compliance teams on carbon market reporting, and identify alternate investment opportunities in renewable natural gas, renewable diesel, bio-crude, etc. Refiners' ability to expand their businesses not only to incorporate renewable fuels but also to produce their own has been momentous in an economy thirsting for sustainable energy solutions.

There is no single solution for all facilities. Our team of consultants, auditors, scientists, and climate professionals will assess your organization, provide action plans for driving down your carbon impact, and help you monitor and adjust along your journey.

Electricity and Electrification of all Things

Fleet owners are caught between the conflicting pressures of demonstrating low emission from their fleet operations and managing fuel and equipment costs required to decarbonize their fleets. Furthermore, the speed of technology evolution creates uncertainties around infrastructure investments. Fleet owners have to interface with biofuel producers, power producers, auto manufacturers, charging networks, and local ordinances and incentives in order to plan for the future.

EcoEngineers offers comprehensive fleet decarbonization and charging infrastructure planning services. Our experience with clean fuel regulations, compliance, carbon markets, lifecycle analysis, and charging technologies makes us the right partner for fleet managers embarking on this journey.

From registering under the eRIN, LCFS, or voluntary programs or conducting economic analyses or identifying optimum locations and the right kind of charging ports, we can help you plan and execute on your zero-emissions mobility strategy.

Everyone wants to save money, reduce pollution, and have more efficient operations. EcoEngineers offers fleet assessment of the environmental impact of their current operations, and analysis of the environmental benefits and cost savings that transitioning their operations

would provide to the bottom line. We have a broad knowledge in EV, energy producers, and fueling infrastructure. We can offer the support needed to complete the project of EV support. In this capacity we have worked with NOPEC.

Profitable fleet decarbonization is possible. Carbon markets, incentive programs, and cost-sharing programs can help you begin your decarbonization journey.

The Hydrogen Economy

Hydrogen fuel has promise for hard-to-decarbonize sectors such as heavy-duty trucking, transit buses, and sectors such as steel, cement, and glass production and other industrial heat and power. Led by Tanya Peacock, EcoEngineers works with a spectrum of organizations across all industries that can benefit from clean hydrogen fuel.

Despite its promise, the main challenges in the way of its wide adoption is cost. That said, the cost of the production of hydrogen is falling. Many countries are developing hydrogen strategies that involve current or upcoming hydrogen production incentives. In the US, it is driven by the Inflation Reduction Act (IRA) that offers the clean hydrogen production tax credit (45v). The first step to check your eligibility under 45V is to conduct an LCA to determine if the hydrogen has a carbon intensity score of 4 kg CO₂e per kg of hydrogen or lower on a well-to-gate basis.

EcoEngineers can perform this LCA and help you maximize the value of the 45v tax credit and other relevant programs. We support hydrogen projects from conception to commissioning, including review of off-take agreements. After the project is up and running, we provide ongoing compliance management to make sure your revenue stream from carbon credits and incentives remains stable.

**For more information on our services, please visit
www.ecoengineers.us or contact us at
clientservices@ecoengineers.us.**