







# Renewable Natural Gas

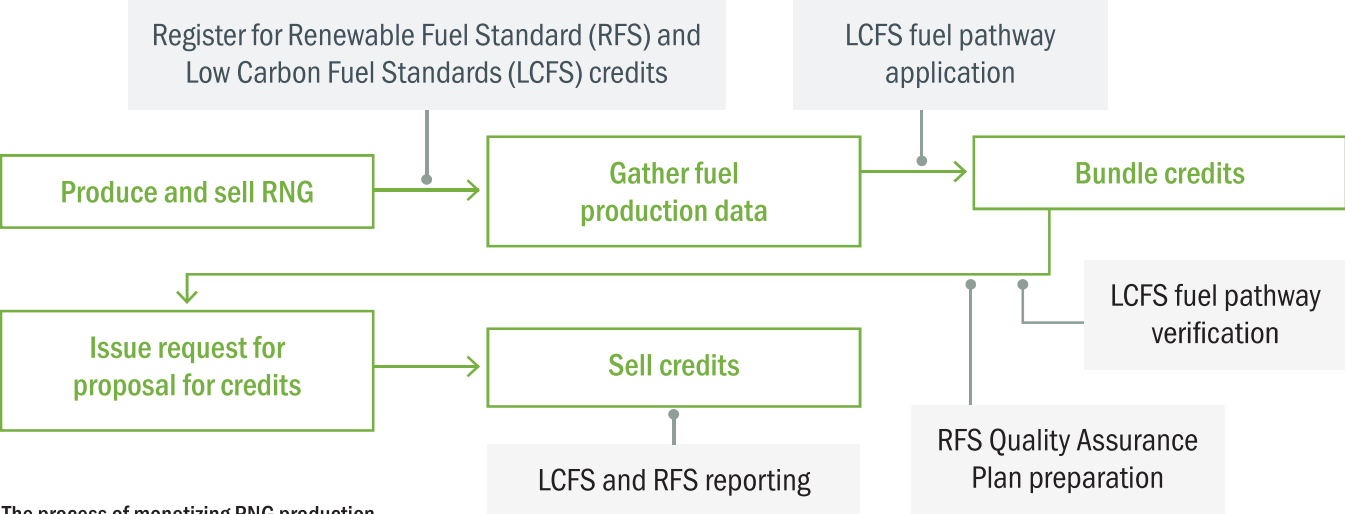
Maximizing profits with green gas production



 <p><b>30+ years</b> delivering RNG solutions</p>	 <p><b>10K scfm</b> of biogas collected and upgraded</p>	 <p><b>10-time winner</b> of National Safety Council's Occupational Excellence Achievement Award</p>
 <p><b>100+</b> anaerobic digestion projects</p>	 <p><b>4 dairy RNG facilities</b> designed and operational since 2018 processing manure from <b>150K+ cows</b></p>	 <p><b>0.68</b> Experience Modification Rate</p>

Brown and Caldwell (BC) focuses on efficient, cost-effective design and construction to deliver renewable natural gas (RNG) facilities that maximize uptime and minimize long-term maintenance.

RNG is a carbon neutral, versatile fuel that is fully compatible with existing pipelines and infrastructure. It is generated by anaerobically turning biogas from animal waste, food waste, wastewater sludge, and trash into biomethane and used to power agricultural, industrial, and commercial businesses, homes, and vehicles. BC has been helping clients capitalize on the monetization of RNG for nearly 40 years. Our services include biogas conditioning and upgrading to pipeline quality biomethane and the gas monetization, operation, design, construction, and permitting of RNG facilities. This diverse experience has enabled us to deliver custom designs for nine projects over the last six years that incorporate stakeholders' interests into the facility and maximize carbon intensity scores and overall profitability.



The process of monetizing RNG production



## National Experience, Regional Focus

Some of the best indicators of a consultant's qualifications are the projects that demonstrate their expertise and innovation. The following projects best demonstrate the depth and breadth of BC's RNG experience.

### Dairy Digester and RNG Facility Phase I // Confidential Client

Service: Program management  
Anaerobic digestion configuration: Four 3 million-gallon (MG) continuously stirred tank reactors (CSTRs)  
Feedstock: Dairy/cofeed  
Dairy Size: 25K cows  
Upgrading technology: Water wash  
Total construction costs: \$35M  
As owner advisor, BC reviewed engineering deliverables and confirmed that the design engineer and contractor complied with project specifications and requirements.

### Dairy Digester and RNG Facility Phase II // Confidential Client

Service: Design and construction  
Anaerobic digestion configuration: Two 3 MG CSTRs  
Feedstock: Dairy/cofeed  
Dairy Size: 25K cows  
Upgrading technology: Amine  
Total construction costs: \$35M  
BC collaborated with the owner and construction manager to expedite design deliverables and provide an operational digester with biogas production within 7 months of breaking ground.

### Threemile Canyon RNG Facility // Threemile Canyon Farms

Service: Program management  
Anaerobic digestion configuration: 15 MG mixed covered lagoon  
Feedstock: Dairy  
Dairy Size: 60K cows  
Upgrading technology: Amine  
Total construction costs: \$15M  
BC's experience in program management and project design and construction enabled this multidisciplinary team to work together to deliver a successful project for the owner.

### Dairy Digester and RNG Facility // Confidential Client

Service: Third-party evaluation  
Anaerobic digestion configuration: 14 MG mixed covered lagoon  
Feedstock: Dairy  
Dairy Size: 50K cows  
Upgrading technology: Pressure swing adsorption  
Total construction costs: N/A  
BC's experience in RNG was implemented to efficiently assess the feasibility of operating and generating RINs at a dairy digestion facility.

### Dairy Digester and RNG Facility // Confidential Client

Service: Design engineering  
Anaerobic digestion configuration: Six 3.3 MG continuously stirred tank reactors  
Feedstock: Dairy  
Dairy Size: 66K cows  
Upgrading technology: Amine  
Total construction costs: \$80M  
BC's experience in designing multiple RNG facilities is being used to design a 2,000 scfm dairy biogas facility that will meet the owner's expectations on a compressed schedule.

### Dairy Digester and RNG Facility, De Saegher Dairy // Middleton, Michigan

Service: Design engineering  
Anaerobic digestion configuration: Two 3.3 MG continuously stirred digesters with membrane gas conditioning  
Feedstock: Dairy  
Dairy Size: 7K cows  
Upgrading technology: Membrane  
Total construction costs: N/A  
BC designed an efficient RNG facility that minimized capital costs while optimizing operational benefits.

### South Plant Biomethane Reuse // King County, Washington

Service: Design engineering  
Anaerobic digestion configuration: CSTR  
Feedstock: Wastewater treatment plant (WWTP) municipal sludge  
Upgrading technology: Air Liquide membrane  
Total construction costs: \$41M  
BC developed the detail engineering design for a plant upgrade to generate biomethane at the operating facility which was designed with a membrane system supplied by Air Liquide.

### Biosolids to Energy // St. Petersburg, Florida

Service: Design and construction  
Anaerobic digestion configuration: 1.8 MG thermophilic reactor, 6 batch tanks, 2.2 MG mesophilic tank  
Feedstock: Primary sludge and waste activated sludge  
Upgrading technology: Biogas upgrading system: AERG and Guild  
Total construction costs: \$48M  
BC developed a cost-effective approach to managing biosolids and yard wastes, creating renewable energy products, and reducing greenhouse gas emissions on an expedited schedule.

### Energy Recovery // Roseville, California

Services: Alternatives analysis, design, construction, grant funding, and renewable credit assistance  
Anaerobic digestion configuration: Mesophilic reactor  
Feedstock: WWTP municipal sludge and high-strength organic waste  
Upgrading technology: Membrane: Unison-BioCNG™  
Total construction costs: \$24M  
BC used a business case evaluation to identify the biogas use option with the greatest life cycle value and greenhouse gas emissions reduction and gained valuable experience on membrane upgrading technologies during the detail design.

## Contact Us



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