

SCS EXTENDS LEADERSHIP POSITION IN BIOGAS AND RENEWABLE NATURAL GAS

SCS Engineers delivers environmental solutions by combining long-term experience with compliance and technological expertise. SCS provides consulting, engineering, construction, O&M, Monitoring SCS Tools and Compliance Services in multiple industries and business sectors. Fifty years ago, no one could have imagined using drones and satellites to collect information to run landfills or turn agricultural and animal by-products into fuel or electricity. SCS Engineers had 2019 revenues of \$239 million, and has earned a leadership role in solid waste management, renewable energy, and environmental services.

Answers provided by Steve Hamilton, Senior Vice President; Jay Hatho, Senior Vice President, CTI, CIO; Phil Carrillo, Director, National Remote Monitoring Control; David Hostetter, Regional RMC Manager.

EBJ: SCS' Biogas practice has been very successful. What types of unique services are you providing through this practice and how have you been able to differentiate from other competitors?

SCS: We cannot claim our services are unique, but we do provide comprehensive services. SCS performed design and design/build services for 14 Renewable Natural Gas (RNG) facilities in 2019. The facilities convert landfill gas, dairy digester gas, and wastewater treatment plant digester gas to RNG. These projects are complex and require employing advanced technology to process the raw biogas into RNG and the experience to know how to reduce associated cost.

Our differentiator is our record of accomplishment. SCS Engineers has one of the longest and most successful biogas practices in the United States primarily in landfill gas to energy (LFGE) and digester gas-to-energy (DGE). SCS Energy has performed over 60 design or design/build biogas-to-energy projects and has provided O&M services for 27 projects. The biogas end-uses include electric power generation (reciprocating internal combustion engines, turbines, microturbines, and fuel cells), direct-use of biogas in lieu of natural gas at industrial, utility, and institutional facilities, production of high-Btu RNG for

injection into natural gas pipelines, and production of biogas-derived compressed natural gas (CNG) for use as vehicle fuel.

Our clients attribute our quality to SCS Energy®, our practice specializing in waste gas utilization; combined with our expertise in solid waste management and compliance. We do subcontract some work, but our engineers and field personnel oversee all work, and we have an exemplary safety record. SCS has designed, constructed, and operated more biogas-to-energy facilities than any other engineering firm in the nation.

Our teams employ decades of energy systems expertise as we analyze and evaluate the effects of variations in processes and the parameters important to success. SCS models, maps, and evaluates complex systems and processes to evaluate plant performance. We account for project objectives and requirements while taking your technical, business, energy and environmental objectives into account.

SCS Engineers brings value to the design-build with our energy and greenhouse gas (GHG) expertise in monitoring and restricting the release of methane into the atmosphere. Our understanding of regional market-based emission control programs, carbon offsets, emission performance stan-

dards, and pipeline construction all serve to enhance our feasibility studies, design, build, testing, and operations-maintenance.

EBJ: What are the major trends in the biogas market?

SCS: The biggest trend right now is Renewable Natural Gas. Under the Federal Renewable Fuel Standard as well as under state-based programs such as the California Low Carbon Fuel Standard the value of RNG has never been higher. SCS works with landfill and digester owners, operators and developers – utilities and governments – renewable energy end-users – and the agricultural and waste industries. All are interested in achieving renewable energy goals, reducing greenhouse gases, and creating useful by-products from waste. Scrubbing technology has improved and conversion to RNG makes renewables economically feasible.

Gas-to-energy and waste-to-energy facilities are attractive options for agricultural and food processing wastes, for treating municipal and industrial wastewater, and for landfills because all these wastes are feedstock for renewable energy. All can provide a fuel source for energy production and reusable byproducts.

EBJ: What opportunities do you see within the biogas market in the United States?

SCS: Integrated waste management, regulatory policy, and the adoption of renewables as part of a business's GHG reduction goals will create more opportunities. Opportunities will continue to expand as the infrastructure for natural gas expands, to meet the rising need and costs for waste treatment and wastewater treatment, and as states announce goals to reduce emissions and promote renewable sources of energy.

EBJ: European countries have strong biogas initiatives and therefore the market has had greater development there

than in the United States. Why haven't we adopted similar initiatives in the United States?

SCS: Biogas production has seen a significant growth in Europe, mainly driven by the favorable support schemes in place in several European Union Member States. Biogas production and the sources vary between different countries; Germany has the largest natural gas consumption. Europeans have fewer wide expanses of land and rural areas so they are naturally leading the change.

That being said, several states have or are considering initiatives that will boost demand for biogas, including requirements that a percent of utilities' natural gas comes from renewable sources.

EBJ: What else is needed to grow the biogas market in the United States?

SCS: More of the encouragement by state and federal governments through incentives and regulatory requirements.

EBJ: What is the future of technology in the biogas market?

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SCS Arsenal of Biogas Technologies and Services

SCS Engineers has built an impressive history, set of accomplishments and qualifications in designing, building and operating Renewable Natural Gas (RNG) facilities. In the RNG field, which is one of the company's most important market areas, SCS creates the RNG by removing almost all other gas constituents except the methane. These other constituents include carbon dioxide, hydrogen sulfide (H₂S) and other sulfur compounds, and volatile organic compounds (VOCs) including siloxanes, oxygen, nitrogen, and waste.

Typically, this is accomplished through:

- Gas compression Gas pre-treatment – H₂S, VOCs, siloxanes, and water
- Carbon dioxide separation Nitrogen and/or oxygen removal
- Gas polishing Gas compression and transfer to the natural gas pipeline
- Destruction of waste or tail gas Gas pipeline interconnect

Using the most appropriate mix of technologies is just a part of innovation. The most commonly used technologies are:

- Gas compression Gas chilling
- Activated carbon, silicon, or other non-regenerative contaminant removal media
- Temperature swing adsorption, redox scrubber, and other regenerative contaminant removal technologies
- Pressure swing adsorption (low- and high-pressure)
- Membranes (low-pressure) Physical absorption (solvents)
- Thermal oxidation Product gas compression

SCS has used all of these technologies in differing combinations on different projects. Having experience with all of these allows us to meet client's goals in the most cost-effective fashion. Success is based on a successful record of providing comprehensive services in all aspects of renewable energy development that get facilities and plants up and running faster. SCS services include:

- Design & Design-Build
- Operations, Monitoring, and Maintenance
- Facility Re-engineering
- Project/Environmental Permits & Utility Interconnect Design
- Feasibility Studies - SCS completes feasibility studies for potential biogas projects. The recommendations of these studies can include:
 - » Selection of facility size and technology
 - » Development of construction & operation/maintenance cost estimates
 - » Investigation of utility interconnection and right-of-way issues
 - » Investigation of permitting issues
 - » Project financial proformas
- Due Diligence for Acquisitions & Financing - SCS Engineers conducts due diligence investigations on existing or proposed facilities for investors and banks. The investigations can support development, refinancing, or acquisition. The total investment covered by these investigations exceeds \$500 million. SCS also offers facility valuations and assistance with negotiating power/energy sales agreements.
- Controls Design: SCADA - SCS provides turnkey supervisory control and data acquisition (SCADA) systems for power plants and other types of energy facilities. SCADA systems provide Internet-based facility monitoring and remote control (see SCS RMC). SCS has installed SCADA systems in biogas plants and landfill gas flare stations utilizing the latest in SCADA development software.

SCS: Technology adoption is influenced by policy intervention, entrenched interests, and other external drivers. Biogas may not outcompete traditional fossil sources on cost. However, the low carbon emissions make them attractive and influence adoption as compared to fossil fuels especially for generating electricity.

Biogas markets are expanding with biogas suppliers and users beginning to organize for direct competition with natural gas and other conventional fuels. Individual buyers and sellers are transacting for negotiated quantities of biogas at negotiated prices across the country. In short, the market is maturing.

Expansion of exploration for natural gas could reduce the cost of pipeline access by increasing the reach of existing networks regionally. The existing pipelines and technology costs are more favorable for some feedstocks over others. □

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