No Pipeline for Renewable Natural Gas Projects? No problem.

Use Virtual Pipeline Technology

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DMT Clear Gas Solutions is a leading technology supplier specializing in upgrading biogas to renewable natural gas (RNG). Through biogas upgrading, trace impurities and carbon dioxide (CO_2) are separated from methane (CH_4) to produce pipeline-specification RNG suitable for injection into the natural gas grid or direct use for vehicle fuel.

Development within the RNG industry often varies from project to project. When determining the feasibility of a potential RNG plant, ideally, there should be a pipeline injection point available or within the general geographic area of the site. But what if there is no natural gas pipeline? Is the RNG project still feasible? Does installing 5 to 10 miles of pipeline at $500k-$1 million per mile make sense? What is the best way to gain the revenue available for these potential RNG projects that could generate a low carbon intensity (CI) score and, hence, a price per MMBTU 10 to 20 times more profitable than the value of conventional natural gas?

The answer may be a virtual pipeline.

What is a Virtual Pipeline?

A virtual pipeline replicates the continuous flow of a fixed physical pipeline, working where physical pipelines cannot to monetize RNG in regions with changing supply and demand centers. As a flexible and diverse approach, a virtual pipeline is based on a scalable and modular system where the RNG is treated, compressed (CNG) or liquefied (LNG), and stored on a mobile unit at its source location before transport. The RNG is then transported to a fuelling station or to a central injection station for entry into the natural gas pipeline network.

Benefits of Virtual Pipeline Technology

The benefits of virtual pipeline technology include:

- **Flexibility.** In contrast to the natural gas supply, which is predictable and much larger in daily volume, a virtual pipeline provides the flexibility to keep RNG flowing as well as the option to use alternate injection centers. Virtual pipelines also open up markets where supply was unable to reach demand.
- **Carbon-neutral transportation.** Virtual pipelines harness the transportation sector to monetize RNG while providing the same reliability and flexible augmentation from a physical pipeline network. A fitting twist is that the trucks delivering the CNG or LNG can also be fuelled by the same gas they are transporting, making them independent of petrol sources and also providing carbon-neutral transportation.
- **Overcoming Injection Site Roadblocks.** Injecting RNG directly into the natural gas grid is not always profitable for potential RNG projects. The cost and complexity required for such an undertaking are not always suitable for RNG projects with a smaller production capacity or further away from an injection site. Virtual pipeline technology can overcome these roadblocks.
- **ROI.** A injection point cannot be established as quickly as the biogas upgrading facility. Gas injection stations usually take 12 to 18 months from concept to build for a potential RNG site with an existing

anaerobic digester, whereas, DMT can provide a standard biogas upgrading system within 30 weeks. By using virtual pipeline technology, a customer can produce RNG within 5 to 11 months, thereby, gaining significant return on investment (ROI).

Virtual Pipeline Technology in Real Life

DMT is currently working on four RNG projects from dairy biogas that harness virtual pipeline technology. All four Wisconsin farms are within proximity to one another and use DMT's high-selective membrane separation technology, the Carborex® MS, to separate CO_2 from the CH_4 stream. Using a scheduled rotation, each dairy farm has a truck as well as a storage area large enough for one day of CNG-storage. A truck returning to the farm can refill from a combination of the stored CNG or DMT's Carborex® MS. Furthermore, each farm utilizes a gas testing center, including moisture, hydrogen sulfide (H_2S), and a full gas chromatograph, to mirror the testing found at an injection point. This approach prevents any RNG that does not meet specification from getting shipped to the injection site—an error that could cost multiple days of expected revenue.

Virtual pipeline technology may be able to save or improve potential RNG projects by offering the flexibility to keep development moving along in the cases where injection points are an issue or cause delay. A significant benefit to the four dairy farms mentioned is the cost savings of not having to install pipeline to the nearest gas pipe. Getting a single farm to the nearest natural gas pipeline a few miles way would have costed $1 to $2 million with an extended project timeline of 12 to 18 months. With four farms, that equates to a cost savings of $8 million. Additionally, by being able to produce RNG within 5 to 11 months, these farms are able to produce $5 to $10 million of early revenue. As the value of RNG has increased, virtual pipeline technology is no longer a concept but an alternative option that can offer a quick return on investment.

About DMT Clear Gas Solutions

DMT Clear Gas Solutions is a technology supplier specializing in biogas upgrading and gas desulfurization. We are part of a global organization with more than 30 years of experience, 100 employees and offices/agents spread throughout Europe & Asia. Our award-winning portfolio, paired with 24/7/365 customer support, is the best the market has to offer to companies seeking sustainable solutions. With key accounts and some of the largest operational renewable natural gas (RNG) plants in North America, our customers see a profitable return on investment when upgrading with DMT. Learn more at www.dmt-cgs.com

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