

Anaerobic Digester Project and System Modifications: An Economic Analysis

WASHINGTON STATE UNIVERSITY EXTENSION • EM090E



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Preface

This Washington State University Extension publication is a substantially abbreviated review of information contained in the publication *Renewable Natural Gas and Nutrient Recovery Feasibility for DeRuyter Dairy* (Coppedge et al. 2012). This publication is also part of the Anaerobic Digestion Systems Series, which aims to provide information that improves decision-making concerning anaerobic digestion systems. Readers interested in further details are encouraged to read the full WSU report located at <http://csanr.wsu.edu/publications/deRuyterFeasibilityStudy.pdf>. Further, individuals seriously interested in a specific digester installation should seek expert guidance from an Anaerobic Digestion System technology provider. The U.S. EPA-AgSTAR project database contains a list of technology providers across the country. This provider list can be found at <http://www.epa.gov/agstar/projects/index.html#database>.

This publication introduces readers to key concerns regarding the profitability of anaerobic digestion systems and includes a discussion of general project costs and potential revenue sources. This publication also examines the potential profitability of three alternative anaerobic digester systems: (a) combined heat and power, which is the baseline system; (b) boiler as a substitute for combined heat and power; and (c) renewable natural gas infrastructure.

Anaerobic Digester Projects in Washington State

Washington State has 443 commercial dairy farms, totaling more than 250,000 dairy cows. Roughly 100 of these dairies, or 23 percent of the total, can be considered large production facilities comprising 700 or more mature animals. Whatcom County, in the upper northwest corner of the state, and Yakima Valley, in the central region of the state, are the two primary dairy centers, totaling nearly 50,000 and 100,000 dairy cows, respectively. Over 70% of the identified large dairies are located in the central

Highlights

- Operating costs can have more impact than capital costs on the profitability of an anaerobic digester project.
- An AD project is more sustainable when it has multiple sources of revenue (energy, fiber and nutrients, and environmental incentives).
- A substantial portion of the AD project's total revenue is comprised of income from fiber products and nutrients, thus underscoring the importance of these co-products in the economic viability of anaerobic digestion.
- An AD project with a renewable natural gas system offers promising opportunities, particularly when the project can acquire Renewable Fuel Standard credits.

region of the state (WSDA 2011). The map in Figure 1 shows the dairy sector in Washington State and the location of seven anaerobic digester (AD) projects. Seven AD facilities can be found in Whatcom, Skagit, and King Counties along the I-5 corridor, and one facility is located in the Yakima Valley.

Anaerobic Digester

An anaerobic digester is a vessel that allows animal manure to interact with bacteria under controlled conditions (a set time and temperature and the absence of oxygen), so that a portion of the organic material can be converted to methane-rich biogas. This biogas, in turn, can be harnessed and converted into renewable energy. The U.S. EPA-AgSTAR website (<http://www.epa.gov/agstar/anaerobic/index.html>) provides an introduction to anaerobic digestion, including different digester types and a process flow diagram. Additionally, an in-depth description of the process and co-products of anaerobic digestion

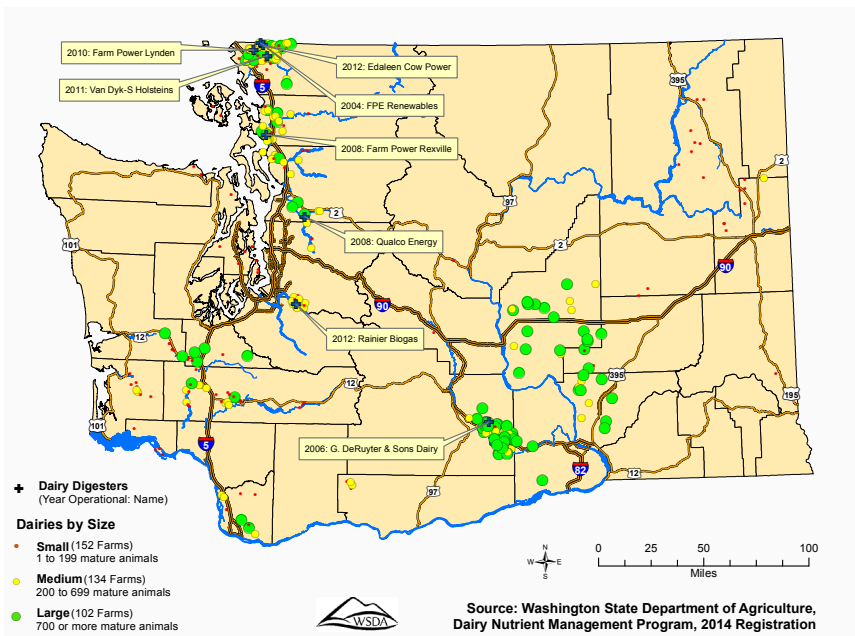


Figure 1. Washington State dairies and anaerobic digester installations (Washington State Department of Agriculture 2014).

on Washington State dairies can be found in *Anaerobic Co-Digestion on Dairies in Washington State: The Solid Waste Handling Permit Exemption* (Yorgey et al. 2011a). Applicable information can also be found in *Anaerobic Digestion in the Pacific Northwest* (Yorgey et al. 2011b).

Anaerobic Digester Systems

The following sections provide an overview of three alternative (modified) systems for AD projects and their co-products. These different system modifications lead to different end-uses of biogas, specifically, heat, electricity, or renewable natural gas. The detailed assumptions used in evaluating capital and operating requirements and revenue sources for different systems can be found on the WSU CSANR website at <http://csanr.wsu.edu/publications/de-RuyterFeasibilityStudy.pdf>. Diagrams illustrating each of the three alternative AD systems are located in the Appendix (Figures A1 through A3).

Anaerobic Digester with Combined Heat and Power (CHP)–Baseline System

The capital cost for a baseline AD system that produces combined heat and power is approximately \$4.4 million. This baseline system produces biogas that fuels a modified diesel engine and generator, which then produce electricity and recovered heat. A portion of the recovered heat is used to maintain the temperature of the digester, while the rest is released without value through a dump radiator. The electrical power is sold to the

grid (that is, the national or regional network that provides electricity to consumers). Fibrous solids are separated from the remaining liquid, dehydrated in settling weirs, and then sold to companies producing soil amendments.

Anaerobic Digester with Boiler–Substitute for Combined Heat and Power

The capital cost for an anaerobic digester with a boiler is approximately \$4.4 million. The only difference between this system and the baseline system is that all biogas produced is used by a boiler as opposed to a combined heat and power system. The boiler supplies thermal heat to the digester for its own operation. Excess heat is not used and, instead, goes to a dump radiator. The boiler system's efficiency is assumed to be 80% and capable of providing more than enough thermal capacity to meet the digester's needs. In this AD system, no electrical power is sold to the grid. Any revenue comes from treated nutrients and fiber products that are sold to companies producing or selling soil amendments.

Anaerobic Digester with Renewable Natural Gas (RNG) Infrastructure–Conversion from CHP System

The capital cost for this system includes the cost of a gas cleaning unit; digester modification for accepting non-manure inputs such as food-processing substrates; transportation of gas off-site (e.g., by pipeline to an injection point or by tube trailer); and an injection point. The present discussion focuses

on the production and transportation of renewable natural gas by pipeline, with an estimated total capital cost of approximately \$9.8 million (i.e., \$4.4 million initial investment for the AD-CHP system, plus a \$5.4 million investment to convert the existing system and build the infrastructure needed to produce RNG). Renewable natural gas can also be used as transportation fuel. The renewable natural gas scenario is discussed in the section on sensitivity analysis in this publication. In the AD-RNG system, biogas produced by the anaerobic digester is upgraded to renewable natural gas, which becomes a source of revenue in addition to nutrients and fiber products and avoided methane emission.

Economic Analysis of Different Anaerobic Digester Systems

Capital costs and operating costs

The estimated annual capital and operating costs for the three alternative AD systems are presented in Table 1. In absolute terms, the AD-RNG system has the highest capital cost due to the added cost of modifications to the digester as well as the installation of the additional infrastructure needed to produce and distribute the renewable natural gas. It should be noted that the digester itself is relatively inexpensive to build and operate. It is adding the electricity (combined heat and power) and the other non-boiler ways to use biogas (natural gas) that make it considerably more expensive in terms of average annual operating costs. For example, the ratio of operating to capital costs is higher in the combined heat and power system (1.67) than it is in the boiler system (0.20) or the renewable natural gas system (0.78). This information suggests that the inclusion of operating costs (day-to-day costs of production) is essential when examining and comparing the profitability of alternative AD systems.

Potential income sources

While both capital and operating costs are important factors to consider in an AD project, potential

sources of revenue are also critical since they provide opportunities to recover costs and may indicate which source(s) would yield maximum profit. The DeRuyter feasibility study examined three revenue sources: (a) energy sales and associated credits and incentives, (b) fiber and nutrient sales, and (c) environmental payments and incentives.

Energy sales, credits, and incentives

Energy sales and associated credits and incentives may be potential revenue sources because the anaerobic digestion process harvests methane gas and converts it into electricity that can power farm operations, and the excess electricity can be sold back to the grid.

The federal Public Utility Regulatory Policies Act of 1978 requires electric utilities to purchase the output of qualifying small power-production facilities that have a production capacity of no more than 80 megawatts (MW). Power Purchase Agreement (PPA) rates are subject to review and approval by the Washington State Utilities and Transportation Commission (WUTC), which requires utilities to purchase power on “terms that do not exceed the utility’s avoided costs for such electric energy” (WAC 480-107-095). The maximum term for a PPA with Puget Sound Energy or Pacific Power is 5 years. Other incentives for electricity production include additional revenue from the sale of Renewable Energy Certificates (RECs), and a maximum of \$5,000/year paid by the Washington State Renewable Energy Incentive to a participating utility through 2020.

Sales of electricity and renewable natural gas to electric and gas utilities are the primary source of revenue for a non-boiler system. The Sumas Cascade commodity price (pipeline wholesale price for gas at the Washington/Canada border) is received for the natural gas, which is injected into the pipeline grid and purchased at that point. Revenue from electricity is about 50% of the average annual gross revenue for the baseline AD-combined heat and power, while revenue from renewable natural gas is about 42% of

Table 1. Average annual capital and operating costs of an AD project under different system configurations.

AD Project	Capital cost ¹	Operating cost ²	Operating cost—Capital cost ratio
AD-Combined heat and power (baseline project)	\$169,231	\$283,270	1.67
AD-Boiler	\$169,231	\$33,000	0.20
AD-Renewable natural gas	\$377,901	\$293,706	0.78

Notes:

¹Average annual capital cost = total capital cost divided by 26 years.

²Operating costs include maintenance and repair, and labor cost.

the average annual gross revenue for the AD-RNG system (Figure 2).

Fiber and nutrient sales

The sale of fiber and nutrients may be another potential source of revenue because after anaerobic digestion the remaining manure fiber and phosphorus solids from the digester effluent can be screened, settled, and harvested and then sold to a fertilizer manufacturer. The anaerobic digester used in the DeRuyter feasibility study produced an average of 42,000 cubic yards of fiber per year. Approximately 250 tons of phosphorus solids were produced by the digester during the first 6 years of the study (2007–2012), 750 tons in 2013, and it is expected to produce 1,000 tons of phosphorus solids per year from 2014 to 2032.

The sales from fiber and nutrients are the main source of income for the AD-boiler system, accounting for 77% of the average annual gross revenue (Figure 2). Furthermore, sales of these co-products are the second most important source of income for the AD-combined heat and power (35%) and AD-renewable natural gas (34%) systems.

Environmental credits and incentives

Carbon credits resulting from the collection and use of methane gas, which is normally released into the atmosphere during non-digested storage in lagoons (the current standard practice for dairy waste management), could be another potential revenue source. Most AD projects certify and sell voluntary credits under the Climate Action Reserve Livestock Protocol. Carbon credits under this protocol were first

issued to the DeRuyter AD project in 2010 (Climate Action Reserve n.d.). Another venue for carbon credits is the California carbon market (implemented in 2013), which is regulated by the California Air Resource Board. The price of carbon credits is higher in regulated markets than in voluntary markets. In the DeRuyter feasibility study, the AD project sold credits to the Climate Action Reserve Livestock Protocol until 2013, and made the assumption that it would transfer to the California program beginning in 2014. The study also assumed that the AD project would generate credits for 10 years (i.e., 2014–2023) with the option of being renewed if the project met the eligibility criteria of the newest protocol available at the time.

Total receipts from carbon credits and other incentives represented 10% and 8% of the average annual gross revenue for the AD-combined heat and power and AD-renewable natural gas systems, respectively (Figure 2). Additional environmental payment, in the form of a Renewable Fuel Standard credit (Renewable Identification Number or RIN), may be received by the AD-RNG system if renewable natural gas was sold as transportation fuel that generated RIN values. This potential income is further discussed in the section on sensitivity analyses.

Economic viability of different AD systems

The viability of an AD project can be evaluated by using investment decision criteria such as the *net present value* (NPV). NPV is calculated as the sum of the discounted cash flows minus the initial investment. Cash flow is the difference in the cash inflow (or benefits) and cash outflow (or costs) from the first year to the last year of the project and is discounted back to its present value.

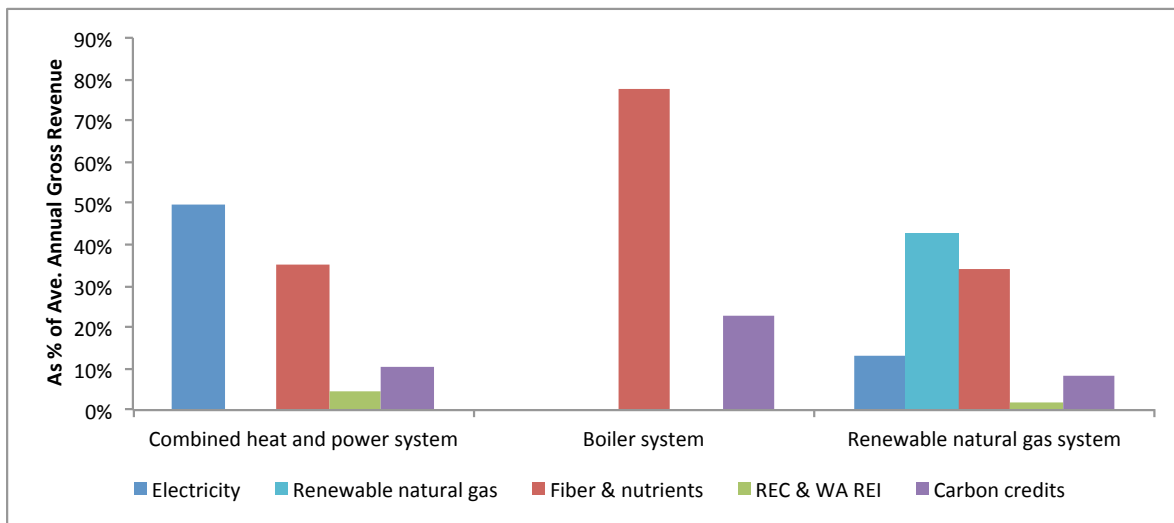


Figure 2. AD system revenue from multiple sources, as a percentage of average annual gross revenue.

Table 2. NPV of alternative AD systems given different revenue streams.

Products	AD-Combined heat and power (CHP)	AD-Boiler	AD-Renewable natural gas
Energy ¹	-\$0.8 million	NA	-\$6.3 million
Energy, fiber, and nutrients	\$4.8 million	\$0.8 million	-\$0.6 million
Energy, fiber, and nutrients and environmental incentives ²	\$7.5 million	\$2.6 million	\$1.4 million

Note: NA means not applicable for AD-Boiler Project because it does not produce electricity.

¹Energy refers to electricity produced by the AD-CHP and AD-Boiler Projects, and electricity and renewable natural gas produced by the AD-RNG Project.

²Environmental incentives include the Washington Energy Initiative, Renewable Energy Certificates, and carbon credits.

The *present value* refers to the value of future cash flows that is discounted to reflect the current value. A discount rate of 4%, which is the average rate of return to equity in U.S. farming (Shumway and Bishop 2008) was used in the AD system calculations. The discount rate represents the opportunity cost of capital. Tables A1 through A3 in the Appendix show the cash flows in 2012 constant dollars for the different AD systems that were used in the NPV analysis. As a result of limited space, data are presented only for selected years from 2012 to 2032. However, complete tables can be accessed at <http://csanr.wsu.edu/wp-content/uploads/2015/02/Appendix-Tables-for-EM090.xlsx>.

In general, the investment decision rule is to accept a project when the NPV is greater than zero. The NPV can also be used to compare the profitability of different digester project alternatives. The greater the NPV, the more economical the project.

Table 2 shows the NPV for the three AD systems given different sources of revenue. If only the energy produced (electricity and/or renewable natural gas) is sold, it will not be economically feasible to implement either of the non-boiler AD systems. Positive NPVs for the combined heat and power and boiler systems occur when there are revenues generated from the sale of energy, fiber, and nutrients. These results highlight the significance of developing the value-added products, which may support an AD project's ability to stay cash-positive or to augment its profits. However, the combined revenues from energy, fiber, and nutrients are not enough to make the NPV of the AD-RNG system positive, mainly due to the system's high initial investment cost. Positive and higher NPVs are projected for all systems when environmental payments are also received. The combined heat and power system has the highest NPV relative to other alternative AD systems.

Sensitivity Analyses

The NPV analysis shows the relative profitability of alternative AD systems. The sensitivity analysis further

evaluates the economic feasibility of AD systems when values within certain parameters are changed, particularly (a) prices for fiber and nutrients, (b) discount rates, and (c) prices for renewable natural gas.

Price of fiber and nutrients

Digested fiber and nutrients are important revenue sources for an AD project. In the DeRuyter feasibility study, the baseline price of digested fiber and nutrients was \$7/cubic yard and \$75/ton, respectively. The sensitivity analysis examined the change in the NPV of the AD system when the prices of both co-products increased at a rate that differed from the baseline, while holding all else constant. Analysis results showed that the NPV of AD-CHP and AD-RNG systems increased as the prices of co-products increased, but the gap in the NPV between the two systems became smaller (Table 3).

Discount rate

The NPV is inversely proportional to the discount rate. The higher a discount rate is set, the more value

Table 3. NPV (in millions) of AD systems given changes in key parameters.

Parameter	AD-Combined heat and power (CHP)	AD-Renewable natural gas (RNG)	NPV _{AD-CHP} / NPV _{AD-RNG(a)}
A. Price of fiber and nutrients (% increase/year)			
0% (baseline)	\$7.5	\$1.4	5.36
5%	\$9.4	\$3.3	2.85
10%	\$12.7	\$6.6	1.92
15%	\$18.5	\$12.5	1.48
20%	\$28.7	\$22.6	1.27
B. Discount rate			
3%	\$8.9	\$2.7	3.30
4% (baseline)	\$7.5	\$1.4	5.36
5%	\$6.3	\$0.3	21.00

is placed on current money as opposed to future money. A discount rate of 4% was used as the base-line in the sensitivity analysis. Given the analysis results, the combined heat and power digester system appears to be a better option than the renewable natural gas system, and even more so as the discount rate increases (Table 3).

Price scenarios for renewable natural gas

Renewable natural gas can qualify for Renewable Fuel Standard (RFS) credits or Renewable Identification Numbers (RIN) if the gas is used as transportation fuel. A full explanation of the RFS program will not be presented in this publication; however, interested readers are referred to the EPA AgSTAR Projects (2013) for details on the regulations and standards. Also, the *Renewable Natural Gas and Nutrient Recovery Feasibility for DeRuyter Dairy* study (Coppedge et al. 2012) includes a detailed discussion on transportation fuel projects and the potential of these projects to earn RINs.

Both the capital and operating costs to produce renewable natural gas can vary depending on the means of transporting it from the digester site to a point of interconnection with the natural gas grid (e.g., by pipeline or by tube trailer). There are also additional costs if it is dispensed at a compressed natural gas (CNG) fueling station. For the sensitivity analysis, two alternative pricing scenarios for compressed natural gas were examined: Scenario 1 focused on the CNG price plus “green premium”—where renewable natural gas was sold as transportation fuel thus generating RIN values in addition to the commodity value, and Scenario 2 focused on the retail CNG price plus “green premium”—where renewable natural gas was used as transportation fuel (generating RIN values) and was dispensed at a CNG fueling station.

In Scenario 1, the capital and operating costs of the AD-RNG system remained the same. The only difference was the revenue received for renewable natural gas if it was used as transportation fuel and thus qualified for RINs. In this scenario, the sale of RNG included the Sumas Index price of natural gas plus the percentage of the RIN agreed on by the AD project and the purchaser of RNG (gas utility, gas brokers, CNG or liquefied natural gas retailers). If renewable natural gas was placed into the pipeline and then compressed and used for fuel off-site, the RIN will be generated off-site. There was potential for RIN revenue-sharing between the AD project, which produced and transported the gas through a pipe to the pipeline injection point, and the RNG purchaser. The following assumptions were used for

the Scenario 1 and Scenario 2 analyses:

- The RIN value equaled \$0.74/RIN;
- The AD project had 100% ownership of the RIN value; and
- There were 2,056,377 RINs generated per year, based on the annual production of renewable natural gas (148,341,050 British thermal units (BTUs) of RNG produced per year divided by 77,000 BTUs per RIN).

In Scenario 2, the capital and operating costs were higher than for the AD-RNG system because they took into account the additional costs associated with the construction and operation of a fueling station. The capital cost of the fueling station was estimated at approximately \$0.3 million, which made the total capital cost of the AD-RNG system equal to approximately \$10.1 million in this scenario. The CNG retail price was combined with the applicable RIN rate paid through the RFS program. The AD project in this second scenario realized 100% of the RIN value because the project itself cleaned and compressed the gas and fueled its own vehicles. The assumed number and price of RINs were the same as those in Scenario 1.

Tables A4 and A5 in the Appendix provide a snapshot of the annual cost and returns of the AD-RNG system using two price scenarios for natural gas. Figure 3 shows the contribution of different income sources to the total revenue of the AD project. Approximately half of the total revenue in Scenario 1 came from RINs, followed by receipts from natural gas. In Scenario 2, income from natural gas accounted for 49% of total revenue, followed by RINs (33%). Fiber and nutrients were also essential sources of income, contributing 17% and 11% to the total revenue of Scenario 1 and Scenario 2, respectively.

Table 4 provides a summary of the NPV, benefit-cost ratio (BCR), and total project costs for alternative AD systems. NPV is an *absolute* measure of project viability, while BCR is a *relative* measure of project viability and thus will provide some indication of how much the project’s benefits outweigh its costs. The BCR is the ratio of the present value of estimated benefits to the present value of estimated costs. As before, the discount rate used was 4%. The BCR should be greater than 1.0 for a project to be acceptable. Also, this ratio indicates the return per dollar of expenditure. For example, the AD-CHP project had a BCR of 1.8, indicating the project had a return of \$1.8 for every \$1 spent.

The AD-CHP system had the lowest total project cost, winning over the alternative AD-RNG system (if the

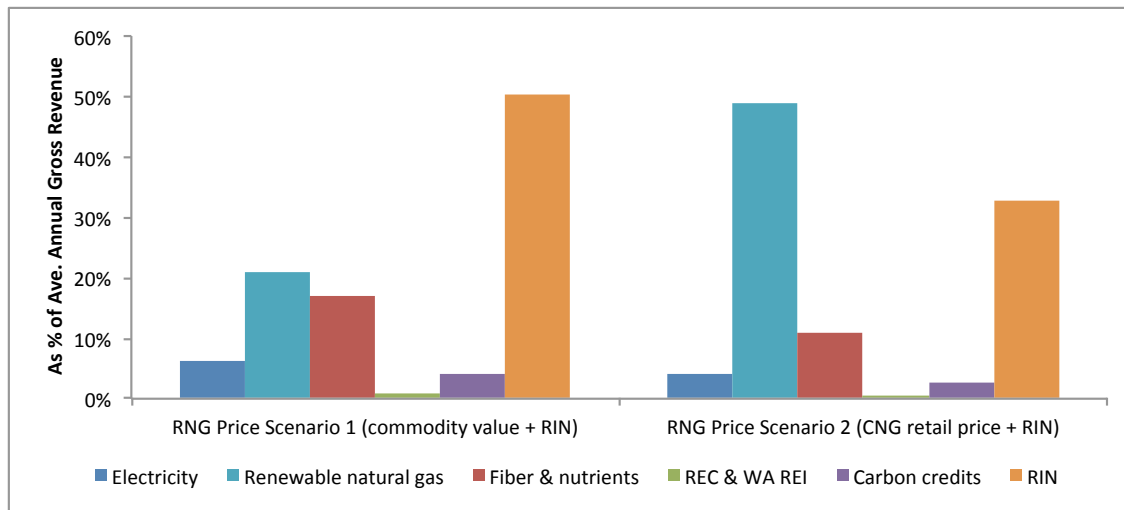


Figure 3. Contribution of different products to the total revenue of the AD-RNG system, given two price scenarios for renewable fuel.

Table 4. NPV, BCR, and total costs of different AD systems.

AD System	NPV	BCR	Total Project Costs
AD-Combined heat and power	\$7.5 million	1.80	\$11.8 million
AD-Renewable natural gas (RNG)			
Baseline RNG price: commodity value	\$1.4 million	1.10	\$17.5 million
RNG Price Scenario 1: commodity value + RIN	\$16.8 million	2.12	\$17.5 million
RNG Price Scenario 2: retail price + RIN	\$28.5 million	2.50	\$25.4 million

commodity price was received for natural gas). However, the AD-RNG system had an NPV that was about two to four times higher than the AD-CHP system when a green premium (RIN) was added to the value of natural gas (Scenario 1), or when natural gas was dispensed and sold at a fueling station and generated RIN values (Scenario 2). Under Scenario 1, there was an estimated return of \$2.12 for every \$1 spent; while under Scenario 2, the estimated benefit was a bit higher at \$2.50 for every \$1 spent.

As previously mentioned, renewable natural gas can be potentially sold to gas utilities, gas brokers, and CNG retailers, and these purchasers may require some sharing of the RIN value. In order to examine the impact of RIN revenue-sharing on the profitability of an AD-RNG system, sensitivity analyses were done at 0%, 25%, 50%, and 75% of the RIN value retained by the project (Table 5). The following results were obtained:

- The relative difference between the NPV in Scenario 1 and the NPV in Scenario 2 increased as the percentage of the RIN value retained by the AD-RNG system decreased.

This difference occurred because under the first price scenario, 50% of the total revenue for the AD-RNG system came from RINs.

- In Scenario 1, at a value of \$0.74 per RIN, the NPV of the AD-RNG system and the combined heat and power system was the same if the AD-RNG system retained about 42% of the RIN value. Therefore, in this price scenario, the AD-RNG system must receive more than 42% of the RIN value in order to be more profitable than the baseline AD-CHP system.
- In Scenario 2, the AD-RNG system that included a CNG fueling station had a higher NPV than the baseline AD-CHP system, even in the absence of RIN revenue.

Conclusion

Capital cost is a significant factor when considering an AD system, but the relative differences between capital and operating costs indicate that non-boiler systems (combined heat and power and renewable

Table 5. NPV and BCR of AD systems given different rates of RIN revenue retained by the AD project.

AD System	NPV (\$ million)	BCR
AD-Combined heat and power	\$7.5	1.8
AD-Renewable natural gas (RNG)		
<i>Baseline Scenario: commodity value</i>	\$1.4	1.1
<i>RNG Price Scenario 1: commodity value plus RIN</i>		
100% RIN retained by AD Project	\$16.0	2.1
75% RIN retained by AD Project	\$12.4	1.9
50% RIN retained by AD Project	\$8.8	1.6
25% RIN retained by AD Project	\$5.1	1.4
0% RIN retained by AD Project	\$1.4	1.1
<i>RNG Price Scenario 2: retail price plus RIN</i>		
100% RIN retained by AD Project	\$28.5	2.5
75% RIN retained by AD Project	\$24.8	2.3
50% RIN retained by AD Project	\$21.1	2.1
25% RIN retained by AD Project	\$17.5	1.9
0% RIN retained by AD Project	\$13.8	1.7

natural gas) have higher annual operating costs, on average. However, the renewable natural gas system has lower operating costs compared to the baseline combined heat and power system. These findings suggest that operating costs can have more impact (than capital costs) on the profitability of an AD project.

The findings of the DeRuyter feasibility study also suggest that the renewable natural gas system offers promising opportunities. When RFS credits (RIN) are added to the commodity price of gas, the AD project with this system may generate greater net returns than the baseline combined heat and power system. Furthermore, if renewable fuel is sold as transportation fuel in the retail compressed-natural-gas market, the renewable natural gas system will be more profitable than the baseline system with or without the addition of environmental incentives.

Economic analyses also show that an anaerobic digester project can be profitable under many different scenarios, but is most sustainable when it allows for revenues from electricity or renewable fuel, fiber products, nutrients, and carbon credits for avoided methane emissions. In particular, the combined income from fiber products and nutrients represents a substantial portion of the AD project's gross revenue, thereby underscoring the importance of co-product markets in the economic viability of anaerobic digestion. Environmental incentives like carbon credits and RFS credits (RIN) also make a significant contribution to the profitability of an AD project, particularly when the project produces renewable natural gas.

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Appendix

Diagrams of three alternative systems for an anaerobic digester project.

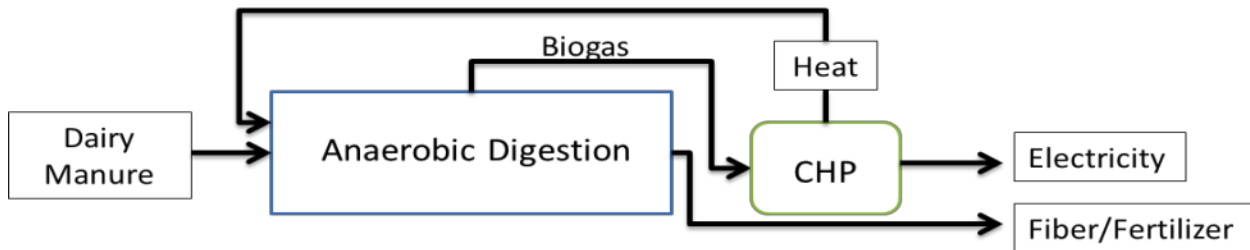


Figure A1. Anaerobic digester with combined heat and power (CHP) system.

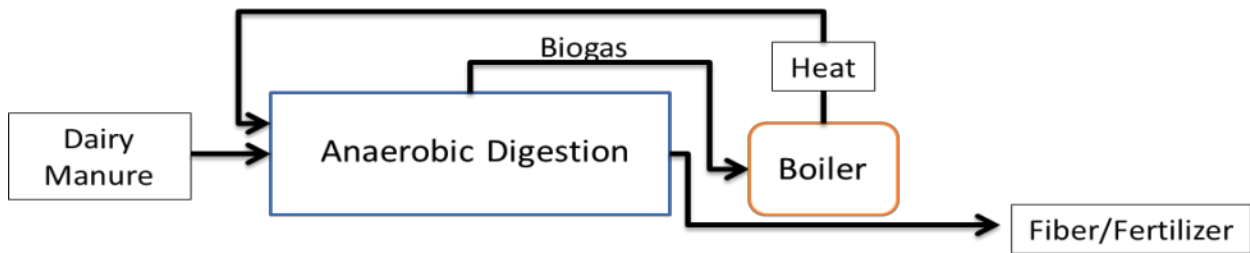


Figure A2. Anaerobic digester with boiler system.

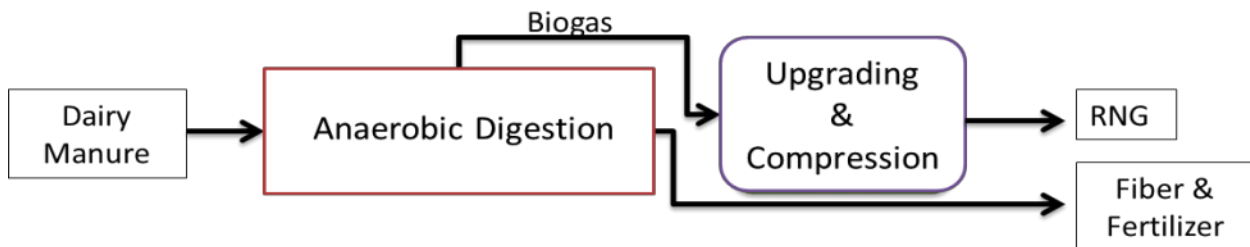


Figure A3. Anaerobic digester with renewable natural gas (RNG) infrastructure.

Appendix Table 1. Revenues and operational costs (in 2012 constant dollars) for the anaerobic digester project with a combined heat and power system, selected years.

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Electricity Produced/Rate											
Electricity Generation (kWh)	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600	8,409,600
Electricity Used in Digester	672,768	672,768	672,768	672,768	672,768	672,768	672,768	672,768	672,768	672,768	672,768
Net Electricity Available for Sale	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832	7,736,832
Electricity Purchase Price (per kWh)	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065	\$0.065
Renewable Energy Certificate Price (per kWh)	\$0.010	\$0.010	\$0.004	\$0.004	\$0.004	\$0.004	\$0.004	\$0.004	\$0.004	\$0.004	\$0.004
Projected Revenue Electricity											
Electricity Sales	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144	\$506,144
Renewable Energy Certificates	\$77,368	\$77,368	\$30,947	\$30,947	\$30,947	\$30,947	\$30,947	\$30,947	\$30,947	\$30,947	\$30,947
Washington State Renewable Energy Incentive	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Electricity Revenues	\$588,512	\$588,512	\$542,091	\$542,091	\$542,091	\$537,091	\$537,091	\$537,091	\$537,091	\$537,091	\$537,091
Fiber Sales											
Cubic Yards Per Year	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Price per cubic yard	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00
Subtotal Fiber Revenues	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000
Nutrient Sales											
Tons Per Year	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price/Ton (medium price)	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Subtotal Nutrient Revenues	\$37,500	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000
Carbon Credits											
Credits per Year	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00	21,063.00
Price per Credit	\$8.50	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Transaction Costs	\$6,672	\$11,672	\$6,672	\$6,672	\$6,672	\$6,672	\$0	\$0	\$0	\$0	\$0
Subtotal Carbon Credits Revenue	\$172,363	\$198,958	\$203,958	\$203,958	\$203,958	\$203,958	\$0	\$0	\$0	\$0	\$0
TOTAL REVENUE	\$1,092,375	\$1,156,470	\$1,115,049	\$1,115,049	\$1,115,049	\$1,110,049	\$906,091	\$906,091	\$906,091	\$906,091	\$906,091
Operation Costs											
Generator Maintenance & Repair Cost	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059	\$227,059
Digester Maintenance & Repair Cost	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210	\$23,210
Labor Cost	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000
TOTAL COST	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270	\$283,270
NET REVENUE	\$809,105	\$873,200	\$831,779	\$831,779	\$831,779	\$826,779	\$622,821	\$622,821	\$622,821	\$622,821	\$622,821

Appendix Table 2. Revenues and operational costs (in 2012 constant dollars) for the anaerobic digester project with a boiler system, selected years.

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Electricity Produced/Rate											
Electricity Generation (kWh)	0	0	0	0	0	0	0	0	0	0	0
Electricity Used in Digester	0	0	0	0	0	0	0	0	0	0	0
Net Electricity Available for Sale	0	0	0	0	0	0	0	0	0	0	0
Electricity Purchase Price (per kWh)	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654	\$0.0654
Renewable Energy Certificate Price (per kWh)	\$0.0100	\$0.0100	\$0.0040	\$0.0040	\$0.0040	\$0.0040	\$0.0040	\$0.0040	\$0.0040	\$0.0040	\$0.0040
Projected Revenue Electricity											
Electricity Sales	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Renewable Energy Certificates	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Washington State Renewable Energy Incentive	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<i>Subtotal Electricity Revenues</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>	<i>\$0.00</i>
Fiber Sales											
Cubic Yards Per Year	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Price per cubic yard	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00
<i>Subtotal Fiber Revenues</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>
Nutrient Sales											
Tons Per Year	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price/Ton (medium price)	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
<i>Subtotal Nutrient Revenues</i>	<i>\$37,500</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>
Carbon Credits											
Credits per Year	21,063	21,063	21,063	21,063	21,063	21,063	0	0	0	0	0
Price per Credit	\$8.50	\$10.00	\$10.00	\$10.00	\$10.00	\$10.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Transaction Costs	\$6,672	\$11,672	\$6,672	\$6,672	\$6,672	\$6,672	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Carbon Credits Revenue</i>	<i>\$172,363</i>	<i>\$198,958</i>	<i>\$203,958</i>	<i>\$203,958</i>	<i>\$203,958</i>	<i>\$203,958</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
TOTAL REVENUE	\$503,863	\$567,958	\$572,958	\$572,958	\$572,958	\$572,958	\$369,000	\$369,000	\$369,000	\$369,000	\$369,000
Operation Costs											
Generator Maintenance & Repair Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Digester Maintenance & Repair Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Labor Cost	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000
TOTAL COST	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000
NET REVENUE	\$470,863	\$534,958	\$539,958	\$539,958	\$539,958	\$539,958	\$336,000	\$336,000	\$336,000	\$336,000	\$336,000

Appendix Table 3. Revenues and operational costs (in 2012 constant dollars) for the anaerobic digester project with a renewable natural gas infrastructure, selected years.

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Electricity Produced/Rate											
Electricity Generation (kWh)	8,409,600	0	0	0	0	0	0	0	0	0	0
Electricity Used in Digester	672,768	0	0	0	0	0	0	0	0	0	0
Net Electricity Available for Sale	7,736,832	0	0	0	0	0	0	0	0	0	0
Electricity Purchase Price (per kWh)	\$0.0654	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Renewable Energy Certificate Price (per kWh)	\$0.0100	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Projected Revenue Electricity											
Electricity Sales	\$506,144	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Renewable Energy Certificates	\$77,368	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Washington State Renewable Energy Incentive	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<i>Subtotal Electricity Revenues</i>	<i>\$588,512</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
Renewable Natural Gas											
Natural Gas Produced (MMBTU per year)	0	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341
Sumas Cascade Price (per MMBTU)	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27
<i>Subtotal Natural Gas Revenues</i>	<i>\$0</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>	<i>\$517,775</i>
Fiber Sales											
Cubic Yards Per Year	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Price per cubic yard (medium price)	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00
<i>Subtotal Fiber Revenues</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>	<i>\$294,000</i>
Nutrient Sales											
Tons Per Year	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price/Ton (medium price)	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
<i>Subtotal Nutrient Revenues</i>	<i>\$37,500</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>	<i>\$75,000</i>
Carbon Credits	\$142,446	\$163,688	\$168,688	\$168,688	\$168,688	\$168,688	\$0	\$0	\$0	\$0	\$0
TOTAL REVENUE	\$1,062,457	\$1,050,463	\$1,055,463	\$1,055,463	\$1,055,463	\$1,055,463	\$886,775	\$886,775	\$886,775	\$886,775	\$886,775
Operation Costs*											
TOTAL COST	\$283,270	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551
NET REVENUE	\$779,188	\$752,912	\$757,912	\$757,912	\$757,912	\$757,912	\$589,224	\$589,224	\$589,224	\$589,224	\$589,224
TOTAL COST	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000
NET REVENUE	\$470,863	\$534,958	\$539,958	\$539,958	\$539,958	\$539,958	\$336,000	\$336,000	\$336,000	\$336,000	\$336,000

*Operation costs include labor, and maintenance and repair of the digester and scrubbing technology (used to remove impurities from methane to produce pipeline quality gas), maintenance of the pipeline, and injection of RNG to the pipeline (delivery charge).

Appendix Table 4. Revenues and operational costs (in 2012 constant dollars) for the anaerobic digester project with a renewable natural gas (RNG) infrastructure under RNG price scenario 1 (commodity value plus the RIN value), selected years.

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Electricity Produced/Rate											
Electricity Generation (kWh)	8,409,600	0	0	0	0	0	0	0	0	0	0
Electricity Used in Digester	672,768	0	0	0	0	0	0	0	0	0	0
Net Electricity Available for Sale	7,736,832	0	0	0	0	0	0	0	0	0	0
Electricity Purchase Price (per kWh)	\$0.0654	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Renewable Energy Certificate Price (per kWh)	\$0.0100	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Projected Revenue Electricity											
Electricity Sales	\$506,144	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Renewable Energy Certificates	\$77,368	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Washington State Renewable Energy Incentive	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Electricity Revenues	\$588,512	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Renewable Natural Gas											
Natural Gas Produced (MMBTU per year)	0	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341	158,341
Sumas Cascade Price (per MMBTU)	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27	\$3.27
Subtotal Natural Gas Revenues at Commodity Price	\$0	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775	\$517,775
No. of RINS	0	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377
RIN Price (\$/RIN)	\$0.00	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74
RIN Transaction Fee	\$0	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409
Subtotal Natural Gas Revenues from RIN	\$0	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310
Fiber Sales											
Cubic Yards Per Year	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Price per cubic yard (medium price)	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00
Subtotal Fiber Revenues	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000
Nutrient Sales											
Tons Per Year	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price/Ton (medium price)	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Subtotal Nutrient Revenues	\$37,500	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000
Carbon Credits	\$142,446	\$163,688	\$168,688	\$168,688	\$168,688	\$168,688	\$0	\$0	\$0	\$0	\$0
TOTAL REVENUE	\$1,062,457	\$2,520,773	\$2,525,773	\$2,525,773	\$2,525,773	\$2,525,773	\$2,357,085	\$2,357,085	\$2,357,085	\$2,357,085	\$2,357,085
Operation Costs*	\$283,270	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551
TOTAL COST	\$283,270	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551	\$297,551
NET REVENUE	\$779,188	\$2,223,222	\$2,228,222	\$2,228,222	\$2,228,222	\$2,228,222	\$2,059,534	\$2,059,534	\$2,059,534	\$2,059,534	\$2,059,534

*Operation costs include labor, and maintenance and repair of the digester and scrubbing technology (used to remove impurities from methane to produce pipeline quality gas), maintenance of the pipeline, and injection of RNG to the pipeline (delivery charge).

Appendix Table 5. Revenues and operational costs (in 2012 constant dollars) for the anaerobic digester project with a renewable natural gas (RNG) in infrastructure under RNG price scenario 2 (retail price of compressed natural gas plus the RIN value), selected years.

	2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032
Electricity Produced/Rate											
Electricity Generation (kWh)	8,409,600	0	0	0	0	0	0	0	0	0	0
Electricity Used in Digester	672,768	0	0	0	0	0	0	0	0	0	0
Net Electricity Available for Sale	7,736,832	0	0	0	0	0	0	0	0	0	0
Electricity Purchase Price (per kWh)	\$0.0654	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Renewable Energy Certificate Price (per kWh)	\$0.0100	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000	\$0.0000
Projected Revenue Electricity											
Electricity Sales	\$506,144	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Renewable Energy Certificates	\$77,368	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Washington State Renewable Energy Incentive	\$5,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Subtotal Electricity Revenues	\$588,512	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Renewable Natural Gas											
Compressed Natural Gas (GGE)	0	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503	1,190,503
Retail Price (\$/GGE)	\$0.00	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85	\$1.85
Subtotal Compressed Natural Gas Revenues	\$0	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430	\$2,202,430
No. of RINS	0	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377	2,056,377
RIN Price (\$/RIN)	\$0.00	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74	\$0.74
RIN Transaction Fee	\$0	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409	\$51,409
Subtotal Compressed Natural Gas Revenues from RIN	\$0	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310	\$1,470,310
Fiber Sales											
Cubic Yards Per Year	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Price per cubic yard (medium price)	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00	\$7.00
Subtotal Fiber Revenues	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000	\$294,000
Nutrient Sales											
Tons Per Year	500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price/Ton (medium price)	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00	\$75.00
Subtotal Nutrient Revenues	\$37,500	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000
Carbon Credits	\$142,446	\$163,688	\$168,688	\$168,688	\$168,688	\$168,688	\$0	\$0	\$0	\$0	\$0
TOTAL REVENUE	\$1,062,457	\$4,205,428	\$4,210,428	\$4,210,428	\$4,210,428	\$4,210,428	\$4,041,740	\$4,041,740	\$4,041,740	\$4,041,740	\$4,041,740
Operation Costs*	\$283,270	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227
TOTAL COST	\$283,270	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227	\$714,227
NET REVENUE	\$779,188	\$3,491,201	\$3,496,201	\$3,496,201	\$3,496,201	\$3,496,201	\$3,327,513	\$3,327,513	\$3,327,513	\$3,327,513	\$3,327,513

*Operation costs include labor, and maintenance and repair of the digester and scrubbing technology (used to remove impurities from methane to produce pipeline quality gas), maintenance of the pipeline, and injection of RNG to the pipeline (delivery charge).



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