

## **Dairy Digestion in the Pacific Northwest: Its Barriers, Needs, and Potential Solutions**

Katie Fankhauser, The Climate Trust, December 2013

### SUMMARY

The following report provides an analysis of the current landscape of dairy digestion in the Pacific Northwest. This summary page provides a quick overview of the fundamental points to take away from this research, while the remaining pages give important detail to each.

The four biggest *barriers* in anaerobic digestion development are identified as:

- Inadequate construction financing
- Reduced revenue/market projections
- Uncertain policy
- Burdensome regulations

Possible *solutions* to these barriers are as follows:

- Bridge loan financing for construction
- Long-term, above-market purchasing agreements
- Diversified revenue streams
- Passage of long-term, consistent, clear policy
- Standardization and aggregation of permitting and verification

### *The Climate Trust's Role*

At the least, The Climate Trust should continue to act as a qualified professional in the anaerobic digestion business, providing expert opinion and guidance to projects and legislature. Beyond that, there are exciting opportunities for the organization to influence the field as a capital provider, carbon credit market player, and/or policy leader. The Climate Trust could act as or contribute to the roles of an agency, legislator, lender, and consultant, directly addressing 11 out of the 13 recommendations suggested by Essential Consulting Oregon for Oregon's—and deductively, the wider Pacific Northwest's—dairy digestion industry.

### *Future of the Funding Matrix/Tool*

A funding matrix that aggregates open funding sources for anaerobic digestion projects in the Pacific Northwest is included with this report. The next step should be to share the completed matrix with other industry professionals and receive their feedback as to whether the identified sources are innovative and practical. This will also inform future development of similar initiatives. However, creation of an online funding platform from this matrix should be tabled until the anaerobic digestion market has matured and relevant policy is more secure. More substantial opportunities exist now for The Climate Trust to explore becoming a capital provider, fund manager, and/or networking channel.

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Recommendation	Dairies	Cooperatives	Agencies	Legislature	Retailers	Utilities	Lenders	Consultants	Tech Vendors	Benefit	Potential TCT
											Actions
Promote digesters as part of long-term solution for dairy viability	X	X	X	X	X			X	X	Supports long-term success of biogas energy; facilitates financing, GHG reduction and dairy viability	Continue anaerobic digestion sectorial focus; continue to provide expertise and diligence to the industry
Spearhead development of markets for all biogas plant products (electrical/thermal energy and fiber/nutrients)		X						X		Supports long-term success of biogas energy; facilitates bank financing, GHG reduction and dairy viability	Provide advance market commitments for the purchase of carbon credits; Study the market for value-added products
Provide 'year round' bridge financing against federal/state grants and tax credits to secure construction financing			X	X			X			Ensures immediate deployment of projects and supports rural wealth retention	Capital provider—credit bank and loan program model
Provide 'year round' long-term financing against project level collateral			X	X			X			Reduces onerous nature of acquiring loan guarantees and collateral (beyond project); supports rural wealth retention	Partner with charitable foundation (ex. Packard) to provide refinancing of initial construction loan
Fast-track project incentives, permits, and interconnection			X			X				Improves project development and reduces development risk	Standardization and aggregation of requirements
Institute feed-in-tariffs				X						Supports the long-term success of biogas energy; facilitates financing	White paper describing the benefits and steps toward implementation
Purchase biogas energy through wheeling arrangements with utilities					X					Supports long-term success of biogas energy; facilitates financing and GHG reduction	NA
Provide process guarantees and guaranteed maximum prices for turn key projects									X	Supports development of biogas energy and facilities bank financing	NA
Secure and readily distribute funds for feasibility studies		X	X			X				Facilities deployment of well planned projects	Capital provider for promising early-stage projects—part of

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									credit bank model	
Engage professional services for feasibility studies	X	X			X	X			Ensures proper planning	Provide consulting services for project partners
Educate stakeholders about the value of biogas energy	X	X	X	X		X	X		Raises overall awareness of the value of biogas energy	Continue to be a leader in the industry, showing expertise through consulting, white papers, and marketing
Support need for energy dense co-digestion feedstock	X		X	X		X	X		Improves financial returns and GHG reductions	Strongly advise co-digestion in project support
Support use local construction companies	X				X	X	X		Facilitates local job creation and wealth retention	Source and provide contact information of experienced project developers and partners

Figure 1. Recommended Actions for Dairy Digestion Industry  
Adapted from Essential Consulting Oregon, 2009.<sup>3</sup>

## INTRODUCTION

Dairy digestion—the anaerobic decomposition of cow manure to produce biogas, a form of renewable energy—has received attention as a project type capable of participating in the carbon market, especially with its inclusion as one of the four California Air Resources Board (CARB) compliance offset protocols. This attention is not without good reason: environmental benefits include greenhouse gas abatement, odor reduction, water quality protection, nutrient management, reduced animal and food waste, and avoided energy use.<sup>1</sup> Compared to other renewable energy sources, such as solar or wind, biogas projects not only have the ability to significantly reduce greenhouse gas emissions, but they also address the emission of methane, a more potent greenhouse gas than carbon dioxide. Moreover, energy production from dairy digesters is uninterrupted and reliable year-round because it is not dependent on weather conditions.<sup>2</sup> However, development of anaerobic digestion projects also faces numerous obstacles, namely in the areas of financing, revenue or market projections, policy, and navigating all of three these adroitly and efficiently. Notably, the technology surrounding the digesters and their interconnection to power grids are generally established and these are not seen as limitations.<sup>3</sup>

This report is confined to the Pacific Northwest, a region that holds some of the highest energy production potential in the nation. However, this potential has yet to be realized: Washington currently only hosts eight dairy digesters out of a total of 125 candidate farms; Idaho has six operating digesters, but boasts potential on 203 farms; Oregon could have 36-80 digesters, but as of now only has eight; and while Montana has the least potential with a range of 0-15 candidate farms, there is still room to increase its numbers from the one digester currently located in the state.<sup>4,5</sup>

In the interest of providing an understanding of the industry, and ultimately, encouraging the development of more anaerobic digesters on dairy farms in the Pacific Northwest, this report outlines the four biggest development barriers—again, financing, revenue or market concerns, policy, and navigation of these three simultaneously. Included in these discussions are an analysis of possible solutions aimed at confronting these barriers and the role The Climate Trust (TCT), or a similar entity, could play in achieving these improvements. Finally, the recommendations section presents an overview of the next realistic steps for interested parties and the market, more abstractly, to take. Essential to this conversation, and a driver of much of it,

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<sup>1</sup> AgStar. *Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities*. Rep. United States Environmental Protection Agency, Nov. 2011. Web. 6 Dec. 2013. <[http://www.epa.gov/agstar/documents/biogas\\_recovery\\_systems\\_screenres.pdf](http://www.epa.gov/agstar/documents/biogas_recovery_systems_screenres.pdf)>.

<sup>2</sup> Weisberg, Peter and Thad Roth. *Growing Oregon's Biogas Industry: A Review of Oregon's Biogas Potential and Benefits*. Rep. The Climate Trust and Energy Trust of Oregon, Feb. 2011. Web. <http://www.climatetrust.org/documents/GrowingORBiogasIndustryWhitePaper.pdf>.

<sup>3</sup> Essential Consulting Oregon. *Oregon Dairy Digester Feasibility Study Summary Report*. Rep. Northwest Dairy Association, 25 Jan. 2010. Web. 5 Dec. 2013. <<http://www.oregon.gov/energy/RENEW/Biomass/docs/OregonDairyDigesterFeasibilityStudySummaryReport.pdf>>.

<sup>4</sup> Ibid. 1.

<sup>5</sup> *Anaerobic digesters, sorted by operational status and by state*. AgStar, United States Environmental Protection Agency, Jan. 2014. Web. 14 Mar 2014. <<http://www.epa.gov/agstar/projects/>>.

is the attached funding matrix that has aggregated sources of funding for the development of dairy digestion projects in the Pacific Northwest.

## FINANCING

### *Obstacles*

From 2009 to 2011, the latest year of data from the Renewable Energy Finance Tracking Initiative (REFTI), the largest barriers to biomass project development were capital needs and inadequate project economics, over other concerns such as technology, permitting, transmission, and accessing incentives.<sup>6</sup> While this self-reporting survey only included 28 respondents in the biomass industry, the quantified data enforces current dialogue heard among industry experts—project developers and organizational leaders—who say that funding is the biggest need for projects; albeit this is ultimately an effect of several factors, specifically those discussed in the following sections.

There have been several recent developments that have negatively impacted biomass development. The Pacific Northwest experiences some of the lowest electricity rates in the nation because of the region's ability to harness hydropower. Where the national average rate is \$0.1045/kWh, customers in Washington, Oregon, Idaho, and Montana pay on average only \$0.0793/kWh for electricity.<sup>7</sup> Subsequently, the avoided cost rate, which is based on the lowest-cost fossil fuel alternative, available to biogas producers is lowered, and, in addition, utilities are able meet the requirements of their Renewable Energy Portfolios with little inclusion of biogas.

Financing prospects were further reduced with the closure in 2013 of the Oregon Business Energy Tax Credit (BETC), which has been an integral part of renewable energy systems development. Moreover, the end of 2013 will see the expiration of two important federal renewable energy tax credits, the Production Tax Credit (PTC) and Investment Tax Credit (ITC). Purchase agreements with utilities and federal and state incentives were both identified as “extremely” or “very” important to development in the REFTI data<sup>8</sup>, thus the latest energy and political landscapes serve to compound the more general credit financing problems historically seen for these types of projects.

However, even with adequate incentives, projects would have trouble getting off the ground because of high initial construction costs, which are not addressed by these post-operational returns. This creates the need for bridge loans to cover equipment and installation costs, but accessing these loans can be challenging and expensive. As a relatively new market with little precedence, there is much misunderstanding and doubt on the part of investors. Concerns over the stability of incentives, much like those mentioned above, and the carbon market lead to reduced interest in providing bridge financing. Even when lenders, most often banks, approve construction loans, they require burdensome over-collateral. Traditional lenders lack the capacity to evaluate the viability and risks of individual projects so they tend to

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<sup>6</sup> *Renewable Energy Finance Tracking Initiative: 2H 2011 Summary*. National Renewable Energy Laboratory, 2012. Web. 5 Dec. 2013. <<https://financere.nrel.gov/finance/REFTI>>.

<sup>7</sup> [http://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.cfm?t=epmt\\_5\\_6\\_a](http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a)

<sup>8</sup> *Ibid.* 4.

generalize and focus on the past failures and uncertainties of the general market, and ultimately withhold financing.<sup>9,10</sup> Accessing construction financing is at the crux of the problem because without it projects stall before they can even hope to tap into other sources of capital.

## *Solutions*

The funding matrix was initially designed to confront this gap in bridge financing as it collects open funding prospects for dairy digestion projects in the areas of pre-development, construction, and post-operation into one document. While aggregating sources of funding is an important first step, tangential improvements are needed in financing arena. The matrix opens the opportunity to support more payment stacking—receiving multiple payments toward establishing one practice—initiatives. Other forms of stacking—horizontal, vertical, and temporal—should be explored, too, as environmental credit markets develop.<sup>11</sup> While current policies and practices surrounding stacking are uncertain, if they can be developed in a transparent and effective way, widening the pool of available grants, loans, incentives, and markets will only help project developers by allowing access to more financial resources.

In order to augment the sources already identified, another capital pool devoted to construction financing would strengthen dairy digestion development prospects. Peter Weisberg, a project manager at The Climate Trust, and Thad Roth, of Energy Trust of Oregon, propose a bridge loan program where after projects raise 30% of their capital costs they can receive a grant or low-interest loan for another 15% of the cost; traditional debt financing would then be easier obtain with these other assurances.<sup>12</sup> Using this model as a starting point, discussion over such a program should continue.

The relative young age of dairy digestion necessitates that a third party evaluator is present to assess the viability of projects, providing due diligence to banks and foundations who are interested in getting involved in anaerobic digestion projects, but who do not have the resources to perform risk assessments internally.

## *The Climate Trust's Role*

At the very least, TCT can act as industry experts who understand the projects and market, a much needed element in order to make smart investment choices.<sup>13</sup> A more active role would have TCT enter as a capital provider itself, where its sound business reputation would increase the legitimacy of the market as a whole, and likely leverage participation by other investors, such as regional banks and philanthropic organizations.

A particularly novel and exciting proposal would form a partnership between The Climate Trust, the Packard Foundation, and a private equity firm. The private investor,

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<sup>9</sup> Ibid. 3.

<sup>10</sup> Ibid. 2.

<sup>11</sup> “How Can Conservation Programs Effectively Interact with Environmental Markets?” World Resources Institute with the USDA Office of Environmental Markets, Nov. 2013. <http://blogs.usda.gov/2013/11/21/new-issue-papers-exploring-environmental-markets/>, p. 5.

<sup>12</sup> Ibid 6, p. 13-14.

<sup>13</sup> Ibid 6, p. 14.

inherently structured to take higher risks, would provide the initial construction financing; the Foundation would pay into a fund that would be designed to refinance the initial private loan upon the project becoming operational; and TCT would have the dual responsibility of managing the fund as well as contracting advanced market commitments for the carbon credits in order to ensure a revenue stream and project return. The model could be expanded further to allow TCT to contribute some of its own funds to construction and receive environmental credits to retire and/or sell as our portion of return.

## REVENUE AND MARKET PROJECTIONS

### *Obstacles*

For dairy digesters to be successful, financing and revenue considerations are two sides of the same coin. Dave Moldal, a renewable energy project manager at Energy Trust of Oregon, says confidence in a 10-12% return on investment is necessary in order to receive debt financing. If this is in place, then financing will follow. In concordance, Kevin Maas, a project developer associated with Farm Power Northwest, and Matt Krumenauer, of the Oregon Department of Energy, identified the lack of revenue guarantees as the largest limiting factor to receiving capital, and thus project development. Revenue sources and levels are constantly changing, and most have been contracting lately. Electricity purchases are the largest source of revenue generated by dairy digesters. However, as mentioned above, current market prices are not high enough to command adequate returns. An analysis done by Essential Consulting Oregon on the feasibility of dairy digesters in Oregon found that a strong power purchase agreement (PPA) with a receiving utility was the largest factor in project viability, over even capital expenditures.<sup>14</sup> Yet, utilities in the Pacific Northwest are on the whole unmotivated to purchase the energy at prices that would make these projects economical.

In an effort to bypass the depreciated electricity market, alternative energy uses for biogas have been developed. Biogas can be cleaned, upgraded and injected directly into natural gas pipelines or used as transportation fuel after compression. These alternate uses command higher prices, but are constrained by a lack of long-term off-take agreements, higher capital costs, scale, and uncertain policy themselves.

The environmental market—the sale of carbon credits and renewable energy certificates (RECs)—is the other main avenue for revenue, but is highly volatile and at present cannot be relied upon as a consistent supply of funds. Additionally, credit sales do not provide a substantial amount of revenue. For example, the digester on VanderHaak Dairy in Washington only receives 5% of its revenue from carbon credits.<sup>15</sup>

### *Solutions*

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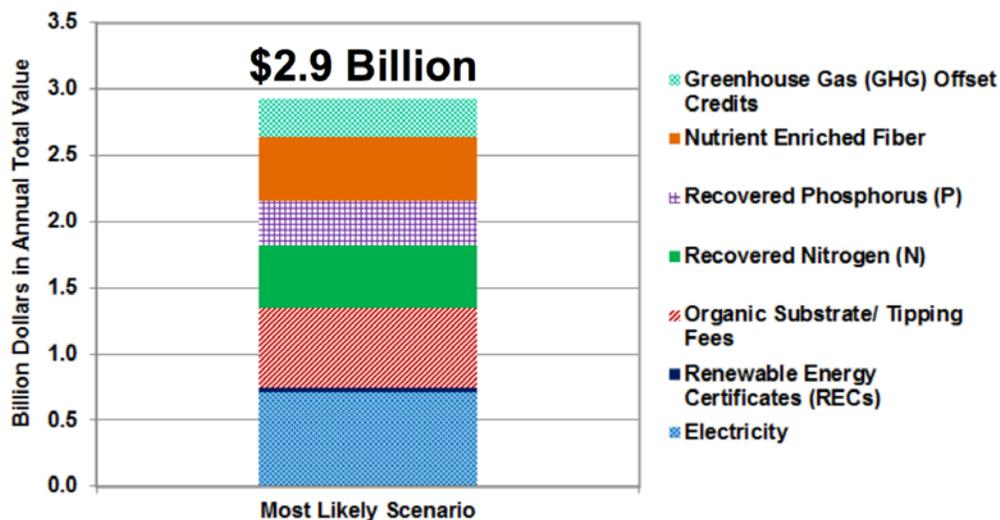
<sup>14</sup> Ibid. 3, p. 18.

<sup>15</sup> <http://www.epa.gov/agstar/documents/workshop08-2/shumway.pdf>

When considering electricity agreements, avoided cost PPAs generally result in limited returns, so really a negotiated PPA, where the energy and RECs are sold together at a premium, is needed for favorable returns.<sup>16</sup> Even better would be a Feed-in Tariff (FiT) that requires utilities to purchase renewable energy at above market rates.<sup>17</sup> On the side of natural gas and transportation fuel, efforts should be placed in establishing long-term off-take agreements with gas companies that extend over 20 years, which would add much needed stability to the market. These initiatives need to be encouraged at all levels by developers, consultants, and during policy discussions.

Long-term purchase agreements should also be secured for ecosystem market credits and secondary, value-added products, such as livestock bedding and fertilizer, which are physical byproducts of the digestion process. Additionally, tipping fees—the payment received for accepting others’ animal and food waste—contribute a significant amount of revenue. Figure 2 below shows the potential market value of these items if digesters were installed on all dairies in the United States housing 500 cows or more; it is most useful, perhaps, to see the value of each source proportional to the others.

If a digester does not capitalize on these secondary products, their return on investment will be low or negative.<sup>18</sup> Essential Consulting Oregon summarizes it nicely: “all parties interested in promoting dairy-based biogas development should play a role in improving power purchase rates, controlling feedstock acquisition expense, and establishing co-product markets.”<sup>19</sup>



<sup>16</sup> Ibid. 3, p. 12.

<sup>17</sup> Ibid 3, p. 19.

<sup>18</sup> Informa Economics. *National Market Value of Anaerobic Digester Products*. Rep. Innovation Center for U.S. Dairy, Feb. 2013. Web. 13 Dec. 2013.

<http://www.usdairy.com/Public%20Communication%20Tools/NationalMarketValueofAnaerobicDigesterProducts.pdf>, p. 69.

<sup>19</sup> Ibid. 3, p. 19.

Figure 2. Potential Market Value of Dairy Digestion Value-Added Products<sup>20</sup>

## *The Climate Trust's Role*

TCT should continue to support the expansion of environmental offset markets, such as the one directed by CARB. Activities to this end include developing methodologies to increase the number of protocols for various carbon projects, writing white papers to influence upcoming policy discussions over the future of the California (and national) markets, and serving as a general source of informed input. Without clear, sure guidelines and time horizons, interest and participation in the market will continue to fluctuate.

Once the validity and trajectory of environmental markets is established, TCT has the ability to be a major player with the unique power to provide guaranteed off-takes. The organization already does this when contracting with projects, but can expand the volume of advance market commitments it makes by participating in partnerships, like the one with Packard described in the previous section, where several investors have pledged funds at different stages of development. TCT's commitment would be part of the package deal so funds are available for a wide range of activities.

Brad Hunter, a representative of Craft3, a community development financing institution (CDFI), would like to see TCT enter complementary markets, such as the trading of RECs and/or renewable identification numbers (RINs). Providing three to five year contracts would give stability to these two additional environmental markets. These efforts again call upon TCT's experience and expertise in evaluating projects and the overall market. While RECs and RINs are important in the overall scheme of renewable energy, indirect encouragement is as far as involvement should go at this time because of organizational priorities and workload.

Regardless, because carbon credits cannot sustain a digester themselves, future research should be done to study the possibilities of value-added products in the market. This should include a survey of various ecosystem credit stacking opportunities. Ultimately, an aggregation of possible revenue sources would be created to supplement the capital funding matrix attached to this report. Being able to see both sides of the coin—financing and return—at the same time before beginning a project would help increase project quality and market confidence.

## POLICY

### *Obstacles*

The policy surrounding anaerobic digesters is inconsistent and incomplete. The Oregon BETC expired in early 2013, as mentioned before, and the Oregon Biomass Producer and Collector tax credit will expire in 2018. Moreover, two large federal incentive programs, the ITC and PTC, are set to retire on December 31, 2013. In the past, the latter two have been extended for one or two more years at the last moment. They have also been allowed to lapse and then reinstated in subsequent legislature. This kind of erratic behavior negatively impacts the digester industry because developers and off-takers can never be assured that the correct policy will be in place to support their activities, particularly so because these projects span several decades and

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<sup>20</sup> Ibid. 13, p. 14.

positive returns on investment are often not realized until ten to twenty years after construction.<sup>21</sup> The unpredictable policy landscape touches power purchase agreements, carbon credit markets, and, ultimately, diminishes revenue projections, which in turn reduces the amount of financing that will be available for construction.

Furthermore, no specific requirement for biogas has been carved out in states' renewable portfolio standards (RPS).<sup>22</sup> Subsequently, in Oregon for example, biogas only constitutes 0.63% of the state's renewable energy sources.<sup>23</sup> When utilities can supplement their energy make-up with cheaper and more proven renewables, such as wind and hydro, they have little incentive to purchase electricity from dairy digesters. In addition, there is no consideration in Oregon's RPS for digesters that combust the gas for heat, inject it directly into pipelines, or compress it into transportation fuel. More economical project choices could be bypassed because projects feel as if they have to produce electricity to receive incentives.

Brian Barlia, a project developer at Revolution Energy Solutions, equates investing in anaerobic digestion to playing in a venture industry because policy predictions are so unclear. One of Barlia's partnering farmers, Jock Gibson of Lochmead Farms, could not speak much to project logistics, but he did evidence the overriding factor for green project development to be federal and state incentives. If those end, or even diminish to some degree, projects will also cease to happen. Matt Krumenauer, Oregon Department of Energy, sees little growth in dairy digestion until there is a policy push, either through states' RPS or market improvements.

## *Solutions*

Many of the solutions proposed in the financial and revenue sections of this report will require policy changes before they can really be effectively implemented. For example, any efforts to implement effective ecosystem credit stacking, environmental market guarantees, feed-in tariffs, off-takes for natural gas, low carbon fuel standards (LCFS) for compressed biogas, and RPS enhancements will take unified policy initiatives. These efforts should come from federal, state, and local levels.

## *The Climate Trust's Role*

Barlia's one suggestion above the rest: use TCT's resources and knowledge to create and influence secure, long-term, consistent policy as that will be the best driver of capital in the long run. Practically, this manifests itself in a capability to produce quick white papers that are relevant to pressing policy issues. Recent work on comparing cap and trade systems to carbon taxes serves as a good model.

Craft3 banking institution has been involved with an enterprise in Washington that seeks to bring together various stakeholders to agree on what key policies exist and which are needed relating to anaerobic digestion. Before Oregon and other states can start these conversations, research needs to be undertaken to identify the main players who have a direct hand in advocating for new or improved policies, to define what those efforts are, and set priorities.

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<sup>21</sup> Ibid. 3, p. 19.

<sup>22</sup> Ibid. 6, p. 13.

<sup>23</sup><http://www.oregon.gov/energy/RENEW/docs/Hydroelectricity%20and%20the%20Oregon%20RPS%20Fact%20heet.pdf>

## NAVIGATING THE MAZE

### *Obstacles*

Regulatory hurdles have the ability to delay a project for several years or completely discourage development. There are various permits relating to land use, waste and nutrient management, and digester technology. Many projects are dissuaded from using co-digestion—a practice identified as key for gaining a return on investment<sup>24</sup>—because of the additional permitting processes required. Not only are regulations inconsistent across states, and even agencies, they are often changing and incoherent.<sup>25, 26</sup> Amanda Green, a renewable energy project coordinator for the Oregon Dairy Farmers Association who worked closely on the digester at Lochmead Farms, said the hoops one has to jump through to get these projects going, let alone running, are senseless and costly. Every city, county, and governmental entity has different regulations that often require the work of a full time person, and frequently lawyers, to navigate. Farm owners do not have the expendable time themselves to do the paperwork and it can be difficult to find people outside the dairy who are fully committed to the cause and success of the project.

Other obstacles exist after the planning and construction stages. In order for a project to generate and sell carbon credits, it has to go through verification processes. These are expensive, burdensome, and often decrease incentive to a point that digester owners lose interest in participating in the carbon market all together. On smaller dairies, the high price of verification can make a project financially irresponsible, and thus derail potential projects and partners from developing anaerobic digestion on farms.<sup>27</sup>

Overall, knowledge on how to adroitly navigate the financial, market, and political landscapes together is integral to success. Filing permits, grant writing, capital raising, and securing feedstock and purchase agreements all carry steep learning curves and require a certain finesse to accomplish. Unfortunately, project success often depends on completing these correctly and in a timely manner—a difficult task for individuals new to the industry. A general ability to access—or even begin to grasp how to access—the anaerobic digester business is seriously lacking.

### *Solutions*

The most important player here is the project developer, the people that work at Farm Power Northwest or Revolution Energy Solutions. They have experience, learned lessons, and deep understanding of each part step in development. Therefore, most digesters installed on

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<sup>24</sup> Yorgey, Georgine, Chad Kruger, Craig Frear, Richard Shumway, Clark Bishop, Shulin Chen, and Craig MacConnell. "Anaerobic Digestion in the Pacific Northwest." *Rural Connections* 5.2 (2011): 33-38. Western Rural Development Center, June 2011. Web. 6 Dec. 2013.  
<<https://wrdc.usu.edu/files/uploads/Rural%20Connections/RCJUN11w.pdf#page=35>>.

<sup>25</sup> Ibid. 3, pg. 14.

<sup>26</sup> *Washington Dairies and Digesters*. Rep. Washington State Department of Agriculture, Oct. 2011. Web. 4 Dec. 2013. <<http://agr.wa.gov/FP/Pubs/docs/343-WashingtonDairiesAndDigesters-web.pdf>>.

<sup>27</sup> Ibid. 3, pg. 14.

farms in the Pacific Northwest are constructed and owned by someone other than the dairy farmer. Dave Moldal, Energy Trust, and Kevin Maas, a developer himself at Farm Power, stressed a strong personal relationship between the developer and owner as a central characteristic of successful projects. Moreover, banks may look to these relationships when deciding on whether to lend funds, as Rob Holden at New Resources Bank explained.

Notwithstanding a movement toward clear, reasonable policy, aggregation of several projects would go a long way in addressing permitting and verification issues. In this case, proposed digesters on several farms—or those providing feedstock to a centralized digester<sup>28</sup>—could collectively fill out requisite documentation, as well as secure joint off-take agreements. Another option would have an outside entity standardize reporting requirements, by compiling technical, economic, and policy related information, and then supply projects with the streamlined version.

### *The Climate Trust's Role*

TCT can be at the front of these standardization efforts. Its staff already helps projects and investors navigate regulatory, financial, and political landscapes by making its unique expertise available to others, but TCT can also lead the efforts toward a more systemized, hands-off approach.

Peter Weisberg imagines a simplified verification process for smaller and middle-sized dairies that have trouble meeting the financial and time commitments of the current process. To develop a new verification model, one would need to look at all the inputs and outputs of a sample of dairies, statistically establish causality among the variables that determine the amount of emissions reduced, and develop a methodology based on the most important factors. This would allow developers to submit all of the projects under their control for verification. One digester would then be randomly chosen for a more traditional, extensive verification to keep projects accountable. While this simplified methodology would result in an overall fewer credits attributed to each project, it would also reduce transaction costs, and make digesters more attractive to a larger number of dairies. This verification idea is still highly theoretical and would require an expert well versed in statistical analysis, but represents the exciting possibilities for aggregation in the industry.

TCT should also support the work of project developers by promoting them in discussions with dairy farmers. Contact information for the main players in anaerobic digestion should be collected and shared with interested parties, such as farm owners, and personal connections should be encouraged. Brad Hunter, of Craft3, explained that those looking for funding often waste a lot of time trying to find the right person to talk to at an institution. Highlighting the correct representative at an organization, or even what institutions are interested in these types of projects, would help streamline the process for all involved. The quicker projects can start funding conversations with various entities, the better.

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<sup>28</sup> See Hub and Spoke model in *Economic Feasibility of Dairy Digester Clusters in California: A Case Study*. California Dairy Campaign, Rep. United States Department of Agriculture, June 2013. Web. 14 Dec. 2013. <<http://www.epa.gov/region9/organics/symposium/2013/cba-session2-econ-feas-dairy-digester-clusters.pdf>>.

## RECOMMENDATIONS

### *Funding Matrix/Tool*

The funding matrix aggregates potential financiers of anaerobic digestion in the Pacific Northwest. It was started with the idea in mind to create a matching system that would connect projects to funders—a kind of eHarmony for dairy digestion. When narrowing results to match specific projects, it is not suitable to include many filters, because projects have very unique characteristics. The three suggested denominations that can be used to funnel projects to applicable funders are location of project, development stage (pre-development, construction, and post-operation), and funding type (grant, loan, tax credit, depreciations, and incentives).

Through discussions with industry experts, such as project developers and bank lenders, mixed opinions on the practicality of such a tool were received. The main concern, particularly shared by Brian Bralia (RES), Kevin Maas (Farm Power), and Rob Holden (New Resources Bank) was that development happens on a project-by-project basis and cannot be reduced to the broad categories used by matching programs. Project feasibility and viability depends on the unique site's manure sources, land features, technology determinations, co-digestion substrate availability, heat recovery options, permitting, utility interconnection, and feedstock and purchase agreements.<sup>29</sup> Thus, as Bralia points out, the anaerobic digestion business is at this time resistant to commoditization. There are too few similarities—and even existing projects—to be able to group characteristics. Each project requires individualized data analysis, knowledge, learning curves, and personal relationship building.

Additionally, some professed doubt in the practical utilization of the tool. Bralia, again, said that the funding platform would lose any worth it had as projects narrowed in on particular funding sources because it does nothing to address the arduous and time-consuming application processes that are highly specific to each program included on the list. Maas agreed that a major obstacle for farmers was seeing a pay-off from the time expended filing various applications that do not necessarily lead to approval, either in permitting or financing. Amanda Green, Oregon Dairy Farmers Association, said farm owners do not have the time to read paperwork or use a computer program—extra steps tangential to their daily operations. The best way to reach them is through putting “boots on the ground” and approaching owners directly and in the field.

However, the creation of the funding matrix for dairy digestion was still a beneficial exercise. Several encouraging and optimistic thoughts regarding the tool and its various parts were also collected. For example, the general sense was that the more information that was available to developers and interested owners, the better. If an online platform were to be developed in the future, it holds most potential as a networking device and could speed up the process of getting bank and private funding because of the ability to see other investors already committed to a project. It seems the matrix will be most useful to new project developers and farm owners who do not have specific past experience with digesters in the Pacific Northwest; established outfits, such as Farm Power and RES, are most likely already highly cognizant of the funding landscape. Dave Moldal at Energy Trust sees potential for the tool in Idaho and Montana, two states where participation in anaerobic digestion has commanded less attention.

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<sup>29</sup> Ibid. 3, p. 3.

The tool, and certainly the matrix, has potential to affect the industry, but there are other extenuating barriers to development—revenue and policy obstacles—that providing capital, without addressing these other issues simultaneously, will not be fix. At this time, any movement forward with development of an online platform should be tabled. The market is too new and interest too low to justify further investment of time and work. The Climate Trust’s resources could be better spent addressing some of the other potential solutions identified in this report. Instead, the author intends to share the completed matrix with relevant parties in the anaerobic digestion business, particularly those people that have already been approached with the idea: Kevin Maas, Farm Power Northwest; Matt Krumenauer, Oregon Department of Energy; Dave Moldal, Energy Trust of Oregon; Thad Roth, Energy Trust of Oregon; and Brian Barlia, Revolution Energy Systems. Their feedback on whether the matrix presents a complete picture and/or novel funding ideas will provide insight into the potential of a larger scale rollout to anyone interested in entering the digester trade.

### *Other Potential Initiatives*

While researching and creating the funding matrix, other opportunities relevant to a funding platform where The Climate Trust’s efforts could be better utilized were identified. First, the development of a tool for the pre-planning and feasibility stages of projects would be beneficial. As said before, a successful digester depends on several factors: herd size (generally has to be over 500 cows); location; feedstock amount and type; potential markets for electricity, heat, or compressed natural gas; local utility interest; markets for value-added products; existing infrastructure; options for manure movement; and farmer interest.<sup>30</sup> While viability is hard to determine beforehand, models can be developed that suggest general feasibility, or more importantly identify those projects that are most likely to fail. For example, Black and Veatch produced a levelized cost of electricity (LCOE) calculator that is able to predict rough estimates of net return for a digester.<sup>31</sup> A similar tool could be developed to include all of the named factors. Any farm owner interested in installing an anaerobic digester would use the model before contacting potential developers and/or funders. If a site does not meet minimum requirements, then contact information for project developers interested in aggregating feedstock of several dairies into one digester could be provided. Feasibility determinations will have to be a necessary part of any funding initiative.

A joint initiative with the Packard Foundation was mentioned briefly before in the financial section, but it deserves more attention here. While the Program Related Investments (PRI) team expressed an aversion to either funding or participating in an online financing platform, they espoused interest in the creation of a loan program that would be added, itself, to the funding matrix. With private equity providing early-stage capital and TCT acting as a fund manager and off-take party, the personal risk for Packard—and other similar foundations—is lowered significantly. Another foundation willing to accept proposals from TCT—for market development or higher-level organizational restructuring—is the Meyer Memorial Trust;

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<sup>30</sup> Ibid. 22, p. 16.

<sup>31</sup> Black & Veatch. SB1122 Levelized Cost of Energy Calculator, Version 1. Rep, California Public Utilities Commission, Mar 2013. <https://docs.google.com/file/d/0B9-9Vlx0SkkFVHhtV1Y1YnJCc28/edit>.

communication should be directed to Kim Thomas, Program Officer. Partnerships with private investors hold high potential for TCT growth.

Finally, an online networking site already exists and could be mobilized reasonably soon to connect serious anaerobic digesters with funders. Agora<sup>32</sup> allows participants to upload information about the details of their project, including received and needed funding. After going through a very broad filtering system, projects can search capital providers and invite them to look at their profiles; additionally, administrators can invite known external partner organizations to join the site. There are areas to exchange documents, such as feasibility studies and agreements, an ability to create action lists, and ways to monitor general interest in a project. There are currently no anaerobic digestion projects advertised on the platform, but The Climate Trust could lead the efforts toward carving out a section for them. TCT would have to reach out to developers and the funders identified in the funding matrix to explain the site and demonstrate how to use its features to the fullest. TCT could also market itself as a capital provider and get connected to relevant deals, or projects. Agora is in its pilot stage, which is available to five counties in Oregon, with plans of going statewide in 2014. Owners of the site are relying on typical social media networking and word of mouth—exponential growth as more people join and invite others to join—to scale their project. TCT should continue to track its progress, and if it makes organizational sense at the time, eventually become an active participant.

## CONCLUSION

This report has done its best to tease our four specific obstacles for dairy digesters in the Pacific Northwest and propose ways to address those barriers. However, as one can see, this is often not possible because the current landscape is so intricate and interwoven as to render a stratified discussion of just one of the obstacles impossible. Policy drives the ability to ensure and gain revenue, which in turn determines the willingness of other actors to finance the construction of these projects. The four major needs of the market are construction financing, guaranteed revenue, consistent policy, and easier access to the industry.

Thus, further investment in an online funding platform for dairy digestion projects is not recommended. The proposed tool would not be a big enough effort on its own to move the needle in the market toward more project development, and merely ends up becoming another intermediary. Certainly the completed funding matrix should be shared with the industry and their feedback taken into consideration. This will also help gauge interest in more initiatives like it. However, TCT should work more toward finding ways to inject more capital into the industry, promote diversified revenue streams, influence policy discussions, and simplify regulatory requirements.

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<sup>32</sup> <http://agora-platform.com/>



## Appendix A: List of Interviewed Persons

### *Project Developers*

Brian Barlia, Revolution Energy Solutions

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December 5, 2013

Amanda Green, Oregon Dairy Farmers Association

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December 15, 2013

Kevin Maas, Farm Power Northwest

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November 4, 2013

### *Farm Owners*

Jock Gibson, Lochmead Farms

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December 5, 2013

### *Industry Experts*

Kipp Baratoff, Agora

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November 15, 2013

Matt Krumenauer, Senior Policy Analyst of Energy Technology, Oregon Department of Energy

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November 5, 2013

Dave Moldal, Renewable Energy Project Manager, Energy Trust of Oregon

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November 26, 2013

Thad Roth, Renewable Energy Sector Lead, Energy Trust of Oregon Native American Chamber

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October 28, 2013

### *Banks*

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December 9, 2013

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# The ClimateTrust<sup>®</sup>

November 18, 2013

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November 14, 2013

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December 9, 2013

## *Foundations*

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December 5, 2013

The Packard Foundation, Susan Phinney-Silver, Madeline Wu, Peter Kelly (Imprint Capital)  
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December 10, 2013