WRITTEN TESTIMONY OF

THOMAS C. BOUCHER

PRESIDENT & CEO

***NATIVE*ENERGY, LLC**

BEFORE THE

SELECT COMMITTEE ON ENERGY INDEPENDENCE AND GLOBAL WARMING

UNITED STATES HOUSE OF REPRESENTATIVES

JULY 18, 2007

Thank you Mr. Chairman and members of the committee for the opportunity to provide this testimony to the Select Committee on Energy Independence and Global Warming. As a leader in the emerging voluntary carbon offsets market, NativeEnergy has been building both a business model and critical relationships with our business and NGO partners since 2000 – building upon previous in-market experience of our founders and staff.

We became Native American majority-owned in 2005 through a structure that complements our interests in helping tribes expand from hosting wind farms to entering the retail market for the renewable power that their vast wind resources can produce. We have found that we have much to learn from our tribal partners' long term perspective.

The formation of this very committee, and the number of global warming-related bills now being considered, all demonstrate the importance and timeliness of our actions on combating global warming pollution. NativeEnergy is proud of its role in providing high quality carbon offsets for and in our pioneering work expanding the voluntary carbon offsets market.

We have recently worked with Congressman Welch to identify his offices' carbon footprint and to provide him quality carbon offsets to complement energy efficiency measures he has also undertaken. The recent decision by Congress to reduce and offset the capitol's contribution to global warming pollution is one more demonstration of the voluntary market at work.

The testimony provided below responds to the questions posed in the letter we received inviting our testimony.

1. What is the nature and scope of your company's business in the voluntary carbon offset market" Specifically, what kinds of projects does your company undertake, what is your business model for selling offsets, and what is the magnitude of your offset business?

NativeEnergy has been an active participant in the voluntary carbon offsets and renewable energy credit (REC) market for six years. We market RECs as a green power option, and REC-based offsets and other carbon offsets from wind, biomass, solar, and agricultural methane abatement.. To date, we have enabled 25 new renewable energy generation and other offset projects that depended on the voluntary market to be implemented and operate successfully. All of these projects are owned and operated by Indian tribes, Alaska Native Villages, family farmers and local communities and businesses, providing distributed generation to enhance grid reliability, help build sustainable economies, and increase energy security.

We launched operations early in the development of the U.S. voluntary market, and our early growth was slow. More recently, with growing public awareness of global warming (recent Live Earth concerts being a prime example), catastrophic weather events, and the release of the film "An Inconvenient Truth," the carbon offset market has grown dramatically. We and our affiliate, NativeEnergy Travel Offsets, LLC, together now have an expanding staff of more than twenty employees and consultants, and are expecting to market and sell this year more offsets than in all prior years combined, with cumulative sales exceeding 1 million tons. Our customers and business partners range from individuals and households throughout the U.S. and around the world, small businesses and NGOs, and large regional and multi-national corporations and NGOs.

We employ two principal business models for purchasing and selling carbon offsets. As most marketers do, we sell carbon offsets generated in the year produced by operating projects. This model helps projects that are dependent on annual offset revenues.

We also employ our patent-pending business model that we developed to address certain critical failures of the voluntary market that are inhibiting the implementation of a class of important and valuable projects. We designed our "forward stream" model to enable our customers' purchases to achieve directly the principal goal of the voluntary market – to fund the development of carbon mitigation projects that would not have happened without incremental funding from the voluntary market. Our model reflects the fact that by providing a portion of the incremental funding the project needs, enabling it to be implemented, each customer is thereby "responsible for" a portion of the result – the carbon reductions the project will generate over its operating life.

The problem we faced is that while most offset projects are financed on a long-term basis, and so need the incremental revenues on a long-term basis, most customers will purchase only on a short term basis. To enable short term purchases to bring new projects on line directly, we structured our model so that the customer purchases, and pays up front for, exactly what that customer is "responsible for," namely, a share of the project's long-term offsets output. Our commitment to the project to purchase its long-term output displaces the need for incremental debt or equity, and enables the project to proceed with implementation. Our payment, in a lump sum upon commercial operations, provides the financial equivalent of the incremental revenues the project would otherwise need on a long-term basis, discounted to present value.

Our customers then donate their rights to their forward streams of offsets to a 501(c)(3), Clean Air-Cool Planet, subject to a retirement restriction. Having ensured retirement, the customers claim the estimated quantity of carbon offsets to be generated by their share of the project as offsetting their current year's footprint. We make contingency plans to substitute an alternate project if the initial target project fails in development. To insure against project under-performance over time, we discount the projects' expected carbon reductions. The effect of this double protection is that projects financed through our forward purchasing and crediting can be expected to perform, on average, at least as well or significantly better than we estimate. Perhaps most important of all, our model enables our customers to help finance "their own" new projects that will produce their offsets.

Our "forward stream" model fixes a market failure, bridging the gap between the projects' long term requirements and the voluntary market customers' short-term requirements. Due to this market failure, any project that truly needs incremental revenues for its offsets must – in the absence of our model – have an investor that is willing to take the risk that the necessary revenues will be forthcoming, or the project will not be implemented. Many potential offset energy projects have no one to take that risk, and are going unbuilt. Those that lack such investors are typically the smaller, distributed projects that we need to implement everywhere across the country, to reduce carbon emissions, to enhance the reliability of our electricity grid, and to provide local economic benefits to our local communities. Typically the multi-national, increasingly foreign-based, corporations that are investing in large-scale renewable energy projects are not interested in these kinds of project. NativeEnergy's model allows farmers, Indian Tribes, and small business to become project owners.

Further details on our forward purchasing and crediting model are provided on Appendix A. Our estimating and discounting methodologies are provided on Appendix B. Appendix C shows the impact our model has from the perspective of a recent community-owned project.

2. What does your company do to ensure the environmental integrity of the offsets you sell, and how would you characterize the overall quality of the offsets being sold into the U.S. voluntary market today?

We ensure the environmental integrity of the offsets we sell in two principal ways: We sell offsets from renewable energy projects that we are confident do not have significant ancillary adverse environmental impact; and we sell offsets from projects that demonstrate additionality in accordance with the United Nations Framework Convention on Climate Change Tool for the Assessment and Demonstration of Additionality. We believe that both are important to environmental integrity, and as a matter of practice, we follow the standards set by WWF Gold Standard.

We believe that the overall environmental quality of the offsets being sold into the voluntary market today is good. In addition, NativeEnergy has confidence that the experts who are overseeing certification standards will continue to bring rigorous judgment to the offset market, which leads to the third question.

3. How can we ensure that individual customers and companies that purchase carbon offsets are getting what they pay for and that offset projects have environmental integrity, with regard to both climate and non-climate effects? Are industry standard-setting initiatives adequate, or is there some role for governmental regulation? If so, what form should regulation take?

In our experience, most carbon offsets marketers are well aware of and follow the principles set forth in the consumer-protection and unfair-trade practices law and various environmental marketing guidelines. These provide an adequate protection. Further protection is provided by non-profit certifying organizations whose standards are developed through open stakeholder processes. While offset marketers and project developers have a voice in the development of such standards, these standards are essentially imposed upon the industry by the environmental NGO community. As occurred with respect to Green-e certification in the green power/REC market, once such standards become available, using them quickly becomes a business imperative for marketers.

The organizations who are actively involved in developing and implementing standards – principally WWF Gold Standard, the Climate Group and the Center for Resource Solutions – have environmental protection as their core mission, and so can be trusted to ensure the environmental integrity of the offsets they certify. Such organizations, as environmentally-focused non-profits, have much more consumer appeal than regulatory agencies. In addition, such organizations have much greater flexibility than regulatory agencies in being able to modify their standards to reflect the innovation that is occurring in this emerging market.

The voluntary offset market does not at this point need government regulation, and neither would it benefit from it significantly. We see the market improving in quality through the availability and use of third party certification, and growing rapidly to the point at which carbon neutrality is the rule among businesses and as commonplace as recycling among households. Given the pace at which certification standards are being developed and embraced by marketers, we expect offset quality to be sound and consumer confidence to be high.

4. What is the future of the voluntary offset market, and how significant a contribution can that market make to mitigation of climate change?

The voluntary market has provided leadership in the U.S. demonstrating how carbon offsetting works, how easy and cost effective it can be, and has provided regulators and legislators a benchmark for considering future mandatory carbon emission reductions. In the E.U., a vibrant voluntary market has complemented the mandatory cap and trade system in place under the Kyoto Protocol, and we expect this to be the case in a future cap and trade regime in the U.S.

Various estimates exist for the size of the voluntary carbon offsets market today. We believe the market is now in the process of moving from tens of millions to hundreds of million tons per year. Each million tons of reductions is equivalent to reducing gasoline consumption by 100 million gallons.

However large the voluntary offset market becomes, it is about much more than tons of carbon avoided and offset. It is about engaging people. The voluntary market gives ordinary individuals and businesses a genuine and effective way to take a significant step to address climate change. As people enter into the market, their actions become an uncommonly forceful form of advocacy. Elected representative will not sit on the sideline when they realize their constituents want them to take action and those constituents are themselves leading the way.

One final point: The biggest threat to the realization of the long-term benefits of the voluntary offset market is the potential for the necessary government regulation of greenhouse gas emissions to undermine well-designed renewable-energy-based offsets. Said simply, government regulation could kill a significant portion of the voluntary offset market unless policymakers take care to align renewable energy and greenhouse gas policies.

Grid connected renewable electricity generators reduce carbon emissions. Every kilowatt-hour delivered to the grid by renewable generators results, on average, in one less kilowatt-hour generated by fossil fuel-powered generators. Most offsets sold today are from renewable electricity projects, and that will likely continue to be the case – Gold Standard, for example, certifies offsets only from renewable energy or energy efficiency projects.

If the U.S. implements a cap and trade regulatory system to reduce greenhouse gas emissions that does not have a mechanism to credit renewable energy generators with the carbon reductions they produce, in a way that enables them to market and sell that credit into the voluntary market, the very foundation of that market will be lost.

A full discussion of the protection of a viable voluntary market for renewable energy in the context of greenhouse gas emissions regulation is beyond the scope of the Committee's request for our testimony. Nevertheless, we would ask that the Committee note the seriousness of this issue for upcoming cap and trade legislation.

I thank the Committee for this opportunity to speak and I look forward to working with you and your colleagues to ensure success in developing market-based approaches as part of a comprehensive plan to address climate change.

*Native*Energy's Forward Stream CO_2 Offsets Model

*Native*Energy's patent-pending business process provides the highest level of "additionality" – bringing upfront payment to renewable projects for their discounted future REC/offset output, enabling our customers to help directly finance the construction of new wind farms and other renewable energy projects with strong social and economic justice value. Here's how it works:

> Show me a wind farm that gets built with just a year or two of its RECs under contract, and I'll show you a wind farm that was going to be built anyway. Investors and lenders look at the long-term revenues, and if the committed power sale revenues aren't enough, a short-term RECs sale won't make a difference.
>
> *Dale Osborn, President*
> *Distributed Generation Systems, Inc.*

Project Selection:

We focus on projects under development that can demonstrate not only that they are "additional" in the sense that their financial success is dependent on revenues from the REC/offsets markets, but also that they cannot depend on the "prospect" of successive annual short-term purchases from that market – i.e., projects that need their REC/offset revenues secured on a long-term basis to get financed and built.

Our Commitment to the Projects:

We commit (by contract) to the project that if it proceeds with development and achieves commercial operations by a specified date, we will purchase and pay for at that time, all of the RECs and/or offsets the project is estimated to generate over a fixed term equal to its conservatively expected project life. In no case do we pay the projects before demonstrated commercial operations, so our customers never lose money to a project that fails in development. Our payment can displace long-term debt or provide a valuable early return on an equity commitment with an otherwise inadequate return. Our commitment to make the payment makes the project pro forma pencil out, and enables financing.

The Projects' Commitment to Us:

The projects commit to use that they will use commercially reasonable efforts to build the project and to cause it to achieve commercial operations by a specified date. Thereafter, the project is obligated to use commercially reasonable efforts to continue operating the project and to maximize its production. Importantly, the project is also independently motivated to do so – while our payment provides a significant amount of financial support (e.g., 15 to 25% of the project cost), the bulk of the return on investment comes from its sale of the generic power over time. Despite this commitment and motivation, the project is not liable to us for underproduction over time. This is another important value we bring o the projects – risk avoidance.

Our Customers' Role:

To finance our purchase from the projects, we sell to our customers capacity-based shares of the projects' estimated long-term REC/offset output. For example, a customer buying 100,000 MWh from us would buy the estimated REC output of a little more than 1.3 MW of a wind farm (assuming a 25 year stream) with an expected net (net of our discounts, see below) capacity factor of 35%. Each of our customers buys a slice of the forward estimated output, and collectively (or individually, with large enough purchases) they buy it all. Our customers then donate their present rights to the future REC/offset output to Clean Air-Cool Planet, for permanent retirement as the RECs/offsets are generated. This has two principal advantages:

- First, for the customers, using up the value of the forward RECs/offsets in the year of purchase, through the donation for retirement, enables them to deduct the cost of the purchase in year one, rather than having to amortize the cost over the generation period;

- Second, it ensures that the renewable energy project supported is never used by a utility to meet minimum renewable portfolio requirements later (many RECs are available cheaply today that are being sold into the market by utilities that have taken long term positions on wind in anticipation of future RPS's, and who are selling off the early years' RECs they have no use for).

Potential for Project Failure:

We commit to our customers that if their project is not built by a specific date, we will use their purchase dollars to help build an alternate project by specific date generally not more than 12 months later, and will provide for them a capacity-based share of its forward output sized to generate their target kWh or offset quantity. If we are unable to do so, we will ultimately supply a firm quantity of RECs or offsets from existing sources equal to their target quantity. We only commit to projects that, after due diligence, appear to have strong prospects (with our financial commitment). We reserve 100% of our cost of goods until the target or alternate project achieves commercial operations, so we can fund the replacement purchase.

Potential for Project Under-Performance:

Each of our customers purchases a share of the project's estimated long-term REC or offset output, which may be more or less than we estimate. Working with the *Natural Resources Defense Council* (NRDC) and the other national and international non-governmental organizations on the Climate Neutral Network's certification board, we developed a model that uses a combination of discounting of the projects' expected future output and conservative assumptions about improvements in the grid emissions profile to self-insure against underproduction risk. This model is intended to overcome the practical impediments to guaranteeing each project's future output, and to ensure that the projects we help build perform as well or better than we estimate, on average. The effect of spreading the performance risk across all our projects is that each of our customers is entitled to claim the estimated forward REC/offset quantity as offsetting their current year footprint, regardless of the risk associated with their specific project. Details of our discounting and grid improvement methodology are available online at http://www.nativeenergy.com/how_we_calculate.html, or in PDF upon request.

Generation Over Time:

Certainly our customers' RECs/offsets are generated over time. Our forward model, however, is designed to enable the construction of projects that are dependent on forward purchasing and crediting in order to get financed and built. We take the view, as do our customers (including NRDC, the film *An Inconvenient Truth*, and businesses that are the best known leaders in corporate social and environmental responsibility) that the cost of the delay in generation is outweighed by the benefit of those RECs/offsets being generated at all.

Regulatory Risk:

Understanding the regulatory risks associated with forward purchasing requires an understanding of the risks associated with the alternative – purchasing RECs/offsets generated in the year of purchase by existing projects. Once built, most renewable energy or offset projects will generate all of their RECs/offsets whether they are purchased or not. Except in rare cases, purchasing "current-year" RECs/offsets does not increase generation by the projects themselves. Rather, the principal justification for purchasing "current-year" RECs/and offsets is to stimulate demand for and investment in other projects to be built later – projects that will generate their RECs/offsets over their operating lives, and that will be subject to having their RECs diverted to meet utilities' minimum renewable portfolio requirements, or to having their offsets stripped away by inappropriately structured carbon cap-and-trade systems. The projects built with forward purchasing are subject only to the latter of those two risks.

Ultimately, deciding whether forward purchasing is appropriate to meet your GHG reduction goals comes down to a choice (assuming that you do not have the capacity to enter into a long-term purchase contract):

> Do you want to be 100% certain that each and every one of your RECs/offsets will be generated, knowing that each and every one would have been generated regardless of your purchase, or
>
> Are you willing to tolerate some modest and well mitigated uncertainty to know that you made a real contribution to financing the construction of a specific new project that will generate truly incremental RECs/offsets?

<u>Communicating a Forward Purchase</u>:

Talking about a forward purchase involves a few extra words. Our customers generally view that not as a burden, but as an opportunity to demonstrate that they went the extra mile to do it right. Certainly it would be easy to say:

> "We achieved a portion of our greenhouse gas reduction goals by buying RECs from national wind farms. These RECs represent reductions in emissions of approximately 100,000 tons of carbon dioxide[1], the primary contributor to global warming."

But isn't it more powerful and compelling to say:

> "We achieved a portion of our greenhouse gas reduction goals by helping finance the construction of new wind farm under development on the Rosebud Sioux Reservation in South Dakota and a wind turbine on a Midwest family farm. In partnership with *Native*Energy, a Native-owned company, we brought critical up front funding to these clean energy projects by purchasing a share of the RECs they will generate over their operating lives, directly helping enable them to get financed and built. Together, these projects will prevent emissions of an estimated 100,000 tons of carbon dioxide, the primary contributor to global warming. In addition, our purchase is helping build sustainable economies in Native America, and is helping family farmers compete as family farms."

[1] A purchaser could make this claim credibly only if the wind farms possessed the requisite additionality, determined on a case by case basis.

Appendix B

METHODOLOGY FOR FORECASTING LONG-TERM REC GENERATION AND CO_2 AVOIDANCE IMPACTS

GRID CONNECTED WIND PROJECTS

REC Generation

We start with the project's nominal capacity factor based on the project engineer's best estimates of gross generation (e.g., theoretical performance based on wind data and manufacturer's power curves), and apply all discounts recommended by project engineer to account for scheduled and expected unscheduled downtime (maintenance and repair), wind turbulence, blade icing and soiling, and related losses or similar efficiency degradation to arrive at the baseline capacity factor. We require this baseline capacity factor to be consistent with the project pro forma assumptions utilized for the project financing. We then discount the baseline capacity factor by 5% to insure against any further underproduction risk. Our final REC generation estimate is determined in accordance with the following formula:

NGC x 8760 hours/year x DCF x POL

where: NGC = the project's nameplate generating capacity
DCF = the final discounted capacity factor
POL = the project's assumed operating life, which is the shorter of 25 years or the expected equipment operating life, assuming commercially reasonable maintenance, repair and parts replacement for wear and tear.

CO_2 Avoidance

We start with the average fossil CO_2 emissions rate for the applicable power control area based on most recent EGRID data. We then improve the PCA Emissions Rate by 0.8% of the original amount per year over the project's assumed operating life. Beginning with the year in which the then-current EIA Annual Energy Outlook shows planned or unplanned capacity increases of fossil generating capacity in the applicable NERC region, we average the annual improving average fossil rate (which represents the emissions rate for the energy the project will displace) with the emissions rate for the first planned or unplanned fossil generating capacity (which represents the emissions rate of marginal generating units whose generating capacity may theoretically be displaced by the project) to derive our assumed long-term average emissions rate. We then multiply this levelized average emissions rate by the assumed REC generation to determine the expected CO_2 reductions the project will produce over its assumed operating life, and allocate appropriate shares of its generating capacity to each customer.

To get a sense of how conservative this is, for the Rosebud St. Francis Wind Farm actually to displace energy over its operating life at the average rate of 1705 Lbs./MWh rate that we assume, the NERC region average fossil rate would have to improve from 2.37 lbs./kWh in year one to

1.04 lbs./kWh in year 25 ((2.37 + 1.04) / 2 = 1.705). That would require the fossil plants feeding that grid to convert from being about 98% coal fired to being about 98% gas fired within 25 years. The 2005 EIA Annual Energy Outlook predicts that the fossil plants feeding that grid will still be more than 95% coal fired in 2025.

ALASKA DIESEL MICRO-GRID WIND PROJECTS

REC Generation

We start with the project's nominal capacity factor based on the project engineer's best estimates of gross generation (e.g., theoretical performance based on wind data and manufacturer's power curves), and apply all discounts recommended by project engineer to account for scheduled and expected unscheduled downtime (maintenance and repair), wind turbulence, blade icing and soiling, and related losses or similar efficiency degradation to arrive at the baseline capacity factor. We require this baseline capacity factor to be consistent with the project pro forma assumptions utilized for the project financing. We then discount the baseline capacity factor by 5% to insure against any further underproduction risk. Our final REC generation estimate is determined in accordance with the following formula:

$$NGC \times 8760 \text{ hours/year} \times DCF \times POL$$

where: NGC = the project's nameplate generating capacity
DCF = the final discounted capacity factor
POL = the project's assumed operating life, which is the shorter of 25 years or the expected equipment operating life, assuming commercially reasonable maintenance, repair and parts replacement for wear and tear.

CO_2 Avoidance

Based on the fact that these projects are interconnected to 100% diesel powered micro-grids, we assume that each kWh generated by the wind turbines reduces diesel generation by one kWh. Based on information from the project developer, these diesel generators produce 13 kWh for each gallon of diesel fuel they burn. Burning diesel fuel produces 22.3 Lbs. of CO_2 per gallon. As a result, these wind turbines displace 1721 pounds of CO_2 per kWh they generate. To be conservative, we assume that this rate will stay constant over the projects' assumed operating lives (25 years for new Northern Power turbines, 20 years for reconditioned turbines), despite the fact that these grid operators fully expect to be required in the next few years to switch to low sulfur diesel, which produces significantly fewer kWh per gallon (and so is significantly more CO_2 intensive).

GRID CONNECTED FARM METHANE PROJECTS

We help build manure digesters on farms whose baseline practice is to store their manure in storage ponds, where it is kept pending bi-annual or tri-annual spreading on the fields. In these storage ponds, all but the very surface of the manure has no access to oxygen, so bacteria that thrive without oxygen decompose the manure, giving off gases including methane (CH4) as a byproduct, which bubble up and enter the atmosphere. There, methane has 21 times the global warming impact of carbon dioxide. Each 95¼ pounds of methane can be expressed as one ton of CO_2-equivalent, or CO_2e.

The farms we work with install anaerobic digester systems in place of the storage ponds. These are heated (with heat recovered from the generator), airtight systems that accelerate the decomposition and capture the methane, which the farms then burn to generate electricity and useful heat. The digested manure is then pumped from the digester to pre-spread storage lagoons, with virtually no future methane off-gassing. As the CO_2 emissions from burning the methane for electricity and heat are equivalent to the CO_2 that would have been emitted if the manure was put directly onto the fields, the electricity and thermal energy are considered CO_2-neutral. As a result, the farms create three sources of CO_2 or CO_2 reductions:

- Reductions from the displacement of electricity from fossil fuels that results from the farms' generation of electricity and delivery of that electricity to the grid ("Electricity-Based CO_2 Reductions");
- Reductions from the displacement of the farms' use of fossil fuels for heating and cooling needs that results from the farms' capture and use of heat given off by the generators ("Avoided Fossil Fuel CO_2 Reductions"); and
- Reductions from the avoidance, or abatement, of fugitive methane emissions that would have resulted from the farms' continued pond storage of manure that would have occurred in the absence of the digester ("Methane Abatement CO_2e Reductions").

Electricity-Based CO_2 Reductions

REC Generation

We start with the project's nominal capacity factor based on the project engineer's best estimates of gross generation (e.g., theoretical performance based on expected methane generation), and apply all discounts recommended by project engineer to account for scheduled and expected unscheduled downtime (maintenance and repair) and related losses or similar efficiency degradation or losses to arrive at the baseline capacity factor. We require this baseline capacity factor to be consistent with the project pro forma assumptions utilized for the project financing. We then discount the baseline capacity factor by 5% to insure against any further underproduction risk. Our final REC generation estimate is determined in accordance with the following formula:

$$NGC \quad x \quad 8760\ hours/year \quad x \quad DCF \quad x \quad POL$$

where: NGC = the project's nameplate generating capacity
DCF = the final discounted capacity factor
POL = the project's assumed operating life, which is the shorter of 25 years or the expected equipment operating life, assuming commercially reasonable maintenance, repair and parts replacement for wear and tear.

CO_2 Avoidance

We start with the average fossil CO_2 emissions rate for the applicable power control area based on most recent EGRID data. We then improve the PCA Emissions Rate by 0.8% of the original amount per year over the project's assumed operating life. Beginning with the year in which the then-current EIA Annual Energy Outlook shows planned or unplanned capacity increases of fossil generating capacity in the applicable NERC region, average the annual improving average fossil rate (which represents the emissions rate for the energy the project will displace) with the emissions rate for the first planned or unplanned fossil generating capacity (which represents the emissions rate of marginal generating units whose generating capacity may theoretically be displaced by the project) to derive our assumed long-term average emissions rate. We then multiply this levelized average emissions rate by the assumed REC generation to determine the expected CO_2 reductions the project's electricity will produce over its assumed operating life, and allocate appropriate shares of its generating capacity to each customer. (Note – although the project emits CO_2 when it burns the methane, that CO_2 amount is equivalent to the assumed baseline of field-spreading the manure, so the electricity is assumed to be CO_2-neutral).

Avoided Fossil Fuel CO_2 Reductions

Thermal Energy Generation

For those farm methane projects that utilize waste heat from the electricity generator to reduce their consumption of fossil fuels, we start with the project engineer's best estimates of the BTU's of recoverable and usable thermal energy and apply all discounts recommended by project engineer to account for scheduled and expected unscheduled downtime (maintenance and repair) and related losses or similar efficiency degradation or losses to arrive at the baseline usable thermal energy capacity. We require this baseline thermal energy capacity to be consistent with the project pro forma assumptions utilized for the project financing. We then discount the baseline thermal energy capacity by 5% to insure against any further underproduction risk.

CO_2 Avoidance

We assume a BTU-for-BTU displacement of the kind of fossil fuel (diesel, propane, etc., based on historic purchase records) that will be displaced by the project's thermal energy output, over the project's assumed operating life, and quantify the CO_2 avoidance based on the emissions profile (Lbs. CO_2/btu) of the displaced fuel.

Methane Abatement CO_2e Reductions

The EPA has developed a methodology listed in **U.S. Methane Emissions 1990-2020: Inventories, Projections, and Opportunities for Reductions (EPA 430-R-99-013) (September 1999)** for calculating baseline methane emissions from various manure management systems based on factors presented in the 1996 Revised Intergovernmental Panel on Climate Change (IPCC) Guidelines.

Three principle factors are needed to calculate baseline methane emissions from manure management systems: Quantity of Manure Volatile Solids; Manure Characteristics; and Manure Management System used. IPCC Tier II standards require these factors to be specific to country location and animal type and class. The EPA utilizes USDA data and conversion factors from the Natural Resources Conservation Service (NRCS) and provides criteria by state. The resulting equation in the EPA methodology is:

$$CH_4 = Manure_{ij} * MF_{ijk} * VS_{ij} * Bo_j * MCF_{ijk}, \text{ where:}$$

CH_4 = Methane created at baseline
$Manure_{ij}$ = total manure produced by animal type *j* in state *i*
MF_{ijk} = % of manure managed by system *k* for animal type *j* in state *i*
VS_{ij} = % of manure that is volatile solids for animal type *j* in state *i*
Bo_j = Maximum methane (CH4) potential of manure for animal type *j*
MCF_{ik} = Methane conversion factor for systems *k* in state *i*

We apply the following formula based on information provided by the farms regarding their baseline number of cows, cow types (milkers, heifers, dry cows), feeding practices and manure handling practices, which we confirm through one or more site visits. An example for calculating methane emissions from a liquid/slurry storage system (*k*) for manure from 500 dairy milking cows (*j*) in Pennsylvania (*i*) might look like:

CH_4 = (80lbs manure /1000# animal weight *****500 cows@1400lbs/cow) *.4536 kg/lb * 100% in system * .1062 (%VS) * 0.24 m^3 CH_4/kg (Bo) * 0.35 (MCF of liquid/slurry system)

= 226.60 m^3 CH_4/day = 82,710 m^3 CH_4/yr = 181,960 m^3 CH_4*1.4956 lbs/m^3 = 123,701 lbs CH_4/yr

=123,701 lbs CH_4 * 21 GHG factor† = 2,597,722 Lbs CO_2e

= 1298.86 tons CO_2e per year

Note: The Bo factor of 0.24 $m^3 CH_4$ and the MCF of .35 are IPCC Tier 2-developed factors that recognize the existing animal diets for North American livestock and the temperate climate zone of Pennsylvania respectively.

*Native*Energy's methodology refines this base equation by including the average monthly ambient temperature effect, by county location, on the speed of manure decomposition in the lagoon using the van't Hoff-Arrhenius equation from the EPA's 2003 Annex M to calculate the effective MCF:

$f = exp[E*(T2-T1)/(R*T1*T2)]$
where:

f	Conversion efficiency of Vs to CH_4 per month.
E	Activation energy constant (15,175 cal/mol).
T2	Ambient temperature (Kelvin) for the climate, by county (NOAA data).
T1	303.16 (273.16° + 30°) in example of 30° C ambient
R	Ideal gas constant (1.987 cal/ K mol).

Using farm-specific data, we also reflect the tempering effect on fugitive methane production of the daily loading of raw manure into the lagoon and the semi-annual or scheduled unloading for field spreading.

Once we have determined the expected annual CO_2e reductions pursuant to the foregoing, we then apply the following discounts:

- a non-cumulative 5% discount to each year's assumed volume to account for potential methane leakage from the digester
- a cumulative annual 5% discount to the 20-year stream of reductions to account for the potential mainstreaming of the technolog

Appendix C

W RD-2

Ron Howard
Superintendent

January 12, 2007

To Whom It May Concern:

The Wray School District RD2, is a public school that serves 670 students K-12, in a rural community of 2500 people. Over the past six years, Wray has suffered from a decrease in the number of students attending the school and a depressed economy. Recent changes in state school finance formulas, coupled with declining rural populations, have created school budget shortfalls in many schools across Colorado. A few years ago, the District had to cut three quarters of a million dollars out of a 5 million dollar budget. The challenges we face have brought the community together in a "Renew the Spirit" Campaign.

At this time the Wray School District staff was challenged by its superintendent to find new ways to create additional revenue streams for the district, emphasizing projects which would enhance the districts educational experience. Our district spends approximately $80,000 a year on electricity. Our Wray High School Vo-Ag instructor, Jay Clapper, proposed to the district that it consider the construction of a wind turbine. This project would offset the district's annual energy costs and provide a renewable energy educational component to the school's curriculum. The Board of Education agreed to support this idea, and a wind committee, including Mr. Clapper and a number of interested Wray citizens, was formed. The committee involved spent almost three years exploring the potential of this resource and gathering the necessary support and resources to move forward. The Wray High Vo-Ag students have collected wind data on-site and the school district contracted for a cost benefit analysis by Tom Wind of Wind Utility Consulting, Inc. The results of the study concluded that the geographical area around Wray is highly suited for wind energy development. Although in the feasibility study we used a 16 mile per hour wind average, numerous anemometers have shown an 18 mph wind average.

Many agencies have provided support for this project. The community of Wray is extremely excited about this opportunity and has provided a tremendous amount of support through donations and in-kind services. To begin the process the Rocky Mountain Farmers Union provided us with $3,000 seed money to begin the process. Highline Utility was instrumental in the technical and professional support. A $10,000 Carl Perkins grant was used to complete a feasibility study and purchase two weather stations and technical support for collecting wind data. The City of Wray, Y-W Electric, and our local Yuma County Economic Development corporation all played a significant role in our success. The District applied for and received a $350,000 Energy Impact Grant to assist with the project. We have received numerous letters of support including Congresswoman Marilyn Musgrave, Governor Bill Owens, Department of Energy, as well as, numerous other agencies, and individuals.

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In spite of this tremendous support from the community and the state the substantial startup costs are still prohibitive to the success of the project. Bond premium and interest from the recently completed 7.79 million dollar bond project, a pledge from the Kiztmiller-Bales Trust, individual personal pledges and an ending fund balance from the school district comprises about three fourths of the required funds. We also have accepted an interest free loan from the City of Wray to be committed to the project. These funds added to the Energy Impact grant still leave us with approximately a fourteen percent shortfall on the funding needed to complete the wind turbine project.

To attempt to cover this shortfall, the Wray School District began looking at the possibility of pre-selling the renewable energy credits (RECs) to a renewable energy company. Anticipating that most renewable energy companies would only purchase the RECs as they were generated over time, we were extremely pleased to find that NativeEnergy's practice is to purchase RECs on an up-front basis, and that they were very interested in purchasing the RECs from our turbine. With both parties of the Wray School District and Native Energy realizing that there was an end in sight we agreed to sell all RECs for the life of the wind turbine to NativeEnergy, with payment to be made upon commercial operations of the turbine. The funding made available by selling the RECs to NativeEnergy makes up substantially the amount we were in deficit, and will enable us to see this project finalized.

This project will be a self-sustaining model of energy production, income generation and innovative educational opportunity for Wray School District RD-2 and rural Colorado. It will also be a pilot program educating utilities, rural communities, businessman, farmers, and other schools on the tremendous value a wind turbine can be. Our project promotes the idea of clean, renewable energy promoting a more responsible attitude towards our environment.

It is the mission of Wray RD2 to develop an educational model for the students and community of Wray. This will be a wonderful real life lesson to show students the benefit of clean renewable energy. The success of this project will be measured in part by the enthusiasm it will create. The promotion of clean energy, sustainability, independence, and innovation will be a tremendous working model for students and rural communities to look upon.

RHoward