COMMENTS OF ReCOMMUNITY, INC.
TO THE
SCIENTIFIC ADVISORY BOARD BIOGENIC CARBON EMISSIONS PANEL
FOR ITS REVIEW OF THE ENVIRONMENTAL PROTECTION AGENCY
DRAFT BIOGENIC CARBON DIOXIDE EMISSIONS ACCOUNTING FRAMEWORK

March 16, 2012

ReCommunity, Inc. submits these comments to support the Scientific Advisory Board (SAB) Biogenic Carbon Emissions Panel (BCE Panel) in providing advice to the Environmental Protection Agency (EPA) regarding a methodology to account for biogenic carbon dioxide (CO_2) emissions in the context of stationary source permitting under the Clean Air Act (CAA). We have reviewed EPA's draft Biogenic CO_2 Accounting Framework,[1] the January 19 and March 9, 2012 drafts of the BCE Panel advisory report,[2] and the minutes of the January 27 teleconference of the BCE Panel[3] and recognize that there is a gap that we hope to address with these comments.

ReCommunity is the largest independent recycling company in the United States. We have developed a technology that manufactures a product, ReEngineered Feedstock™,[4] from discrete, select components of non-recyclable wastes. ReEngineered Feedstock is a primarily-biogenic recycled fuel product leading the way to sustainable communities and a zero-landfill future. As explained in these comments, ReEngineered Feedstock reduces greenhouse gas (GHG), criteria air pollutant, and hazardous air pollutant (HAP) emissions from coal-fired boilers when co-fired with coal, and it dramatically increases recycling (20-60%) and reduces landfilling. It is a unique entity that is not woody biomass, agricultural biomass nor municipal waste, but which is nevertheless a biogenic fuel that helps to reduce dependence on fossil fuel energy sources.

ReCommunity's purpose for this document is, first, simply to let the BCE Panel know that ReEngineered Feedstock exists and is of a character that needs to be separately addressed in

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1 Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources (draft; Sept. 2011). U.S. Environmental Protection Agency Office of Atmospheric Programs [hereinafter Draft Accounting Framework], http://www.epa.gov/climatechange/emissions/downloads/Biogenic_CO2_Accounting_Framework_Report_Sept_2011.pdf.

2 1-19-12 DELIBERATIVE DRAFT report of the Biogenic Carbon Emissions Panel [hereinafter 1-19 Draft BCE Panel Report], http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/45E511BD3C19B6D3852579890065C7AC/$File/1-18-12+Biogenic+Carbon+Advisory+--+CLEAN+COPY.pdf; 3-13-12 DELIBERATIVE DRAFT report of the Biogenic Carbon Emissions Panel [hereinafter 3-13 Draft BCE Panel Report], http://yosemite.epa.gov/sab/SABPRODUCT.NSF/ea5d9a9b55cc319285256cbd005a472e/cc5422dde3678ac4852579bc005f16d4/$FILE/3-13-12%20Advisory_Page%20Numbers%20Corrected.pdf.

3 Summary Minutes of the U.S. Environmental Protection Agency Science Advisory Board Biogenic Carbon Emissions Panel Teleconference, January 27, 2012 [hereinafter January Teleconference Minutes], http://yosemite.epa.gov/sab/SABPRODUCT.NSF/MeetingCal/1DB6AEA2DF05DE7E8525793B0065B76E/$File/1-27-12+Biogenic+Telec.+Minutes.pdf.

4 ReEngineered Feedstock is a registered trademark of ReCommunity, Inc.

the Accounting Framework. Our second purpose for these comments is to strongly urge that the Accounting Framework be designed so as to be an incentive, not a disincentive, to the increased recycling and other benefits afforded by the use of ReEngineered Feedstock and other biogenic fuels. The power of increased recycling to produce both economic and environmental benefits should not be dampened. If the Accounting Framework produces ambiguity for facilities as to whether use of ReEngineered Feedstock will facilitate or hamper the CAA permitting process, there will be no investment in this highly beneficial technology.

Section I and Appendix A of these comments describe what ReEngineered Feedstock is, how it is made, and how it increases recycling, decreases (GHG) emissions and provides other significant environmental benefits.

Section II explains the need for the Accounting Framework to be simple and straightforward. An attempt to precisely account for all of the factors that influence the carbon cycle will introduce complexity that will discourage facilities from using biogenic fuels such as ReEngineered Feedstock. At least initially, while the biogenic feedstock sector is being established, accounting for CO_2 emissions should be undertaken on a broad, easily implemented level that will encourage and facilitate a transition from fossil fuel to biogenic fuel sources.

Section III discusses the need for the accounting methodology to be flexible enough to easily accommodate innovative biogenic fuels that do not fall into any of the categories of wood biomass, agricultural biomass or waste biomass. ReEngineered Feedstock is a unique feedstock separate from municipal waste and therefore must be accounted for separately. Applying equations developed for municipal waste to ReEngineered Feedstock not only would be inaccurate but also would require a degree of complexity that would defeat the goals of greater use of biogenic fuels and greater recycling. In addition, while distinct from municipal waste, ReEngineered Feedstock source materials are drawn from waste. Therefore, ReEngineered Feedstock shares the differences of waste biomass from woody and agricultural biomass, such as lack of a direct tie to a given region. The Accounting Framework must be able to easily recognize such differences in its treatment of a given source.

Section IV addresses the bottom line: that CO_2 emissions generated by ReEngineered Feedstock should be treated as being carbon neutral for purposes of CAA permitting. This can be accomplished simply and straightforwardly by giving Reengineered Feedstock CO_2 emissions a categorical exclusion, or by assigning a biogenic accounting factor (BAF) of 0 to all such emissions, or by establishing a general certification for Reengineered Feedstock as producing carbon neutral emissions.

Thank you for your consideration of these comments. Upon request, ReCommunity would be pleased to provide additional information to assist the BCE Panel in understanding ReEngineered Feedstock and why it should be treated as carbon neutral under the Accounting Framework.

I. REENGINEERED FEEDSTOCK IS AN ADVANCED, RENEWABLE, AND PRIMARILY BIOGENIC FUEL THAT ALSO SERVES AS A EMISSION CONTROL TECHNOLOGY

ReEngineered Feedstock is a biogenic product that reduces GHG and other emissions from coal-fired boilers, while increasing recycling and reducing landfilling. It was developed by ReCommunity, Inc., the largest independent recycling company in the United States. ReCommunity operates a total of 36 facilities in twelve states, and employs 1,150 talented and experienced employees. ReCommunity focuses on using advanced technology to increase the capture of recyclables from mixed waste streams, *i.e.*, unsorted municipal solid waste, commercial waste, and institutional waste. ReCommunity works closely with the municipalities who are its primary customers, and establishes a mutually beneficial relationship that encourages and rewards increased recycling.

ReCommunity's advanced technology has succeeded in increasing recycling volumes in communities by 20% to 60%. One reason for this increase is that the technology can use commercial and industrial waste streams as well as municipal solid waste. However, not all materials can be sold into the recycling market even with the most advanced technology, and ReCommunity has developed an innovative solution to convert the largest portion of the remaining materials into a useful product, ReEngineered Feedstock. Because the technology increases the portion of the waste stream that is converted to a commercial product and because revenues are shared with municipalities, recycling becomes attractive to a greater number of municipalities. Thus, ReCommunity's processes increase both the depth and breadth of recycling.

ReCommunity's ReEngineered Feedstock technology can be used to produce a wide range of commercial and industrial products, including biofuels feedstocks, high value chemical feedstocks, and as a partial substitute for coal in combustion units. ReEngineered Feedstock's first use will be as a co-firing option, replacing up to 30% of coal used in a combustion unit with a fuel that is, on average, composed of 70% biogenic material. As will be explained in greater detail below, ReEngineered Feedstock is engineered to consist primarily of post-consumer, non-recyclable fibers that would otherwise be destined for landfilling. The biogenic fiber is synthesized with light and hard plastics and virgin sorbents to create a fuel that has low fossil CO_2 emissions and that also works as an active pollution control technology targeting other criteria pollutants (*e.g.*, NO_x and SO_2) and HAPs.

A detailed description of ReEngineered Feedstock composition and manufacture is provided in Appendix A; a summary is provided below. We also describe the significant environmental benefits afforded by this technology.

A. ReEngineered Feedstock is a Renewable Fuel That Harnesses the Non-Recyclable Energy Content of Discrete Components of Municipal Solid Waste

The ReEngineered Feedstock manufacturing process harnesses the renewable energy content and non-recyclable biogenic material components of the municipal solid waste stream to create a renewable fuel that reduces GHG emissions and also serves as an effective air pollution control technology. The source material for ReEngineered Feedstock is unsorted municipal solid waste (MSW) as well as commercial waste and institutional waste (*i.e*., mixed waste streams). Traditional recycling methods are generally limited to residential municipal waste streams and cannot accept commercial and institutional waste streams. The ReEngineered Feedstock process dramatically expands recycling and reduces landfilling by utilizing all these waste streams and by removing all recyclable materials from the waste stream, including papers, paper products, cardboard, PET and HDPE plastics, glass, aluminum, ferrous metals, and a variety of other recyclables. Through carefully separating out these recyclables and using only non-recyclable materials to manufacture ReEngineered Feedstock, the process ensures that all materials in the waste stream are used in the most renewable and energy-efficient matter possible

The ReEngineered Feedstock manufacturing process consists of two phases, termed Multi-Material Processing Platform (MMPP) and Advanced Product Manufacturing (APM). Prior to the manufacturing of ReEngineered Feedstock, the MMPP uses advanced sorting and materials characterization technologies to recover all marketable recyclable materials and removes select portions of the non-combustibles and inert residues from the material stream.

Once the discrete, selected constituent ingredients have been segregated and thoroughly processed, the ReEngineered Feedstock APM phase synthesizes these ingredients with sorbents and additives made from virgin materials. All of the ReEngineered Feedstock ingredients – recyclables and sorbents/additives – are engineered precisely to deliver the exact fuel emissions control capabilities required for the end use. The result is a fuel that has a consistent, defined origin and is specifically engineered for a target heating value, profile, fluid dynamic attributes, and combustion kinetics matched to that of the coal with which it will be co-fired.[5]

B. The Use of ReEngineered Feedstock Leads to Substantial Benefits for Communities, the Environment and the Economy

Use of ReEngineered Feedstock provides multiple benefits. It replaces mined fossil-based carbon with biogenic carbon and reduces GHG emissions. ReEngineered Feedstock is specifically manufactured with sorbents that are precisely calibrated to reduce the emissions of criteria pollutants and HAPs when co-fired with coal. The advanced materials characterization and separation phase of the manufacturing process dramatically increases recycling, which reduces landfilling and avoids the production of methane. Further, because ReEngineered Feedstock is manufactured from discrete ingredients selected from MSW, unlike many other biogenic feedstocks, it does not require the use of virgin biomass materials.

1. Greenhouse Gas Emissions Reductions

ReEngineered Feedstock reduces GHG emissions because the energy content of ReEngineered Feedstock is entirely derived from waste materials, replacing the fossil carbon in virgin coal. The carbon dioxide emitted from combustion of ReEngineered Feedstock is an “anyway” emission. The dramatically increased recycling technology allows waste materials to

[5] This ability to engineer a product with particular characteristics will also support the development of future ReEngineered Feedstock product lines, and could eventually allow for the incorporation of additional source materials, such as agricultural residues.

be used in the most energy efficient manner possible while reducing landfilling and the resulting methane emissions. ReEngineered Feedstock also enables reduction in energy costs for virgin materials, and it does not have the negative externalities often associated with other biomass. Thus, ReCommunity believes that use of ReEngineered Feedstock may enable carbon negative performance when co-fired with coal.

Biogenic Carbon Dioxide: Combusted ReEngineered Feedstock emits primarily biogenic CO_2. Each batch of ReEngineered Feedstock is specifically tailored to the needs of an individual customer (*i.e.*, customized heating value to match the coal with which it will be co-fired and specifically selected sorbents to target the desired pollutants), but on average the fuel is approximately 70% non-recyclable, biogenic, and renewable fibers.[6] The rest of the carbon content, light and hard plastics, is also derived from waste materials, making emissions due to those materials "anyway" emissions. As a result, unlike the carbon emitted from fossil fuels, the ReEngineered Feedstock is carbon neutral. A large percentage is comprised of CO_2 that was recently captured from the atmosphere by plants, and all of the emissions would have occurred anyway through combustion of coal and/or decomposition in landfills.

Coal Combustion Efficiency. Noncombustible materials in MSW cause slagging and boiler tube contamination when the MSW is combusted in boilers. Use of ReEngineered Feedstock can increase the efficiency of power plants, because recyclables and non-combustible materials are not included in the discrete, select portion of the waste stream used to manufacture ReEngineered Feedstock. Improvements of 1 to 2% in boiler efficiency can result, thereby decreasing demand for fuel and its associated GHG emissions.

Further, if ReEngineered Feedstock is treated as carbon neutral for purposes of CAA permitting, it can reduce the need for emissions control equipment. Such equipment requires a 2-3% efficiency reduction due to parasitic loading. Avoidance of the need for control equipment thereby reduces the total amount of fuel consumed by the facility and therefore total GHG emissions.

Reduced production of virgin materials. The ReEngineered Feedstock process increases the extent of recycling by municipalities, commercial businesses, and industrial facilities. The recovery of recyclable metals and plastics decreases the requirement to produce virgin materials, and thus reduces the GHG emissions associated with such production.

ReEngineered Feedstock also displaces virgin coal – up to 30% of coal in an industrial boiler, lowering CO_2 emissions associated with mining of the coal.

Methane: Methane (CH_4) emissions are more potent GHG than CO_2 and are considered anthropogenic, not biogenic. ReEngineered Feedstock can dramatically reduce CH_4 emissions through reduced landfilling. As shown in Table 1, below, the eventual widespread adoption of ReEngineered Feedstock technology could reduce landfill methane emissions by 100 million metric tonnes of carbon dioxide equivalent ($MMTCO_2E$) annually. In the context of an individual stationary source, even if methane from waste landfilling would otherwise have been

[6] The 70% figure is prior to the addition of any sorbents made from virgin materials. After addition of sorbents, a typical batch of ReEngineered Feedstock will be approximately 55% biogenic fiber.

partially captured, the use instead of the waste to manufacture ReEngineered Feedstock co-fired by the facility represents a reduction in methane production and thus a net reduction in carbon dioxide equivalents.

Current	ReEngineered Feedstock Potential
• 250 million tons generated • 65 million tons recycled, 20 composted, and 29 combusted • 136 million tons landfilled	• 250 million tons generated • 220-225 million tons recycled & used • 25-30 million tons landfilled
Landfill methane – 123 $MMTCO_2E$	Landfill methane – 22.5 $MMTCO_2E$

Table 1 – Landfill methane emissions with 100% ReEngineered Feedstock market adoption

No Negative Externalities: The biogenic content of ReEngineered Feedstock is pulled entirely from post-consumer waste. No biomass is harvested strictly for energy purposes. This means that none of the negative externalities typically associated with biomass (*e.g.*, reduced forestation or higher food prices because of increased corn production) are implicated by ReEngineered Feedstock. Thus, the GHG emission reductions indicated above are not offset by such externalities.

2. Reduced Criteria Pollutant and HAP Emissions and Increased Efficiency

ReEngineered Feedstock controls conventional pollutants and HAPs when co-fired with coal. ReEngineered Feedstock is precisely engineered to control the emissions of traditional air pollutants including SO_2, SO_3, NO_x, and HCl (as well as other acid gases). ReCommunity's on-specification process can create a feedstock to precisely match an existing power plant's fuel and emissions reduction needs. Table 2 compares the composition of eastern bituminous coal with typical ReEngineered Feedstock, demonstrating that ReEngineered Feedstock has far fewer contaminants to emit as either conventional pollutants or HAPs. For example, co-firing 20% of a coal fired power plant by weight with ReEngineered Feedstock at 455,460 MWh annual production (based on bench scale testing, as applied to a 100MW coal-fired boiler) would result in calculated reductions of 66.9% for SO_2 (3,444 tons per year) and 30.5% for NO_x (213 tons per year) per year. Given these capabilities, ReEngineered Feedstock can dramatically reduce the costs of reducing pollution, such as the capital costs of NO_x controls or flue gas desulfurization.

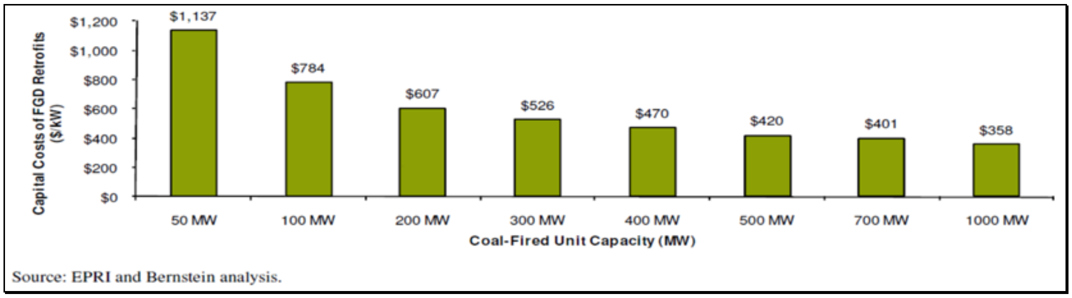
Eastern Bituminous Coal	Average	Stdev	ReEngineered Feedstock	Average	Stdev
Moisture	8.54	3.18	Moisture	2.04	0.01
Ash, wt.% (db)	10.86	4.52	Ash, wt.% (db)	10.95	0.54
Dehydrated Sorbent, wt.% (db)	0.00	0.00	Dehydrated Sorbent, wt.% (db)	18.87	0.00
Volatile Matter, wt.% (db)	35.56	3.23	Volatile Matter, wt.% (db)	69.95	0.56
Fixed Carbon, wt.% (db)	45.06	4.06	Fixed Carbon, wt.% (db)	0.24	0.15
Carbon, wt.% (db)	63.36	4.38	Carbon, wt.% (db)	31.30	0.00
Hydrogen, wt.% (db)	5.39	0.37	Hydrogen, wt.% (db)	5.43	0.00
Oxygen, wt.% (db)	15.60	3.50	Oxygen, wt.% (db)	33.45	1.54
CO2 emission, lb/mmBtu	203.04	3.62	CO2 emission, lb/mmBtu	75.92	5.75
HHV, Btu/lb (db)	11,441	760	HHV, Btu/lb	9,984	0.00
Non-metal elements – dry basis			Non-metal elements – dry basis		
Nitrogen, wt.% (db)	1.28	0.34	Nitrogen, wt.% (db)	< 0.01	0.00
Sulfur, wt.% (db)	1.87	1.72	Sulfur, wt.% (db)	0.01	0.00
Chlorine (Cl), wt.% (db)	0.06	0.07	Chlorine (Cl), wt.% (db)	0.04	
Flourine (F) ppm	96.29	209.08	Flourine (F) ppm	14.28	2.71
Metal elements – dry basis			Metal elements – dry basis		
Arsenic (As), ppm	19.61	24.62	Arsenic (As), ppm	0.98	0.44
Beryllium (Be), ppm	3.17	1.37	Beryllium (Be), ppm	0.66	0.16
Chromium (Cr), ppm	16.82	15.16	Chromium (Cr), ppm	5.12	1.74
Cobalt (Co), ppm	7.46	8.07	Cobalt (Co), ppm	4.22	1.08
Mercury (Hg), ppm	0.10	0.08	Mercury (Hg), ppm	<0.005	0.00
Nickel (Ni), ppm	28.76	24.20	Nickel (Ni), ppm	6.69	0.65
Selenium (Se), ppm	2.95	1.83	Selenium (Se), ppm	2.00	0.00

Note: ReEngineered Feedstock chlorine data content based on PVC removal and thermal treatment. HHV and CO_2 values assume ReEngineered Feedstock manufactured with 20% plastic/80% fiber content; results will vary depending on sorbent mix.

Table 2 -- Contaminant data for Eastern Bituminous Coal and ReEngineered Feedstock[7]

In addition to direct pollution reductions, ReEngineered Feedstock can increase power plant efficiency. Figure 1 illustrates the estimated capital costs of NOx controls and flue-gas desulfurization retrofits – costs that potentially can be avoided by use of ReEngineered Feedstock. As discussed above, resulting efficiencies are due to both reduction in the need for emissions control equipment, which requires a 2-3% efficiency reduction due to parasitic loading, and to improvement in boiler efficiency due to reduced slagging and boiler tube contamination (between 1 and 2 %).

[7] All Eastern bituminous data taken from the US Coal Quality Database, http://energy.er.usgs.gov/coalqual.htm except for chlorine, which is taken from Bragg, L.J., R.B. Finkelman, and S.J. Tewalt. 1991. *Distribution of Chlorine in United States Coal*. In CHLORINE IN COAL (Stringer, J. and D.D. Banerjee, eds.). Elsevier, Amsterdam.



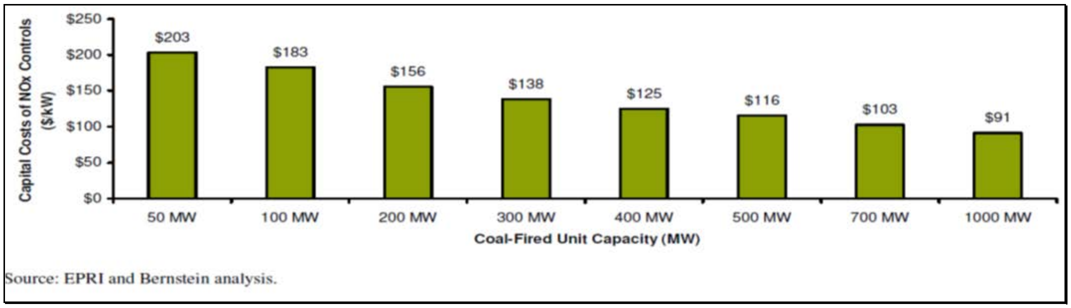


Figure 1 -- Estimated capital costs of NOx controls and flue-gas desulfurization retrofits

3. Increased Recycling & Reduced Landfilling

ReCommunity's advanced recycling technology dramatically increases the percentage of a community's waste stream that is recycled – from 20% to 60%. As explained in greater detail in Appendix A, the ReEngineered Feedstock material characterization and separation process removes *all* commercially recyclable materials from the waste stream. Recyclable metals (ferrous and non-ferrous), plastics, and fibers are all segregated into separate streams and sold on commodity markets, the proceeds of which are shared by ReCommunity and the municipality. ReCommunity then uses the majority of the remaining waste materials to create ReEngineered Feedstock.[8] In total, the ReEngineered Feedstock process allows the capture and reuse of between 85-90% of the current mixed municipal waste stream.

Importantly, ReCommunity's technology can be applied to waste streams that have been challenging for traditional recycling to access, including the commercial, industrial, and institutional waste streams. ReCommunity's dedication to increased recycling means that not only is the biogenic content in ReEngineered Feedstock not harvested specifically for the purpose of energy production, but also that none of the biogenic content in the waste materials that could be put to better use (*i.e.*, recycled and reused) is combusted. The reduced landfilling preserves land area for more beneficial uses, reduces greenhouse gas emissions from decaying organic materials, and also saves communities money by reducing disposal fees. Figure 2 illustrates the increase in recycling afforded by the ReEngineered Feedstock process.

[8] Inerts, non-combustibles, and prohibitive materials are removed and landfilled. (Prohibitive materials are those with significant contaminant concentrations, particularly when combusted, such as batteries and dry wall.)

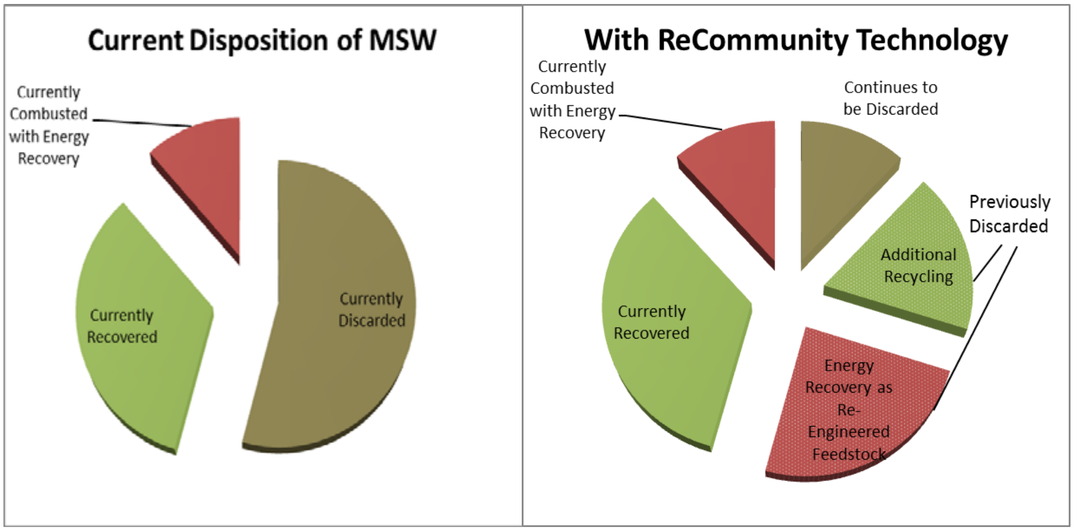


Figure 2 – MSW disposition currently and with 100% ReEngineered Feedstock participation

II. THE ACCOUNTING FRAMEWORK MUST BE KEPT SIMPLE AND STRAIGHTFORWARD

In the vital areas of GHG control and recycling, the perfect must not be the enemy of the good. ReCommunity joins those commenters who urge that the BCE Panel report provide assistance to EPA in developing an Accounting Framework that is simple and straightforward. A complex formula for determining whether to count biogenic CO_2 toward permit-triggering thresholds will discourage replacement of fossil fuels with biogenic feedstocks, when exactly the opposite incentive should be provided. It is especially important that that framework not discourage use of ReEngineered Feedstock, which provides significant additional environmental and economic benefits, such as greatly expanding the breadth and depth of recycling and reducing emissions of criteria pollutants and HAPs as well as GHG.

A. The Accounting Framework Must Enable Transition to Sustainable Fuels

In response to EPA's question of whether the draft Accounting Framework is simple to implement and understand, the draft BCE Panel report states, "It is neither."[9] ReCommunity agrees with that assessment and with the draft report's statement, "The Framework also appears to be difficult to implement, and possibly unworkable, especially due to the requirements for the many kinds of data required to make calculations for individual facilities."[10]

The complexity of EPA's draft Accounting Framework will discourage use of biogenic fuels and the increased recycling and other benefits afforded by use of ReEngineered Feedstock. While the BCE Panel's draft report appropriately addresses flaws in EPA's approach, it does not appear that the draft BCE Panel suggestions necessarily will reduce the complexity of the

9 3-13 Draft BCE Report at 31.

10 *Id.*

Framework. In fact, several of the draft recommendations likely would increase the complexity of the Accounting Framework (*e.g.*, addressing leakage).

If the issue of rising levels of atmospheric CO_2 is to be successfully addressed in the near term, use of sustainable fuels to displace fossil fuels must be a part of the equation. Therefore, it is imperative that EPA's policies under the Clean Air Act facilitate the transition to sustainable fuels. In particular, it is important that the treatment of biogenic CO_2 emissions not be such as to nip in the bud the emerging biogenic feedstock sector.

Further, use of a biogenic fuel such as ReEngineered Feedstock has environmental benefits beyond displacement of fossil fuel. As discussed above, ReEngineered Feedstock's advanced manufacturing process dramatically increases recycling, which in turn reduces GHG emissions associated with production of virgin materials and with landfill decomposition. The Accounting Framework must be designed in a manner that encourages this move toward greater recycling.

Permitting complexity has the potential to serve as a greater barrier to the adoption of biogenic fuels than price. If a biogenic fuel is more expensive than available fossil fuels, it nevertheless can be attractive as an energy source if its use can help to address GHG permitting requirements and thereby lower overall facility expenses. However, if the permitting process is complex, thus introducing ambiguity as to the GHG reduction benefits for a facility, it will discourage use of biomass. Even where biogenic fuel is less expensive than fossil fuels, additional hoops to jump through in obtaining a permit – such as complex, data-intensive calculations or certifications – will be a disincentive to using that biogenic fuel.

ReCommunity urges that the BCE Panel assist EPA in developing an Accounting Framework that will enable rather than disenable the use of sustainable resources and recycling. That is, we urge that the Accounting Framework be, within the realm of scientific soundness, as simple as possible. We recognize that addressing these issues requires policy decisions as well as science, and that policy is not the realm of the BCE Panel. Nevertheless, the BCE Panel can help EPA to understand what the science demands for accuracy versus what it demands for precision. The March 9 draft has done this to some extent,[11] for which we applaud the BCE Panel, but the draft report also make suggestions that the BCE Panel admits could increase complexity and costs.[12]

As noted by the draft BCE Panel report, "Technical considerations can influence the feasibility of implementing a policy just as policy options can influence the technical discussion. The two need to go hand in hand rather than be treated as separable."[13] The Panel can support the favorable replacement of fossil fuel with biogenic sources by providing technical guidance on how to keep the Accounting Framework simple and straightforward.

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[11] *E.g.*, 3-13 Draft BCE Report at 46 ("To certify greenhouse gas neutrality … does not require determining the specific size of change in carbon loss or greenhouse gases ...").

[12] *E.g.*, the suggested certification system; *id.* at 45

[13] 3-13 Draft BCE Panel Report at 22-23.

B. Scientific Precision Is Not Scientific Accuracy

If the wholesale price of potatoes is based on their weight to the nearest pound, then it is not necessary to determine the precise number of ounces. One wants a scale that is accurate – that is, one that gives a value of 10 pounds when the weight actually is 10 pounds, not 9 or 11 pounds – but if the scale is accurate, one does not need to hold off the sale until a scale that reads to the nearest 10^{th} of an ounce is obtained.

As is readily evident in the draft Framework and draft BCE Panel report, the sciences of GHG generation, atmospheric dispersion, and the carbon cycle are extraordinarily complicated. The variables that could be factored in to make an accounting precise are nearly infinite. But the more factors that are included, the more difficult will be the science and mathematics required to accurately address those variables. Further, the greater the number of factors, the less flexibility the framework will have to accommodate unforeseen but valuable biogenic resources.

ReEngineered Feedstock is an example of why the framework must be kept on a level that is broadly accurate, without attempting ultimate scientific precision. The draft Framework and the draft BCE Panel report are focused almost entirely on use of biomass sourced at specific locations (*e.g.*, a forest; a crop growing region). Municipal waste is lightly touched upon. But there is nothing in the drafts that would directly accommodate ReEngineered Feedstock – a unique product manufactured from discrete components of MSW and other waste materials, but of a completely different character than those wastes.

We of course do not criticize the BCE Panel for not being aware of ReEngineered Feedstock, but use our example to point out that it is impossible to foresee all the possibilities (*e.g.*, all the feedstocks that should have a separate BAF). There likely are other innovative and meritorious technologies existing or in development. Too many factors in the Accounting Framework would create the danger that such technologies would not be adopted, because facilities and permit writers would be uncertain of how to treat the related CO2 emissions. Thus, the goal should be to have a Framework that is broadly accurate, but with the simplicity and flexibility to readily accommodate non-traditional biogenic feedstocks and technologies.

C. Carbon Neutrality Can Be and Should Be Assumed for Many Biogenic Feedstocks

The BCE Panel has agreed with EPA that biogenic feedstocks cannot be assumed *a priori* to be carbon neutral. While this may be true to a degree, it is important not to stifle the beneficial use of all biogenic feedstocks because of the potential that some feedstocks may have less than 100 percent carbon neutrality. Further, it is essential not to stifle the benefits of increased recycling afforded by a fuel such as ReEngineered Feedstock.

The January 19 draft BCE Panel report suggested as one alternative that EPA categorically include all biogenic CO_2 emissions with an opt-out via certification.[14] In the March 13 draft, the term "presumptive categorical inclusion" is not used, but could still be implied for use of a certification system. A presumptive categorical inclusion would be

[14] 1-19 Draft BCE Panel Report at 40.

unwarrantedly extreme. As noted by the BCE Panel, "A categorical inclusion would provide no incentive for using Biogenic sources that compare favorably to fossil energy in terms of greenhouse gas emissions."[15] The BCE Panel acknowledges that there are particular feedstocks and consumption cycles that are carbon neutral.[16] For the reasons given in these comments (Section IV), ReCommunity believes that ReEngineered Feedstock is one such feedstock that safely can be given a categorical exclusion. The need to go through a complicated certification or other complex process to demonstrate carbon neutrality would discourage use such feedstocks and thus unnecessarily sacrifice the benefits of that use.

EPA potentially could take a bifurcated approach: categorical exclusion for fuels such as ReEngineered Feedstock and presumptive inclusion for fuels likely to emit more CO_2 than that sequestered over the fuel's life cycle. Alternately, an initial categorical exclusion for *all* biogenic fuels may be justifiable to facilitate the establishment of a stable, well-functioning biogenic fuel sector. Just as EPA has designed the Tailoring Rule as part of a tiered approach to CAA permitting for CO_2-emitting facilities, EPA also could take a tiered approach to biogenic CO_2 accounting. Once the biogenic fuel sector is well-established, EPA could then determine how to address those feedstocks that may increase CO_2 emissions over their lifecycle.

Another alternative to either categorical inclusion or exclusion that is suggested by the BCE Panel is to develop feedstock-specific BAFs.[17] This may be a viable option provided the process for deriving those BAFs is not overly complicated. For the reasons set out in Section IV, below, under such an approach ReEngineered Feedstock should have a BAF of 0.

III. THE ACCOUNTING FRAMEWORK MUST HAVE THE FLEXIBILITY TO ACCOMMODATE "OUT-OF-THE-BOX" BIOMASS SUCH AS REENGINEERED FEEDSTOCK

ReCommunity agrees with the BCE Panel's statement that there is "considerable heterogeneity in feedstock types, sources and production methods."[18] We therefore encourage the BCE Panel to assist EPA to incorporate sufficient flexibility to enable, not disable, innovative renewable fuels like ReEngineered Feedstock that do not fit easily into the draft Accounting Framework's "three biologically based feedstock categories" (*i.e.*, forest-derived woody biomass, agricultural biomass, and waste materials).[19] ReEngineered Feedstock clearly is not woody biomass or agricultural biomass. Importantly, it also is fundamentally different from the unprocessed waste from which it derives its biogenic content. It is a sophisticated, engineered fuel with constant chemical composition and biogenic content, and the advanced recycling component of the MMPP process ensures that all waste materials are used in the most sustainable and energy efficient manner possible.

[15] 3-13 Draft BCE Panel Report at 2.

[16] *Id.* at 15.

[17] 3-13 Draft BCE Panel Report at 7.

[18] 3-13 Draft BCE Panel Report at 2.

[19] Draft Accounting Framework at 44.

It is crucial that the Accounting Framework not hinder or disincentivize innovative and outside-the-box renewable energy solutions like ReEngineered Feedstock, which seeks to maximize recycling and reduce landfilling, while at the same time creating a primarily biogenic fuel that reduces GHG emissions and serves as a control technology. This means creating a flexible framework that straightforwardly accounts for the differences among the types of biomass and that can easily accommodate additional categories of biomass.

A. ReEngineered Feedstock is Fundamentally Distinct from MSW and Has Important Advantages over MSW as a Fuel

ReEngineered Feedstock is an engineered, valuable, and homogeneous fuel that is the product of a technologically advanced manufacturing process. In contrast, municipal waste and other waste materials are heterogeneous and highly variable in content and, as a result, have highly variable biogenic content and emissions. *See* Appendix A, Section C. ReEngineered Feedstock's sorting and manufacturing process utilizes unprocessed municipal waste as an initial source material, much like a wheat field provides the fibers and carbohydrates for end products like bread and straw after sufficient processing and related manufacturing. The ReEngineered Feedstock process isolates and segregates discrete, selected constituent ingredients from the MSW—biogenic fibers, hard plastics, and soft plastics—from which the fuel is manufactured along with sorbents made from virgin materials. Just as a loaf of bread does not contain the roots or stalk of the wheat—but does contain other non-wheat materials (like yeast and salt)—so too the ReEngineered Feedstock contains only the intended, specified constituent ingredients derived from the municipal waste stream, and also includes other virgin materials such as sorbents. ReEngineered Feedstock, like the bread from the wheat field, is an engineered product that is physically, chemically, and legally distinct from the source material.

The composition of MSW and other waste materials is inherently variable and heterogeneous, meaning that the related biogenic carbon emissions will have dramatic temporal and spatial fluctuations. Numerous studies underscore the difficultly of properly characterizing the composition and quality of municipal waste, with one study noting that "large numbers of at least 200 lb (100 kg) samples [need] to be taken and analyzed to get even a rough estimate of the properties and variations…"[20] A number of factors account for the variability in composition of MSW, including seasonal variations, regional variations, climate, population density, state waste management policies, and the differing ratios of household, industrial and commercial wastes.[21]

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[20] Floyd Hasselriis, *Variability of Municipal Solid Waste and Emissions From Its Combustion*, 1984 Solid Waste Processing Conference, Orlando, FL. (June 1984), at 333.

[21] FLOYD HASSELRIIS, REFUSE-DERIVED FUEL PROCESSING 3 (Butterworth Publishers, 1984). Seasonal variations in yard trimmings are impacted by grass clippings, autumn leaves and Christmas trees, depending on climate. Bans on certain MSW components, such as lead-acid batteries, used oil, and scrap tires, are common, but by no means uniform or uniformly enforced. Arizona, California, Delaware, Kansas, New Mexico and Ohio all allow lead-acid batteries to be landfilled and six other states allow the landfilling of used tires. *Technical Support Document For Revision Of Certain Provisions: Proposed Rule For Mandatory Reporting of Greenhouse Gases*, Office of Air and Radiation, U.S. Environmental Protection Agency, 19 (July 8, 2010). Bans on yard trimmings, white goods, and electronics are much more variable. *Id.* The amount of materials recovered through recycling programs has been shown to have a strong influence on the composition of MSW, particularly on the paper components such as newspapers, cardboard, and office paper. *Id.* MSW further varies

CO_2 emissions from combusted MSW vary greatly with the seasonal changes in the content and ratio of "fossil-to-biogenic components."[22] The content and ratios of biogenic matter are strongly influenced by the recovery of paper, yard trimmings, and other seasonal and regional variables (*i.e.*, urban versus suburban, and arid versus temperate climates).[23] Even if the BCE Panel agrees that a BAF for biogenic CO_2 emitted during MSW combustion should be 0, it would still necessary to determine what portion of the MSW (and as a result, the emissions) is biogenic content. Given the variability of MSW, this is problematic. These uncertainties are not present with ReEngineered Feedstock, because the biogenic content of ReEngineered Feedstock is constant.

In contrast to unprocessed waste materials, ReEngineered Feedstock is a manufactured product, with consistent chemical composition and biogenic content. ReEngineered Feedstock draws some of its source material from specific, discrete components of the MSW stream, which are engineered into a fuel that itself is consistent and homogeneous. The link to the variable composition of municipal waste is completely severed by the ReEngineered Feedstock MMPP process, which allows the AMP to always begin with specifically selected, chemically-consistent constituent ingredients. Each specific, made-to-order batch of ReEngineered Feedstock contains that exact same composition of biogenic fibers, light plastics, heavy plastics and sorbents made from virgin materials. The consistent, homogenous composition means that the ratio of biogenic to fossil CO_2 in the emissions is also constant, predictable, and easily measured.

For all of these reasons, an Accounting Framework aimed at only woody biomass, agricultural biomass, and waste materials would not be appropriate for innovative biogenic products such as ReEngineered Feedstock. Accounting for emissions from highly variable MSW may involve factors unnecessary for accounting of ReEngineered Feedstock emissions. Yet, if the methodology dictates use of a complicated equation, deciding how to apply that equation to ReEngineered Feedstock could introduce enough uncertainty to discourage its use. The ultimate accounting framework must have the flexibility to easily accommodate "out-the-box" biogenic solutions such as ReEngineered Feedstock and other beneficial biogenic fuels perhaps not yet invented.

B. The Biogenic Content of ReEngineered Feedstock Is Different From Woody Biomass or Agricultural Biomass and Requires a Different Accounting Methodology

While ReEngineered Feedstock is a unique biogenic entity separate from MSW, it nevertheless is derived from MSW and other waste content. Therefore, a number of the considerations for dealing with MSW emissions also apply to Reengineered Feedstock. Both sources are very different from woody and agricultural biomass with respect to carbon lifecycle

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across regions and population density. For example, rural areas produce fewer newspapers and telephone directories on a per capita basis than urban areas. *Id.* at 17. Not surprisingly, the levels and types of commercial activity in a community have a strong impact on biogenic materials like corrugated boxes, office paper, wood pallets, and food scraps from restaurants. *Id.*

[22] *Technical Support Document For Revision Of Certain Provisions: Proposed Rule For Mandatory Reporting of Greenhouse Gases*, Office of Air and Radiation, U.S. Environmental Protection Agency, 20 (July 8, 2010).

[23] *Id.* at 20.

considerations, and many concerns with regard to the externalities associated with the biogenic content of biomass fuels are not implicated in the combustion of waste materials and ReEngineered Feedstock. Therefore, the Accounting Framework needs to be appropriately structured to address those considerations, apart from the structure for wood and agricultural biomass.

1. Accounting Variables Are Significantly Different between Directly Harvested Biomass and Waste-Sourced Biomass

The January 19 draft Accounting Framework recognizes the difference between the biogenic content of waste and that derived from other biomass sources:

> "….a critical difference between waste and other biologically based material is related to the connection to the land providing the material. The biologically based material in waste is initially removed from land for other economic purposes (*e.g.*, for manufacture of consumer and industrial products such as newspaper, food, and construction). Given that the treatment of waste itself does not drive the management of the growth and harvesting of biomass, it is more difficult to quantify a connection between the consumption of waste at stationary sources and the positive or negative CO_2 impact on the atmosphere."[24]

Nevertheless, the focus of EPA in the draft Accounting Framework and of the BCE Panel in its draft report has been primarily on biomass that is harvested directly at the point of growth (*e.g.*, woody biomass, agricultural biomass), not biomass contained in waste. The variables used to calculate Net Biogenic Emissions ("NBE")[25] primarily contemplate biomass that is harvested at the point of growth for its energy content, not waste materials like MSW that have already been used and disposed of. For instance, the NBE variables include feedstock losses in transportation, storage, and handling that would require more feedstock to be harvested than is actually used at the facility; atmospheric CO_2 sequestered during feedstock growth; feedstock carbon contained in products that leave the facility (*e.g.*, ethanol); "Total Net Chance in Site Emissions," meaning changes in the stock of land-based carbon at the site where the feedstock is produced (*e.g.*, cutting down a forest to plant corn for ethanol production may cause a net increase in CO_2 emissions); and "leakage" (*i.e.*, unanticipated decreases or increases in GHG emissions outside the projects "accounting boundary" as result of the project's activities). <u>None of these variables is implicated with ReEngineered Feedstock</u>.

2. Regional Scale Accounting Is Definitely Inappropriate for ReEngineered Feedstock

ReCommunity agrees with the BCE Panel's criticisms of EPA's proposed use of a regional scale, and believes that such a regional carbon stock is especially inappropriate when

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24 1-19 Draft Accounting Framework at 17.

25 In the Accounting Framework, EPA provides a methodology for determining a *Biogenic Accounting Factor* ("BAF") in a given facility. A facility's BAF is found by dividing its "Net Biogenic Emissions" ("NBE") by its "Potential Gross Emissions" ("PGE") to arrive at a value between 0 and 1 (with a 0 indicating 100% carbon neutral emissions).

applied to the biogenic emissions from waste materials. It is certainly true that the "atmospheric response to an additional ton of carbon is the same, regardless of its geographic origin."[26] However, there is at least a theoretical link between biogenic carbon emitted from, for example, woody biomass and the carbon potentially sequestered by the forest that is in the same region as the harvested wood.

In contrast, there is no link whatsoever between the combusted biogenic content of municipal waste and the region from which it was produced. The original plant was harvested for some purpose other than energy generation, the product (*e.g.*, paper) was potentially produced in an entirely different area, the product was then disposed of in potentially another geographic region, and then combusted in potentially a fourth different region. The biogenic emissions of combusted MSW have little or no relationship to the area where the original biogenic content was grown. The same is true for ReEngineered Feedstock. By the same logic, fuelshed measurement is also inapplicable to MSW, and it is inapplicable to ReEngineered Feedstock. Municipal, commercial, and industrial waste is generated in every corner of the United States and internationally (to say nothing of where the original biogenic material was grown), making the potential fuelshed of MSW or ReEngineered Feedstock nationwide or even worldwide. A regional approach is simply not an effective way to measure the BAF of biogenic carbon emitted by the combustion of waste materials and fuels and products made from waste materials.

IV. CO_2 EMISSIONS DUE TO COMBUSTION OF REENGINEERED FEEDSTOCK SHOULD BE TREATED AS CARBON NEUTRAL

Carbon dioxide emissions due to combustion of ReEngineered Feedstock are anyway emissions. ReCommunity believes that use of ReEngineered Feedstock may in fact enable carbon negative performance when co-fired with coal. The Accounting Framework therefore should treat the ReEngineered Fuel CO_2 emissions as carbon neutral.[27]

A. All CO_2 Emissions Due to ReEngineered Feedstock Are Anyway Emissions

Each CO_2 molecule produced through combustion of ReEngineered Feedstock is one that would have been produced anyway (or would have been produced in the form of methane). This is for two reasons: 1) The carbon content of ReEngineered Feedstock comes from selected materials drawn from processed waste streams; and 2) ReEngineered Feedstock displaces use of virgin coal that otherwise would have been combusted.

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26 3-13 Draft BCE Panel Report at 3.

27 ReCommunity would support a Framework approach that allows facilities to take credit for reduction in carbon dioxide emissions, due to use of ReEngineered Feedstock, <u>if</u> it does not introduce complexity that would discourage use of ReEngineered Feedstock. That is, the presumption should be carbon neutrality, perhaps with an option to demonstrate a carbon negative outcome. The Framework should not try to create a methodology that would in the first instance define whether a facility's biogenic emissions are carbon negative versus carbon neutral, because the associated complexity in the permitting process would discourage use of biogenic feedstocks at all.

The CO_2 attributable to ReEngineered Feedstock would have been generated anyway from waste disposal. Apart from sorbents added to assist with pollution control, ReEngineered Feedstock is composed entirely of discrete materials selected from municipal, commercial or industrial waste – primarily biogenic fibers. If not made into ReEngineered Feedstock, those materials would have gone into a landfill and decomposed into CO_2 and methane, or they would have been incinerated, producing CO_2. So long as the biogenic content is not harvested specifically for its energy content – and it is not in the case of ReEngineered Feedstock, the biogenic CO_2 emitted will be an "anyway emission."[28]

CO_2 emissions attributable to fossil fuel-based sources also would have been generated anyway through waste disposal. In discussing municipal waste, the draft BCE Panel report recommends that EPA develop a methodology to account for the portion of municipal waste that is fossil fuel based.[29] However, the CO_2 emissions attributable to the fossil fuel-based materials in ReEngineered Feedstock (*i.e.*, non-recyclable light and hard plastics) also are anyway emissions; that is, they would have decomposed to CO_2 (or methane) in the landfill. Note that all recyclable plastics, metals, and fibers are separated prior the manufacturing of ReEngineered Feedstock and sold into the commercial market; therefore, combustion of ReEngineered Feedstock does not represent combustion of carbon that otherwise would have been sequestrated in products due to recycling.

CO_2 emissions from ReEngineered Feedstock replace CO_2 emitted from coal. Even if CO_2 from the fossil fuel-based component of ReEngineered Feedstock would not have been generated at the landfill or incinerator, it represents CO_2 that would have been generated anyway by use of virgin coal. This is true for the entire carbon content Reengineered Feedstock combusted by a facility. Reengineered Feedstock is combusted instead of virgin coal. Thus, ReEngineered Feedstock CO_2 Emissions are anyway emissions.

B. ReEngineered Feedstock Provides Significant Additional Greenhouse Gas Reductions over Other Types of Biomass

Not only are CO_2 emissions due to combustion of ReEngineered Feedstock anyway emissions, use of ReEngineered Feedstock has the benefit of reducing CO_2 equivalent emissions that otherwise would have occurred. Reductions in GHG emissions were discussed above in Section I.B.2 and are summarized again here.

Reduction in methane production. Much of the carbon content of landfilled waste is converted to methane, which is a much more potent GHG than CO_2. By instead generating CO_2 through combustion, use ReEngineered Feedstock provides an overall decrease in CO_2 equivalents emitted to the atmosphere.

[28] Draft Accounting Framework at 40. ("…CO_2 emitted from the treatment of waste at a waste management system would have otherwise been returned to the atmosphere from natural decay of waste, regardless of the management or status of the land providing the biological material. The human management of the waste materials affects only the timing or location of these CO_2 emissions.")

[29] 3-13 Draft BCE Panel Report at 6 and 24.

The draft BCE Panel report recommends that, with respect to municipal waste, EPA develop a methodology to account for the fact that some landfill methane already is captured and burned. This consideration is relevant to ReEngineered Feedstock only if EPA decides to provide credit for potential carbon negative impacts of its use due to replacing methane emissions with CO_2 emissions. As noted above (note 27), ReCommunity would support such an approach, if it does not introduce complexity that would discourage use of ReEngineered Feedstock. In the first instance, however, the displacement of at least some landfill methane emissions with CO_2 emissions is further support for treating ReEngineered Feedstock as carbon neutral under the Accounting Framework.

Coal Combustion Efficiency. Noncombustible materials in MSW cause slagging and boiler tube contamination when the MSW is combusted in boilers. Use of ReEngineered Feedstock can increase the efficiency of power plants, because recyclables and non-combustible materials are not included in the select portion of the waste stream used to manufacture ReEngineered Feedstock. Improvements of 1 to 2% in boiler efficiency can result, thereby decreasing demand for fuel and its associated GHG emissions.

Further, if ReEngineered Feedstock is treat as carbon neutral for purposes of CAA permitting, it can reduce the need for emissions control equipment. Such equipment requires a 2-3% efficiency reduction due to parasitic loading. Avoidance of the need for control equipment thereby reduces the total amount of fuel consumed by the facility and thus the amount of associated GHG emissions.

Reduced production of virgin materials. The ReEngineered Feedstock process increases the extent of recycling by municipalities, commercial business, and industrial facilities. The recovered metals and plastics decrease the requirement to produce virgin metal and plastic materials, and thus reduce the GHG emissions associated with such production. Use of Reengineered Feedstock also reduces demand for virgin coal, and thus reduces GHG associated with mining of the coal.

C. The Ultimate Accounting Methodology, Whatever the Form, Should Automatically Exclude CO_2 Emissions Attributable to ReEngineered Feedstock

For the reasons above, the Accounting Framework should treat ReEngineered Feedstock CO_2 emissions as carbon neutral. It should do so in a straightforward manner that will not add complexity to CAA permitting and discourage use of ReEngineered Feedstock. Depending on the Accounting Framework methodology, there are several ways this could be accomplished.

Categorical exclusion. The most straightforward and use-enabling methodology would be to categorically exclude ReEngineered Feedstock CO_2 emissions, without need for application of a complicated accounting or certification methodology. This is more than justified for Reengineered Feedstock so as to encourage its use and reap the many consequent environmental benefits, as described above. We urge the BCE Panel to recommend this approach to EPA.

BAF set to 0. If EPA stays with a methodology to calculate a biogenic accounting factor (BAF), then ReCommunity agrees with the draft Accounting Framework and the BCE Panel that the BAF can be considered equal to 0 for biogenic CO_2 released from waste combustion.[30] For the reasons given above, a BAF for ReEngineered Feedstock clearly should be 0.

It also may be justifiable to set the BAF for ReEngineered Feedstock to a value lower than one (*i.e.*, carbon negative). It makes sense to do this if the lower BAF value can be determined readily for application at all facilities using ReEngineered Feedstock. However, if it is to be derived on a facility-specific basis, or if derivation of the BAF would be delayed by this consideration, then it should be considered only as an option that facilities can pursue if they choose. In the first instance, the BAF simply should be 0.

Certification as carbon neutral. Certification on a facility-by-facility basis would be complicated and cumbersome and would discourage use of ReEngineered Feedstock. However, a general certification of carbon neutrality could be applied at any facility using ReEngineered Feedstock. Certification should be not done on a fuelshed basis for ReEngineered Feedstock,[31] because the waste materials from which it is made can literally come from numerous fuelsheds around the world. ReCommunity would be pleased to work with EPA to provide the data supporting such a general certification.

CONCLUSION

Development of a thriving biogenic fuel sector is vital to reducing dependence on fossil fuels and lowering GHG emissions. Reengineered Feedstock is a biogenic fuel that further provides for dramatically increased recycling and other significant environmental benefits. While ReEngineered Feedstock can be an important tool for facilities to attain permitting limits without the need for expensive and efficiency-lowering control equipment, facilities will shy away from its use if the Accounting Framework creates ambiguity about the treatment of ReEngineered Feedstock emissions. ReEngineered Feedstock emissions are clearly carbon neutral and should be treated as such in a simple and straightforward manner in the ultimate Biogenic CO_2 Accounting Framework. ReCommunity respectfully asks that the BCE Panel's report assist EPA in taking this approach.

[30] 3-13 Draft BCE Panel Report at 17.

[31] *See* 3-13 Draft BCE Report at 45.

Appendix A
The ReEngineered Feedstock Manufacturing Process Description

A. Objectives of the ReEngineered Feedstock Manufacturing Process

The ReEngineered Feedstock sorting, material characterization, fuel manufacturing, and sorbent addition process has two distinct objectives: (1) to maximize the effectiveness, scope and financial viability of a single stream recycling process, and (2) to engineer a homogenous fuel that is consistent over time with equivalent contaminant levels to substitute fuels, that provides meaningful heating value and controls emissions. The ReEngineered Feedstock process accomplishes the first objective—to dramatically expand recycling and reduce landfilling by removing all recyclable materials from the waste stream—by removing papers, paper products, cardboard, PET and HDPE plastics, glass, aluminum, ferrous metals, and a variety of other recyclables from the waste stream. This means that no recyclable materials are used in the production of ReEngineered Feedstock. Recyclables are stored at the Advanced Material Recovery Facility (AMRF) and then sold on the market. Unlike traditional recycling methods, which are generally limited to residential municipal waste streams, the ReEngineered Feedstock process can accept commercial and institutional waste streams, dramatically expanding the scope of the recycling process.

As a direct result of ReCommunity's recycling maximization, the percentage of commercial and municipal waste streams destined for landfilling is dramatically reduced. Although the contents of individual waste streams varies considerably, on average the ReEngineered Feedstock process lowers the amount of landfilled material from the current average of 60%[32] down to approximately 10-15% of the waste stream. The advanced recycling process ensures that no valuable materials are combusted or landfilled. Increased recycling also reduces greenhouse gas emissions. A ReCommunity plant in Oakland County, Michigan will prevent more than 320,000 metric tons of CO_2 equivalent greenhouse gases from being emitted annually when operating at full capacity, the equivalent of removing 59,000 cars from the road each year. Expanded recycling also reduces air and water pollution associated with making new products from raw materials. ReCommunity shares the proceeds of its sale of recyclables with the local municipality from which it receives its initial source materials (*i.e.*, MSW).

The second objective of the ReEngineered Feedstock process is to create a homogenous fuel that has a comparable heating value relative to traditional fuels and that can be co-fired seamlessly with coal in existing (unmodified) boilers while serving as an effective control technology. Every batch of ReEngineered Feedstock is engineered to meet the specific heating value and emission control targets of individual boilers. ReCommunity will the use the quality of input coal actually intended to be combusted, the existing actual emissions of the facility using this coal, and the design of the boiler and other related characteristics of the system to design the co-firing rate and the ReEngineered feedstock formulation needed to achieve the desired targeted emission after the use of the ReEngineered feedstock.

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[32] EPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2010, available at http://www.epa.gov/osw/nonhaz/municipal/pubs/msw_2010_rev_factsheet.pdf (last visited Mar. 15, 2012).

ReEngineered Feedstock is pelletized for easy transportation, yet when pulverized and or granulated, it is fluid-dynamically and kinetically identical to the coal with which it will be co-fired. Each pellet of ReEngineered Feedstock is manufactured from the exact same discrete constituent ingredients – fibers, light plastics, hard plastics, and sorbents – that are specifically selected, segregated and thoroughly processed by the materials sorting and characterization process. Not only are the selected constituent ingredients uniformly consistent across pellets and batches, each batch of ReEngineered Feedstock is specifically tailored to the needs of the boiler in which it will be used. This precise engineering recovers all recyclable materials and removes hazardous materials and non-combustible inert materials. The ReEngineered Feedstock manufacturing process also enables the utilization of organic and food waste materials found in MSW in the fuel feedstock. The carbon content in these organics is valuable in the fuel feedstock and moisture content of the stream is reduced using heat generated during processing. The chemically consistent, homogenous constituent ingredients—both the recovered materials and the virgin sorbents—allow the ReEngineered Feedstock to be manufactured with exact precision to meet the heating and emissions needs of its customers.

ReEngineered FEEDSTOCK™

ReEngineered Feedstock Facts

	Units of measure (UOM) db = dry basis
801010SSP 30	**UOM**
Biogenic Carbon, wt. %	**56.0**%
Carbon, wt. % (db)	**33.6**%
Moisture, wt. %	**2.04**%
HHV, Btu/lb. (db)	**9,984**
CO2 emissions, lb./mmBtu	**68.9** lb
Hydrogen, wt. % (db)	**5.7**%
Oxygen, wt. % (db)	**35.9**%
Nitrogen, wt. % (db)	**0.3**%
Sulfur, wt. % (db)	**0.01**%

ReEngineered Feedstock is engineered to synthesize the sorbents and additives with the other constituent ingredients in such a fashion that they are effectively embedded across the ReEngineered Feedstock profile. Those additives are incorporated into the ReEngineered Feedstock to alter the chemical composition of the materials and ultimately to produce a fuel product with an emissions profile tailored to the needs of the end user, typically one that reduces emissions of hazardous air pollutants (HAPs) and criteria pollutants (*e.g.,* NOx and SO_2) and improves combustion efficiency. The sorbents and additives are synthesized into ReEngineered Feedstock mechanically and physically in a way that causes the fluid dynamics and mechanics to be identical to the coal with which it is co-fired. This ensures that the sorbent is delivered to the precise reactivity zone in the combustor to maximize effectiveness. For example, the optimal temperature zone to remove SO_2 is 1800 - 2250 degrees Fahrenheit. Traditional sorbent injection methods (*i.e.* injecting the sorbent with the coal) result in sintering of the sorbents at high temperatures, between 3000 and 2500 degrees Fahrenheit (found in the first stage of combustion.) This precludes or retards the reactivity of the sorbent and reduces the effectiveness of the sorbent to as low as 20%. Directly injecting sorbent in the boiler in the optimal temperature zone also reduces the effectiveness of the sorbent because it is not effectively distributed across the profile of the combusted coal. Injecting larger amounts of sorbent in an attempt to distribute across the combusted coal's profile leads to slagging and reduced boiler efficiency. In contrast, ReEngineered Feedstock allows the sorbent to be injected *with* the coal, without being directly exposed to inefficient temperatures, and allows the sorbent to be evenly distributed across the combusted coal's profile to maximize the efficiency of pollutant reductions. *See* Figure A-1.

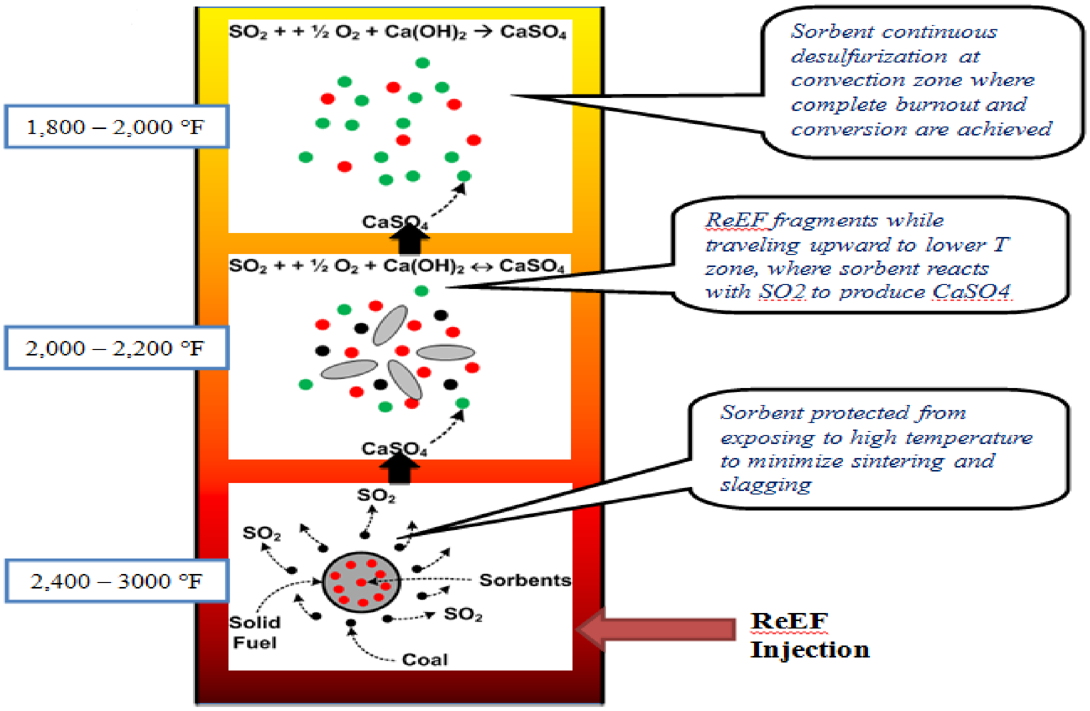

Figure A-1. Optimal sorbent injection temperature zone

B. Stages of the ReEngineered Feedstock Manufacturing Process

Figure A-2 illustrates the ReEngineered Feedstock manufacturing process. The following describes that process.

1. Multi-Material Processing Platform

The ReEngineered Feedstock process begins by accepting source materials in the form of comingled municipal, institutional, and commercial waste streams at the advanced Material Recovery Facility (MRF). Once the source materials arrive on the tipping floor, they are pre-sorted to separate out large metals and large rigid plastics to be sent to the recycling commodity market, as well as bulky materials that cannot be processed and unwanted prohibitive materials. The remaining source materials are lightly shredded and then fed into ReCommunity's innovative MMPP.

After the presorted source material enters the MMPP, it is shredded and sent through a fiber separator that extracts all fibers from the waste stream. The extracted fibers are then sent through two optical sorting stations calibrated respectively to remove any remaining rigid plastics and segregate old corrugated containers (OCC) and old newspapers (ONP) for recycling. The optical sorting stations also segregate any remaining non-recyclable plastics and remove them to the plastics processing flow. The remaining non-recyclable fibers are finely shredded and sent through a fluidized bed separator. Fluidized bed separation removes all nonconforming

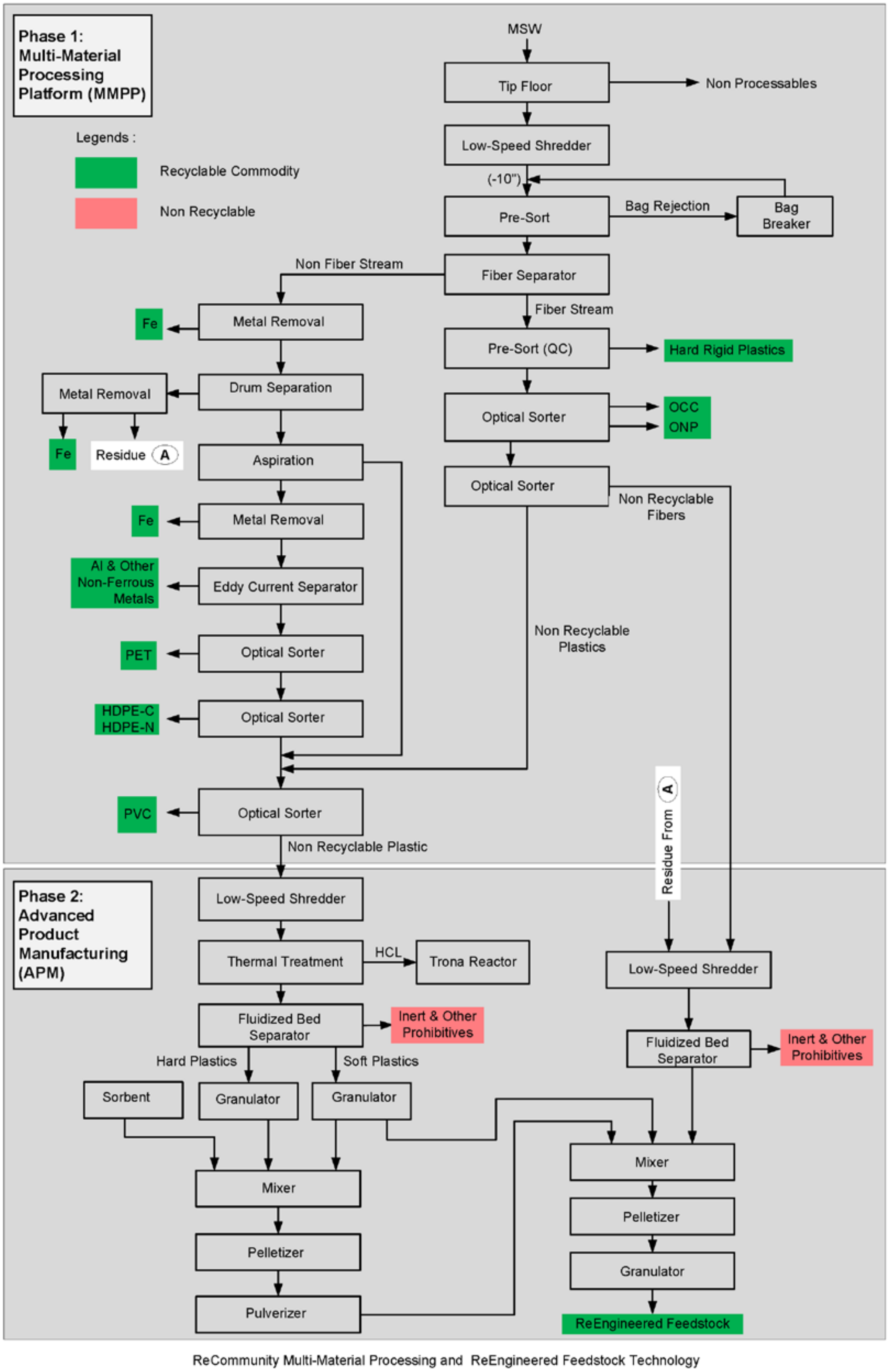

Figure A-2. The ReEngineered Feedstock Process particles (*i.e.,* heavy inerts and non-combustibles) and any microscopic metal fragments attached to the fibers that are too small for magnetic or eddy current separation. The pure biogenic fibers are then granulated and sent to the fiber silo.

The non-fiber stream is exposed to a drum separator, a magnetic separator, and an eddy current separator to recover all recyclable metals. The magnetic separator removes the vast majority of the ferrous metals from the waste stream. After the ferrous and non-ferrous metals are removed, the waste stream moves through an optical sorting station. The optical sorter is calibrated to separate out high density polyethylene (HDPE) and polyethylene terephthalate (PET) from the waste flow for recycling. The optical sort module will substantially remove greater than 80% of the polyvinyl chloride (PVC) material from the stream. The removed PVC will be separated and sold into the PVC recycling market.

The remaining post-sorted plastics will be further subjected to thermal treatment to remove any remaining amounts of chlorine embedded in remaining plastics. The PVC thermal treatment module is located following the low speed shredder on the non-fiber stream. The thermal treatment system uses thermal energy to actuate the devolatization properties of PVC material remaining in the non-fiber plastic stream following PVC optical sort removal. PVC has as an attribute, the ability to completely devolatize the chlorine attached from the remaining hydrocarbon structure when exposed to temperatures above 400 F. The free chlorine is then directed to a packed trona reactor designed to convert free chlorine into salt, preventing any release of off-gas to the atmosphere. This two-step process will bring the entire discrete constituent stream down to comparable levels of chlorine found in other fuels. The remaining non-recyclable plastics are then subjected to fluidized bed separation to remove all nonconforming particles (*i.e.*, heavy inerts and non-combustibles) and any microscopic metal fragments attached to the plastics that are too small for magnetic or eddy current separation. Fluidized bed separation also separates and segregates hard plastics and soft plastics. The segregated hard plastics and soft plastics are then granulated and sent to their respective silos.

2. Advanced Product Manufacturing

After the completion of the MMPP, the remaining fibers, light plastics, and hard plastics have been segregated into separate silos and are free from any non-combustible materials, inert residues, or prohibitive materials. In the fuel manufacturing and sorbent incorporation phases, the constituent ingredients are carefully metered, volumetrically mixed in the correct proportion, and conditioned to produce an end product that suits the specific energy needs of each end user. In order to maximize the effectiveness of the sorbents, as discussed above, hard plastics and sorbents are first precisely metered, mixed, and pelletized. This ensures that the sorbents are effectively synthesized across the ReEngineered Feedstock's profile so that it is activated to the optimal point in the combustion process. After the sorbents have been synthesized into the profile of the hard plastics, the pellets are granulized. The desired amounts of granulated fibers and soft plastics are then precisely metered and mixed with the granulated hard plastics and sorbents. The thoroughly mixed feedstock is then pelletized. Depending on the specifications of the customer, ReEngineered Feedstock can be transported and stored in pelletized form or granulated and delivered in Super Sack® or Gaylord containers.

Each pellet of ReEngineered Feedstock is manufactured from the exact same discrete constituent ingredients – fibers, light plastics, hard plastics, and sorbents – that are specifically selected, segregated and thoroughly processed by the materials sorting and characterization process. Not only are the selected constituent ingredients uniformly consistent across pellets and batches, each batch of ReEngineered Feedstock is specifically tailored to the needs of the boiler in which it will be used. This precise engineering recovers all recyclable materials and removes hazardous materials and non-combustible inert materials. The ReEngineered Feedstock manufacturing process also enables the utilization of organic and food waste materials found in MSW in the fuel feedstock. The carbon content in these biogenic organics is valuable in the fuel feedstock and moisture content of the stream is reduced using heat generated during processing. The chemically consistent, homogenous constituent ingredients—both the recovered materials and the virgin sorbents—allow the ReEngineered Feedstock to be manufactured with exact precision to meet the heating and emissions needs of its customers.

Thus, ReEngineered Feedstock is a sophisticated fuel technology that combines the benefits of primarily biogenic carbon emissions and of displacing the fossil carbon emitted by coal, with the benefits of a fuel engineered to target HAPs and criteria pollutants. It further benefits communities and the environment by increasing recycling and decreasing landfill space demand.