September 12, 2016

Mr. Robert Carlson
Project Lead, AB 901 Regulatory Development
Department of Resources Recycling and Recovery
1001 I Street
Sacramento, CA 95812

(Comment submitted electronically to Robert.Carlson@calrecycle.ca.gov
and AB901.Reporting@CalRecycle.ca.gov)

RE: AB 901 Proposed Regulations

Dear Mr. Carlson,

Fulcrum BioEnergy, Inc. ("Fulcrum") appreciates the opportunity to provide comments regarding the Department of Resources Recycling and Recovery's ("CalRecycle"), draft regulations to implement AB 901 ("Draft Regulations"). As further described in this letter, Fulcrum is a world leader in the production of low carbon fuels from municipal solid waste that has already undergone separation of standard recyclable materials ("Separated MSW").

Fulcrum is the parent company of Fulcrum Sierra BioFuels, LLC ("Sierra BioFuels"). Sierra BioFuels is constructing and will own and operate a commercial scale low carbon fuel production facility comprised of a Feedstock Processing Facility and a Biorefinery (together the "Sierra BioFuels Plant"). The Feedstock Processing Facility is operational and is located near the Lockwood Regional Landfill in Storey County, Nevada. The Biorefinery is located approximately 20 miles east of Reno in the Tahoe-Reno Industrial Center. Once the entire Sierra BioFuels Plant is completed, Fulcrum will have the capability to utilize Separated MSW feedstock to produce low carbon diesel and jet fuels that are fully compatible with the existing transportation infrastructure.

Fulcrum is highly supportive of California's aggressive policies to reduce landfilling and greenhouse gas ("GHG") emissions, and to expand the reduction, recovery, reuse, and recycling of MSW. Indeed California's regulatory structure is a crucial policy driver in the development of environmentally beneficial waste derived transportation fuels. Fulcrum looks forward to working with CalRecycle to increase diversion of California waste streams to reduce environmental impacts and to foster California's clean energy

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economy. Fulcrum sees significant opportunity for CalRecycle to better achieve the State's goals by integrating the following revisions to the Draft Regulations:

- ***Recognition that a defined subset of next generation biofuel facilities that utilize Separated MSW as a feedstock do not meet the statutory definition of a transformation or engineered municipal solid waste facility; and,***
- ***Establishment of a qualified fuel feedstock category under the AB 901 regulatory structure so that diversion credit is appropriately provided to feedstock supplied to these next generation biofuel facilities.***

AB 901 Statutory Framework

The goal of the Legislature in adopting AB 901 was to fortify California's overall program of reducing landfill disposal and its environmental impacts on soil, water and air quality, and to better track the State's progress against that goal. As stated in the AB 901 legislative analysis prepared for the Senate Environmental Quality Committee:

> *An estimated 35 million tons of waste are disposed of in California's landfills annually, of which 32% is compostable organic materials, 29% is construction and demolition debris, and 17% is paper. CalRecycle is tasked with diverting from landfills at least 75% of solid waste statewide by 2020 through source reduction, recycling and composting. Source reduction, or waste prevention, is designing products to reduce the amount of waste that will later need to be thrown away and also to make the resulting waste less toxic. Recycling is the recovery of useful materials, such as paper, glass, plastic, and metals, from the trash to use to make new products reducing the amount of virgin raw materials needed. (…)*
>
> *By using and reusing materials in the most productive and sustainable ways across their entire life cycle, conserving resources and reducing wastes help slow climate change and minimize the environmental impacts of used materials. (…)*
>
> *California has set a goal of achieving a recycling rate of 75% by 2020. Many actions will be needed to achieve that goal, but most importantly it will be necessary to have accurate and timely data on waste disposal and recycling.* [1]

A key factor in determining whether California is meeting its 75% diversion goal is the statutory distinction between disposal and recycling. AB 901, now codified at Public

[1] Senate Committee on Environmental Quality, Analysis of Bill No. AB 901, Version of July 2, 2015, 2015-2016 session, prepared by Consultant Joanne Roy.

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Resources Code (PRC) §§41821.5 et seq., references several existing statutory definitions to clarify this distinction. In particular, Section 41821.5(g) provides,

> *(5) For purposes of this subdivision, 'disposal' and 'disposal facility' have the same meanings as prescribed by Sections 40120.1 and 40121, respectively.*

Section 40120.1 provides that "'Disposal' or 'dispose' has the same meaning as 'solid waste disposal' as defined in Section 40192." The applicable provision of Section 40192[2] provides that:

(a) *For purposes of Part 2 (commencing with Section 40900), "solid waste disposal," "dispose," or "disposal" means the management of solid waste through landfill disposal, transformation, or EMSW conversion, at a permitted solid waste facility, unless the term is expressly defined otherwise.*

Section 40121 provides:

> *'Transformation' means incineration, pyrolysis, distillation, or biological conversion other then composting. 'Transformation' does not include composting, gasification, EMSW conversion, or biomass conversion.*

Thus disposal for purposes of AB 901 categorization refers to material disposed at a landfill, or managed through transformation or EMSW conversion. Transformation means incineration, pyrolysis, distillation, or biological conversion other than composting. EMSW conversion is defined by statute as follows:

a. *"Engineered municipal solid waste conversion" or "EMSW conversion" means the conversion of solid waste through a process that meets all of the following requirements:*

(1) *The waste to be converted is beneficial and effective in that it replaces or supplements the use of fossil fuels.*

(2) *The waste to be converted, the resulting ash, and any other products of conversion do not meet the criteria or guidelines for the identification of a*

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[2] The AB 901 provisions are found within Part 2, Chapter 7, at §§ 40121.5 et seq. Therefore the definition provided by §40192(b) is specifically applicable. Reviewing the Section 40192(a) and (c) provisions, Part 2 of the regulations pertains to Integrated Waste Management Plans so controls over the more general §40192(a). Regarding §40192(c), none of the referenced parts or chapters are applicable: Chapter 16 pertains to waste tires and Chapter 19 pertains to tire hauler registration; Part 4 pertains to solid waste facilities; Part 5 pertains to enforcement; Part 6 pertains to appeals; and, Chapter 2 of Part 7 pertains to finances of the Integrated Waste Management Fund.

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hazardous waste adopted by the Department of Toxic Substances Control pursuant to Section 25141 of the Health and Safety Code.

(3) *The conversion is efficient and maximizes the net calorific value and burn rate of the waste.*

(4) *The waste to be converted contains less than 25 percent moisture and less than 25 percent noncombustible waste.*

(5) *The waste received at the facility for conversion is handled in compliance with the requirements for the handling of solid waste imposed pursuant to this division, and no more than a seven-day supply of that waste, based on the throughput capacity of the operation or facility, is stored at the facility at any one time.*

(6) *No more than 500 tons per day of waste is converted at the facility where the operation takes place.*

(7) *The waste has an energy content equal to, or greater than, 5,000 BTU per pound.*

(8) *The waste to be converted is mechanically processed at a transfer or processing station to reduce the fraction of chlorinated plastics and materials.*

Fulcrum's Next Generation Biofuel Processing Technology

The Sierra BioFuels Plant will transform Separated MSW into low carbon jet and diesel fuels that are anticipated to meet ARB's heightened standards for low emission diesel fuel.[3] The Feedstock Processing Facility will receive Separated MSW that would otherwise be landfilled. A sophisticated feedstock processing system will shred, screen, and sort the MSW producing a MSW-derived feedstock. The resulting products from the Feedstock Processing Facility include the MSW-derived feedstock and recoverable materials with market value (e.g. ferrous and nonferrous metals and high value plastics). The Biorefinery will have the capability to convert the MSW–derived feedstock into jet and diesel fuels using a three-step process comprised of steam reformation, Fischer-Tropsch ("FT") synthesis, and hydroprocessing.

Processing Separated MSW into FT diesel or landfilling the material both result in greenhouse gas ("GHG") emissions. The landfilling of Separated MSW results in

[3] See Air Resources Board, Mobile Source Strategy, May 2016, at 153-155 (low emission diesel specifications anticipated to be less than one percent aromatics, near zero sulfur, and a CI of 30-60 gCO2e/MJ), https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf (last viewed September 12, 2016).

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emissions when the biogenic material decomposes into landfill gas ("LFG"). LFG from Separated MSW produces GHG emissions through a variety of processes at the landfill. Some portion of the LFG may be captured and combusted at the landfill producing GHG emissions on site. Other LFG escapes from the landfill as methane, a highly potent short-lived climate pollutant.

The Air Resources Board ("ARB") has approved a prospective pathway for Sierra Biofuels' FT diesel under the Low Carbon Fuel Standard ("LCFS") with a carbon intensity ("CI") of 37.47 g/MJ. The pathway is based on the engineering parameters of Fulcrum's process design for the Sierra BioFuels Plant. The CI is based on the total GHG emissions associated with the FT diesel fuel production process minus the avoided emissions from landfilling the MSW. While not yet incorporated into Fulcrum's LCFS FT diesel pathway, the recovery of recyclable material also results in lower GHG emissions by displacing the production of new metals and plastics.[4]

Applying AB 901 Statutory Framework to Fulcrum's Feedstock

Applying the AB 901 statutory framework to Fulcrum's feedstock and process, it is established that Fulcrum's use of the Separated MSW feedstock does not correspond to any of the disposal categories. As previously noted, disposal for purposes of AB 901 categorization refers to material disposed at a landfill, or managed through transformation or EMSW conversion.

- Landfill disposal- Fulcrum's Feedstock Processing Facility and Biorefinery do not qualify as a landfill under California law.
- Transformation- As provided by California statute, "transformation" refers to "incineration, pyrolysis, distillation, or biological conversion other then composting." Fulcrum's process is not within the scope of any of these process technologies.
- EMSW conversion- Fulcrum's process does not meet the statutory definition of EMSW conversion in several respects. The smallest Fulcrum facility will receive 1550 tons per day of Separated MSW, more than triple the maximum size for EMSW conversion by statute. In addition, the Sierra BioFuels Facility will receive Separated MSW material with a moisture content in excess of 40% as is typical for MSW which would otherwise be landfilled, and is well above the 25% maximum criteria for an EMSW conversion facility. Finally, the Sierra BioFuels Facility will not maximize the burn rate of the Separated MSW. Instead, in the Fulcrum process, the Separated MSW is not a fuel, but a feedstock for a high temperature thermochemical reaction. In the Biorefinery, the Separated MSW

[4] Fulcrum plans to pursue a modification to its FT diesel LCFS pathway to incorporate the GHG benefit of recovering recyclable materials from its feedstock processing facility.

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reacts with heat in a reducing environment without combustion or incineration, breaking down the feedstock into simple molecules and producing syngas.

Instead of being characterized as disposal, feedstock supplied to the Sierra BioFuels Facility is properly recognized as recycling. Per PRC §40180:

> *"Recycle" or "recycling" means the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace. "Recycling" does not include transformation, as defined in Section 40201 or EMSW conversion.*

As required by the statutory recycling definition, the Sierra BioFuels Facility will utilize Separated MSW as a raw material to produce fuel that meets the quality standards necessary to be used in the marketplace. In particular, the Biorefinery will produce diesel fuel to the ASTM D975 specification as well as the heightened CARB diesel specification, and jet fuel to ASTM specification D7566. These are exacting fuel specifications in a highly regulated, established, and sophisticated market. Fulcrum's use of Separated MSW will directly displace the use of fossil fuel in these applications, thereby lowering GHG emissions, reducing landfilling, and providing other environmental co-benefits.

GHG Benefits

A more detailed review of Fulcrum's LCFS pathway establishes that Fulcrum's FT diesel will provide substantial GHG emission reductions on a life cycle assessment basis, consistent with the goals of California's climate policies including recently signed SB 32 and AB 197. In 2009, ARB approved the original LCFS regulation. That regulation designated the California-modified Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation model ("CA-GREET," version 1.8b) as the model to be used for estimating direct life cycle emissions from the production, transport, and use of transportation fuels.[5]

Fulcrum's FT diesel prospective pathway was reviewed and approved by ARB with reference to the CA-GREET 1.8b model. Fulcrum's FT diesel fuel has therefore been considered by ARB from a complete lifecycle GHG reduction basis and found to reduce more than 60% of GHG emissions compared to diesel fuel. In addition, Fulcrum has effectively addressed concerns that waste-derived fuels will impact recycling rates.

[5] See section 95486(b)(1)(E) of the previous LCFS regulation, available at http://www.arb.ca.gov/regact/2011/lcfs2011/frooalapp.pdf (last viewed April 6, 2016).

Fulcrum's feedstock supplies are diverted after separation of recycling has occurred and immediately before landfill disposal. Fulcrum's process facilitates the expansion of traditional diversion programs upstream of Fulcrum (e.g. recycling, composting, organics recovery, etc.) and Fulcrum has integrated resource recovery into its Feedstock Processing Facility. As may be observed at Fulcrum's operating facility in Nevada, Separated MSW that is received by Fulcrum will achieve higher rates of recycling and resource recovery than conventional MSW streams, even before the remaining Separated MSW is processed into a transportation fuel.

Conclusion

Thank you for your consideration of our input. We have attached our specific recommended changes to the Draft Regulation in redline format as an Annex to this letter.

We look forward to continuing to participate in the development CalRecycle's AB 901 rulemaking process, and to furthering the achievement of California's policy goals by producing fuel from Separated MSW and supplying that finished fuel to the transportation sector.

Sincerely,

Ted Kniesche
Vice President, Business Development
Fulcrum BioEnergy, Inc.

Annex- Proposed Changes to Draft Regulations

AB 901 Regulation Development
Draft of Reporting Regulations for Disposal, Diversion & Enforcement
For Public Release 6/24/2016

(…)

Section X.2 Definitions.

(a) For the purposes of this Article, the following terms have the meanings given below.

(…)

(17) "End User" means the person who uses a product made from recovered material after a level of processing that has resulted in that material:

(A) Significantly resembling a virgin material (such as plastic pellets, paper pulp, metal ingots,

glass cullet, etc.),

(B) Becoming a homogenous mixture or material (such as mulch or compost or a material

suitable for direct land application), or

(C) Becoming suitable for use as a qualified fuel feedstock.

End use or End User does not mean a facility solely engaged in baling, washing, or simple size

reduction for ease of transportation or processing.

(…)

(27) "Material category" is the kind of material that recycling and composting operations must report, pursuant to this article. Material categories include:

(A) Paper
(B) Plastics
(C) Glass
(D) Metals
(E) Organics
(F) Construction and demolition debris and inerts
(G) Qualified fuel feedstock
-(H) Target products including carpet, mattresses, white goods, furniture, electronics, textiles,
household batteries, architectural paint, used tires
(I) Mixed recyclable or compostable materials containing less than 10% residual non-

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recyclable materials
(J) Mixed solid waste which may contain recyclable materials but also contain greater than 10%
residual non-recyclable materials
(…)
(30A) "Qualified Fuel Feedstock" means raw material that meets the quality standards necessary be used to produce fuel at a facility that is not an Engineered Municipal Solid Waste facility as defined by section 40131.2 of the Public Resources Code or a Transformation facility as defined by section 40201 of the Public Resources Code.
(…)
(32) "Recycle" or "recycling" has the same meaning as defined in section 40180 of the Public
Resources Code. This includes both traditionally recycled commodities, recycled organics, raw materials for products that meet the quality standards necessary to be used in the marketplace, and other recycled materials and products.
(A) For traditional commodity recyclables such as paper, glass, metal, and plastics: this includes
but is not limited to sorting, baling, shredding, pulping, crushing, cullet making, smelting, flaking, and pelletizing.
(B) For non-composted recycled organics such as food waste and green waste, this includes but
is not limited to mulching, chipping and grinding.
(C) For recycled construction and demolition material, this includes but is not limited to: crushing, grinding, shredding, sizing or other processing of asphalt, concrete, lumber, brick,
carpet and gypsum board.
(D) For qualified fuel feedstock, this includes but is not limited to sorting, crushing, grinding, shredding, sizing or other processing of MSW.
(~~D~~E) For other targeted products, this includes but is not limited to: sorting, baling, cutting,
shearing, renovating, deconstruction, and removal of components from products including
mattresses, furniture, appliances, textiles, electronics, etc.
(…)

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