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December 02, 2008

Request for Private Letter Regarding Additional First-Year Depreciation Deduction for Cellulosic Biomass Ethanol Plant Property

Legend

Taxpayer =

Parent =

City =

A =

B =

C =

Dear :

This letter responds to a letter dated May 30, 2008, and subsequent correspondence, submitted on behalf of Taxpayer, requesting a letter ruling on whether Taxpayer's commercial demonstration cellulosic ethanol production plant (demonstration plant) will be eligible for the additional first-year depreciation deduction for qualified cellulosic biomass ethanol plant property under section 168(l) of the Internal Revenue Code. Specifically, Taxpayer seeks the ruling in order to confirm that section 168(l) will apply to the demonstration plant even though the plant will, as described

below, produce ethanol through fermentation subsequent to hydrolysis, rather than as a direct output of the hydrolysis process.

FACTS

Taxpayer represents that the facts are as follows:

Taxpayer, a wholly-owned subsidiary of Parent, is engaged in the development of biofuels derived from domestically abundant, low-cost cellulosic biomass feedstocks, and specifically, is in the business of commercializing the production of cellulosic ethanol using exclusive proprietary technology. Taxpayer uses the accrual method of accounting and files its federal income tax returns on a calendar year basis.

Taxpayer is in the process of designing and building a demonstration plant in City that will, if successful, allow the commercial production of as much as approximately A gallons of ethanol per year. The ethanol produced by the demonstration plant is expected to be sold at market prices to unrelated gasoline blenders. The demonstration plant has entered the start-up phase and is expected to be operational during the B.

The demonstration plant is designed to operate on diverse lignocellulosic biomass feedstocks. The feedstocks will consist of one or more of the following materials: dedicated energy crops such as energy cane, switchgrass, hybrid poplar wood, or elephant grass; agricultural residues such as rice straw, corn stover, or wheat straw; agricultural wastes such as sugarcane bagasse, rice hulls, corn fiber, sugar beet pulp, citrus pulp, or citrus peels; forestry wastes such as hardwood or softwood thinnings or residues from timber operations; wood wastes such as saw mill waste or pulp mill waste; and urban wastes such as the paper fraction of municipal solid waste, municipal wood waste, or municipal green waste. Each of the feedstocks has three principal components – hemicellulose, cellulose, and lignin, with the proportion of each component depending on the specific feedstock.

Taxpayer's Demonstration Plant's Cellulosic Biomass Ethanol Production Process

Taxpayer intends to produce ethanol at the demonstration plant using a multi-stage process summarized by the following numbered steps described as follows:

1. *Delivery & Storage* – Biomass feedstock will be delivered to the demonstration plant for storage.

2. *Preparation* – Biomass feedstock will be prepared for processing. Preparation equipment will include (i) a de-stoning and debris separation system to remove foreign matter present in the feedstock; and (ii) one or more devices for controlling feedstock flow rates. The preparation will vary somewhat depending on the specific feedstock.

3. *Pretreatment Hydrolysis* - Biomass will undergo pretreatment using dilute acid, water, and/or elevated temperature to break down (hydrolyze) plant matter. At this stage hemicellulosic feedstock will be hydrolyzed into its component sugars, primarily five-carbon (or C5) sugars, the most common of which is xylose. The pretreatment also solubilizes some of the lignin in the feedstock and "exposes" the cellulose for subsequent enzymatic hydrolysis.

4. *Fermentation of C5 Sugars* - Hemicellulose, in the form of syrup containing xylose or C5 sugars, will be drawn off for processing. C5 sugars will be fermented using Taxpayer's proprietary bacterium or other fermentation agent, yielding dilute ethanol referred to as "beer" or "ethanol beer." This process is known as pentose fermentation.

5. *Enzymatic Hydrolysis and Fermentation* - The remaining lignocellulose (cellulose and lignin), which is fiber residue, will be processed into ethanol using Taxpayer's integrated conversion process. In this process, the lignocellulose will be mixed with enzymes, which will be produced on-site (step 6 below) using Taxpayer's proprietary enzyme production process and specific microbes. The enzymes will hydrolyze the lignocellulose into six-carbon (or C6) sugars, and the microbes will simultaneously ferment the resulting sugars into ethanol yielding additional ethanol beer. Any remaining hemiocellulose or hemicellulose sugars will be hydrolyzed and fermented, respectively, at the same time.

6. *Enzyme Production* – Proprietary enzymes will be produced on-site. The enzymes will be optimized for the biomass source to be used in Step 5 above.

7. *Collection* – Ethanol beer from steps 4 and 5 will be collected for distillation.

8. *Distillation/Dehydration.* – Ethanol beer, which is expected generally to have an alcohol concentration of 5% or less, will be concentrated and purified in conventional ethanol distillation and dehydration columns, resulting in high-grade commercial ethanol.

9. *Stillage* – Lignin-rich residue from distillation, or stillage, will be burned in a boiler, yielding steam for the demonstration plant's cellulosic biomass ethanol production process. The decanted liquid stream generated during the centrifuge processing of the stillage, along with other plant process waste water streams, will be treated to remove residual solids, and any residual organisms will be deactivated prior to discharge. Residual solids removed from the effluent stream will be reintroduced into the stillage for their energy value or will be disposed of at a landfill.

10. *Ethanol* – High-grade commercial ethanol will be shipped to market.

Summary of Taxpayer's Descriptions in the Literature of the Process of Producing Ethanol from Cellulosic Biomass Using Hydrolysis

Taxpayer represents that while the specific microbes the demonstration plant will use for fermentation and enzyme production are proprietary, the cellulosic biomass ethanol production process to be used in the demonstration plant as described above is a typical industrial process for the conversion of cellulosic biomass into ethanol using hydrolysis, and specifically, enzymatic hydrolysis, as that process has been described in numerous reports prepared by U.S. government agencies and industry trade associations.

For example, the U.S. Department of Energy's ("DOE") Office of Energy Efficiency and Renewable Energy ("EERE") biomass program describes the cellulosic biomass hydrolysis process with a diagram (Figure 2: The enzyme process configured for simultaneous saccharification and cofermentation (SSCF)) and explanatory text available at http://www1.eere.energy.gov/biomass/process_description.html (visited by Taxpayer on September 10, 2007)). Taxpayer represents that the process described in the DOE's description and flow diagram (namely, preparation, pretreatment, enzymatic hydrolysis with simultaneous fermentation, and ethanol recovery) matches the process to be used in Taxpayer's demonstration plant.

Taxpayer also represents that the demonstration plant's process is also fundamentally the same as that described in a technical report of the National Research Energy Laboratory (NREL), a research facility of DOE's EERE, concerning the production of ethanol from lignocellulosic biomass:

> [t]he process being analyzed here can be briefly described as using co-current dilute acid prehydrolysis of the lignocellulosic biomass with simultaneous enzymatic saccharification of the remaining cellulose and co-fermentation of the resulting glucose and xylose to ethanol. In addition to these unit operations, the process involves feedstock handling and storage, product purification, wastewater treatment, enzyme production, lignin combustion, product storage, and other utilities.

Wooley et al., Lignocellulosic Biomass to Ethanol Process Design and Economics Utilizing Co-Current Dilute Acid Prehydrolysis and Enzymatic Hydrolysis Currrent and Futuristic Scenarios", National Research Energy Laboratory Technical Report, NREL/TP-580-26157 (July, 1999) (available at http://www.nrel.gov/docs/fy99osti/26157.pdf).

Taxpayer further represents that the stages employed in Taxpayer's process are also recognized in industry publications as essential steps in the production of ethanol from cellulosic biomass. Research studies and papers confirm that, in addition to pretreatment hydrolysis and hydrolysis using enzymes, the fermentation stage is a

necessary step in the industrial production of ethanol from cellulosic biomass. See, e.g., M. Himmel et al., *BSCL Use Plan: Solving Biomass Recalcitrance,* National Renewable Energy Laboratory Technical Report, NREL/TP-510-37902 (August, 2005) ("Saccharification of lignocellulosic biomass has long been recognized as a potential low-cost source of mixed sugars for fermentation to fuel ethanol or chemicals. … [E]nzymatic saccharification still requires a thermochemical 'pretreatment' that increases the digestibility of the lignocellulosic feedstock."); J.D. Wright, *Economics of Enzymatic Hydrolysis Processes,* Solar Energy Research Institute Presentation (March, 1988) ("[a]ll enzymatic hydrolysis processes contain four major operations: pretreatment, hydrolysis, fermentation, and enzyme production" (abstract); "some form of pretreatment is necessary to achieve reasonable rates and yields in the enzymatic hydrolysis of biomass… The hydrolysis and fermentation can be carried out separately (SHF) or simultaneously (SSF). SSF processes are superior…" (p.24).

Taxpayer represents that, in sum, the literature describes a standard process for the production of ethanol from cellulosic biomass using hydrolysis at both the pretreatment stage and at the enzymatic hydrolysis stage to break down the raw materials into the sugars needed for the fermentation process, and that Taxpayer's demonstration plant will produce ethanol from cellulosic biomass using that process.

Taxpayer's Representations pertaining to Section 168(l) Requirements

Apart from matters addressed by this ruling relating to the production of cellulosic biomass ethanol, Taxpayer also makes the following representations as they relate to the demonstration plant satisfying the requirements of section 168(l).

The demonstration plant will be acquired by Taxpayer by purchase (as defined in section 179(d)) after December 20, 2006, the date of enactment of section 168(l), and Taxpayer did not enter into a binding contract for the acquisition of the demonstration plant on or before that date. See section 168(l)(2)(C). In a subsequent correspondence dated September 15, 2008, Taxpayer represents that its demonstration plant meets the requirements of section 168(l)(5)(A) because the demonstration plant is self-constructed property within the meaning of section 168(k)(2)(E)(i), and groundbreaking occurred and construction of the demonstration plant began in C. The demonstration plant will be located in the United States, the original use of the demonstration plant will commence with Taxpayer after December 20, 2006, and the plant will be placed in service prior to January 1, 2013. See sections 168(l)(2)(A), (B), and (D).

The demonstration plant is not subject to the additional first-year depreciation provision of section 168(k) (as amended by section 103 of the Economic Stimulus Act of 2008, Pub. L. No. 110-185, 122 Stat. 613 (2008)) because Taxpayer began building the demonstration plant prior to December 31, 2007. See sections 168(l)(4)(A), 168(k)(2)(A)(iii), and 168(k)(2)(E)(i). The demonstration plant also will not be subject to

the alternative depreciation system within the meaning of section 168(l)(4)(B) and 168(k)(2)(D)(i), and will not be tax-exempt bond financed property within the meaning of section 168(l)(4)(C). Taxpayer has not made and will not make an election under section 168(l)(4)(D) to have section 168(l) not apply to the demonstration plant. Taxpayer has not made and will not make an election under section 179C with respect to the demonstration plant. See section 168(l)(8). The demonstration plant will only be used in Taxpayer's trade or business of commercializing the production of cellulosic ethanol, and the plant is not inventory or stock in trade. See section 167(a) and section 1.167(a)-2 of the Income Tax Regulations.

RULING REQUESTED

Taxpayer requests the Internal Revenue Service issue the following ruling:

Taxpayer's demonstration plant will, when placed in service in the manner described herein, be eligible for the additional first-year depreciation deduction for qualified cellulosic biomass ethanol plant property under section 168(l).

LAW AND ANALYSIS

Section 168(l), enacted on December 20, 2006, by section 209(a) of the Tax Relief and Health Care Act of 2006, Pub. L. No. 109-432, ,120 Stat. 2922 (2006), and modified by section 11(b)(1) of the Tax Technical Corrections Act of 2007, Pub. L. No. 110-172, 121 Stat. 2473 (2007), and section 103(c) of the Economic Stimulus Act of 2008, Pub. L. No. 110-185, 122 Stat. 613 (2008), provides a 50-percent additional first-year depreciation deduction in the case of any qualified cellulosic biomass ethanol plant property.

Section 168(l)(2) defines the term "qualified cellulosic biomass ethanol plant property" to mean property of a character subject to the allowance for depreciation –

(A) that is used in the United States solely to produce cellulosic biomass ethanol,

(B) the original use of which commences with the taxpayer after the date of the enactment of section 168(l) (i.e., December 20, 2006),

(C) that is acquired by the taxpayer by purchase (as defined in section 179(d)) after December 20, 2006, but only if no written binding contract for the acquisition was in effect on or before December 20, 2006, and

(D) that is placed in service by the taxpayer before January 1, 2013.

Section 168(l)(3) defines the term “cellulosic biomass ethanol” for purposes of section 168(l) to mean ethanol produced by hydrolysis of any lignocellulosic or hemicellulosic matter that is available on a renewable or recurring basis.

Section 168(l) does not specifically address what is meant by ”lignocellulosic or hemicellulosic matter that is available on a renewable or recurring basis.” However, the Joint Committee on Taxation’s explanation with respect to section 168(l) states that lignocellulosic or hemicellulosic matter that is available on a renewable or recurring basis includes bagasse (from sugar cane), corn stalks, and switchgrass. Joint Committee on Taxation Staff, Technical Explanation of H.R. 6408, The “Tax Relief and Health Care Act of 2006,” as Introduced in the House on December 7, 2006, December 7, 2006 (JCX-50-06). Further, the House Committee on Ways and Means stated that section 168(l) “applies to cellulosic ethanol which can be derived from feedstocks such as switchgrass, wood fibers, shell hulls, agricultural residue and other organic sources.” House Committee on Ways and Means, Detailed Summary of Tax and Other Provisions in H.R. 6111, the “Tax Relief and Health Care Act of 2006,” (December 8, 2006). The demonstration plant’s proposed feedstocks, as described above, include each of the items mentioned by the Joint Committee and the House Ways and Means Committee, as well other renewable lignocellulosic materials as represented by Taxpayer. Accordingly, the proposed feedstocks for Taxpayer’s demonstration plant in City meet the terms ”lignocellulosic or hemicellulosic matter that is available on a renewable or recurring basis” that are used in section 168(l)(3).

In this case, Taxpayer represents that its demonstration plant in City will use an industry standard process to preheat, enzymatically hydrolyze, and then ferment lignocellulosic biomass materials in order to produce ethanol. Section 168(l)(3) defines “cellulosic biomass ethanol” as “ethanol produced by hydrolysis.” However, the hydrolysis of cellulosic materials (whether at the pretreatment stage or at the cellulose hydrolysis stage) does not yield ethanol – instead, hydrolysis is simply a process of breaking down cellulosic materials into a form that can more readily be converted into ethanol through a fermentation process. Further, section 168(l)(2)(A) requires that qualifying property be used “solely to produce cellulosic biomass ethanol.” However, besides producing ethanol, Taxpayer’s demonstration plant will produce a lignin-rich residue from distillation.

Section 168(l) should be interpreted in light of the purpose it was intended to serve. Section 168(l) was enacted as an incentive for taxpayers to invest in property that produces ethanol from economical and renewable lignocellulosic or hemicellulosic feedstocks. As indicated in the following DOE sources, both hydrolysis and fermentation are necessary to produce ethanol from cellulosic biomass. See *Biofuels in the U.S. Transportation Sector*, Energy Information Administration (Release date: February, 2007), (originally published in DOE’s *Annual Energy Outlook 2007*, February, 2007, Washington, DC) (available at http://www.eia.doe.gov/oiaf/analysispaper/biomass.html); *How Cellulosic Ethanol is*

Made (diagram and description), DOE's Genomics: GTL Program Image Gallery at http://genomics.energy.gov/gallery/biomass/gallery-01.html (visited by the Service on July 23, 2008); DOE's EERE *Cellulosic Ethanol Production* (description and diagram of a biochemical cellulosic ethanol production process) (Content Last Updated 9/19/2008) (available at http://www.afdc.energy.gov/afdc/ethanol/production_cellulosic.html) (visited by the Service on November 20, 2008).

Further, a lignin-rich residue from distillation is a common by-product of the cellulosic biomass-to-ethanol process. See DOE's EERE *Cellulosic Ethanol Production* (description and diagram of a biochemical cellulosic ethanol production process) (Content Last Updated 9/19/2008) (available at http://www.afdc.energy.gov/afdc/ethanol/production_cellulosic.html) (visited by the Service on November 20, 2008).

Accordingly, the necessary use of a fermentation agent to convert sugars to cellulosic ethanol and the common by-product of lignin from the cellulosic biomass-to-ethanol process should not disqualify an otherwise eligible plant from the additional first-year depreciation deduction provided by section 168(l).

CONCLUSION

Based solely on the facts and representations submitted and the relevant law and analysis as set forth above, we conclude that:

(1) Taxpayer's demonstration plant in City is used in the United States solely to produce cellulosic biomass ethanol; and

(2) Provided all of the requirements in section 168(l)(2)(B)-(D) (including sections 168(l)(5) and 168(k)(2)(E)) are met and provided sections 168(l)(4) and (l)(8) do not apply, Taxpayer's demonstration plant in City will be eligible for the additional first-year depreciation deduction for qualified cellulosic biomass ethanol plant property under section 168(l).

Except as specifically set forth above, we express no opinion concerning the federal income tax consequences of the facts described above under any other provisions of the Code. Specifically, no opinion is expressed or implied on: (i) whether Taxpayer's demonstration plant in City meets the requirements in section 168(l)(2)(B), (C), and (D), including when Taxpayer began construction of the demonstration plant or whether sections 168(l)(5) and 168(k)(2)(E)(ii), (iii), and (iv) apply to the demonstration plant; (ii) whether any of the exceptions in section 168(l)(4) applies to Taxpayer's demonstration plant in City; or (iii) whether section 168(l)(8) applies to Taxpayer's demonstration plant in City.

In accordance with the power of attorney, we are sending copies of this letter to Taxpayer's authorized representatives. We are also sending a copy of this letter to the appropriate operating division director.

This ruling is directed only to the taxpayer requesting it. Section 6110(k)(3) provides that it may not be used or cited as precedent.

Sincerely,

Kathleen Reed

Kathleen Reed
Chief, Branch 7
Office of Associate Chief Counsel
(Income Tax & Accounting)

Enclosures:
Copy of this letter
Copy for section 6110 purposes