Evolving Structure of the U.S. Biorefinery Industry

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Introduction

Conventional resources (mainly fossil fuels) have long been the predominant source of energy and chemicals (Amidon et al., 2008; Naik et al., 2010). However, fossil fuels are finite and not renewable; whereas there is a growing demand for energy and chemicals as economies and populations grow (Kamm et al., 2008). The imbalance between energy demand and supply has prompted humans to look for sustainable and renewable alternatives (Fernando et al., 2006). With various feedstock availability and biotechnology advancement, the structure of the U.S. biorefinery industry has evolved during the past ten years (Naik et al., 2010). Therefore, the major objectives of this poster are to:

- Develop classification strategy;
- Segment the U.S. biorefinery industry based on classification strategy;
- Present characteristics of different categories of biorefineries.

Classification Strategy & Segmentation

- Value stream outputs: biofuels or renewable chemicals;
- Feedstock inputs: first, second and third generation feedstock.

Categories of biorefineries (n) Numbers

<table>
<thead>
<tr>
<th>Categories of biorefineries (n)</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Generation Biofuel BR</td>
<td>(n=338)</td>
</tr>
<tr>
<td>(1st Gen Ethanol BR)</td>
<td>(N=196)</td>
</tr>
<tr>
<td>(1st Gen Biodiesel BR)</td>
<td>(N=142)</td>
</tr>
<tr>
<td>2nd Generation Biofuel BR</td>
<td>(N=63)</td>
</tr>
<tr>
<td>3rd Generation Biofuel BR</td>
<td>(N=14)</td>
</tr>
<tr>
<td>1st and 2nd Generation Non-fuel BR</td>
<td>(N=40)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>(N=455)</td>
</tr>
</tbody>
</table>

1st Gen Ethanol Biorefineries

(Figure 1. U.S. 1st gen ethanol biorefinery locations (n=193))

1st Gen Ethanol Biorefineries (Mueller, 2013; RFS, 2014; Wu, 2008)

1st Gen Biodiesel Biorefineries

(Figure 2. U.S. 1st gen biodiesel biorefinery locations (n=142))

1st Gen Biodiesel Biorefineries (ASTM D 6751)

2nd Generation Biofuel Biorefineries

(Figure 3. U.S. 2nd generation biofuel biorefinery locations (n=63))

2nd Generation Biofuel Biorefineries (Biofuels Digest, 2013)

3rd Generation Biofuel Biorefineries

(Figure 4. U.S. 3rd generation biofuel biorefinery locations (n=14))

3rd Generation Biofuel Biorefineries (Biofuels Digest, 2013)

1st & 2nd Gen Non-fuel Biorefineries

(Figure 5. U.S. 1st and 2nd gen non-fuel biorefinery locations (n=40))

1st & 2nd Gen Non-fuel Biorefineries (Miralb, 2013)

References


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