We Make Sustainability Real

• Consulting, product development, project development, project finance

• Agriculture, energy and food

• Bioenergy/Biofuels practice in US/CA: BEAST™ and Bioenergy Association of CA (BAC)
50+ years international experience in environmental asset development
Vision and Big Picture

• Regulatory drivers behind bioenergy and biofuels asset development

• The assets in play: RFS2 RINs, LCFS credits vs. energy

• BEAST™: Prasino practice for environmental asset development
Why? Regulatory Drivers

<table>
<thead>
<tr>
<th>RFS2</th>
<th>LCFS</th>
<th>RPS/REC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Created in 2005, expanded in 2007 under Energy Independence and Security Act (EISA)</td>
<td>• Schwarzenegger Exec Order in 2007 to enact LCFS</td>
<td>• Renewable Portfolio Standard established 2002</td>
</tr>
<tr>
<td>• New categories of fuel/new targets</td>
<td>• 10 percent reduction in Cl of CA transportation fuels by 2020</td>
<td>• Utilities must procure increasing percentages of retail power from renewables – wind, solar and biomass</td>
</tr>
<tr>
<td>• Lifecycle GHG performance standard</td>
<td>• Eligibility criteria defined by CARB in 2009</td>
<td>• 33% overall by 2020</td>
</tr>
<tr>
<td>• Final rulemaking for RFS2 published in the Federal Register on March 26, 2010</td>
<td>• LCFS took effect Jan. 2011</td>
<td>• Can comply through purchase of RECs</td>
</tr>
<tr>
<td></td>
<td>• California LCFS considers full life cycle emissions (well to wheel)</td>
<td></td>
</tr>
</tbody>
</table>
Value Proposition on the Totem Pole

**RFS2 RINs**
- Renewable Fuel Standard: production of biofuels
- RINs issued by EPA (measured in gallons)
- Projects outside the US are eligible for generating credits

**CA LCFS Credits**
- Low Carbon Fuel Standard: CO$_2$ avoided by clean fuel production
- Credits issued by California Air Resources Board (measured in tCO$_2$e)
- Projects outside CA eligible for credits

**RECs**
- Renewable Energy Credits
- Represent one megawatt-hour (MWh) of renewable power
- State level compliance RPS targets
- Voluntary

**Carbon Credits**
- CCO – California Compliance Offset, issued by ARB
- California/Canada compliance
- Voluntary
# RFS2 -- EPA RIN Codes and Fuel Types

<table>
<thead>
<tr>
<th>D Code RIN</th>
<th>Fuel Type</th>
<th>Fuel</th>
<th>GHG Reduction Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3</td>
<td>Cellulosic Biofuels</td>
<td>Cellulosic ethanol, RCNG!</td>
<td>60%</td>
</tr>
<tr>
<td>D4</td>
<td>Biomass-based Diesel</td>
<td>Biodiesel, renewable diesel</td>
<td>50%</td>
</tr>
<tr>
<td>D5</td>
<td>Advanced Biofuels</td>
<td>Sugarcane ethanol, Sorghum/biogas ethanol, RCNG</td>
<td>50%</td>
</tr>
<tr>
<td>D6</td>
<td>Renewable Fuel</td>
<td>Corn ethanol</td>
<td>20%</td>
</tr>
<tr>
<td>D7</td>
<td>Cellulosic Diesel</td>
<td>Cellulosic diesel</td>
<td>60%</td>
</tr>
</tbody>
</table>

Pricing between .25 and .50 USD, was over 1.00 USD
Working with RFS2 -- Pathways

§80.1426 How are RINs generated and assigned to batches of renewable fuel by renewable fuel producers or importers?

(a) General requirements. 

(1) To the extent permitted under paragraphs (b) and (c) of this section, producers and importers of renewable fuel must generate RINs to represent that fuel if the fuel:

(i) Qualifies for a D code pursuant to §80.1426(f), or EPA has approved a petition for use of a D code pursuant to §80.1416; and

(ii) Is demonstrated to be produced from renewable biomass pursuant to the reporting requirements of §80.1451 and the recordkeeping requirements of §80.1454; and

(A) Feedstocks meeting the requirements of renewable biomass through the aggregate-compliance provision at §80.1454(g) are deemed to be renewable biomass.

(B) [Reserved]

(iii) Was produced in compliance with the registration requirements of §80.1450, the reporting requirements of §80.1451, the recordkeeping requirements of §80.1454, and all other applicable regulations of this subpart M.

(2) To generate RINs for imported renewable fuel, including any renewable fuel contained in imported transportation fuel, heating oil, or jet fuel, importers must obtain information from a foreign producer that is registered pursuant to §80.1450 sufficient to make the appropriate determination regarding the applicable D code and compliance with the renewable biomass definition for each imported batch for which RINs are generated.
Working with LCFS

- **GREET**: Greenhouse gases, Regulated Emissions, and Energy use in Transportation model.

- **Method 1, 2A and 2B**
  - Re-adopted as **Tier 1 and Tier 2**
    - **Tier 1**: conventional biofuels – starch, sugar ethanols, bio-diesel.
    - **Tier 2**: Next generation fuels, conventional biofuels w innovative process. Producer-specific CI.
  - **GREET 2.0**: More exacting. Upstream and plant-specific.

- **Current Price**: $35 USD / tonne
LCFS Carbon Intensities

CARBON INTENSITY OF FUELS

<table>
<thead>
<tr>
<th>FUEL TYPE</th>
<th>CO2E/MJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>GASOLINE</td>
<td>99.18</td>
</tr>
<tr>
<td>DIESEL</td>
<td>98.03</td>
</tr>
<tr>
<td>NATURAL GAS</td>
<td>98</td>
</tr>
<tr>
<td>HYDROGEN</td>
<td>68</td>
</tr>
<tr>
<td>ELECTRIC VEHICLES</td>
<td>39.42</td>
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<tr>
<td>BIODIESEL FROM MIDWEST SOY BEANS</td>
<td>30.8</td>
</tr>
<tr>
<td>CORN ETHANOL</td>
<td>83.25</td>
</tr>
<tr>
<td>SUGARCANE ETHANOL</td>
<td>74.7</td>
</tr>
<tr>
<td>HYDROGEN FROM RENEWABLE GAS</td>
<td>58.4</td>
</tr>
<tr>
<td>BIODIESEL FROM WASTE OILS</td>
<td>76</td>
</tr>
<tr>
<td>DAIRY BIOGAS</td>
<td>11.6</td>
</tr>
<tr>
<td>LANDFILL GAS</td>
<td>13.45</td>
</tr>
<tr>
<td>WASTEWATER TREATMENT</td>
<td>11.26</td>
</tr>
<tr>
<td>CONVERSION OF USED CORN OIL</td>
<td>11.5</td>
</tr>
<tr>
<td>HIGH SOLIDS</td>
<td>4</td>
</tr>
<tr>
<td>WASTEWATER BIOGAS</td>
<td>-0.25</td>
</tr>
</tbody>
</table>
Bioenergy Environmental Asset Strategies and Tactics (BEAST™)

Consulting and Development Services
understand, develop and maximize the value of environmental assets

Workshops
lessons learned and best-practices
ongoing policy requirements
asset prices/market understanding
sharing project types or technologies
Service Range

- Cost/benefit analysis of asset development per project
- Funding potential / grants
- Targeted asset development assistance and project/asset documentation/application submission
- Assistance with asset stacking
- Broader asset strategy / asset marketing / contract structuring
- Data management system integration for multiple sites
- Buyer identification and commercial assistance
## LCFS and RIN Scorecard

<table>
<thead>
<tr>
<th>RIN Category</th>
<th>Annual Generation Capacity</th>
<th>$ @ 30 cents/RIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3</td>
<td>2M</td>
<td>0.6M</td>
</tr>
<tr>
<td>D4</td>
<td>46M</td>
<td>13.8M</td>
</tr>
<tr>
<td>D5</td>
<td>432M</td>
<td>129.6M</td>
</tr>
<tr>
<td>D6</td>
<td>78M</td>
<td>23.4M</td>
</tr>
<tr>
<td><strong>Annual Tonnage Generation Capacity</strong></td>
<td><strong>$ @ $40/MT</strong></td>
<td></td>
</tr>
<tr>
<td>LCFS Credits</td>
<td>625,000</td>
<td>25M</td>
</tr>
</tbody>
</table>

**Total:** $192.4M
LCFS and RINs: What’s Needed

• Fuel + LCFS + RINs = very attractive BUT
• Legal resolution and re-adoption
• More CIs and movement through resource bottlenecks – RVO?
• Additional verification and enforcement standards – will come
• Finance and price assurance
Biogas development: Issues to consider

+ **Combined returns** very attractive
+ **Pathways** fairly straightforward
+ Shift to **natural gas economy**
+ People profit planet

- Financing with assets difficult, no future price certainty
- **Permits** and site specific regulatory issues – AD in CA?
- **Infrastructure** costs – pipeline, tube trailers
- Injecting into pipeline = utilities
- Selling fuel/credits = dealing with traders
Lessons Learned

1. From preliminary assessment to asset delivery it can take a few months to a few years to develop and realize these assets.

2. The regulations are constantly evolving and new pathways are being created – navigating the regulatory documents is complicated.

3. Projects outside of the US are eligible to generate RINS; projects outside CA are eligible to generate LCFS credits.

4. LCFS credits and RINs can be stacked.

5. Relationships with regulators help a lot.

6. These markets are real!
Questions?
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AND blively@prasinogroup.com
510-908-1210
EPIC – Electricity Program Incentive Charge

- $163 million per year in clean electricity funding
  - 80% administered by CEC and 20% by IOU’s
  - $55 million per year for applied R&D
  - $45 million per year for Technology Deployment & Demonstration
    - at least 20% of which must go to bioenergy
  - $15 million for market facilitation

For more info:  www.energy.ca.gov
Working with RFS2

- D6 Renewable Fuel
- D5 Advanced Biofuel
- D3 Cellulosic Biofuel
- D7 Cellulosic Diesel
- D4 Biomass based diesel
Clean Fuels and Alternative Transportation – AB118

- Includes $20 million per year for biofuels
- $9 million for natural gas vehicle deployment
- $15 million for medium and heavy duty advanced vehicle demonstration
- $1.5 million for natural gas fueling infrastructure
RFS2 -- Engineering Reviews

Engineering Reviews are required by regulation under RFS2 for a facility to generate RINs.

Independent third party opinion by certified engineer that the facility is capable of producing a transportation fuel of sufficient quality and quantity to meet the requirements and objectives of the RFS2 program.