Proprietary Processes to Co-produce “F-1XXs”, Derivatives and Biochemical Glycols

Terry Brix, CTO Founder/Mark Kirby CEO/Jeff Plato VP

Summary | May 2016
## S2G’s Basic Products: Bio-Glycols

<table>
<thead>
<tr>
<th>Products</th>
<th>Markets</th>
<th>PNW Fits/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2G Propylene Glycol</td>
<td>Deicer, Urethanes, Cosmetics and Food Additives—Tide Detergent</td>
<td>Local Aircraft Deicing and Asian Export 5 million MT/yr</td>
</tr>
<tr>
<td>S2G Ethylene Glycol</td>
<td>PET Containers, Man-made fibers, anti-freeze</td>
<td>Green EG for Plastic Bottles 30 Million MT/Yr</td>
</tr>
<tr>
<td>S2G Sugar Based Glycerin Make/ or Use GLY</td>
<td>Cosmetics non-GMO, Kosher, Halal</td>
<td>Local Source Glycerin Gray’s Harbor to Make Propylene Glycol</td>
</tr>
<tr>
<td>S2G Butanediols</td>
<td>Performance Additives &amp; Pharma</td>
<td>Future Specialty Chemical Feedstocks</td>
</tr>
<tr>
<td>Numerous Alditols/Glycols</td>
<td>New Products/Applications</td>
<td>New R&amp;D--S2G, WSU, UW</td>
</tr>
</tbody>
</table>
**S2G’s Products: “F-100” Example and Bio-glycols**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Food Additive</th>
<th>Biochemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2G Products</td>
<td>“F-100” Food Pharma</td>
<td>Bio-glycols: Ethylene glycol, Propylene glycol</td>
</tr>
<tr>
<td>Product Drivers</td>
<td>Health Superior properties</td>
<td>Product Differentiation</td>
</tr>
<tr>
<td>Current Market Size</td>
<td>$0.5 billion</td>
<td>2% of $35 Billion Glycol Market</td>
</tr>
<tr>
<td>Competitors</td>
<td>Small scale High cost Low yield</td>
<td>Petrochemical Bio: mono-product</td>
</tr>
<tr>
<td>Barrier to Growth</td>
<td>Too expensive</td>
<td>Too expensive</td>
</tr>
<tr>
<td>Opportunity</td>
<td>10X growth</td>
<td>10+% CAGR</td>
</tr>
</tbody>
</table>
# Technology – Competitive Advantage

## S2G’s Haystack Process:
Co-Production of F-100 and Bio-Glycols

<table>
<thead>
<tr>
<th>Technology</th>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical process</td>
<td>2\textsuperscript{nd} Generation</td>
<td>50%+ F-100 cost reduction</td>
</tr>
<tr>
<td>Co-production</td>
<td>High yield</td>
<td>Competitive bio-glycols</td>
</tr>
<tr>
<td>Proprietary</td>
<td>Rapid—20 minutes</td>
<td>25+% IRR</td>
</tr>
<tr>
<td>New Patent(s)</td>
<td>Continuous</td>
<td>$1 billion+ business opportunity</td>
</tr>
<tr>
<td></td>
<td>Scalable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Robust, Drop-in, Proven</td>
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</tbody>
</table>
S2G’s Advantages to Any Third Party--
Co-Production of F-1XX and Bio-Glycols

**Technology**
- Chemical process
- Co-production
- New Process Technology
- New Separations/Purification
- New IP

**Features**
- Existing Glycol Products
- Paid For Pilots, Low Op Cost$
- R&D Focus
- Risk Sharing

**Benefits**
- XX% cost reduction
- Competitive bio-glycols
- 15-25+% IRR
- Defined business opportunity
Haystack Technology
Value from C5/C6 Sugars - Today

• Haystack technology provides ~$1,400/MT at current pricing to cover operating costs and depreciation

• Technology provides very strong returns
  – Even though today, C5/C6 sugars are more costly than C6 AND require conditioning

• With Haystack, more than $400/MT available to cover costs
  – Ever increasing value-added
Plant “0” - BlueBelle

Commercial Production—First S2G U.S. Plant

BlueBelle Project – Manages Scale-up Risks

- USA Mid-south--Memphis
- Existing chemical production facility
  - Available assets
  - Experienced operating partner
- Feedstock & off-take agreements
  - Strategic partners
  - Solves problems for C5/C6 sugar & glycerin suppliers
Capital Efficient Commercialization Structure

- S2G
- Haystack (Fortune 100 Co)
- JVCo

Demonstration Project Development Licensing Marketing of products

Project financed

Project 0 BlueBelle

Financing
Staged Project

- Staged capital
- Progressively de-risked
- Profitable at each step

Glycerol → Cellulosic Sugars

- 2016 - Campaign
- 2017 - Dedicated Reactors
- 2018 – Full Capabilities

$75 million capital
$70 million revenue
35% gross margin
25% IRR unlevered
PNW-Big Bio – S2G/NARA

A Possible Scenario For a New Forest Products Paradigm

- S2G $10 Million Pilot Plant in Vancouver BC
- Blue Belle Memphis Plant Making PG
- Strategic Partners/Off-Take Agreements
- In-House S2G Engineering

- NARA Network in Place/Funding
- Gevo Butanol/IPK-Southhampton
- Strong USDA-NIFA Ties
PNW-Big Bio – S2G/NARA

Major Starting Locations PNW S2G (No Priority)

- Gray’s Harbor, WA
  - Cosmo Specialty Fibers
  - Imperium Biodiesel Glycerin GLY > PG
  - Methanol Storage Facility
- Boardman, OR
  - Zeacchem Wood > C5/C6 Sugars Pilot
  - Pacific Ethanol Fermentation
  - Columbia Products--Lactose
- Twin Falls, ID
  - Cheese Lactose
  - Wheat Straw
  - Beet Sugars, Molasses, Pulp
Major PNW Biomass Feedstocks for Fuels, Biochemicals

- Softwoods (Slash, Limbs, Thinnings, Dedicated Growth)
  - Douglas fir,
  - Hemlock
- Hardwoods
  - Hybrid Poplar,
  - Ash, Alder
- Odd Sugars/Sources
  - Cheese Lactose
  - Wheat Straw/Willamette Grass Straw
  - Arundo Donax
  - Corn Fiber from Ethanol Plants (OR,ID)
Strategy of F-100’s--F-110, F1XX New Higher Valued Derivatives and Co-Products

• S2G – Developed C5/C6 Sugars >> Glycols (Propylene Glycol, Ethylene Glycol, Glycerin and Butanediols)
• S2G—Expanded Technology—Conversion of Glycerin to Propylene Glycol
• F-100—First Fortune 500 Supported Special Derivative.
• Other Partners Want One, Several or All of the Following:
  – Green, Renewable, Sustainable Glycols/Derivatives ,
  – Non-GMO, Non-Round-Up,
  – Kosher, Halal and
  – Some Want Alternatives to Corn.
Examples of New Classes of F-1XX’s--Derivatives and Co-Products

• New Examples F-1XX Type of Value-Added Products
  – Sorbitol—Sorbitol for Toothpaste and Vitamin C is Corn Glucose Based. Niche Pharma Cosmetic Market Interest in Non-GMO.
  – Acrylonitrile (ACN)—Basic Organic Chemical for Nylon and Carbon Fibers. S2G and WSU Working to make ACN from PG. JCATI Funded Project.
  – Butanediols (BDs) for Pharma. C4 BDs can be used as precursors for Pharma. S2G Makes 10-12% BDS.
S2G Investment Highlights

Multi-product technology at final commercial stage

Major strategic partner for both plant development and product off take

Project de-risked by 2-stage development

~50% of cost vs. Greenfield

Valuation and structure that are preferential to investors

Proven team

S2G BioChemicals Inc.
4250 Wesbrook Mall,
Vancouver, BC V5T 1W6 CANADA

1-604-259-9820
info@s2gbiochem.com
www.s2gbiochem.com
Who are we?

S2G BioChemicals Inc.

- $10+ million since 2009--$45 million Total
  - $2.1MM Angel funding
  - Support from Canadian government
  - FY2015 revenue: $4MM

- Committed, excited Fortune 100 partners
  - leading “F-100” user

- Capital efficient business model
Capabilities: Technology Development & Engineering

- $8 MM Pilot Plant
  Start-up Nov 2012
  24/7 operation

- Lab & Analytical
  Vancouver & Seattle

- Process Development & Modelling
  ASPEN

- Front-End Engineering Design (FEED)
### S2G Team

#### Management & Key Personnel

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Mark Kirby</td>
<td>Pres/CEO</td>
<td>Praxair, Questair, Ballard</td>
</tr>
<tr>
<td>Terry Brix</td>
<td>Founder/CTO</td>
<td>Battelle, IPCI, Brix-Berg</td>
</tr>
<tr>
<td>Himanshu Kamboj, CA</td>
<td>CFO</td>
<td>DMCL, MNP</td>
</tr>
<tr>
<td>Jeff Plato</td>
<td>Director, BD &amp; Corp Dev</td>
<td>Paradigm, Hydrogenics, GE, HP</td>
</tr>
<tr>
<td>Kent Smith, PEng</td>
<td>Director, Projects</td>
<td>Pacific Coast Terminals, Vancouver Wharves</td>
</tr>
<tr>
<td>Norm Barmeier, PEng</td>
<td>Project Manager</td>
<td>Apotex, AECOM, KGS Group</td>
</tr>
<tr>
<td>Claudio Arato, BSc, PEng</td>
<td>Process Manager</td>
<td>Lignol, Millar Western, Sonora</td>
</tr>
<tr>
<td>Prof Bill McKean</td>
<td>Principal Scientist</td>
<td>Battelle, Weyerhaeuser, Univ. of Washington</td>
</tr>
<tr>
<td>Dr Lloyd Allen</td>
<td>Senior Scientist</td>
<td>Dow, Innovatek, Westinghouse, PNNL</td>
</tr>
<tr>
<td>Quak Foo Lee, MEng</td>
<td>Plant Mgr &amp; R&amp;D Eng</td>
<td>City Farm Biofuel, UBC</td>
</tr>
<tr>
<td>Dr Josh Davies</td>
<td>Senior Scientist</td>
<td>U of W</td>
</tr>
<tr>
<td>Bryan Gene, BASc</td>
<td>Process Eng</td>
<td>UBC</td>
</tr>
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