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

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S2G's Basic Products: Bio-Glycols

Products	Markets	PNW Fits/Comments
S2G Propylene Glycol	Deicer, Urethanes, Cosmetics and Food Additives—Tide Detergent	Local Aircraft Deicing and Asian Export 5 million MT/yr
S2G Ethylene Glycol	PET Containers, Man-made fibers, anti-freeze	Green EG for Plastic Bottles 30 Million MT/Yr
S2G Sugar Based Glycerin Make/ or Use GLY	Cosmetics non-GMO, Kosher, Halal	Local Source Glycerin Gray's Harbor to Make Propylene Glycol
S2G Butanediols	Performance Additives & Pharma	Future Specialty Chemical Feedstocks
Numerous Alditols/Glycols	New Products/ Applications	New R& D--S2G, WSU, UW



S2G's Products:

"F-100" Example and Bio-glycols

Factors	Food Additive	Biochemicals
S2G Products	"F-100" Food Pharma	Bio-glycols: Ethylene glycol Propylene glycol
Product Drivers	Health Superior properties	Product Differentiation
Current Market Size	\$0.5 billion	2% of \$35 Billion Glycol Market
Competitors	Small scale High cost Low yield	Petrochemical Bio: mono-product
Barrier to Growth	Too expensive	Too expensive
Opportunity	10X growth	10+% CAGR



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

Technology

- Chemical process
- Co-production
- **Proprietary**
- **New Patent(s)**

Features

- 2nd Generation
- High yield
- Rapid—20 minutes
- Continuous
- Scalable
- Robust, Drop-in, Proven

Benefits

- **50%+ F-100 cost reduction**
- **Competitive bio-glycols**
- 25+% IRR
- \$1 billion+ business opportunity

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

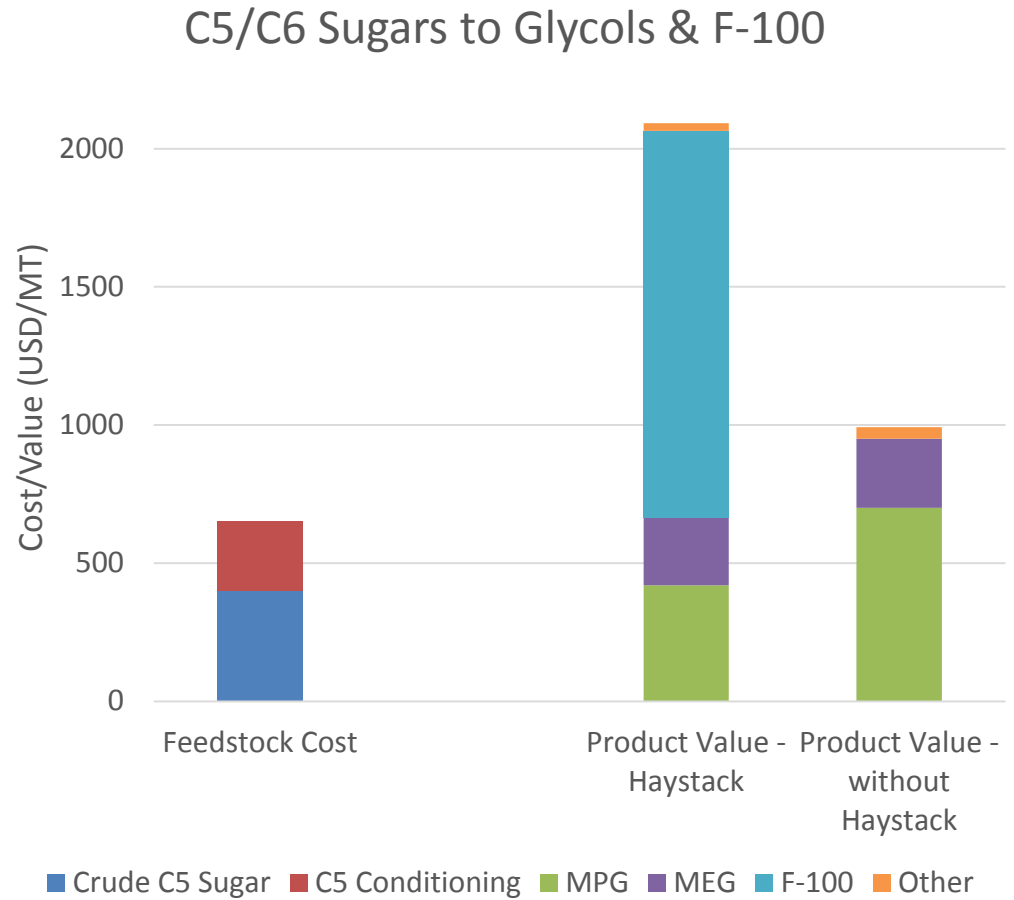
Benefits

- 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

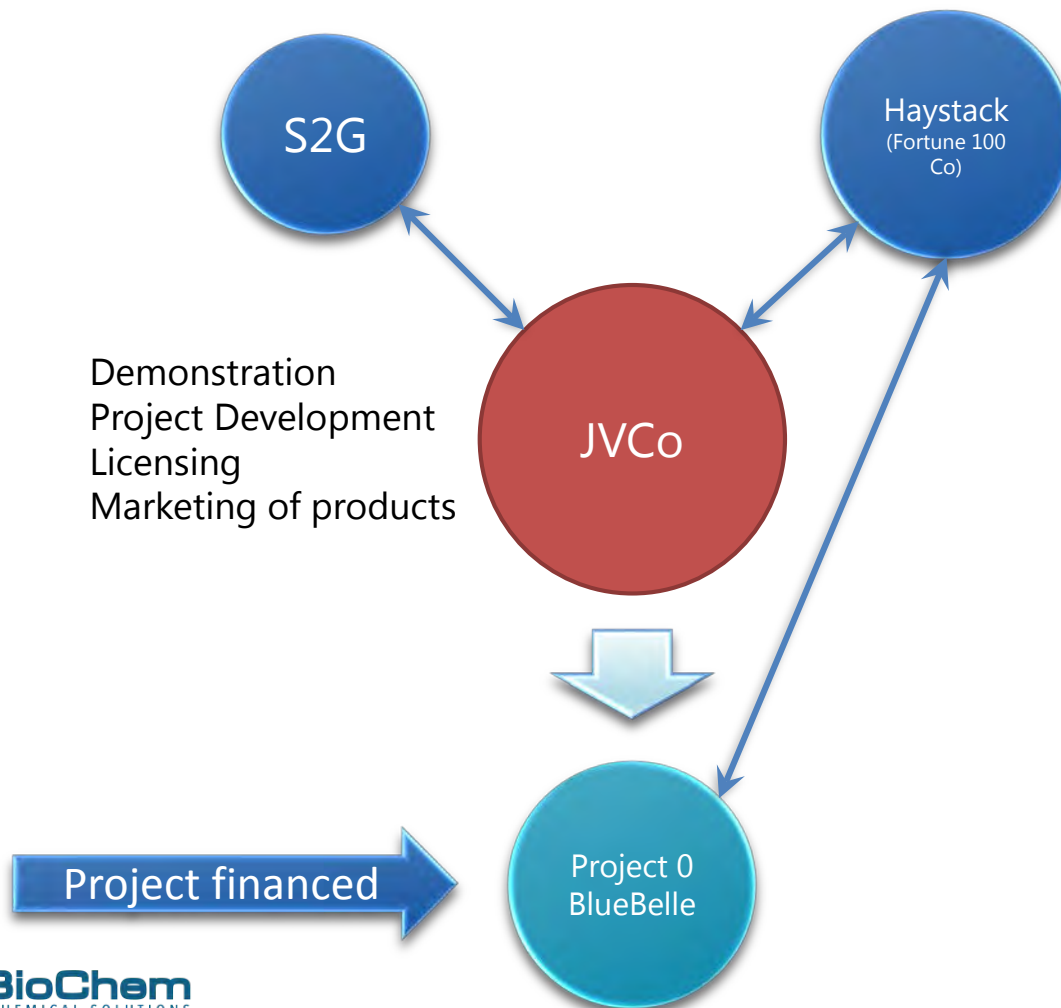
Commercial Production—First S2G U.S. Plant

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



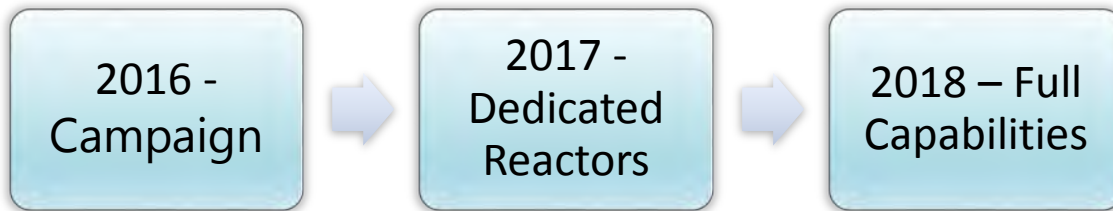
Capital Efficient Commercialization Structure



Staged Project

\$75 million capital
\$70 million revenue
35% gross margin
25% IRR unlevered

Glycerol → Cellulosic Sugars



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

PNW-Big Bio – S2G/NARA

A Possible Scenario For a New Forest Products Paradigm

S2G C5/C6 Conditioning & Hydrotreating IP/KNOW-HOW + NARA

- 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-Southampton
- 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
 - Zeachem Wood>>C5/C6 Sugars Pilot
 - Pacific Ethanol Fermentation
 - Columbia Products--Lactose
- Twin Falls, ID
 - Cheese Lactose
 - Wheat Straw
 - Beet Sugars, Molasses, Pulp



PNW-Big Bio – S2G/NARA

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.
 - **Tree Based Aircraft Deicer**—Use of Propylene Glycol (PG) From Biomass to Replace Petro-based PG for Aircraft Deicing. “Alaska Airlines Uses Douglass Fir PG for Deicing”.
 - **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.
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CANADA

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S2G BioChemicals Inc.

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

Committed, excited
Fortune 100 partners
- leading "F-100" user



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

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