• Low-Cost Butanol
• from Carbon Dioxide Emissions

Accredited Investor Presentation
April 2018

Gordon Skene, Chairman & Executive VP
Gordon@Phytonix.com
Focus: Industrial Butanol Market

$9 Billion/year

Plastics

Paints

Household Cleaners

Solvents

Perfume

Adhesives

N-Butanol  =  Normal Butanol  =  Butanol  = C₄H₉OH
Phytonix Process using modified photosynthesis

CO₂ Emissions → Sun → Butanol

Estimated production cost ≈ $1.95/gallon
Wholesale Price ≈ $5.75/gallon (Q1, 2018)

High-Value, High-Margin Product
Phytonix uses cyanobacteria to produce butanol from CO$_2$.

Cyanobacteria are tiny photosynthetic plants found in:

- Fresh water
- Salt water

Phytonix genetically engineered cyanobacteria consume CO$_2$ emissions to secrete 100% butanol.
Phytonix’s Key Scientists
Angstrom Laboratory, Uppsala Sweden

Dr. Peter Lindblad

Dr. Pia Lindberg

World leaders in synthetic biology, photosynthesis and cyanobacteria to produce “solar chemicals”.

All IP developed by Angstrom under contract is owned 100% by Phytonix.
Cyanobacteria are cultivated in PBRs containing water. Cyanobacteria consume CO₂ to produce pure butanol.
Carbon-Negative Process

**Phytonix Photosynthesis Formula:**

\[ 4\text{CO}_2 + 5\text{H}_2\text{O} + \text{light} \rightarrow \text{C}_4\text{H}_9\text{OH} + 6\text{O}_2 \]
Phytonix: Low-Cost Butanol Producer

**Fossil**

- $\sim 4.75$/gal

**Incumbent Producers:** Propylene feedstock cost (Q1/18)

- $2.75$/gallon of butanol

**Phytonix CO₂ feedstock cost**

- $0.35$/gallon of butanol
  
  (assumes cost of $CO₂ = 40$/ton)

**Competitors using propylene**

- BASF, DOW/DuPont, OXEA, Eastman, etc.
- huge carbon footprint.

**TOTAL COST**

- **Q4, 2017**
  
  - $4.50$
  - $4.00$
  - $3.50$
  - $3.00$
  - $2.50$
  - $2.00$
  - $1.50$
  - $1.00$
  - $0.50$
  - $0.00$

**TOTAL COST**

- **INCUMBENTS**
  
  - $5.00$
  - $4.50$
  - $4.00$
  - $3.50$
  - $3.00$
  - $2.50$
  - $2.00$
  - $1.50$
  - $1.00$
  - $0.50$

- **PHYTONIX**
  
  - $1.95$/gal

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Pilot Plants with Industrial Partners

Pilot plant projects initiated with 2 Industrial Partners
- $5M+ of revenue from each pilot over 2½ years.
- Covers over 50% of our burn rate.

• **Shaw Industries** (CO$_2$ from natural gas power plant)
  - Pilot plant will be located in Columbia, South Carolina.

• **European Power Co.** (coal-fired power plants)
  - Pilot plant will be located in Europe.
  - 1$^{st}$ progress payment (Sept. 2017) = $800K.

• Potential partner: Praxair Inc.
  - Plus CO$_2$ emitters in other industrial sectors.
Large Industrials emitting CO$_2$ fund 100% of CAPEX
- Minimizes dilution to Phytonix shareholders

Returns to Plant Owners after Phytonix fees:
- IRR ≥ 50%
- Payback < 2 years

Phytonix Recurring Revenue from Plant Operations:
- 6% to 9% of butanol sales
- 10% to 20% of Plant Pre-Tax Profit
- Consumables: cyanobacteria + PBR replacement parts
- Monetization of GHG reductions
Management Team

MANAGEMENT + BOARD OF DIRECTORS

- Bruce Dannenberg  Founder & CEO
- Gordon Skene  Chairman & EVP
- Michael Weedon  Independent Director
- Rick Hopp  Independent Director
- Bill Cory  Independent Director

TECHNOLOGY & ENGINEERING TEAM

- Dr. Peter Lindblad:  Organism Development Director
  - Advise on expertise in: Chemicals Market, Climate Change, Policy, Business, Finance, Synthetic Biology, Clean Technology.
- Dr. James Lee:  Phytonix Business
Mini-Pilot Plant to Produce Butanol

Producing butanol at mini-pilot scale indoors is a key step towards scaling the Phytonix process to large outdoor plants at customer sites.

CO₂ Feedstock

1,250 Litre Capacity LED PBR

Butanol Separation System

2-5 Litres per week of Butanol > 99% pure

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Scaling to Commercial Success

- Mini-Pilot: Make butanol indoors using LED PBRs
  - Produce butanol outdoors
    - Optimize PBRs + Process

- Design → Build → Operate 2 pilot plants

- 1st commercial plants owned by CO₂ emitters
  - Acquisition offers?

2018 2019 2020 2021 2022
2018 Equity Offering

Offering: $1,125,000

- 15,000,000 Common Shares
- $0.075/share
- Valuation = $13.0M
- 173M shares pre-offering

Uses of Proceeds

- Process optimization
- Build Engineering Team
- Add’l Industrial Partners
- Engineer microbes at UBC to produce 2 new, high-value chemicals from CO$_2$
  - Grant from GenomeBC

Keiretsu Due Diligence Report
Contact: swhitford.phytonix@gmail.com
Prime acquisition candidate.
Potential return: 26X to 40X
Based SOLELY on the industrial butanol market.

For Further Information, please call:

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Backup Slides

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### Estimated Value to a Chemical Co. with a 25% Share of the Industrial Market for Butanol

<table>
<thead>
<tr>
<th>Estimated Savings &amp; Acquisition Value</th>
<th>Valuation &amp; Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Savings/gallon</td>
<td>$1.75/gallon</td>
</tr>
<tr>
<td>Annual Cost Savings (400M gal)</td>
<td>$0.70 B/year</td>
</tr>
<tr>
<td>Cost Savings over 15 years</td>
<td>$10.5 B</td>
</tr>
<tr>
<td>Present Value of Cost Savings (25% disc. rate)</td>
<td>$2.7 B</td>
</tr>
<tr>
<td>Estimated Acquisition Value = 30% of PV</td>
<td>$0.8 B</td>
</tr>
<tr>
<td>Per Share</td>
<td>$2.00/sh.</td>
</tr>
<tr>
<td>Multiple on $0.075/sh.</td>
<td>26X</td>
</tr>
</tbody>
</table>

- Maximum estimated shares o/s at acquisition = 400 million (fully-diluted)
- Acquisition Value **based solely** on the industrial butanol market.
Butanol Prices closely correlated with Crude Oil Prices

Crude Oil Price Dec./17 ~ $62/barrel.

Butanol Price Dec./17 ~ $5.75/gal.

US Wholesale Price Butanol & Crude Oil

Plant Profit vs. Butanol Price
(5.0M gal/year plant. Production cost est. = $1.95/gallon)

Pre-tax Profit & % Profit Margin
(Plant CAPEX = $25 million)

<table>
<thead>
<tr>
<th>Butanol Wholesale Price per gallon</th>
<th>Pre-tax Earnings</th>
<th>Profit Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>$4.00</td>
<td>$10,250,000</td>
<td>51%</td>
</tr>
<tr>
<td>$5.00</td>
<td>$15,250,000</td>
<td>61%</td>
</tr>
<tr>
<td>$6.00</td>
<td>$20,250,000</td>
<td>68%</td>
</tr>
<tr>
<td>$7.00</td>
<td>$25,250,000</td>
<td>72%</td>
</tr>
</tbody>
</table>

Plant Revenue vs. Butanol Wholesale Price

$25,250,000

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Phytonix is NOT a biofuel company!

- **Fuels are a low-price, low-margin market.**
- **Wholesale Prices USA (Q1, 2018):**
  - Gasoline $\approx$ $1.70 - $1.75/gallon
  - Ethanol $\approx$ $1.40 - $1.50/gallon
  - Butanol, an industrial chemical $\approx$ $5.75$/gallon
- **Potential future Phytonix biofuel market for butanol:**
  - Approved for a 16% blend with gasoline. $\approx$ $200$ billion/year.
  - Gasoline engines can run on 100% butanol. $\approx$ $900$ billion/year.

Phytonix will initially pursue high-margin, industrial markets for butanol and other solar chemicals.
Other Phytonix Industrial Chemicals Market > $30 Billion per year

Phytonix can genetically engineer cyanobacteria to produce other valuable industrial chemicals from CO₂

- Iso-butanol
- Pentanol and Iso-pentanol
- Hexanol, Heptanol & Octanol
- Medium & long chain fatty acids: (C₈ octonoic acid, C₁₆ palmitic acid, and C₁₈ linolenic acid)
- Plus many other chemicals

Multiple chemicals = multiple liquidity events
| UNITED STATES PATENT | Patent No. US 8,735,651 issued in 2014  
“Designer Organisms for Photobiological Butanol Production from Carbon Dioxide and Water” |
|---------------------|--------------------------------------------------------------------------------------------------|
| OTHER MAJOR MARKETS | EU, Eurasia, Australia, South Africa and Hong Kong patents issued  
Patents expected in other major markets |
| PATENT COST | Pa  
Over $800,000 invested to secure Phytonix patents |
Phytonix Patent Protection

**Key features include:**

- Ability to inducibly over-express or disable (under-express) the starch hydrolysis and glycolysis (cyanobacteria food production) pathways. This provides a strong barrier to entry.

- *Without the ability to turn the glycogen pathway on and off, the chemical synthesis pathway would directly compete with the organism's glycogen (food) pathway, severely limiting the production of butanol.*

- Ability to halt cell division/replication.

- Ability to maximize the reducing power of ATP and NADPH to increase photosynthetic conversion efficiency.

- Proprietary alternative genetic pathways (specific DNA codes) for the synthesis/production of n-butanol.
Butanol Competition

• **Incumbent fossil-based producers:** BASF, DOW/DuPont, OXEA, Eastman, etc.
  – Expensive, carbon intensive and energy intensive.

• **Fermentation/bio-based producers:** Gevo, Butamax, Cobalt Technologies, Green Biologics
  – Biomass feedstock = expensive, generates CO₂ as a waste product.

• **Phytonix solar-based production:**
  – CO₂ feedstock = very low-cost process, with low energy cost.
  – Highly carbon-negative process.
Management Team

**Management Team**

**Mr. Bruce Dannenberg:** Founder, President & CEO. Director. Expertise in commercialization, genetics, and microbiology, Degrees in Zoology, industrial management (M.S.) & MBA.

**Mr. Gordon Skene:** Chairman & Executive Vice President. Former CEO of several technology companies and of a VC technology fund. BSc. (Physics & Economics). MSc. Business Administration (Finance). Former Director of Finance for an industrial corporation with sales of $3 billion, listed NYSE.

**Mr. Michael Weedon:** Independent Director. Former COO of a large chemical company with 25 years of experience in finance, clean technology and senior management. MBA, Western Ontario.

**Mr. Richard Hopp:** Independent Director. Over 30 years experience in conventional, and renewable energy, biomass and in advancing companies from concepts to commercial realities. MA in Admin.

**Dr. Peter Lindblad:** Phytonix Technology Director, Organism Development. Director of the Angstrom Laboratory and Professor of Microbial Chemistry & Molecular Biology at Uppsala University. Strategic planning and finance. Former executive with Sun Microsystems and Atari. MBA Stanford.

**Patrick Neill P. Eng.:** Phytonix Director of Engineering: Experienced engineering manager in the water/wastewater industry, including commercializing new technologies. Formerly with Honeywell.

**Dr. James Lee:** Phytonix Inventor & Scientist: Expertise and degrees in photosynthesis, plant physiology, biochemistry, and synthetic biology (Cornell). 15 years at Oak Ridge National Lab.
Board of Advisors

Mr. Michael Macdonald: Former Senior Vice President, Global Operations, Methanex Corporation, responsible for all manufacturing activities including eight methanol plants.

Dr. Victor Der: Executive Adviser, Global Carbon Capture and Storage Institute. Former Assistant Secretary, US Department of Energy, leading initiatives in clean coal, carbon capture, and oil & gas R&D. Former Chair of the Carbon Sequestration Leadership Forum Policy Group.

Mr. Peter Hoyle: Product Manager of Quadra Chemicals, a leading North American distributor of industrial chemicals including butanol. Consultant on renewable resources in industrial applications as replacements to hydrocarbon-based materials.

Mr. John Robertshaw: Industrialist and commercial real estate developer with a substantial real estate and private equity portfolio. An active investor in emerging technology companies.

Dr. Thomas Lee: Due diligence lead for the Tech Coast Angels, California (TCA). Anesthesiologist in Orange County, CA and Chairman of the Medical & Life Sciences Committee for the Orange County chapter of Tech Coast Angels (TCA-OC). MD, MBA, and BA (Chemistry).

Dr. David Glass: Extensive experience in regulatory affairs in industrial biotechnology, technology licensing and patent management, including obtaining MCAN-EPA approvals for field tests of genetically modified agricultural microorganisms and plants.
## History

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Events</th>
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| 2008 - 2010 | • Core technology invented by Dr. James Lee.  
• Phytonix acquires exclusive global technology rights. |
| 2010 – 2012 | • Phytonix contracts leading international experts to develop technology and build IP/patent portfolio. |
| 2014 | • **Phytonix scientists produce 100% n-butanol** from CO₂ using its proprietary engineered cyanobacteria.  
• **US patent issued** (No. US 8,735,651). |
| 2015 - 2017 | • EU, Eurasia, Australia, South Africa and Hong Kong patents issued. Other key markets to follow.  
• Pilot projects hosted and funded by 2 industrial emitters of CO₂ negotiated and 1st stage initiated. |
## Estimated Butanol Production Cost versus Yield in grams/litre/week

### Phytonix Plant Producing Butanol

<table>
<thead>
<tr>
<th>Lab Yield (Grams/Liter/week)</th>
<th>Yield in Field (Gallons per Acre per Year) (“GPAY”)</th>
<th>Unit Cost with $0.55/gallon contingency ($/gallon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>13,562</td>
<td>4.20</td>
</tr>
<tr>
<td>3</td>
<td>20,343</td>
<td>2.99</td>
</tr>
<tr>
<td>4</td>
<td>27,123</td>
<td>2.38</td>
</tr>
<tr>
<td>5</td>
<td>33,904</td>
<td>2.01</td>
</tr>
<tr>
<td>6</td>
<td>(p_a) 40,685</td>
<td>1.76</td>
</tr>
<tr>
<td>7</td>
<td>(g_e) 47,466</td>
<td>1.59</td>
</tr>
<tr>
<td>8</td>
<td>28 54,247</td>
<td>1.46</td>
</tr>
</tbody>
</table>

*Based on Proviron Photobioreactors*
Phytonix Process Flow Diagram – Modified Photosynthesis To Produce Butanol

**Energy Source** | Sun (+/or LED)
---|---

**Series of Photobioreactors (PBR’s)**
(Phytonix “Basic” PBRs are culture bags + Arrays)

**“Butanol Syntheses Mode”**
Cell division halted. Glycogen production stopped.

1. **Cell Culture Tank**
   - Cells are dividing and producing/storing glycogen. No butanol production at this stage.
   - “CB” = Cyanobacteria

2. **Nutrients & Minerals**
   - New strains of CB in H2O for inoculation

3. **CO2 Storage & Flue Gas Cooling System**
   - CO2 fed to PBRs

4. **Water Source Storage**
   - Water
   - Recycled Water

5. **Water Recycling**
   - Remove dead CB solids.
   - Used for biodiesel feedstock, etc.

6. **Flue Gas Emissions**
   - From industrial sources

7. **CB & culture piped to additional PBRs to produce more n-butanol**

8. **Pervaporation System**
   - N-butanol is separated from culture media

9. **Butanol Storage Tanks**
   - 100% n-butanol stored for delivery

10. **Settling Tank/ Separation System**
    - Remove dead CB solids.
    - Used for biodiesel feedstock, etc.

11. **Process continues to the end of the CB’s lifecycle.**