This presentation contains "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements are statements that contain projections, estimates or assumptions about our revenues, income and other financial items, our plans for the future, future economic performance, transactions and dispositions and financings related thereto. In many cases, forward-looking statements relate to future events or our future financial performance. In some cases, you can identify forward-looking statements by terminology, such as “anticipate,” “estimate,” “believe,” “continue,” “could,” “intend,” “may,” “plan,” “potential,” “predict,” “should,” “will,” “expect,” “objective,” “projection,” “forecast,” “goal,” “guidance,” “outlook,” “effort,” “target,” and other similar terminology or the negative of such terminology. However, the absence of these words does not mean that the statements are not forward-looking.

In addition, these forward-looking statements include, but are not limited to, statements regarding implementing our business strategy; development, commercialization and marketing of our products; our intellectual property; our estimates of future revenue and profitability; our estimates or expectations of continued losses; our expectations regarding future expenses, including research and development, sales and marketing, manufacturing and general and administrative expenses; difficulty or inability to raise additional financing, if needed, on terms acceptable to us; our estimates regarding our capital requirements and our needs for additional financing; attracting and retaining customers and employees; sources of revenue and anticipated revenue; and competition in our market.

Forward-looking statements are only predictions. Although we believe that the expectations reflected in these forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance or achievements. All of our forward-looking information is subject to risks and uncertainties that could cause actual results to differ materially from the results expected. Although it is not possible to identify all factors, these risks and uncertainties include the risk factors and the timing of any of those risk factors identified in “Item 1A. Risk Factors” section contained in our most recent 10-K, as well as the risk factors and those set forth from time to time in our filings with the Securities and Exchange Commission (“SEC”). These documents are available through our web site, http://www.sulphco.com, or through the SEC's Electronic Data Gathering and Analysis Retrieval System (“EDGAR”) at http://www.sec.gov.

Each forward-looking statement speaks only as of the date of the particular statement and we undertake no obligation to update or otherwise revise any forward-looking statement, whether as a result of new information, future events or otherwise.

References in this presentation to “we,” “us,” “our,” “our company,” and “SulphCo” refer to SulphCo, Inc., a Nevada corporation.
Outline

• Desulfurization – the regulatory picture
• Hydrodesulfurization (HDS)
• Challenges of HDS
• Introduction to oxidative desulfurization
• SulphCo’s desulfurization technology
• Potential benefits of ODS
Desulfurization – The Regulatory Picture

- Established to prevent $SO_x$ emissions due to fuel combustion (EPA)
- U.S. gasoline: 30 ppm sulfur
- U.S. On-road diesel: 15 ppm sulfur
- U.S. Non-road diesel:
  - Europe diesel: 10 ppm
  - Pipeline sulfur specifications are tightening
  - What’s next? Heating oil...

http://www.clean-diesel.org/
Hydrodesulfurization

- Chemical process to remove sulfur from refined petroleum products
- Requires heat, pressure and catalyst
- Not limited to sulfur; nitrogen, aromatics, olefins react also
- $H_2S$ is subsequently converted to elemental sulfur
Challenges of Hydrodesulfurization

Ultra low sulfur (ULSD):

- Capital cost – high pressure HDS
- Operating cost/utilities – high operating temperature and pressure
- Catalyst – high catalyst cost; limited catalyst life
- Carbon footprint – high hydrogen and operating energy usage
Oxidative Desulfurization (ODS)

- **Chemistry:**
  - Oxidation of sulfur species (focus on thiophenic sulfur)
  - Catalysts: acids, heteropolyanions ($\text{PX}_{12-n} \text{Y}_n \text{O}_{40}^{(3+n)^-}$)
  - Oxidants: $\text{H}_2\text{O}_2$, tert-$\text{BuOOH}$
  - Phase transfer catalysts (oil-water systems)

- **Separation:**
  - Extraction – liquid-liquid separation
  - Adsorption

- Focus of a variety of companies: [http://www.e2env.com/HE.pdf](http://www.e2env.com/HE.pdf)
Ultrasound-Assisted Oxidative Desulfurization

Conversion of DBT to DBTO with and without the use of ultrasound

- Chemistry: oil, H\textsubscript{2}O\textsubscript{2} solution, catalyst, phase transfer reagent
- Original patent assigned to SulphCo
- Un-optimized technology

Ultrasound greatly enhances reactivity

Mei, H.; Mei, B. W.; Yen, T. F. Fuel, 82, 405 (2003)
SulphCo’s Approach to Oxidative Desulfurization

Chemistry
- Oxidant: H₂O₂ etc.
- Oxygen transfer catalyst

Ultrasound
- Frequency: 18 kHz
- Amplitude: 40-120 μm

Separation
- Gravity separation
- Adsorption
- Extraction

Chemistry Diagram:
- DBT → DBTS with H₂O₂ and Catalyst/PTA

Ultrasound Diagram:
- Image of ultrasound equipment
Sonocracking™ Process

Sonocracking™: The application of sonochemistry to petroleum-based liquids combining ultrasound with proprietary catalysts and oxidants.

A. Oil, water and additives flow together towards the reaction chamber.
B. In the reaction chamber, the ultrasound probe causes cavitation (formation of small bubbles). These bubbles expand and then collapse, creating energy and heat that facilitates chemical reactions.
C. Oxygen is attached to sulfur compounds thereby changing their chemical composition.

Chemical reaction inside reaction chamber
How Does Ultrasound Do It?

SulphCo’s patented technology uses high-power ultrasound to induce cavitation in a water/oil stream, which when combined with proprietary additives allows for chemical reactions to occur.

Cavitation bubbles grow, become unstable and collapse from the negative pressure of sound wave fronts in the liquid.

The collapse, or implosion, of the bubbles generates intense excess heat and pressure in and around every nanometer-sized bubble resulting in intense shear, mixing and high localized pressure and temperature.

The intense mixing and highly localized intense heat and pressure allow for complex chemical reactions to occur at relatively low temperatures and pressures in the bulk system.
Sulfur Species Distribution – Before & After Process

Feed: API = 36.3; %S = 0.62%

- Technology: efficient conversion of sulfides to sulfones
- **Sulfones** have much **higher boiling points**, are **more polar** and **hydrotreat easier**
- Sonocracking™ performs best on hard-to-hydrotreat sulfur compounds (e.g. thiophenes)
Example: Crude Oil Fractions – Treated vs. Untreated

Naphtha: 60% reduction

Kerosene: 80% reduction

Diesel: 90% reduction

VGO: 70% reduction

Shifts Sulfur from Middle Distillate to Heavier Fractions
Diesel – Sulfur Distribution Before & After Process

- Significant conversion of S species to sulfones
- Consistent and reliable process
South American Diesel Fraction – After Sulfur Removal Process

- Converted sulfur (sulfones) easily removed
- >70% reduction in sulfur content after full treatment
Sonocracking™ Process: Potential Applications

- Option 1: SulphCo process followed by HDS
- Option 2: LSD (<500 ppm) to ULSD (<10 ppm)
Typical Equipment Installation

SulphCo’s Systems are designed for easy integration into existing plants
SulphCo Process: Potential Benefits

Commercial:
- Upgrade off-road diesel & heating oil → Higher value diesel
- Reduce downgrading of high sulfur diesel to resid → Better refining economics
- Increase on-spec diesel production → Reduce biodiesel or other blending components
- Increase flexibility of crude slate → Ability to optimize crude oil cost

Hydrodesulfurization (HDS) Operations:
- Conversion of dibenzothiophenes to sulfones → Avoid high pressure HDS
- Milder HDS operating conditions → Reduced incremental hydrogen production
- Increase HDS catalyst life → Fewer turnarounds and downtime
- Debottleneck existing HDS units → Increased throughput/Lower unit cost
- Lower-cost alternative to HDS → Increase life of refineries limited by HDS or CAPEX constraints

Carbon Footprint:
- Less hydrogen required and produced → Lower CO₂ production
- Lower HDS temperature and pressure → Reduces operating energy requirements

Several Significant Economic Advantages; Overall Benefits are Application Specific