Bridge Energy Overview

- Founded in 2017, partnership between Randy Breitenbach and KKR’s Energy Income and Growth Fund
  - Formed to evaluate all forms of energy and energy storage necessary to fuel the California economy, safely, cost effectively, and with minimal environmental impacts: “Bridging to the Next Energy Paradigm”.
  - Formed to develop investment opportunities that arise from the massive capital deployment required to finance the current energy transition.

- Acquired the Brea Olinda field from Linn Energy, July 2017, adjacent to the 2nd largest Landfill in the State called the Olinda Landfill.

- LA basin is the 2nd most prolific oil basin in the world per aerial acre.
  - In the 1920’s when Santa Fe Springs Field was first discovered, the LA basin produced 20% of the world’s daily oil supply.
  - Brea Olinda Oil Field was the first oil field discovered in CA and was discovered in the early 1880’s.
  - Brea Field OOIP 2.27 billion bbls; 410 million bbls oil produced to date, recovery only 18% of OOIP; peak production in 1950’s given reservoir complexity.

- Water Injection/disposal was not introduced to the Brea Field until the 1970’s. As a result, the reservoir pressure throughout the field is very low and provides a possible location for gas injection & storage.
Technical Summary Brea Oil Field

- 295 producing wells and 22 injectors
- Gross production: 2,500 bopd and 1,300 mcfd (gas burned to generate electricity)
  - 5-20% oil cut
- ~2-3% decline rate
- Produces from Miocene and Pliocene zones
  - Majority of wells are ~3,000-5,500 feet deep
- Comparison to other LA Basin fields
  - Dramatic dips, gravity drainage
  - Harder rock, higher gravity, lower pressure
  - Located in northeast portion of LA Basin
  - One of a series of fields associated with the northwest trending Whittier fault
  - 16th largest field in California
Detailed Area Land Map

Los Angeles County, CA
Orange County, CA
Print Date: 2/7/2019
Brea Field Office Location Layout

Anatomy of a Landfill

Landfill Gas Conversion
Decomposing waste in landfills naturally produces methane gas. The gas is collected through pipes then sent to a facility for conversion to renewable energy or to be flared.

Desilting Basin
Desilting basins help protect our streams and ocean. They capture storm water runoff and trap sediment, keeping it from entering the storm water released into drains.

Condensate and Leachate Storage Tanks
Leachate is liquid that results from decomposing waste. Condensate is the liquid that forms inside the landfill gas collection system. These liquids are collected and stored in tanks. Some of the liquid is used for dust control.

Creating a Cell
Each day trash is placed, compacted and covered with a layer of soil or tarps in sections until a specified size is reached, forming a cell.

Environmental Protection
1. Special wells enable ground water monitoring.
2. To control dust, trucks continuously spray dirt areas with water that has been “recycled” at the landfill.
3. Portable screens are used to trap and collect any stray litter, to keep it from flying away. They can be moved based on wind directions.
4. Special misting machines spray a very fine mist into the air to help confine odors.
CO2 Source Specifications

► Olinda Landfill

- Before combustion – Landfill Gas (40% CO2) – 160k tons CO2 annually - *Multiple locations*
  
  - Landfill gas produced via vacuum - 45inwc -55inwc pulled on field using extraction blowers. Average temp raw gas directly from field 95F - 102F. Gas blowers then push it forward at 4psig.
  
  - Landfill gas is chilled to drop out water content and then compressed to 105psig increasing gas temp to 115F - 130F. Gas is then cleaned in the Venture media based TSA. At this point it is supposed to be free of water and siloxanes.
  
  - Landfill gas then gets compressed further to 245psig increasing temperature to 140F-145F. Gas is then fed to the gas turbines (4-total - Solar T-60’s). This temp keeps all the VOC’s gaseous. The gas BTU is at about 504.

- After combustion – Flue Gas – (5-6% CO2) 270k tons CO2 annually
  
  - The stack temp is 325-350F out the top. The exhaust contains dry ammonium bisulfate and dry siloxanes that require filtration before entering any post process such as amine or membrane. Combustion gas is added in the turbines which dilutes the CO2 concentration and the flow rate increases to roughly 53 mcf a minute.
Brea Olinda Full-field Modeling
Brea Olinda Full-field Modeling
**Connected Volumes**

**Vshale** property model using SP logs

**Connected volumes** using a simple sand/shale facies model
Intersection through Vshale property model showing the updip pinch outs and confining shales

Connected volume in the Miocene C zone was identified as the initial target reservoir for feasibility analysis
**CO₂ Sources and Storage Volume – Miocene C Geobody**

### 1.2 BCF CO₂ Source

<table>
<thead>
<tr>
<th>CO₂ Sources</th>
<th>Volume/Rate</th>
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<tbody>
<tr>
<td>Landfill (MT/yr.)</td>
<td>160,000</td>
</tr>
<tr>
<td>Landfill CO₂ Gas Rate (Mscfd)</td>
<td>8,328</td>
</tr>
<tr>
<td>Landfill 30 Year CO₂ Volume SC¹ (BCF)</td>
<td>91</td>
</tr>
<tr>
<td>Landfill 30 Year CO₂ Volume RC² (BCF)</td>
<td>1.2</td>
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1) Standard Conditions (14.7 psia, 60 deg. F)
2) Reservoir conditions (1100 psi, 195 deg. F)

### 3.5 BCF Storage

<table>
<thead>
<tr>
<th>Potential CO₂ Storage Volume (Miocene C Reservoirs)</th>
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<tbody>
<tr>
<td>Gross Reservoir Volume (Ac-feet)</td>
</tr>
<tr>
<td>Net Reservoir Fraction (v/v)</td>
</tr>
<tr>
<td>Porosity (v/v)</td>
</tr>
<tr>
<td>Water Saturation (v/v)</td>
</tr>
<tr>
<td>Storage Pore Volume RC² (BCF)</td>
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2) Reservoir conditions (1100 psi, 195 deg. F)
Three main tasks are used to ensure confidence in product containment:

1) Site Characterization
   a) Key to defining bounds for safe operation
   b) Identify seals and demonstrate their tightness (e.g., permeability)
   c) Use field history and data to select storage zone, EOR, and CCUS development plan
   d) Design pattern of injection and observation wells using existing wells
   e) Produce set of KPIs that verify inventory and demonstrate gas containment

2) Risk Assessment
   a) Operator can tailor monitoring plans to areas of greatest uncertainty
   b) Define main hazards of CCUS and propose effective monitoring and mitigation measures

3) Monitoring Plan
   a) Developed from previous 2 tasks
   b) Includes action plans for mitigating and reporting product movement
Key Mitigation Strategies during Injection:

1) Verify containment by upper seals (facies changes and/or stratigraphy)
   - Measure fluid/gas saturations above seals and above fault(s) using existing wells as observation wells

2) Gas migration out-of-zone
   - Periodically measure saturations at up-dip, lateral, and other potential leak-points (including wellbores) identified during risk analysis

3) Fault triggering
   - Measurements taken in observations wells near (below) and above faults; $\Delta P \sim 0$ indicates no measurable pressure changes at fault that could trigger slip by CCUS
3D Model Interactive Session

Petrel 3D Model
Obstacles to Completion

- Permitting, Permitting, Permitting

  - Need to reduce and streamline permitting process
    - Is a CEQA & EIR fast track review process possible
    - Proof of Closure – Will a proven oil & gas trap be sufficient assuming conservative injection volume parameters.
    - Seismic Review and Liability – Will CO2 sequestration require a lengthy seismic study if conservative injection parameters are maintained.
    - 100 Year Bonding issues – If a 100 year bonding liability is required NO projects will be built.

  - CO2 EOR –vs- Sequestration Permitting differences
    - Improve access to incentive programs – CO2 volume thresholds are arbitrarily high
    - Political Narrative if Oil & Gas Industry is the lead and likely recipient.
    - Given current economic outlook will the programs stay funded.
Call Participants: Bridge Energy

Randall Breitenbach
Chairman, CEO and Founder

Randall H. Breitenbach is the Founder, Chief Executive Officer and Chairman of Bridge Energy LLC. Randy also cofounded Pacific Coast Energy Company, BreitBurn Energy Company and BreitBurn Energy Partners MLP, serving as Co-Chief Executive and Chairman of the Board from 1988 until his retirement in 2012. Randy also served as Chairman of Stanford University's PIC Endowment in 2007 and is currently a member of the Alternative Energy Investment Committee. Randy is also currently a member of the Carbon Capture Uses & Storage Roadmap Team "CCUS" reporting to the Department of Energy. Randy also serves as a Trustee and is currently Chairman of the Board for Hotchkis and Wiley Funds, a large mutual funds company. Randy holds both a B.S and M.S. degree in Petroleum Engineering from Stanford University and an M.B.A. from Harvard Business School.

Bruce Laverty
Sr Engineering Manager

Bruce Laverty is a petroleum engineer with thirty-three years of experience in California. Bruce has worked for several major and independent oil producers, both on and offshore California, working in the Los Angeles, Ventura and San Joaquin Valley Basins. Bruce’s employment history includes: Union Oil Company of California; 11 years; Reservoir & Production Engineer. Nuevo Energy Company; 7 years; Senior Petroleum Engineer to Exploitation Manager. Plains Exploration & Production Company; 2-1/2 years; Exploitation Manager. Dos Cuadras Offshore Resources (DCOR); 4 years; Onshore & S. SB Channel Asset Manager. Chico Martinez Oil (CMO); 1 year; Subsurface Manager. Seewell Engineering; 4 years; Chief Visionary & Multi-discipline engineering. Crimson Resource Management; 2 years; Light Oil Asset Manager. Graduate of The Pennsylvania State University, BS Petroleum & Natural Gas Engineering, Tau Beta Tau.

Ben Davidson
Geologist

Ben Davidson is a young professional geologist with 2+ years of experience in the industry. He has a bachelor’s and master’s degree in Geology, both from California State University of Long Beach, with a focus on petroleum and structural geology. In early 2017, he worked as an engineering technician with California Resources Corporation in Long Beach, CA. Upon completing his master’s degree at the end of 2017, he quickly transitioned into a permanent role as the Geologist for Pacific Coast Energy Company in Orcutt, CA followed by Bridge Energy, LLC. in Brea, CA. Ben has utilized Schlumberger’s Petrel 3D modeling software to build and manage the 3D geologic models for both the Orcutt and Brea-Olinda Oil Fields. He excels at visualizing in 3D, problem solving, critically thinking, and analyzing various types of data.
Call Participants: Numeric Solutions

John H Harris
Co-Founder

John H. Harris is the Founder and President of Numeric Solutions LLC (Numeric) in Ventura, CA and a Co-Founder of Integrity Subsurface LLC in Houston TX. Over the past 20+ years, while at Numeric, John and his staff have specialized in 1) risk analysis of operations related to oil and gas production and underground gas storage facilities, 2) energy regulatory and compliance activities and 3) energy-related mergers and acquisitions. These projects have led to Numeric working with clients as expert witnesses in litigation related to underground gas storage and oil and gas asset valuation. In addition to working with Numeric, John has held direct positions at Statoil (now Equinor), UCSB, and Texaco. John has degrees in Geology from the University of Michigan and the University of New Hampshire.

Dr. Richard A Schultz

Dr. Richard A. Schultz is owner of Orion Geomechanics LLC Co-Founder and Partner with Integrity Subsurface LLC, both of Houston, TX. He is a geologist specializing in the geomechanics of faulted overburden and reservoir systems and in underground natural gas storage. Previously he was Senior Research Scientist at The University of Texas at Austin, Principal Geomechanicist with ConocoPhillips, and Foundation Professor of Geological Engineering and Geomechanics (now Emeritus) with the University of Nevada, Reno. The author of some 120 technical papers, books, and chapters, and several hundred professional abstracts and reports, he received his B.A. degree in Geology from Rutgers University, M.S. degree in Geology from Arizona State University, and Ph.D. degree in Geology from Purdue University. Dr. Schultz is a member of the US Interstate Oil and Gas Compact Commission, a Fellow of the Geological Society of America, a licensed Professional Geologist in the State of Texas, and was an instructor of State oil and gas regulators with TopCorp.