Insights into Water Utilization & Engagement in the South TX Oil Field
Safety is the Top Priority

BE SAFE. DRIVE SMART.

- **Pass Carefully**
- **Drive Now Text Later**
- **Not So Fast**
- **Drive to Conditions**
- **Really Stop**
- **Stop Means Stop**

https://www.txdot.gov/driver/share-road/be-safe-drive-smart.html

- **Hard Hat**
- **Hearing Protection**
- **Flame Resistant (FR) Clothing**
- **Steel-Toed Boots**
- **Gloves**
- **Hydrogen Sulfide (H2S) Monitor**
- **Eye Protection**
Oil and Gas is Vital to Everyday Life
Oil and Gas is Vital to Everyday Life
South Texas Energy & Economic Roundtable

• Trade Association connecting the oil and natural gas industry to South Texas communities

• Represented by the largest operators in the Eagle Ford Shale region

• Mission to facilitate and coordinate communication, education and public advocacy surrounding the production of energy resources in South Texas
Supporting Members
- Baker Hughes
- Halliburton
- NGL Energy Partners
- Schlumberger
- Weatherford

Resource Members
- AEP Texas
- Aggreko
- Cheniere Energy
- HOLT CAT
- Port of Corpus Christi
- Port of Victoria
- Union Pacific
- Tenaris

Associate Members
- Free Trade Alliance
- Victoria Economic Development Corporation
STEER Impacts Through Collaboration

- STEER Water Sustainability, HSE, Operations, Communications, Stakeholder Relations, and Millennial Committees
- Alamo Area Council of Governments (AACOG) Eagle Ford Emissions Inventory
- Roads: TxDOT/DPS/STEER
- UTSA Economic Impact Study
- San Antonio River Authority (SARA) on Eagle Ford Shale Handbook
- San Antonio River Authority
- Groundwater Conservation Districts
- Texas Parks & Wildlife
- Taking Care of Texas
- EDF
- And the list goes on…

“Taking Care of Texas is about building on existing conservation efforts. We want Texas to be a leader in meeting the nation’s energy needs while conserving soil and habitat and boosting the economy in South Texas.”

- Laura Bush, Taking Care of Texas
The Eagle Ford Shale

• Named after Eagle Ford, Texas, the town where the shale outcrops can be found in clay form on the earth’s surface
• Made up of sedimentary rock that contains oil and natural gas
• Extends approximately 50 miles wide, 400 miles long
• Primary 15 - county region includes: Atascosa, Bee, DeWitt, Dimmit, Frio, Gonzales, Karnes, La Salle, Lavaca, Live Oak, Maverick, McMullen, Webb, Wilson, and Zavala

Source: Institute for Economic Development Center for Community and Business Research – The University of Texas At San Antonio - 2012 Economic Impact Study
Eagle Ford Data & Stats

- September 2017: 1,601 wells permitted, 1,119 all of 2016 (Railroad Commission of Texas)
- 82 rig count (EagleFordShale.com)
- EIA estimates average Eagle Ford EUR at 168,000 bbl/well
- EIA: Eagle Ford producing over 1.393 million daily barrels in August (oil)
- Wood Mackenzie predicts production will reach 2 mill b/d of oil and condensate by 2020
- EAGLE FORD HAS PRODUCED OVER 2.1 BILLION BARRELS OF OIL AND CONDENSATE TO-DATE!

Source: Railroad Commission of Texas
South Texas Engagement

• Supporting education and outreach initiatives in South Texas
  ▪ STEER Oil & Gas Education Guide and Presentation
  ▪ Speaking engagements

• Continually foster relationships with stakeholders

• Media relations and rapid response

• Share positive industry news and stories
  ▪ Eagle Ford Excellence Awards
  ▪ Social Media

• Public Forums
  ▪ Town Halls, Commissioner Courts, Neighbors of Oil & Gas, etc.
STEER Programs

- Awards to showcase companies making a difference in the community, in safety and environmental stewardship

- Awards for 2016 include: Community and Social Investment, Environmental Stewardship, Safety Performance and The STEER Impact Award.

- Previous Environmental winners include: Alphabet Energy, Aggreko, Energy Waste, Schlumberger, NuStar, Caesar Kleberg Wildlife Research Institute at Texas A&M University Kingsville, HOLT CAT, and others.

- Companies have won for water management technologies, emission reduction technologies, reclamation projects, alternative fuel technologies, and more...
STEER Programs

- STEER partnered with the San Antonio Spurs, HOLT CAT, and Shale Magazine for a one-day oil and gas education program.

- Over one thousand students from South Texas and San Antonio with a desire to learn more about STEM careers/oil and gas attended the Spurring Education Energy Day event.

- The event showcased oil and gas industry and STEM career opportunities available upon graduation from high school or college.

- The Day provided students with an explanation of the process of drilling and producing oil and gas, and offered interactive quizzes and games. Students were informed of the various careers related to science, technology, engineering and math as well as the many opportunities that are available beyond STEM fields.

“We are grateful to STEER and Spurs Sports and Entertainment for providing our students with this unique and educational experience,” said Nancy Dunn Thompson, Ph.D., Director of Community Outreach and Communications for the School of Science and Technology.
Total Economic Impact (21 County Area)

- 2014 - $123.2 billion
  an all-time high to date
- 2015 - $80.2 billion
- 2016 - $49.8 billion

- 2014 – 191,153 jobs
  (direct and indirect)
- 2015 – 176,918 jobs
- 2016 – 108,213 jobs
Drilling Permits Issued in the Eagle Ford

- 2014 – 5,613
- 2015 – 2,315
- 2016 – 1,119
- As of October 2017 – 1,601
Total Eagle Ford Shale Production

- 2014 – 5,186 million cubic feet
- 2015 – 6,081 million cubic feet
- 2016 – 5,452 million cubic feet

- 2014 – 1,077,872 barrels per day
- 2015 – 1,199,851 barrels per day
- 2016 – 935,199 barrels per day
- 2017 - 1.393 m daily barrels August
History doesn’t repeat itself. But it does rhyme.

Mark Twain
International Impact

US Crude Oil Production, January 1973 to January 2015

- 9.2M bpd
- America's Shale Revolution

Barrels per day (Millions)

Source: Energy Information Administration, Carpe Diem Blog

Texas Crude Oil Production, January 1981 to December 2014

- Output More Than Doubled from December 2011 to December 2014

Barrels per day (millions)

Source: Energy Information Administration, Carpe Diem Blog
International Impact

U.S. Natural Gas Pipeline Exports to Mexico

- 2013 – 660 billion cf
- 2014 – 730 billion cf
- 2015 – >1 trillion cf

Source: U.S. Energy Information Administration
640 with verticals

640 with horizontal wells
Not your Parent’s Oil Well

Building an Oil Factory

Instead of drilling wells on an ad hoc basis, Liberty Resources is developing a 96-well North Dakota development called Stomping Horse in a methodical manner to reduce costs. The company has built a “utility corridor” that connects and services the well pads, reducing the need for heavy truck traffic and long runs of pipeline to isolated units.

- A network of 16-inch pipe will collect the natural gas for sale; a 6.5-inch oil pipeline will gather the oil.
- Natural gas will also be captured and piped around the project to power drilling rigs and other equipment.
- Water for hydraulic-fracturing operations in the 96 wells will come from a single “frac pond” connected by pipeline to the well pads.
- A saltwater disposal well will take wastewater via pipeline from oil-extraction operations.

Source: Liberty Resources LLC
Water Management and Conservation

One Well in South Texas
Used One Time to Last 30 Years

Same amount of water consumed by:

- Corn Field Over 5 Acres per season
- Average Golf Course Every 28 days
- The City of San Antonio in ~20 minutes
- Texas’ Cattle Herds in about 16 minutes

Used Every Day for 30 Years
Innovative Technologies to Find Oil and Natural Gas

These extraordinary technological achievements enable operators to maximize returns from each well, which in turn means higher royalty payments to mineral owners, and higher tax revenues for local and state taxing authorities.

- Horizontal Drilling: A Technological Marvel Ignored, Forbes, 1/28/2013
• EUWCD Background Info
  ▪ Permits groundwater wells in counties overlying Eagleford Shale
  ▪ High level of autonomy in establishing and enforcing rules
  ▪ Considerable flexibility with developing rules different from other GCDs
  ▪ Rules are 10-years old and are not as favorable for pumping brackish groundwater as rules for some nearby GCDs
  ▪ Prior to project, EUWCD had a very limited understanding their aquifer systems and well locations

• Why Sponsor a Project
  ▪ Provide District with data and science necessary to develop prudent management policies based on science
  ▪ Educate District to management approaches used by other GCDs that are beneficial to oil & gas industry but are protective of existing the residential well owner with a shallow well
STEER Evergreen Underground Groundwater Conservation District Study

• Project Activities
  ▪ Five workshops with EUWCD staff and board members on GIS, Aquifer Science, and Rule Changes
  ▪ 10 presentations to the Board over a 2-year period

• Project Accomplishments
  ▪ Significant overhaul of District GIS capabilities, aquifer and well data, and data
  ▪ Detailed maps developed of shales and water quality with depth based on geophysical log analysis
  ▪ Identified problems with existing rules and solutions for improving rules

• Potential Benefits
  ▪ Rules are currently being updated to include improvements that will provide more flexibility and benefits to oil & gas industry

Potential Importance of Shale Layers

Potential Management Zones
Impossible to provide an adequate clean water supply in the State of Texas without oil and gas.

Through oil and gas operator and land owner relationships our industry has been able to share water resources and data to ensure safe water.

STEER members have share scientific well log data worth tens of millions of dollars and assisted in sponsoring independent studies to improve the water management planning process, protecting the communities they live and operate in.

Oil and gas industry is constantly revolutionizing technology for future water recovery and management.

The Rainy Day fund is an essential component to paying for the next 50 years of water infrastructure projects.
Our Partnership with AACOG

Valuable Partnership with AACOG, oil and gas Industry, and organizations like CPS Energy in sharing data

Participating in the Planning Process

We ALL have a role in air quality – it is not one contributor!
AACOG Eagle Ford Emissions Inventory

- The study is conducted by Alamo Area Council of Governments (AACOG) funded by Texas Commission on Environmental Quality (TCEQ) to study air quality in the San Antonio MSA. The goal is to develop comprehensive air quality planning document to determine how to remain below EPA Non-Attainment qualifications.

- STEER and member companies work with AACOG to supply data for Eagle Ford and serve on committees to continue dialogue.

- STEER Communications Committee gathered talking points for use with media and key stakeholders to educate the community about programs in place to lower emissions.
What is Industry Doing

Eagle Ford Well Pad Design Improvements

Standard Tank Battery
- Vertical separators – instrumentation above eye level
- Tank connections
- Truck traffic
- Large footprint
- Higher chance of spills due to loading/unloading

Commingled Allocation Separator
- Horizontal separators – instrumentation at eye and ground level
- Fewer connections
- No Truck traffic
- Greatly reduced footprint
- Reduced chance of spills
Statoil, Technology Developer and Environmental Defense Fund Partner to Deploy Innovative Methane Detection Device for the Methane Detector’s Challenge

New technology developed in San Antonio to detect methane gas leaks in oil fields is getting its first real life test in the Eagle Ford Shale. Statoil ASA (NYSE: ADR) has deployed low-cost laser technology to detect methane emissions at one of its well pads off State Highway 72 just west of the Karnes County town of Kenedy.

Developed as part of the Environmental Defense Fund's Methane Detectors Challenge, the solar and battery powered equipment was designed by Colorado-based startup Quanta3 LLC at San Antonio's Southwest Research Institute. It provides a 24-hour monitoring service that will alert company officials the moment a natural gas leak happens.

Statoil Senior Researcher Desikan Sundararajan said the company aims to be the most carbon efficient oil and gas producer by using cost-effective and innovative technology. If successful, Sundararajan said the technology being field tested just south of San Antonio could have much wider implications.

“This creates lasting value in the communities where we work and has a global effect,” Sundararajan said. “Sensors providing real-time data on ambient facility level emissions will allow us to act upon this information in a timely manner.”

Courtesy San Antonio Business Journal, Sergio Chapa

Norwegian oil giant Statoil is using one of its wells near Karnes City to test methane leak detection that was developed in San Antonio.
What is Industry Doing

• Converting production facilities from natural gas use to instrument air use. The variable bleed controllers will release compressed air instead of gas on pneumatic controllers and pumps. Although small they quickly add up.

• Putting more facilities on oil gathering systems to reduce loading and vapor. Big reduction on truck traffic.

• Optimize flares to burn more efficiently.

• Leak Detection and Repair (LDR) programs.

• Implementing Green Completions
ExxonMobil Corp.: World's largest ethylene cracker plant will be in South Texas

BRINGING THE WORLD'S LARGEST ETHYLENE CRACKER PLANT TO SAN PATRICIO COUNTY HAS THE POTENTIAL TO OFFSET A MASSIVE FOURTH-QUARTER DROP IN THE REGION'S WORKFORCE.

Chris Ramirez, Corpus Christi Caller-Times
Cheniere Energy

Corpus Christi Liquefaction: Aerial view of construction
Texas, the Future of Exports ....
Future of Oil?
Roadside trash pickup programs in DeWitt, Karnes, and McMullen Counties: Over 72,000 lbs. of roadside trash annually, this does not include McMullen County.
Beautification Programs
Beautification Programs

- **Eagle Ford Reclamation:**
  Numerous STEER Operators like Anadarko have partnered with organizations such as the Caesar Kleberg Wildlife Research Institute to reclaim the native habitats.
Time to get Home
Like us on Facebook and Follow us on Twitter to stay up to date with Eagle Ford activities!

/STEEROUNDTABLE
@STEEROUNDTABLE
www.STEER.com

Questions?