SYLLABUS

Course: Shale Gas & LNG – Spring 2013
Time: *1:00p-2:30p TTh* **Location:** Room 215 TU2

Professor Susan L. Sakmar
slsakmar@central.uh.edu
Cell: 415-272-4691
Office: 713-743-0933
Office: 132-TUII
Office Hours: Wed. 10:30 a.m. – 12:00 p.m. or by appointment

COURSE OVERVIEW

This course explores the myriad of legal, policy and environmental issues pertaining to global natural gas markets with a particular focus on global shale gas development and the development of LNG import and export projects around the world, including recent developments in US LNG export projects.

The first half of the semester will explore the growing role that natural gas will play around the world in the context of global shale gas development. By most accounts, shale gas development in the United States has been a "game changer" that could be replicated around the world so long as the right regulatory and environmental frameworks are put in place. This course will explore the existing regulatory and environmental frameworks for shale gas, especially those in the United States, as well as frameworks being developed around the world with the objective of exploring the substantive law of shale gas development as well as developing the analytical and practical skills necessary to the practice of law.

The second half of the semester will explore the growing role that LNG is expected to play as the "glue" linking global gas markets. The course will explore the opportunities and challenges for various LNG import and export projects around the world in the current contextual reality wherein energy law and policy are increasingly intersecting with environmental law and geopolitics.

COURSE REQUIREMENTS

Book Requirements: Photocopied materials will be available from the UHLC Copy Center. Other reading materials will also be assigned throughout the semester and will be available at the UHLC Copy Center and/or available on-line for students to download.

Atlantis Natural Case Study: This assigned case study can be downloaded from the course website.
Research Assignments: The 1st Research assignment can be downloaded from the course website. Other research assignments will either be handed out to students at class and/or posted on-line for students to download.

Grades: The final grade will be weighted as follows:

50% - Research paper (due at end of semester)
50% - Research assignments, class participation, current events and attendance.

Research Paper: Each student will write a 15-20-page term paper on a topic related to global gas markets. Students are free to develop a topic of their choice but it will be subject to professor approval. Students will submit an outline of their paper to the professor and will identify their paper topics to the class mid-semester. Time permitting, students may present their papers to the class at the end of the semester.

Class discussions: Class participation in the seminar is both necessary and mandatory. Students are expected to complete assigned readings and be prepared for class.

Current events: Each student is required to turn in a "current event" relevant to some aspect of global gas markets every week or as assigned. Time permitting, several students will present their current event to the class each week.

Research assignments: Several written research assignments will be assigned throughout the semester. These assignments will require some amount of research to answer several questions posed in the assignment. Students are required to turn in these written assignments (2-4 pages) each week or as otherwise instructed.

1. SHALE GAS DEVELOPMENT (First half of semester)

Overview of North American Shale Gas Development

The development of unconventional or shale gas in North America in recent years has significantly altered the global energy supply assessment. With significant advances in hydraulic fracturing and other technologies, the United States has become the undisputed leader in unlocking vast tracts of gas-bearing shale. Since shale rock exists in almost every corner of the world, developments in the North American shale gas industry are being closely watched as other countries begin to explore the extent of their own unconventional resources. The interest in shale gas development is likely to continue to grow as industry, governments, and policymakers search for ways to meet growing energy demand with cleaner-burning fuels. While the potential for global shale gas development is significant, the industry faces a number of commercial, regulatory and environmental challenges. The course will cover these issues in as much detail as possible and students will have the opportunity to explore a topic of interest in further detail in their research papers.

Topics to be covered in the course include:

- History and evolution of the shale gas industry – what is shale gas?
- Overview of the major U.S. shale gas plays, including the Barnett, Marcellus, Haynesville, Eagle Ford, and others.
- Overview of the technology used to extract shale gas, including hydraulic fracturing and horizontal drilling.
- Recent trends in the U.S. shale gas industry, including the current focus on liquids-rich shale plays that offer higher-valued liquids, such as oil and NGLs and how shale gas is creating opportunities for other industries such as the petrochemical industry
- Identify the key environmental issues related to hydraulic fracturing and shale gas development as well as the regulatory responses to these issues.
- Identify the key water-management issues related to hydraulic fracturing, including water acquisition, use, reuse, and disposal.
- Analysis of the key regulatory frameworks for U.S. shale gas development including focused discussion on key shale producing states such as Texas, Pennsylvania and other states.

Overview of Global Shale Gas Development

While North America has thus far been the undisputed leader in terms of shale gas development, a recent study released by the U.S. Energy Information Administration (EIA), "World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States," indicates that the "international shale gas resource base is vast." Thus, the potential exists for shale gas to be a global energy game changer. However, the development of global shale gas is not likely to go as quickly as the experience in North America, and the countries that have the right frameworks in place as well as the passion to develop their shale gas resources will be the most successful. The course will cover the following topics:

- What is the potential for shale gas development globally?
- Overview of the Global Shale Gas Initiative (GSGI) led by the United States
- Which countries have potential shale gas resources? What are the major assessments that have been done?
- Which countries are actively pursuing shale gas development and which countries have the most potential?
- What is the potential for shale gas development in Europe? Is Poland leading the way? What other European countries are developing their shale gas resources?
- Analysis of the key regulatory frameworks that are emerging for global shale gas development, including focus on Poland, Canada, and Australia as well as others.

2. THE ROLE OF LNG IN GLOBAL GAS MARKETS (Second half of semester)

The second half of the semester will explore the growing role that LNG is expected to play as the "glue" linking global gas markets. The course will explore the opportunities and challenges for various LNG import and export projects around the world in the current contextual reality wherein energy law and policy are increasingly intersecting with environmental law and geopolitics. Topics covered include:

- The entire LNG value chain, including a discussion of the liquefaction process, LNG shipping, and the regasification process.
- The evolution of LNG markets including the history of LNG and an overview of the three major LNG markets.
- A description and overview of key LNG supply projects around the world.
- The primary markets driving LNG demand around the world.
- LNG contracts and trade including whether the increased globalization of LNG markets will lead to LNG trading as a global commodity.
- The numerous safety and environmental issues that have been raised in the context of constructing LNG projects as well as the environmental sustainability of LNG as a fuel for the future.
- An overview of current LNG mega-projects around the world.
- The potential impact of shale gas on global gas markets including the prospects for North American LNG exports.
- An overview of some of the main emerging issues in the LNG industry including whether North America will become a major LNG exporter, the potential impact of the Panama Canal expansion project on LNG trade, the growing role of floating LNG (FLNG) technology, the potential influence of the Gas Exporting Countries Forum (GECF) to act as a "Gas OPEC", and the emergence of LNG as a shipping and vehicle fuel to aid in emission reduction efforts around the world.

COURSE SCHEDULE AND ASSIGNMENTS

Part 1A **Course Overview, Global Gas Markets, and Shale Gas Overview**

Week 1

Jan. 15 &17
Read: TAB 1: Energy for the 21st Century: Opportunities and Challenges for Liquefied Natural Gas (LNG) (Chapters 1 & 3)
Read: Atlantis Case Study
Current Event: Discuss and turn in 1st current event.
Assignment 1: Discuss and turn in 1st research assignment.

Week 2

Jan. 22 & 24
Read: TAB 2: Modern Shale Gas Development in the United States: A Primer
Current Event: Discuss and turn in 2nd current event.
Assignment 2: Discuss and turn in 2nd assignment on 1/24.

Note: I will be in Doha, Qatar on Jan. 22. Prof. Julian Cardenas Garcia will be the guest lecturer for this class. The research assignment will be due on Thurs. 1/24)

Week 3

Jan. 29 & 31
Read: TAB 3: America's New Energy Future: The Unconventional Oil and Gas Revolution and the US Economy, Volume 1 - National Economic Contributions
Current Event: Discuss and turn in 3rd current event.
Assignment 3: Discuss and turn in 3rd assignment.

Part 1B **Shale Gas - Regulatory Frameworks and Environmental Issues**

Week 4

Feb. 5 & 7
Read: GAO Reports and EPA Hydraulic Fracturing Study (on-line)
Current Event: Discuss and turn in 4th current event.
Assignment 4: Discuss and turn in 4th assignment.

Feb. 7
NO CLASS. We will make up this class at a date TBD but either Friday, March 1 or Friday, April 12 or the week of LNG17.

Week 5

Feb. 12 & 14
Read: GAO Report and EPA Hydraulic Fracturing Study and TAB 4: Secretary of Energy Advisory Board Shale Gas Production Subcommittee 90-Day Report, August 18, 2011
Secretary of Energy Advisory Board Shale Gas Production Subcommittee Second Ninety-Day Report, November 18, 2011
Current Event: Discuss and turn in 5th current event.
Assignment 5: Discuss and turn in 5th assignment

Week 6

Feb. 19 & 21 **NO CLASS THIS WEEK. WE WILL MAKE UP THIS TIME WITH SPECIAL GUEST LECTURERS AT LNG17 IN APRIL. SPEND THE EXTRA TIME ON RESEARCHING YOUR PROPOSED PAPER TOPICS DUE NEXT WEEK.**

Read: Any materials for your proposed paper topic.
Current Event: Discuss and turn in 6th current event.
Assignment 6: Discuss and turn in 6th assignment

Week 7

Feb. 26 & 28 Read: TAB 5: The Global Shale Gas Initiative: Will the United States Be the Role Model for the Development of Shale Gas Around the World? and World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States
Current Event: Discuss and turn in 7th current event.
Assignment 7: Discuss and turn in 7th assignment.

PROPOSED PAPER TOPICS DUE FEB. 28!

Fri. March 1? **Make up class from Feb. 7? TBD**

Week 8

March 5 & 7 Read: TAB 6: Analysis of Litigation Involving Shale and Hydraulic Fracturing
Current Event: Discuss and turn in 8th current event.
Assignment 8: Discuss and turn in 8th assignment.
Guest Lecturer?

Week 9

March 12 & 14 **UHLC Spring Break**

Part 2 **THE ROLE OF LNG IN GLOBAL GAS MARKETS**

Week 10

March 19 & 21 Read: TAB 7: LNG Reading TBD
Current Event: Discuss and turn in 9th current event.
Assignment 9: Discuss and turn in 9th assignment.

Week 11

March 26 & 28 Read: TAB 8: LNG Reading TBD
Current Event: Discuss and turn in 10th current event.
Assignment 10: Discuss and turn in 10th assignment.
Guest Lecturer?

Week 12

April 2 & 4 Read: TAB 9: LNG Reading TBD
Current Event: Discuss and turn in 11th current event.
Assignment 11: Discuss and turn in 11th assignment.

Week 13

April 9 & 11 Read: TAB 10: LNG Reading TBD
Current Event: Discuss and turn in 12th current event.
Assignment 12: Discuss and turn in 12th assignment.

Fri. April 12? **Make-up class from Feb. 7? TBD**

Week 14

April 16 & 18 **LNG17 – HOUSTON, TX**

LNG17 is the world's largest global gas event for 2013 and will be held at the George R. Brown Convention Center in Houston, TX.

The University of Houston is registered as a sponsor in the Education Pavilion at LNG17 and our global gas course will participate in some manner TBD. Classes this week will be held at LNG17 with details TBD. We will make up the missed class time from Feb. 19 & 21 during LNG17.

Week 15

April 23 & 25 Read: LNG Reading TBD.
Current Event: Discuss and turn in 13TH current event.
Assignment 13: Discuss and turn in 13TH assignment.

May 1-10 **FINALS** **There is NO final for this class.**

MAY 9 **PAPERS DUE BY 5:00 p.m.**

A hard copy of your paper must be turned in by 5:00 p.m. on May 9, 2013. In addition, an electronic copy of your paper must be emailed or submitted electronically to me.