Partnership to Strengthen Local Capacity for Economic, Financial, and Social Analysis of Energy Sector Initiatives

MONTHLY REPORT – JUNE, 2004

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July 22, 2004
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UH IELE Monthly Report – June

The following are the activities that the UH IELE conducted in the month of June.

- UH IELE continued discussions with Prof. Tamim on the BUET/PMRE curriculum review and update. The suggestions developed during the discussions will be incorporated in a separate UH IELE report on curriculum.

- The UH IELE and Prof. Tamim continued development of the syllabus and teaching materials for a new course to be introduced at BUET/PMRE in fall 2004. The course syllabus is attached to this report (Attachment 1). Suggestions on enhancing teaching capacity at PMRE will be provided in a separate report.

- On June 18, Prof. Tamim completed his three-month visit to the UH IELE and returned to Dhaka. The visit included attendance of the UH IELE New Era in Oil, Gas & Power Value Creation program May 16-28, 2004; attendance of classes of various University of Houston colleges, and networking with the UH IELE staff and outside advisors on various issues. Prof. Tamim left for Bangladesh on June 18. Trip report and Prof. Tamim’s reflections of the trip are attached to this report (Attachment 2 and 3).

- The UH IELE and Prof. Tamim finalized the value chain model and discussed potential use of this model in teaching efforts at BUET/PMRE. The model also forms the basis for several research papers to be issued; a short article is already published in a Bangladesh journal. A progress report on research activities will be provided separately.

- On June 16, Prof. Tamim and Dr. Gülen met with six alumni of BUET, working in the energy industry in Houston. Prof. Tamim has been communicating with most of the BUET alumni throughout his stay. They are interested in the UH IELE – PMRE/BUET partnership and willing to help. As a first step, they informed their large email group about the partnership and its web site (http://www.energy.uh.edu/IDA/ALO.asp). One of the possibilities is for them to act as resources for PMRE, via providing information or guest lecturing in PMRE courses as they go back visiting.
One of the challenges faced by PMRE/BUET, like many other universities in developing countries, is the ability to retain faculty and research staff. Most of these well-educated people have better paying alternatives outside the university or even outside the country. One of the greatest benefits of Prof. Tamim’s visit to Houston may turn out to be his recruitment of a new faculty member, a BUET alum with more than 10 years of energy industry experience. Dr. Gülen also met with this candidate, who would indeed be a significant gain for PMRE. His final decision is expected soon.

Next steps
Actions expected in the months of July and August include:
- Develop a tentative schedule for completion of research papers
- Finalize the evaluation reports on curriculum review & update, teaching and research capacity at BUET/PMRE
ATTACHMENT 1: DRAFT SYLLABUS FOR THE NEW COURSE AT PMRE
ENERGY VALUE CHAIN ECONOMICS, POLICY AND REGULATION

Introduction

Energy is a key input for economic development of countries. Typically, energy industries require large, integrated infrastructures that are capital intensive to build and require professional skill to manage efficiently. As a result of the importance of energy for development and the scale economies involved in delivering energy to consumers, a vertically integrated and monopolistic structure became the norm around the world, especially for the electricity sector. In most places, a government-owned monopoly generated, transmitted and distributed electricity. Many countries maintain integrated oil and gas monopolies as well. Under this structure, countries were successful in building basic infrastructure. But, these entities have been reaching their limits because they developed inefficiencies partly as a result of lack of competition; and they fail to invest in new infrastructure to meet growing demand because governments tend to use these companies’ revenues for general government expenditures. Restructuring of the energy sectors attracted some private investment but, in many places, establishing and sustaining competitive structures remains a very challenging task, partly because human resources with professional skills and understanding of energy value chain economics are scarce.

Bangladesh is certainly not an exception. A country with significant natural gas reserves and potentially more significant resources has not been able to provide basic energy services to majority of its population. Only about one third of Bangladesh’s 130 million people have access to electricity. Biomass remains the largest source of energy supplying 55% of total energy consumption in the country.

This course is intended to provide fundamentals of energy value chain economics to future professionals of the energy industry in Bangladesh. A better informed workforce will help ministries, regulatory agencies and companies operating in the sector and making and implementing policy.

Reading Material

There is no assigned textbook for the course. There will be handouts and reading assignments. There are numerous resources on the internet to obtain background information on most of the topics we will discuss. An important site, for which you should establish a bookmark is [www.bp.com](http://www.bp.com), where you can find the Statistical Review of World Energy.

Course Requirements

Two mid-term exams (25% each) and a final (50% each).

COURSE OUTLINE

Week 1

- Development of Economic Thought
  - Basic Theory of Scarcity
  - Value Theory
  - Importance of Price Signals
- Supply And Demand Curves
  - Shifts
  - Elasticities
- Economic Rent
Week 2
• Principles of Macroeconomics

Week 3
• Principles of Microeconomics
• Theory of the Firm
  o The Single-Product Firm
    ▪ The Total Cost Function
    ▪ Marginal Cost and Average Cost
    ▪ The Short Run and the Long Run
    ▪ Economies of Scale
  o The Long Run, the Short Run, and Entry
    ▪ Fixed Cost and Variable Cost
    ▪ Sunk Cost and Avoidable Cost
    ▪ Entry
  o The Multi-Product Firm
    ▪ Economies of Scale in the Multi-Product Firm
    ▪ Incremental Cost and Average Incremental Cost in the Multi-Product Firm
    ▪ Economies of Scope

Week 4
• Market Structure
  o Perfect Competition
  o Monopolistic Competition
  o Oligopoly
  o Monopoly
  o Natural Monopoly
  o Monopsony
• Market Failure
  o Public Goods
  o Externalities
  o Market Power
  o Equity
• Competition as Regulator
  o Perfect Competition
  o Profit Maximization
  o Supply and the Perfectly Competitive Equilibrium
    ▪ Short-Run Equilibrium
    ▪ Long-Run Equilibrium

Week 5
• The Context of Market Regulation
  o Transactions, Incentives, and Private Institutions
    ▪ Property Rights
    ▪ Incentives
    ▪ The Corporation
• Law and Politics
  o The Legal System
    ▪ Systems and Sources of Law
    ▪ Civil, Criminal, and Administrative Law
    ▪ Dispute Resolution in the Civil Context
    ▪ Law in Economic Affairs
  o The Political System
- Limitations on Government Action
- Sources and Uses of Political Power
- Regulatory Agencies and Their Jurisdiction
- State versus Federal Scope

**FIRST MIDTERM**

**Week 6**
- Governmental Market Regulation
  - Regulation of Competition
  - Regulation of Industries
  - Social Regulation
- The Economic Welfare Goal of Market Regulation
  - The Idea of Economic Welfare
    - Pareto Optimality
    - Efficiency
  - Representing Economic Welfare
    - Consumer Surplus
    - Producer Surplus
    - Economic Welfare
  - The Benefits of Competition
    - Competition Brings Efficiency
    - Competitive Prices Allocate Resources Efficiently
  - Risk and Welfare

**Week 7**
- Economics of Exhaustible Resources
  - Optimal Depletion
  - Shortcomings of the Theory
    - Reserve Additions
    - Common Pool Problem

**Week 8**
- Oil Value Chain Components
  - Key Segments and Activities
  - Key Policy and Regulatory Considerations
- Investment in the Oil Value Chain
- The Link between Investment and Commercial Frameworks
  - Global Perspectives
  - Commercial Framework Principles for the Oil Value Chain
- Natural Gas Value Chain Components
  - Key Segments and Activities
  - Key Policy and Regulatory Considerations
- Investment in the Natural Gas Value Chain
- The Link between Investment and Commercial Frameworks
  - Global Perspectives
  - Commercial Framework Principles for the Natural Gas Value Chain

**Week 9**
- Pipeline Economics
  - A Model of Pipeline Investment
  - Contracting and Rate Design
- Natural Gas Processing
  - A Model of Natural Gas Processing Plant Investment
- Refining
- Refining Technology
  - A Model of Refining Investment
- Marketing
  - A Model for Marketing Investment

**Week 10**
- Liquefied Natural Gas (LNG)
  - Role of LNG in Global Natural Gas Trade
  - New LNG Supplies
    - *Atlantic Basin*
    - *Pacific Basin*
  - LNG Value Chain
    - *Liquefaction*
    - *Transport*
    - *Regasification*
  - LNG Pricing Mechanisms
  - Project Ownership and Financing
  - Potential for LNG Spot Trade

**SECOND MIDTERM**

**Week 11**
- Electric Power Value Chain Components
  - Key Segments and Activities
  - Key Policy and Regulatory Considerations
- Electricity Industry Restructuring
  - Key Drivers
  - Key Characteristics
- Investment in the Electric Power Value Chain
- The Link between Investment and Commercial Frameworks
  - Global Perspectives
  - Commercial Framework Principles for the Electric Power Value Chain
- Power Plant Economics
  - Key Considerations
  - Costs
- Merchant Power Plants
  - The Components of Generation Value
  - Gas and Power Prices and Optionality
  - Example on Optionality
- A Model of Power Plant Investment

**Week 12**
- Regulated versus Competitive Pricing
  - Objectives
  - Cost Plus
  - Rate of Return
  - Competitor Indexing
  - Geographical
- The Economic Welfare Goal and Universal Service
- State Monopoly versus Private Competition
- History of Energy Regulation - World, The U.S., Bangladesh

**Week 13**
- Energy Markets
  - Types of Markets
    - *Spot Markets*
- Futures Markets
- Forward Markets
  - Risk Management
    - Types of Risk
    - Risk Management Tools
    - Hedging & Speculation
- Economics of Alternative Energy
  - Power Generation
    - Technology
    - Economics
  - Transportation
    - Technology
    - Economics

**Week 14**
- Bangladesh Energy Value Chain Study
- Case Studies (U.S. Natural Gas Market, Bolivia-to-Brazil Natural Gas Pipeline, and others)

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**COMPREHENSIVE FINAL**
ATTACHMENT 2: TRIP REPORT ON PROF. TAMIM’S VISIT TO UH IELE IN HOUSTON

Prof. Tamim visited UH IELE between March 24 and June 18, 2004. The following is a brief description of the activities during his visit.

1. During his stay, Prof. Tamim attended five courses at UH for the last five to six weeks of classes:

   - **ECON 4389 Economics of Regulation** taught by Prof. Roger Sherman, Economics Department. Prof. Tamim benefited greatly from this course that provided fundamentals of regulatory economics and supporting microeconomic principles. Prof. Sherman provided Prof. Tamim with draft chapters from his forthcoming book on regulation, including two chapters on energy regulation. Prof. Tamim will use material from this course to lay the foundation of economic and regulatory principles for engineering students at BUET as well as professionals in Bangladeshi energy sector (possibly through short courses and advising). Energy markets and regulation are recent developments in Bangladesh and institutions need staff with the knowledge of these fundamentals.

   - **ECON 3385 Economics of Energy** taught by Dr. Gürcan Gülen, UH IELE. This course uses *Economics of the Energy Industries*, a textbook created and constantly updated and expanded by UH IELE for its New Era program. Prof. Tamim has a copy of the book both in electronic and hard copy formats along with the Power Point presentations used by Dr. Gülen in this course. These materials covers fundamentals of energy-economy relationship and energy value chain economics, with spreadsheet models for a variety of energy projects from upstream oil & gas development to power plant construction. Prof. Tamim will use parts of these materials in PMRE’s “energy economics” course as well as future courses PMRE will develop (both university and professional courses).

   - **ACCT 4378 Oil & Gas Accounting** taught by Prof. Gary Schugart, Accounting Department, Bauer College of Business. The notes from this course along with the books will supplement oil & gas accounting content of existing PMRE courses as well as support research (e.g., on PSC contracts in Bangladesh). PMRE may also use this material in professional courses it will develop for the industry.

   - **LAW 6283 International Energy Transactions** taught by Prof. Jacqueline Weaver, Law Center. This course exposed Prof. Tamim to international energy investment practices, contracts and negotiations; as a result, Prof. Tamim decided to become a member of the Association of International Petroleum Negotiators (AIPN, [www.aipn.org](http://www.aipn.org)) to gain access to detailed information on international energy transactions and to stay current on the developments.

   - **LAW 5397 Energy Inc.** taught by Dr. Michelle Michot Foss, UH IELE. This course is based on a virtual international energy company, requiring students to develop energy projects as managers in this company. The course explores the dynamics of the global energy industry, the energy value chains and related business segments, global energy market trends and fundamentals, the key policy considerations that affect business development across the value chains and critical issues that impact the industry (and strategies for dealing with these issues); investigates profitability for energy enterprises (e.g., through individual competitor reports on an energy company); and helps students gain specific knowledge regarding energy industry and market/policy trends and issues and business development skills. Overall, the course provided Prof. Tamim with the perspective of a private investor looking for energy projects around the globe. Policymakers in Bangladesh can benefit greatly from exposure to this perspective through PMRE’s research, policy analysis and training.
2. Prof. Tamim took part in the *New Era in Oil, Gas and Power Value Creation* – a two-week international capacity-building program of UH IELE. Prof. Tamim attended the lectures, participated in discussions and exercises on various issues, including: energy value chain economics, commercial frameworks for energy development, dealing with media, smart development pathways, administrative agencies, and others. Delegates were appointed into various teams to complete a team project. Teams varied in backgrounds and cultures, which made the experience more valuable, teaching to work in multi-national environments. Prof. Tamim’s team successfully presented a proposal for the development of a natural gas field in Lardistan, the virtual country for the program. Prof. Tamim benefited greatly from the field trips to Lake Charles LNG terminal and El Paso pipeline control facility at Hockley, Texas as these locations relate directly to and may yield valuable lessons for natural gas developments in Bangladesh. After these visits, Prof. Tamim decided to visit the biggest natural gas pipeline hub of Bangladesh at Ashuganj and its brand new, state-of-the-art SCADA center for comparison purposes.

3. In consultation with his UH IELE colleagues, Prof. Tamim developed a course syllabus and content for a new course which will be given at PMRE starting Fall 2004 “*Energy Value Chain Economics, Policy and Regulation.*” Please see Attachment 3 to this Report.

4. Prof. Tamim and colleagues at UH IELE started working on several research papers, focusing on the natural gas value chain in Bangladesh and its bottlenecks. One short piece named “The Perils of Bangladesh Gas value Chain” was published in the anniversary edition of *Energy & Power*, an energy magazine, on July 1 in Bangladesh. Another version is currently under development for publication in one of the major industry publications such as the *Oil & Gas Journal* or *The World Oil*. Eventually, a longer version will be targeting academic journals such as *The Energy Journal* or *Energy Policy*. Prof. Tamim developed the case study on the Bangladeshi energy value chain, on which these articles are based, during his stay and presented it in two different classes (ECON 3385 and LAW 5397) and to a group of Department of Commerce energy specialists from around the world in a half-day program organized by UH IELE.

5. During his stay in Houston, Prof. Tamim also:
   
a. Visited with different representatives from Texas Energy Center to learn about the activities of the center;

   b. Networked with several BUET alumni in Houston to initiate a support network and hopefully have access to them as resources for PMRE (e.g., as guest lecturers in short courses PMRE will develop);

   c. Attended a number of meetings of the local chapter of the U.S. Association for Energy Economics (USAEE), Gulf Coast Power Association (GCPA) and the local chapter of the Society of Petroleum Engineers (SPE) and interacted with energy professionals who are members of the organization; and

   d. Attended the Offshore Technology Conference (OTC), the largest gathering of the oil & gas industry held annually in Houston.

For an interview with Prof. Tamim regarding his thoughts on his stay in Houston, please visit [http://www.energy.uh.edu/IDA/ALO.asp](http://www.energy.uh.edu/IDA/ALO.asp).
ATTACHMENT 3: Interview of Prof. Tamim for the UH IELE website

Visit of Dr. Mohammad Tamim to Houston
(March 24 – June 18, 2004)

Prof. Tamim, who is the main counterpart for the ALO grant activities, visited the UH IELE in Houston for three months. Here is a short interview with Prof. Tamim and his reflections on his visit.

Prof. Tamim, what were your main objectives/expectations for your visit to the UH IELE in Houston?

The Petroleum Engineering Department in BUET started operating in 1995. The focus of that program was more technical oriented. It still has a strong technical and engineering base. During the last few years, the faculty in the department felt that there were a big knowledge gap in the country in energy economics and understanding of the commercial framework of petroleum business. There was an urgent need to fill this gap and create a center of excellence in BUET that would be better equipped to serve the industry and government in this regard.

The expectation for the UH IELE visit was to acquire a clear vision of the integration process of petroleum economics, policy and regulation. Also to understand the complete energy value chain and different parameters that would influence the business. Transferring this knowledge to BUET was also a major objective of the program.

A large component of your visit was the attendance of New Era program. What were the highlights?

The first and foremost success of the New Era program is the opportunity of exchanging ideas and sharing of problems between people from different countries with different backgrounds. Yet it was intriguing to find so many similarities that evoked a feeling that ‘you are not alone’!

The program is very well designed with practical problem solving exercises, field trips and excellent class room presentation covering the entire energy value chain topics. It exposed the participants to the intricacy of a complex commercial framework. At the end of the two week program, everyone left with a clear picture of ‘how things work’ in oil and gas business. It did not make anyone an expert but it definitely opened many eyes and helped people to think differently in a positive manner.

What about developing curriculum for BUET/PMRE?

I attended five different courses during the first month of the visit. These courses covered energy economics, petroleum accounting, development of regulations, international petroleum law and transaction and the study of the business framework of petroleum industry. They helped me understanding the subject better and refining my objectives. In addition, these courses also gave me the opportunity to observe different class room teaching techniques.
Based on the experiences gathered from these courses I developed the first course tentatively titled "Energy Value Chain Economics, Policy and Regulation" (Draft Course Outline) with the help of my colleagues at IELE. We are hoping to offer this course to our petroleum graduate students in the coming semester at BUET. Later on, this course will be offered to all graduate students of BUET. We also plan to develop two more courses in the future. Based on the energy economy course, several short courses will be offered to the industry, government and general public.

**What were some other activities in which you took part while in Houston?**

I attended several SPE (Society of Petroleum Engineers), GCPA (Gulf Coast Power Association) and USAEE (United States Association for Energy Economics) meetings. I also attended the Offshore Technology Conference which is the largest show in the oil industry. These meetings and seminars gave me a clear image on the present trends and direction in the industry. I also got updated on the recent development in technology, processes, models, procedures and most importantly, ideas.

Together with my colleagues at IELE, I started a research program on the Bangladesh energy value chain. We finished a short article for a Bangladesh publication and are working on a more refined article for the international industry publications such as the *Oil & Gas Journal*. Eventually, a much longer version will be sent to academic journals such as *The Energy Journal* or *Energy Policy*.

**Overall, how beneficial was to be in Houston?**

This trip was very helpful. My experience and exposure was beyond my expectation.

**Finally, what are the next steps in the partnership activities?**

I think the first objective would be to successfully transfer the knowledge and finish the research papers. Recently, Bangladesh has established the Energy Regulatory Commission. We hope to showcase our success to the industry and the government. Through interaction and dialogues with the shareholders, we hope to set the objectives of the next stage.

Posted on [http://www.energy.uh.edu/IDA/ALO.asp](http://www.energy.uh.edu/IDA/ALO.asp)