

# 5 Day

## International Gas Market & Economic Evaluation of Gas Projects



### Course Leaders



M. A. Mian, P.E.



Dr. S. Ghouri



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## YOUR PARTNER FOR SUCCESS IN OIL AND GAS INDUSTRY

Gain in-depth knowledge of gas market and economic evaluation of gas projects.

This 5-Day course covers the dynamics of the gas industry. The gas market section provides general industry overview, nature of natural gas, the global market place, estimating gas reserves, petroleum resources management system, development and economics of shale gas and impact of shale gas on LNG market.

The second part provides setup of economic analysis cases, including the estimation commodity prices, project costs – CAPEX, OPEX, taxes, royalties, transportation, depreciation, before-tax (BTAX) cash-flow, after-tax (ATAX) cash-flow, international fiscal regimes (production sharing agreement and concessionary system). The course starts from the basic required parameters of inflation, interest and time value of money. These concepts are then transformed into profitability indicators. Last but not the least, the profitability indicators are then used to make investment decisions.

Emphasis of the course is to bridge the gap between theoretical concepts and their practical limitations. In addition to this, emphasis is also on the use of Excel's financial functions. This understanding is very critical when it comes to boiling economic cash-flow models.

Multiple choice problems are solved each day to reinforce the understanding of the concepts covered that day. Many tricks, not widely known, are shared with the participants. The concepts covered in this course are not restricted to downstream, upstream or petrochemical projects. These concepts can be used to evaluate any type of investment under consideration.

### WHAT WILL THIS COURSE COVER?

The basic objective of this course is to provide overall dynamics of the gas market/industry and improve your risk and investment analysis by reinforcing your financial modelling techniques, investment evaluation and knowledge of project economics. The course will cover the basic economic evaluation concepts and their application in practice. On completion of this course you will receive a complimentary copy of the course leader's published book, **"Project Economics and Decision Analysis, Vol I, 2nd Edition, 2011."**

### WHAT WILL YOU LEARN?

On completion of this course you will be able to fully understand the gas market dynamics & Investment Evaluation:

- Understand the dynamics of gas market, monetization of shale gas and impact of shale gas on LNG imports
- Learn how to reduce exposure and mitigate risks in projects and handling uncertainty
- Clarify concepts such as: time value of money, cash-flow models, capital budgeting, IRR, NPV, income producing investments
- Maximize the return on investments by good decision-making processes based on the commercial viability of projects
- Improve your decision process, investment and opportunity analysis
- Practice the hands-on experience in building your own economic evaluation models and solving case study based examples

### WHO WILL BENEFIT?

The following oil & gas company personnel will benefit from the knowledge shared in this course.

- Planning managers
- Oil & gas engineers
- Project managers & business development personnel
- Analysts
- Commercial managers
- Economists
- Government officials
- Geologists
- Business advisors & Asset managers
- E&P managers
- Product managers



#### DRIVERS BEHIND THE BUSINESS

- Oil & gas industry
- Drivers behind the oil & gas business
- Key performance indicators
- Industry streams
- Oil & gas business value chain
- Supply chain strategy
- Simple steps in oil & gas processing

#### TOTAL PRIMARY ENERGY CONSUMPTION

- Primary energy consumption by fuel
- Regional TPEC consumption
- Regional TPEC consumption comparison
- Global power generation
- Global renewable energy

#### GENERAL INDUSTRY OVERVIEW (OIL)

- Global oil reserves
- Global oil production
- Global oil production forecast
- Global oil consumption
- Global oil consumption forecast
- Regional oil consumption

#### GENERAL INDUSTRY OVERVIEW (GAS)

- Global gas reserves
- Global gas production
- Global gas production forecast
- Global gas consumption
- Global gas consumption forecast
- Regional gas consumption
- Regional gas production
- Natural gas consumption
- Natural gas consumption by end use sectors
- Oil consumption by end use sectors
- Key Asian gas consumers

- Natural gas trade vs. local consumption
- Natural gas trade movement by pipeline

#### THE NATURE OF NATURAL GAS

- Gas-to-oil ratio (GOR)
- Condensate-to-gas ratio (CGR)
- Natural gas properties
- Properties of pure gases
- Natural gas processing
- Gas liquids recovery calculator
- Gas added value products
- Types of accumulations
- Conventional vs. unconventional resources
- The gas resource triangle

#### SHALE GAS

- Why is it called unconventional?
- Tight gas, shale gas & coalbed methane
- Sedimentary geology of natural gas resources
- Importance of shale gas
- Vertical & horizontal wells
- Benefits of horizontal wells
- Global shale gas resources
- Shale gas plays in United States
- Factors affecting monetization of UG

#### GLOBAL LNG MARKET

- Basics of LNG (Liquefied Gas)
- Major LNG exporters & importers
- Gas production & consumption of major LNG importers
- What is LNG
- Basics – rules of thumb
- Why LNG
- Natural gas liquefaction process
- LNG value chain
- Shipping decision for propane/butane
- LNG shipping cost
- Natural gas trade vs. local consumption
- LNG trade movements

#### LNG FUNDAMENTALS

- LNG vs. crude oil products
- Project formation
- LNG process cycle
- Options to structure LNG project

#### OVERVIEW OF LNG PRICING MECHANISM

- Natural gas prices
- LNG pricing formula in Asia
- LNG prices in Japan, Korea & Taiwan
- LNG pricing formula in Europe
- "S" Curve price formula
- Basic terms of LNG

#### INTRODUCTION TO ECONOMIC EVALUATION

- Why economic evaluation
- Projects subject to economic evaluation
- Capital expenditure plans
- Basic process of economic evaluation
- Typical workflow

#### INFLATION & RISK

- Inflation defined
- Types of inflation
- US consumer price index (CPI)
- Italian consumer price index
- Risk factors
- Simple & Compound Interest
- Compound interest formula
- Nominal & effective interest rate

#### THE TIME VALUE OF MONEY

- Equivalence
- Interest tables
- Future value of present sum
- Present value of future sum
- Future value of ordinary annuity
- Future value of annuity due
- Present value of ordinary annuity
- Conditions for annuity
- Excel's financial functions

#### DEBT CASH-FLOW CALCULATION

- Project financing
- Loan amortization schedule
- Interest during construction period
- Excel's financial functions

#### BEFORE-TAX (BTAX) CASH-FLOW MODEL

- Cash-flow (CF) defined
- Gross revenue (GR)
- Basic data requirement

#### FORECASTING CASH-FLOW VARIABLES

- Forecasting product stream
- Gas project's revenue streams
- NGLs' forecast
- Gas liquids recovery methods





### FORECASTING CASH-FLOW VARIABLES (CONT'D)

- Dependence of CAPEX
- Capex breakdown
- Estimating CAPEX
- Scheduling capital expenditure
- Capital maintenance
- Gas project's CAPEX stream
- Economies of scale (scaling rule)
- Estimating number of wells
- Capex during production
- Breakdown of OPEX
- Develop rules of thumb for OPEX
- Gas project's OPEX stream
- Typical oil production facilities
- Schematic of typical cash-flow
- LNG cash-flow variables
- Refinery cash-flow variables

### COST ESTIMATION

- Project cost management
- Various types of costs
- Levels of cost estimates
- Dependence of cost estimates
- Criticality of cost estimates

### AFTER-TAX (ATAX) CASH-FLOW MODEL

- Additional variables
- Straight line depreciation
- Double declining balance depreciation
- Declining balance with switch to straight line
- Sum-of-the-years digits depreciation
- Excel's depreciation functions
- Typical After-tax cash-flow
- Gas project's net cash-flow stream

### WEIGHTED AVERAGE COST OF CAPITAL (WACC)

- Capital asset pricing model (CAPM)
- Cost of equity & cost of debt
- Weighted average cost of capital (WACC)
- Sample WACC calculations
- Relationship between WACC & cash-flow

### PROFITABILITY INDICATORS

- Typical profitability indicators
- Cumulative net cash-flow (NCF)
- Discounted payback period (graphical method)
- Discounted payback period by linear interpolation
- Discounted payback period using Excel
- Internal rate of return (IRR)
- Internal rate of return – linear interpolation
- Internal rate of return – graphically
- Net present value (NPV)
- Excel's financial functions
- Profitability index (PI)
- Long-range marginal cost (LRMC)
- LRMC of sample cash-flow

### NETBACK VALUE & INDEXED PRICING

- Netback value (NBV)
- Netback value example
- Base case & ROR approach
- Netback value – the LRMC approach
- Schematic of LRMC approach
- Indexed netback pricing

### CASH-FLOW & DISCOUNTING ASSUMPTIONS

- Funds flow & discounting assumptions
- Common cash-flow assumptions
- Use of Excel's NPV functions
- Other ways of calculating NPV
- International Petroleum Agreements
- The need for collaboration
- International agreement
- Parties to agreement
- Typical contract terms
- Contractual arrangements
- Comparison of fiscal terms
- Sliding scale tranches
- Concessionary system's cash-flow
- Production sharing agreement's cash-flow
- PSA sample cash-flow calculation

### INVESTMENT SELECTION DECISION-MAKING

- Investment types
- Types of investment decisions
- Investment decision-making
- Revenue producing investments using NPV
- Revenue producing investments using PI & IRR
- Revenue producing investment – incremental analysis
- NPV/IRR conflict
- Inherent problems with IRR
- Multiple rates of return
- Economic solution for project with multiple IRR
- Ranking projects – non-mutually exclusive investments
- Ranking projects using PI
- Ranking projects using NPV
- Service producing investments
- Service producing investments using annual values
- Service producing investments using IRR
- Service producing invest – unequal service life
- Leasing vs. buy decision
- Project NPV maximization
- Project sensitivity on plateau rate

### COMPREHENSIVE CASE STUDY





## M. A. Mian, P.E.

B.Sc. Mechanical Engineering  
M.Sc. Petroleum Engineering  
M.Sc. Mineral Economics

Mian is a Sr. Petroleum Engineering Consultant with Saudi Aramco in Dhahran, Saudi Arabia. He has previously worked with Qatar Petroleum (Doha, Qatar), ZADCO (Abu Dhabi, UAE), Euratex Corporation (Colorado, USA), Kiplinger & Associates (International Energy Consultants in Colorado, USA), and as Independent Consultant in Colorado, USA. He is a registered professional Engineer in the state of Colorado, USA.

Mian has 35 years of diversified experience in petroleum engineering, reservoir engineering, project economics and decision analysis. He had been involved in evaluating multi-billion-dollar oil and gas field development, LNG, GTL, Aluminum smelter, refinery, petrochemical, power and production sharing projects.

Mian is the author of six books:

- Petroleum Engineering Handbook for the Practicing Engineer, Vol. I and Vol. II, PennWell Publishing Co., Tulsa, OK, USA
- Project Economics and Decision Analysis, Vol. I and Vol. II, 2<sup>nd</sup> Edition, 2011, PennWell Polishing Co., Tulsa, OK, USA
- Tips & Tricks for Excel Based Financial Modeling, Business Expert Press, New York, USA

He has also authored several papers in the Oil & Gas Journal, The Log Analyst, World Oil, SPE Journals, and Oil & Gas Financial Journal.

Mian is one of the pioneers in working with unconventional gas resources. He has extensively dealt with reserves evaluation of tight gas and coalbed methane. Currently he is involved in applying his experience to shale gas resources. He has also served as an expert witness in US Federal court and Energy Commission hearings regarding tight gas pricing classification in the US.

He has delivered lectures in more than 25 countries around the globe. He has always received excellent feedback, as an expert presenter, from the participants of his courses.

### PORTFOLIO OF COURSES

- 5-Day – Project Economics, Risk & Decision Analysis
- 5-Day – Designing Efficient Oil & Gas Fiscal Systems
- 5 Day – Advanced Project Economics, Risk & Decision Analysis
- 3-Day – Economics of Production Sharing Agreements
- 3-Day – Development & Economics of Unconventional Resources
- 3-Day – Fundamentals of Oil & Gas
- 3-Day – Decline Curve Analysis, Diagnostic Methods and Performance Forecasting

### PUBLICATIONS

- Unnecessary and Avoidable Mistakes in Financial Calculations
- Comparison of Methods used to Calculate Netback Value
- Revisiting the Pitfalls and Misuse of WACC
- Custom Graphs Help Analyze Oil, Gas Operations
- Spreadsheet Programming Simplifies Drilling Calculations
- Program Quickly Solves Trial-and-Error Problems
- Creating Quality, Cost Effective Property Reports
- Predicting the Performance of Tight Gas Reservoirs

### COURSES DELIVERED IN

United Kingdom, Italy, Czech Republic, Norway, Sydney, Perth, Adelaide, Brisbane, New Zealand, Singapore, Malaysia, Hong Kong, Pakistan, South Korea, Kazakhstan, UAE, Kuwait, Qatar, Saudi Arabia, Bahrain, Bolivia, Brazil, Canada, Angola, Nigeria, Ghana, Mozambique, Algeria & South Africa.



## Dr. S. Ghouri

M.A. Economics  
M.Sc. Mineral Economics  
Ph.D. Mineral Economics

Dr. Ghouri, with more than 35 years of experience, is a Sr. Performance Analyst with Qatar Petroleum, Doha, Qatar. He has previously worked with Oil and Gas Development Company (OGDCL), a national oil company of Pakistan as a senior advisor to various Chairmen, senior instructor in banking industry to train managers as how to evaluate feasibilities submitted to them for loan approval, manager marketing, Chief economist, researcher at Karachi University Applied Economics Research Center (AERC), teaching/research assistant at University of Waterloo, Canada/Colorado School of Mines, USA, independent consultant to advise various clients pertaining to oil and gas companies, bankers, and independent consultant and advice various clients on market assessment, specific projects and short/long term oil and gas price forecast.

He had been involved in evaluating multi-million-dollar oil and gas field development, participate in import of Turkmenistan-Pakistan pipeline in 1992, gas project, economic/risk assessment of exploratory, development and full field development. He was involved in formulation of Pakistan's 1994 Petroleum Policy, formulated OGDCL LPG and Sulphur sale strategy, participate in oil/gas sale purchase agreement. He also carried over 50 comprehensive studies pertaining to assessment of Tariff Reforms for Qatar KARAAMA, Qatar's long-term GDP Outlook, Qatar's long-term Petroleum Products Outlook, European Energy Outlook, Europe Security of Supplies and Role of LNG etc.

He has published over 90 papers in international journals, such as: American Economist, Energy Policy, LNG Journal, European Energy Review, Energy Review, Economic Review, OPEC Review, International energy Investments, MEES, MEEDs, Petromin, Hydrocarbon Asia, The Daily Journalists, Oil Price Volatility: Speculation or Market Fundamentals? Middle East Institute Viewpoints: Viewpoints Special Edition The 1979 "Oil Shock:" Legacy, Lessons, and Lasting Reverberations. He also wrote chapter for Emirates Center for Energy & Strategy Research (ECSSR) and International symposium, the Indus River Biodiversity, Resources, Humankind, Linnean Society Burlington House, London, published by Oxford University Press. He has invited to speak at World Energy Council (WEC), World Petroleum Congress (WPC), OPEC/IEA, International Center for Energy and Economic Development (ICEED), ECSSR, GasArabia, SPE, IPTC, Middle East Petroleum & Gas Conference etc.

### PUBLICATIONS

- Cyclical Oil Prices - Is it a Necessary Condition to Balance Global Oil Supply/Demand?
- Defending Market Share: A Dilemma for OPEC or for the Shale Oil?
- OPEC strategic miscalculation-created-its-own-worst-enemy"
- Peak Oil and Technology - The Never-Ending Game
- Plunging Oil Prices - US Tight Oil Boom or the Burst
- Aftermath of US Shale Gas - Oil index or Decoupling
- The US unconventional oil revolution: are we at the beginning of a new era for US oil
- Does LNG Industry need a new strategy for changing LNG market dynamics?
- Oil Price Volatility: Speculation or Market Fundamentals?"
- Forecasting Natural Gas Prices using Cointegration Technique
- How most recent events alters expectations - A case of oil price forecasting

### COURSES DELIVERED IN

Italy, Calgary, Nigeria, Dubai, Pakistan

# International Gas Market & Economic Evaluation of Gas Projects

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## COURSE FEES & VENUE

**Middle East – US\$ 3,500**

**All Other Locations – US\$ 3,950**

Hotel accommodation and travel costs are not included in the fees. The Fees includes refreshments, lunch and course material. Course is held preferably in a 5-star hotel. The final venue selection will depend upon the number of delegates attending the course and availability of the venue. All delegates will be informed about the venue two weeks before the course start date.

808 W. Boxborough Dr.  
Wilmington, DE 19810, USA

Tel: +1 (303) 872 0533

Mob.: +966 50 857 3255

e-mail: [mianma@OGKnowledgeShare.com](mailto:mianma@OGKnowledgeShare.com)

Full payment is due within 14 days from date of invoice and before the course commences. Delegates will not be allowed entry to the course if any payments are outstanding. A confirmation letter and invoice will be sent to you on receipt of your booking.

You may substitute delegates at any time as long as reasonable advance notice is given to O&G Knowledge Sharing Platform. For any cancellation received in writing not less than twenty (20) working days prior to the date of the training course, you will receive a full refund less US\$ 150 administration fee and any related bank or credit card charges.

Delegates who cancel the registration less than twenty (20) working days of the date of training course, or who do not attend the course, are liable to pay the full course fee and no refunds will be granted.

In the event that KSP cancels or postpones the course for any reason, the delegates will be given choice to (a) request full refund less applicable credit card or bank charges, (b) attend the same course at the rescheduled date at the same or other venue or (c) receive credit note to be used by any employee of the same company for any other course offered by KSP, which must occur within one year from the date of postponement.

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