



**DAVID LAUGHTON CONSULTING LTD.**  
*Real Asset Risk Analytics (RA)<sup>2</sup>*



## Making better real asset decisions and avoiding common errors: The role of valuation

**David Laughton, davidlaughtonconsulting.ca**

**A case-based two-day workshop, 4-5 Feb 2013, to be held at  
the Australian School of Petroleum, University of Adelaide**

### **Why this workshop**

Many people in the mining and upstream petroleum industries are concerned that their organisations may be destroying value by making systematic errors in asset design and management decisions.

Some common problems include:

- 1) undervaluing long-lived, low-cost legacy assets
- 2) overbuilding production facilities and extracting resources too quickly
- 3) paying too much for outsourced processing or gathering activities
- 4) putting too little value on the quality and reliability of equipment and processes used in business activities
- 5) inadequate consideration, when designing and using infrastructure, of the value of flexibility to respond to future uncertain opportunities and problems.

Unfortunately, the discounted cash flow (DCF) valuation methods currently in common use in these industries have systematic biases that can lead asset managers to fall into all of these traps, and others.

For close to 30 years, Dr. David Laughton has shown his clients how the current standard approach to value estimation in financial markets, when applied properly, can help asset managers to make better decisions in dealing with these and other issues.

These more recent valuation methods differ from static DCF methods by using:

- 1) Complete decision-tree analysis (CDTA)
- 2) Market-based valuation (MBV)

CDTA extends current industry practice for the use of decision trees in two ways.

- 1) It deals with sequential and contingent decisions, not just at the beginning of the asset life cycle during exploration and appraisal, but throughout the asset life cycle, including brown-field development and the management of mature and end-of-life assets.
- 2) It allows decisions to depend on dynamic models of the resolution of uncertainty, not just in asset-level geological and technical variables, but also in commercial variables, such as prices.

Market-based valuation (MBV) automatically causes the different types and levels of uncertainty inherent in different asset designs and management plans to have appropriately different effects on asset value. This is not possible with a "one discount rate fits all" DCF approach to valuation.

MBV uses financial market data as much as possible to help organisations understand the effects of uncertainty on value (hence the name "Market-based valuation"). Despite the flexibility with which MBV treats discounting for risk, an organisation can adopt it without any loss of consistency in its analysis across assets, or loss of control by senior management over the decision-making process.

### **Who should attend?**

This workshop is designed for anyone responsible for contributing to asset valuations for use in corporate and government decision-making in the mining and upstream petroleum industries, including:

- asset managers
- people in planning, business development, and economic risk management groups
- economic analysts on asset teams
- lenders and project finance specialists
- equity analysts, portfolio managers and people in M&A groups
- government officials responsible for fiscal system design and management or overall extractive industry policy.

### **What we shall do in this workshop**

A detailed Agenda can be found on the last page. In summary, the course will:

- 1) Look at the role of valuation in the overall decision-making process in a large resource development organization
- 2) Discuss in detail the problems with the use of current static DCF methods
- 3) Outline how MBV and CDTA methods help to overcome these problems
- 4) Demonstrate how valuations that feature MBV and CDTA are done, using a series of examples of increasing complexity and realism
- 5) Examine the organisational implications of using this type of valuation, including the different ways by which an organisation can manage its process for changing from using static DCF valuation methods to using MBV and/or CDTA.

### **Logistics**

This course will be open to up to 12 people. The fee is AUS\$2000 (plus AUS\$100 Canadian GST if from a Canadian-based entity) payable directly by cheque to David Laughton. Interested parties should contact the instructor directly by email at [laughton.david@davidlaughtonconsulting.ca](mailto:laughton.david@davidlaughtonconsulting.ca) by 21<sup>st</sup> January.

Location is the Australian School of Petroleum, Santos Petroleum Engineering Building, Gate 6, Frome Road, Adelaide. Laptops will be provided for the exercises, but participants are welcome to bring their own.

### **The workshop leader**

Since 1982, Dr. Laughton has helped major corporations around the world to use information and valuation methods from financial markets to increase their understanding of how different combinations of uncertainty and asset structure affect real asset value. With these insights, he has helped his clients to improve their capacity for making better real asset design, selection and management decisions. He has also worked with government agencies and industry associations, showing them how to do asset-level analysis to improve their understanding of appropriate fiscal and regulatory policies for their industries.

His consulting is based on the extensive applied research that he has done in this field, initially as a key participant in seminal research and development programmes at the MIT Center for Energy Policy Research and at one of the first user organisations, the Canadian Department of Finance.

While his main activities are conducted through his consulting company, Dr. Laughton is also an Adjunct Professor in the University Of Alberta School Of Business, and has been an Executive-in-Residence and an Adjunct Professor in the University Of Alberta School Of Mining and Petroleum Engineering, and a Visiting Scholar at the MIT Laboratory for Energy and the Environment. He has also organised a workshop at the request of the Society of Petroleum Engineers, and edited a special journal issue for the International Association for Energy Economics, both to examine the future of real asset valuation in the petroleum industry. Finally, he led a process to create multidisciplinary research programmes in Canada on the climate change issue.

Dr. Laughton holds a Ph.D. in Physics from Princeton University and a Ph.D. in Financial Economics from MIT.

### **Some comments about David Laughton's activities on this topic**

#### **Rick Hyndman, Former Deputy Minister, Alberta Ministry of Energy Former Senior Consultant, Canadian Association of Petroleum Producers**

"Dr. Laughton's teaching and consulting is based on an in-depth knowledge of the theory and art of asset valuation. He consistently provides novel and important insights, difficult to obtain in other ways, not only for those responsible for private sector commercial decision-making but also for those involved in public policy development...."

#### **Steve Letros, Shell Canada**

"The work that Dr. Laughton did for one of our evaluation teams gave us new insights into our investment opportunity. What I found interesting about the team's reaction was that they 'recognised' and accepted the results, despite the novelty of methods involved, because of the manner in which Dr. Laughton 'packaged' his findings."

#### **Bill Bailey, Schlumberger**

"I attended a two-day course that Dr. Laughton gave, and it very successfully laid the foundation for a productive consulting relationship that he has had with us since."

"In both his teaching and consulting, he is rigorous and challenging, thorough and clear. He obviously knows the field of asset valuation inside out, and can convey the big ideas in a concise and digestible format as well as deal with the technical nuances and organizational issues raised by "real world" applications."

#### **Frank Koch, Former Decision Analysis Practice Leader, Chevron**

"I have helped to organize several SPE [Society of Petroleum Engineers] activities. The valuation workshop organized by David Laughton is the one that I have enjoyed the most. Usually, in these situations, I am giving. In this one, I actually got as much as, if not more than, I gave. Some of the concepts we discussed are inherently difficult. There is no way around it. It takes several exposures over a period of time for them to sink in. But it is definitely worth the time and effort."

# Workshop Agenda

## **Introductions, review of expectations and discussion of the agenda**

### **Session 1: Introduction to two teaching examples**

- Outline of the examples
  - A bidding opportunity based on the Antimina mineral deposit auction
  - A CO<sub>2</sub> capture and storage opportunity
- What analysis would you do for these using current practice?

### **Session 2: The basic issues illustrated by a simple development lease bid**

### **Session 3: Making real asset decisions**

- The role of analysis, and in particular of asset valuation
- The organisation of corporate and asset-level tasks
- The limits of asset value as a decision metric:
  - The basic frictionless financial market approximation
  - Bounds on asset-level analysis

### **Session 4: The models used in asset analysis and how they interact**

- The decision model
- The underlying physical and commercial uncertainty models
- The physical and cash-flow models
- The valuation model

### **Session 5: Going beyond current valuation practice: The benefits and the costs**

- The effect of uncertainty on value: Going from a single corporate discount rate to market-based valuation (MBV)
- The decision model: Going from static “now or never” decisions to sequential contingent decisions via complete decision tree analysis (CDTA)

### **Session 6: Going beyond current valuation practice: three simple examples**

- Example of capex-opex tradeoff with output price uncertainty
  - The law of one price
  - Value additivity
  - Using forward prices to assess prices of risk
  - The CAPM and the corporate cost of capital
- Example of a windfall profits tax with output price uncertainty
  - Dynamic uncertainty models: states in scenario trees
  - Value additivity over states and the use of state prices in valuation
  - One-period state prices from forward prices and interest rates
  - Generalising compound interest models to get multi-period state prices
- Example of a development lease with output price uncertainty
  - Decision tree analysis
  - Direct search vs. dynamic programming

### **Session 7: Going beyond current valuation practice: the Antimina & CO<sub>2</sub> Storage teaching examples**

- Commodity price modeling
- Cost indices
- Geological uncertainty
- Value optimisation using multi-dimensional continuous decision tree models and simulation-projection search methods

### **Session 8: Implementation issues**

- Management of change in the analysis process
- Management of communication of analytical results
- Effects of language and mindset
- Effects of organisation politics

## **Wrap-up**