

Petroleum Economics, Risk and Decision Analysis

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
<p>Introduction</p> <ul style="list-style-type: none"> • Drivers behind the business • Why economic evaluation • Objectives of the course • Typical oil and gas company objectives • Typical oil and gas company activities • Capital expenditure plans • Basic process of economics evaluation <p>Inflation & Risk</p> <ul style="list-style-type: none"> • Inflation defined • Types of inflation • Consumer price index (CPI) • Risk factors (simple illustration) <p>Interest</p> <ul style="list-style-type: none"> • Simple & compound interest • Compound interest formula • Nominal & effective interest <p>The Time Value of Money</p> <ul style="list-style-type: none"> • 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 of annuity • Excel's financial functions <p>Debt Cash-Flow Calculation</p> <ul style="list-style-type: none"> • Project financing • Loan amortization schedule • Interest during construction period • Excel's financial functions 	<p>Before-Tax (BTAX) Cash-Flow</p> <ul style="list-style-type: none"> • Cash-flow (CF) defined • Gross revenue (GR) • Basic data requirement • Forecasting product stream • Dependence of CAPEX • Economics of scale • Capex during production • Breakdown of OPEX • Develop rules of thumb for OPEX • Gas processing flow chart • Typical oil production facilities • Simple before-tax cash-flow • Schematic of typical cash-flow • Refinery cash-flow variables <p>Cost Estimation</p> <ul style="list-style-type: none"> • Project cost management • Various types of costs • Cost estimation tools and techniques • Levels of cost estimates • Dependence of cost estimates • Criticality of cost estimates <p>After-Tax Cash-Flow</p> <ul style="list-style-type: none"> • After-tax cash-flow • Straight line depreciation • Double declining depreciation • Declining balance with switch to straight line 	<p>Profitability Indicators</p> <ul style="list-style-type: none"> • Typical profitability indicators • Cumulative net cash-flow • Discounted payback period • Internal rate of return (IRR) • Net present value (NPV) • Excel's financial functions • Profitability index (PI) • Long-range marginal cost (LRMC) • LRMC of sample cash-flow • Maximum sustainable risk <p>Netback Value & Indexed Pricing</p> <ul style="list-style-type: none"> • Netback value (NBV) • Base year & ROR approach • LRMC approach • Indexed netback pricing <p>Cash-flow & Discounting Assumptions</p> <ul style="list-style-type: none"> • Funds flow & discounting assumptions • Common cash-flow assumptions • Use of NPV Excel functions <p>International Petroleum Agreements</p> <ul style="list-style-type: none"> • The need for collaboration • International agreements • Parties to the agreement • Typical contract terms • Contractual arrangements • Comparison of fiscal systems • Sliding scale tranches • Concessionary system's cash-flow • PSA cash-flow distribution 	<p>International Petroleum Agreements</p> <ul style="list-style-type: none"> • Joint venture contracts • Risk service contracts <p>Economic Assessment of International Contracts</p> <ul style="list-style-type: none"> • Crafting fiscal terms – what to look for? • Front end loading index (FLI) • Effect of government's take on contractor's economics • Contractor's IRR <p>Investment Selection Decision-Making</p> <ul style="list-style-type: none"> • Investment types • Types of investment decisions • Investment decision-making • Revenue producing investment – using NPV • Revenue producing investments – using IRR & PI • Revenue producing investments – incremental analysis • NPV/IRR conflict • Inherent problems with IRR • Multiple rates of return • Economic solution for projects with multiple IRRs • Ranking projects • Ranking projects using PI • Ranking projects using NPV • Service producing investments • Lease vs. buy decision <p>Gas & LNG Economics</p> <ul style="list-style-type: none"> • Types of gas accumulations • Classification of natural gas • Typical composition of natural gas • Global energy mix • Global natural gas reserves 	<p>Introduction to Decision Analysis</p> <ul style="list-style-type: none"> • Why decision analysis • Typical industry risks • Handling uncertainty in capital investments • Sensitivity analysis • Wide applications of decision analysis <p>Basic Probability Concepts</p> <ul style="list-style-type: none"> • Probability definitions • Widely used probability distributions • Binomial probability distributions • Multinomial probability distribution • Other discrete probability distributions • Continuous probability distributions • Normal probability distribution • Lognormal probability distribution • Uniform probability distribution • Triangular distribution • Excel's probability functions <p>Expected Value Concepts</p> <ul style="list-style-type: none"> • Expected value of random variables • Expected Monetary Value (EMV) • Sensitivity analysis • Correct interpretation of expected value • Dice rolling experiment • Expected profitability index <p>Simulation in Decision - Making</p> <ul style="list-style-type: none"> • Applications of simulation • Probabilistic reserves estimation

	<ul style="list-style-type: none"> • Sum-of-the-year digits • Depreciation – Excel functions • After-tax (ATAX) cash-flow • Typical cash-flow <p>Weighted Average Cost of Capital (WACC)</p> <ul style="list-style-type: none"> • Capital asset pricing model (CAPM) • Cost of equity & cost of debt • Weighted average cost of capital • Sample WACC calculation • Relationship between cash-flow & WACC 		<ul style="list-style-type: none"> • Global natural gas production • Global natural gas consumption • Global LNG exporters • Global LNG importers • Gas production & consumption of major LNG importers • LNG cash-flow variables • NGL recovery calculator <p>Comprehensive Case Study</p> <ul style="list-style-type: none"> • Gas field development economics • With NGL recovery • Without NGL recovery 	<ul style="list-style-type: none"> • Obtaining random observations • Investment decision-making using expected values <p>Management Presentation</p> <ul style="list-style-type: none"> • Assumptions • Profitability indicators • Sensitivity analysis • Sensitivity of LRMC to well cost & well OPEX • Sensitivity of LRMC to plateau period & well cost • Waterfall chart • Two-variable cross plot • Three-variable cross plot <p>Comprehensive Case Study (Cont'd)</p>
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