AFP® Annual Conference

Association for Financial Professionals®

November 7-10, 2010 | San Antonio

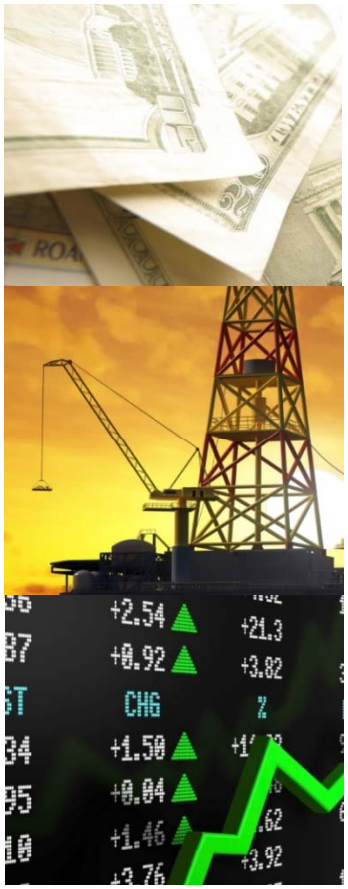
ORIGINAL
ESSENTIAL
UNBIASED
INFORMATION

The right way to hedge

noble energy

McKinsey&Company

Today's discussion



- Importance of cash flow risk management and core beliefs
- Case study on hedging and capital structure optimization in oil & gas
- Implications for organizations

Our beliefs and insights on hedging and capital structure optimization

1 There is no such thing as "hedging"; management teams must define a strategic position regarding hedging and risk management

- There are either: (1) risk mitigation or (2) margin optimization actions; management teams should disaggregate and measure these activities independently

2 A "Risk Compass" provides an effective guide to understand true risk capacity and optimize hedging and capital structure decisions

- Account for indirect and second order effects
- Take advantage of natural hedges/optionality in portfolio (e.g., flexibility of capital program)

3 Risk mitigation actions should be linked to both capital structure and optimized to protect priority business cash requirements

- Optimal liquidity based on trade-off between marginal returns from capex vs. incremental liquidity cost

4 Incorporate impact of natural floors/ceilings and commodity relationships on risk capacity

- Requires deep understanding and alignment of commodity pricing mechanisms

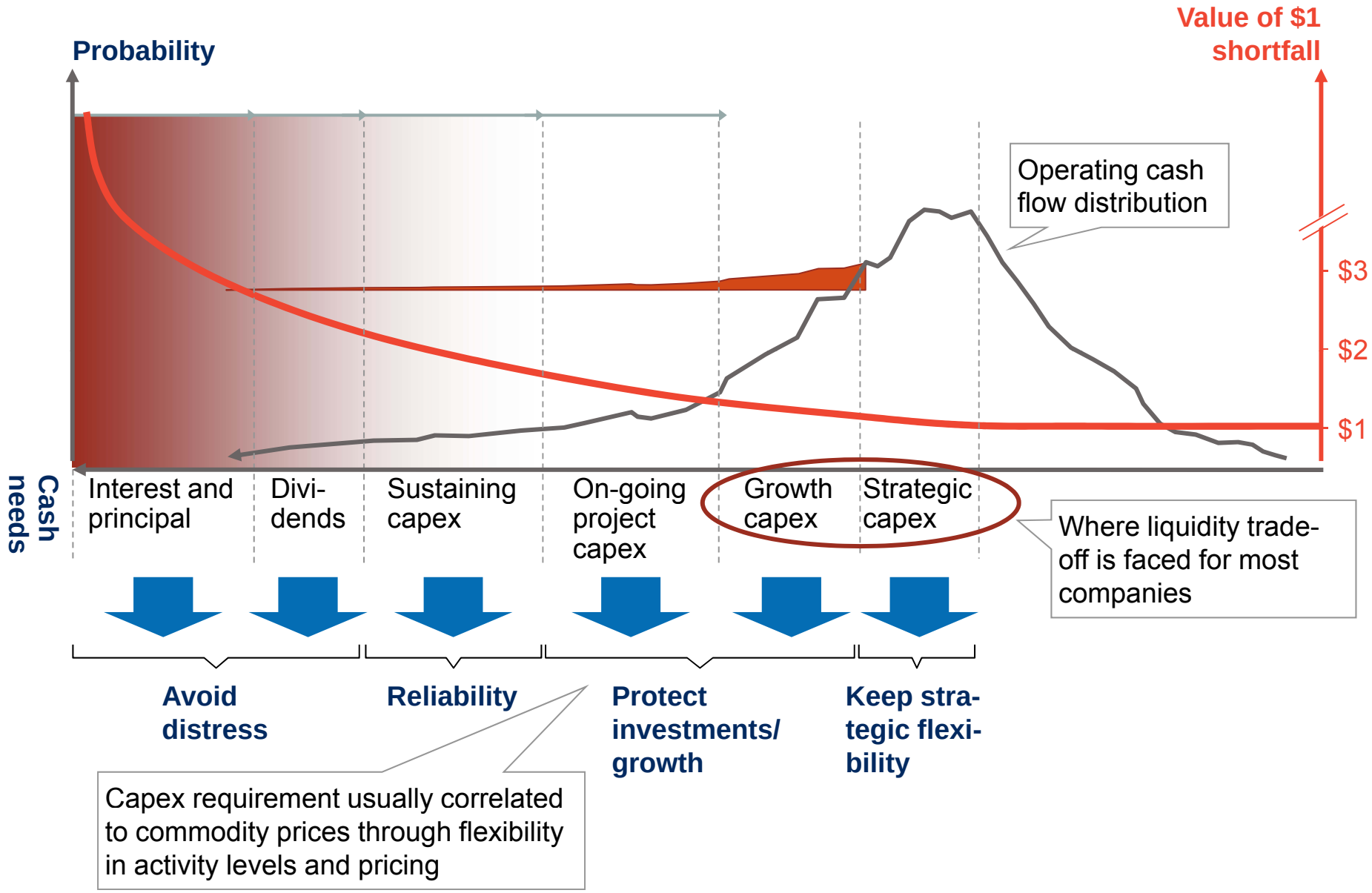
5 Take a "TCO" approach to hedging and optimizing capital structure; the direct costs are only a fraction of total hedging cost

- Indirect costs (e.g., liquidity capital posting and lost upside) typically represent greatest costs

6 Alternatives to financial hedging could be more attractive

- Options include: contracting, substitution/product specs, strategic moves (e.g., vertical integration)

A "Risk Compass" allows a company to understand true risk capacity…

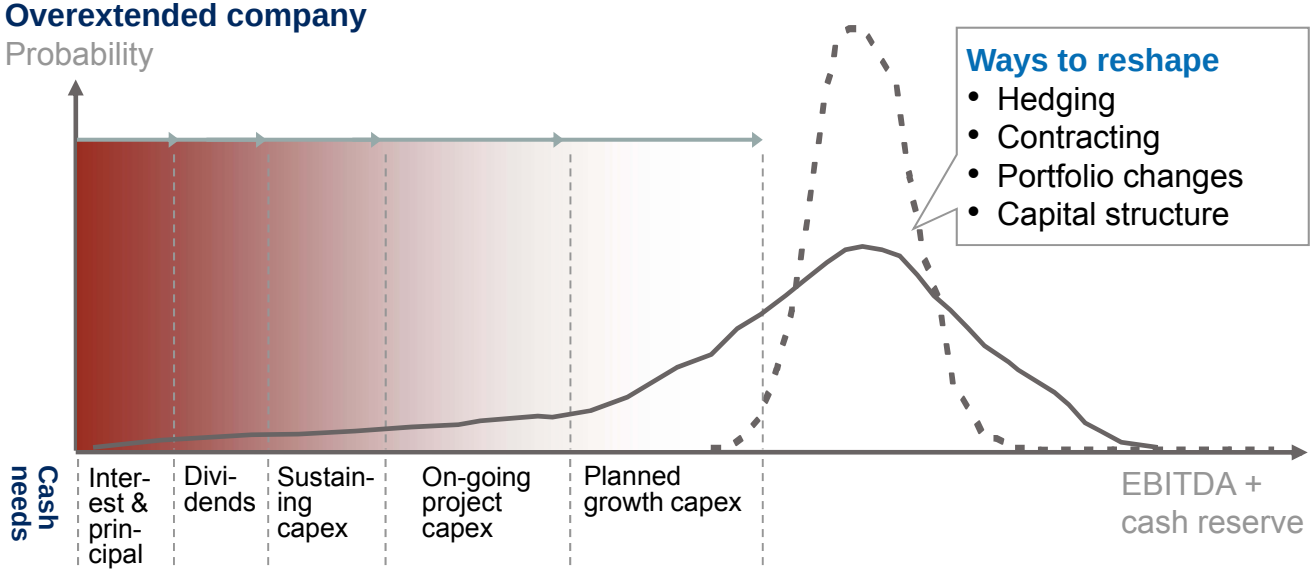


SOURCE: McKinsey Risk Management Practice

2. UNDERSTAND TRUE RISK CAPACITY – Cont.

… and hedge only the material exposures

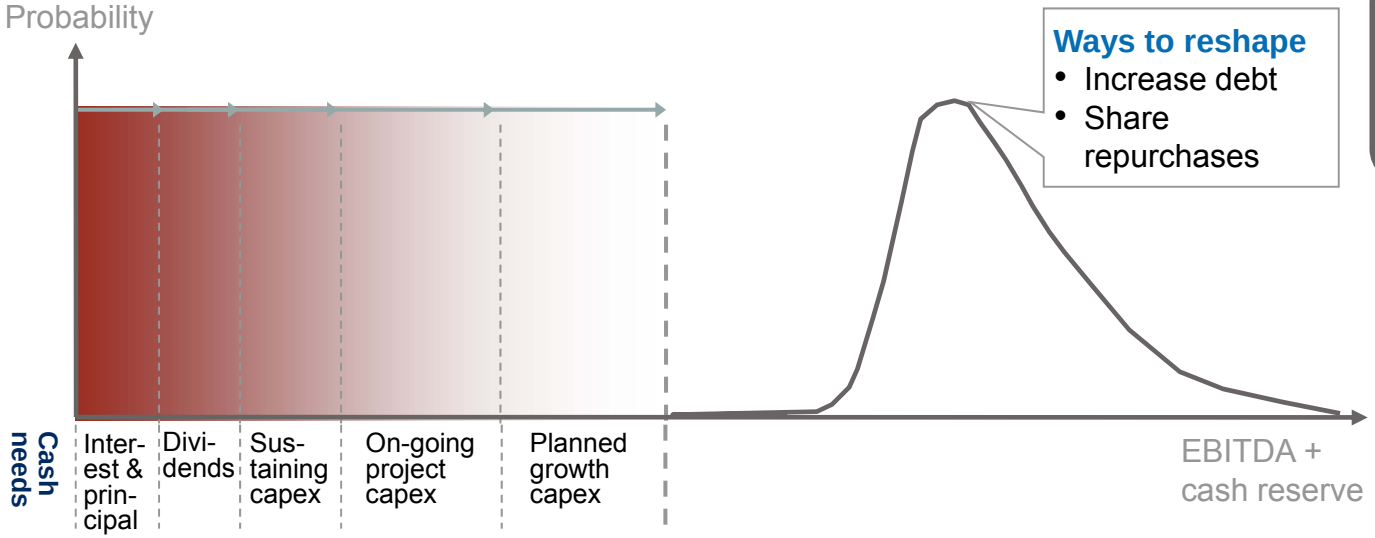
Overextended company



When it typically applies

- Recent distress
- Substantial growth/ capital program

Over-insured company



When it typically applies

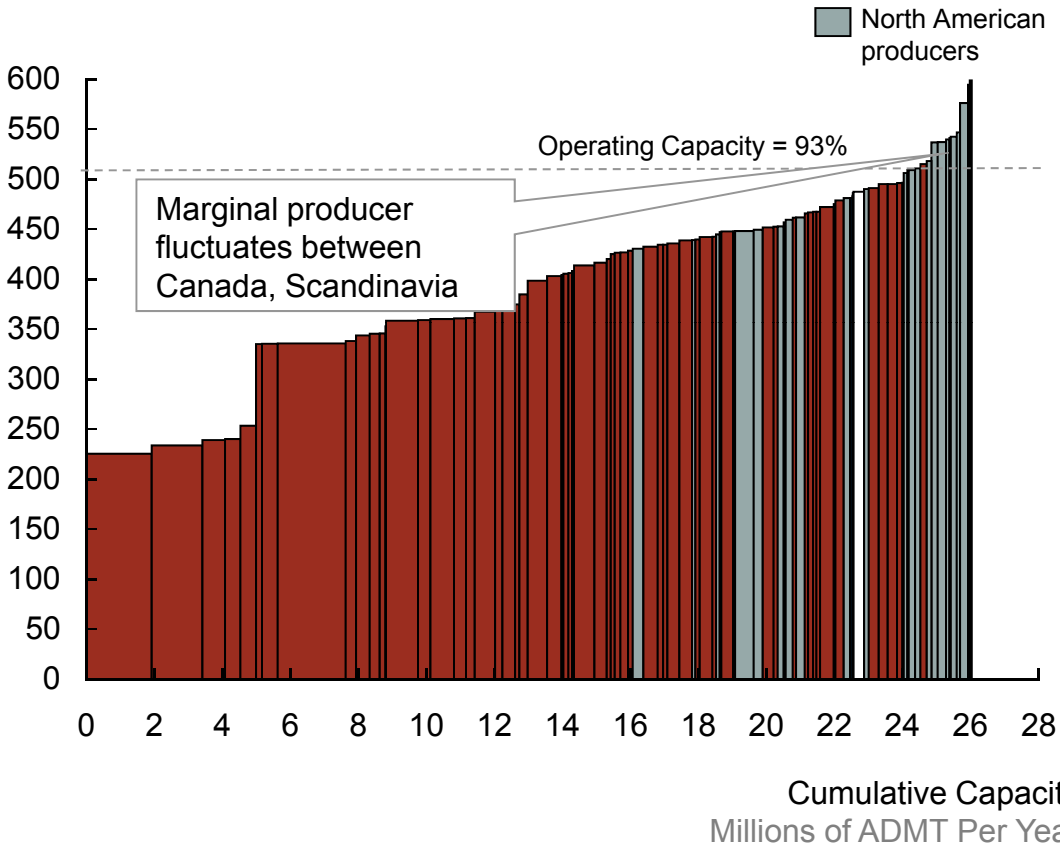
- High free cash flow ("pecking order theory")

SOURCE: McKinsey Risk Management Practice

Need to understand "second-order" exposures embedded in commodity exposure

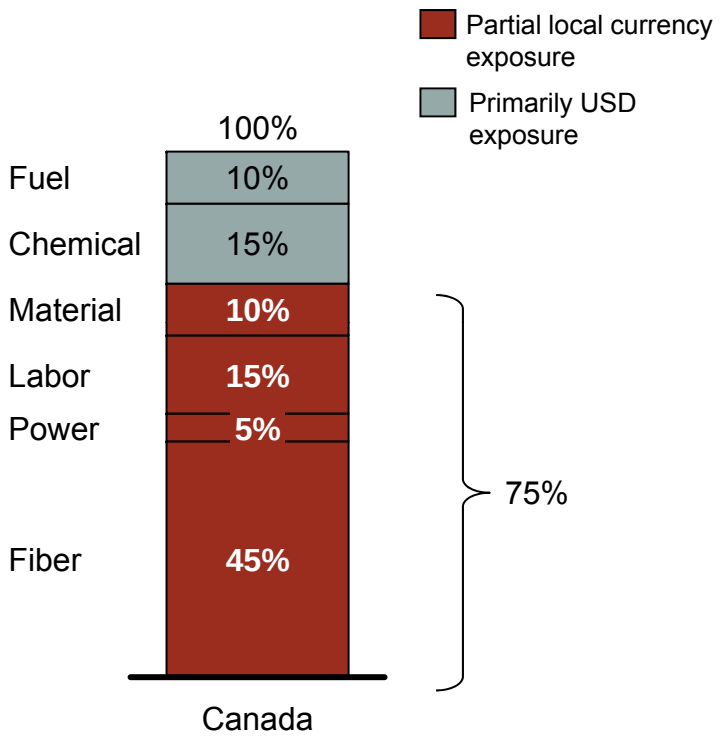
BHKP delivered cost of supply (cash cost)[1]

US$/ADMT



Industry weighted average cash cost

Percent of total



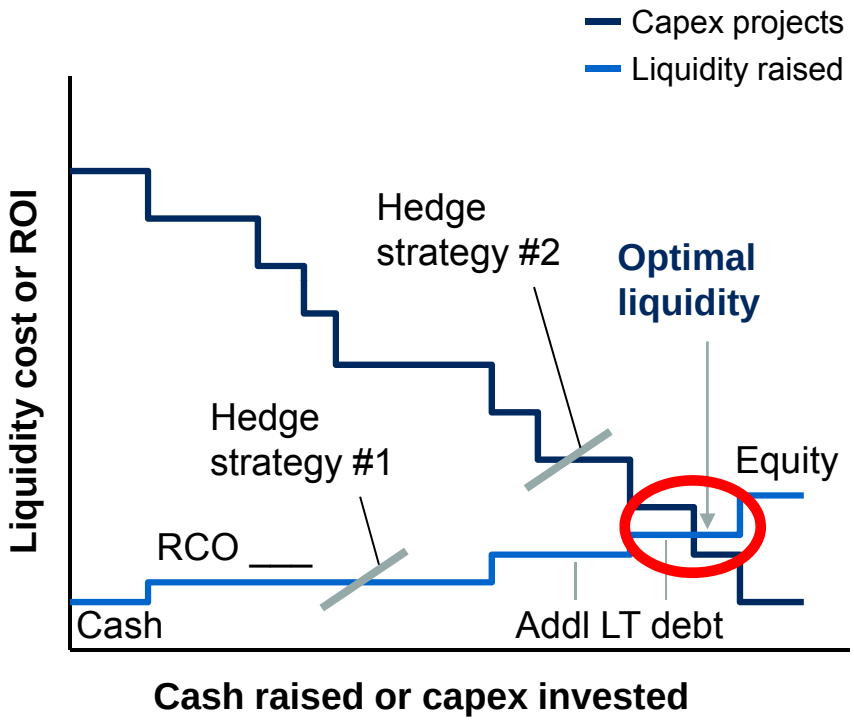
- **Significant FX exposure embedded in pulp prices**
- **FX exposure in Pulp shifts between Canada, Scandinavia**

1 Sorted by cash costs, delivered to Shanghai, China

SOURCE: Hawkins Wright, Paperloop, RISI Analytical Cornerstone; McKinsey analysis

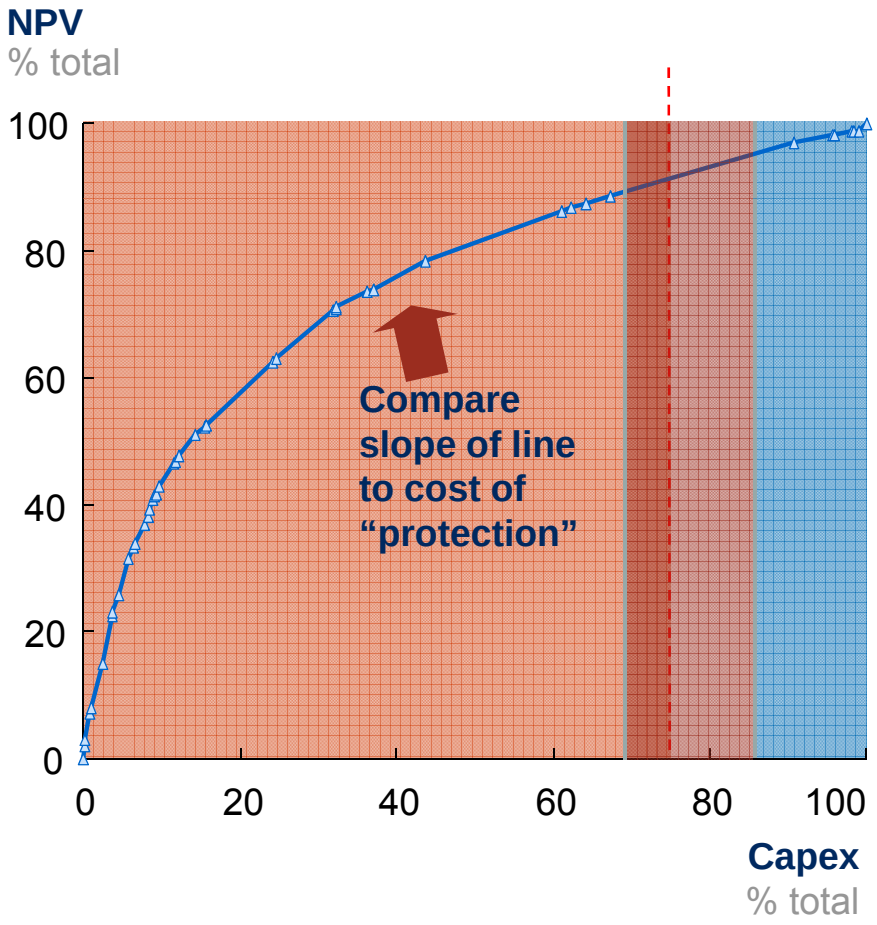
Risk mitigation actions must be linked to capital structure and optimized to protect priority business cash requirements

Where the tradeoffs occur



- For the optimal liquidity point, the marginal cost equals the return of protected capex projects
- Risk analysis prioritizes which projects are worth "protecting" to the desired confidence level

Comparing project returns to cost of "protecting" funds



SOURCE: McKinsey Risk Management Practice

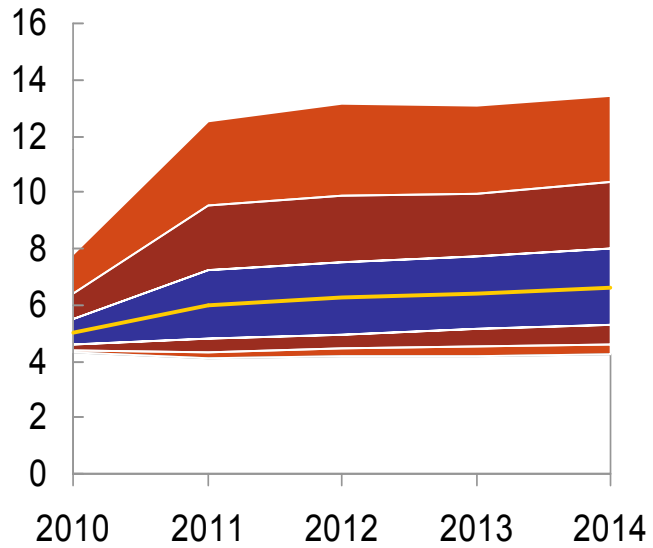
Commodity price risk can be forecasted with a "price envelope" based on distribution of market expectations and industry expertise

Methodology

- Future prices simulated based on aggregate market expectations
- Mean price based on 30 day average forward curve
- Volatility is implied volatility from traded options
- Mean reversion estimated using the mOU process

Simulated future HH prices[1]

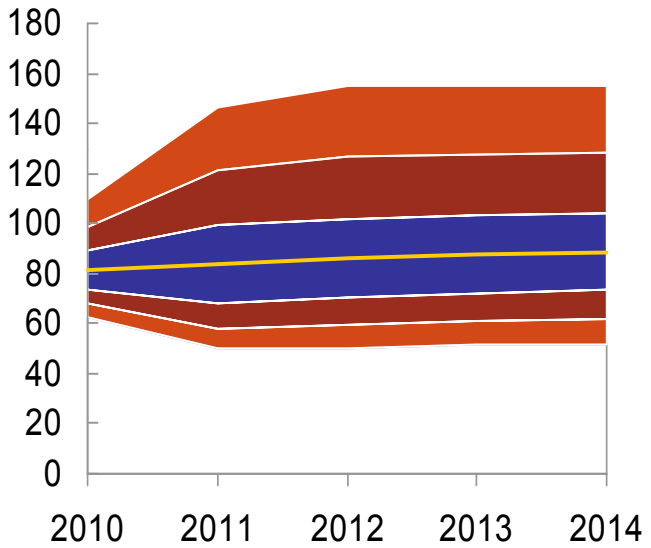
$/MMBtu



Simulated HH prices in 2014 fluctuate between $4 and $13.5/MMBtu

Simulated future WTI prices[1]

$/Bbl



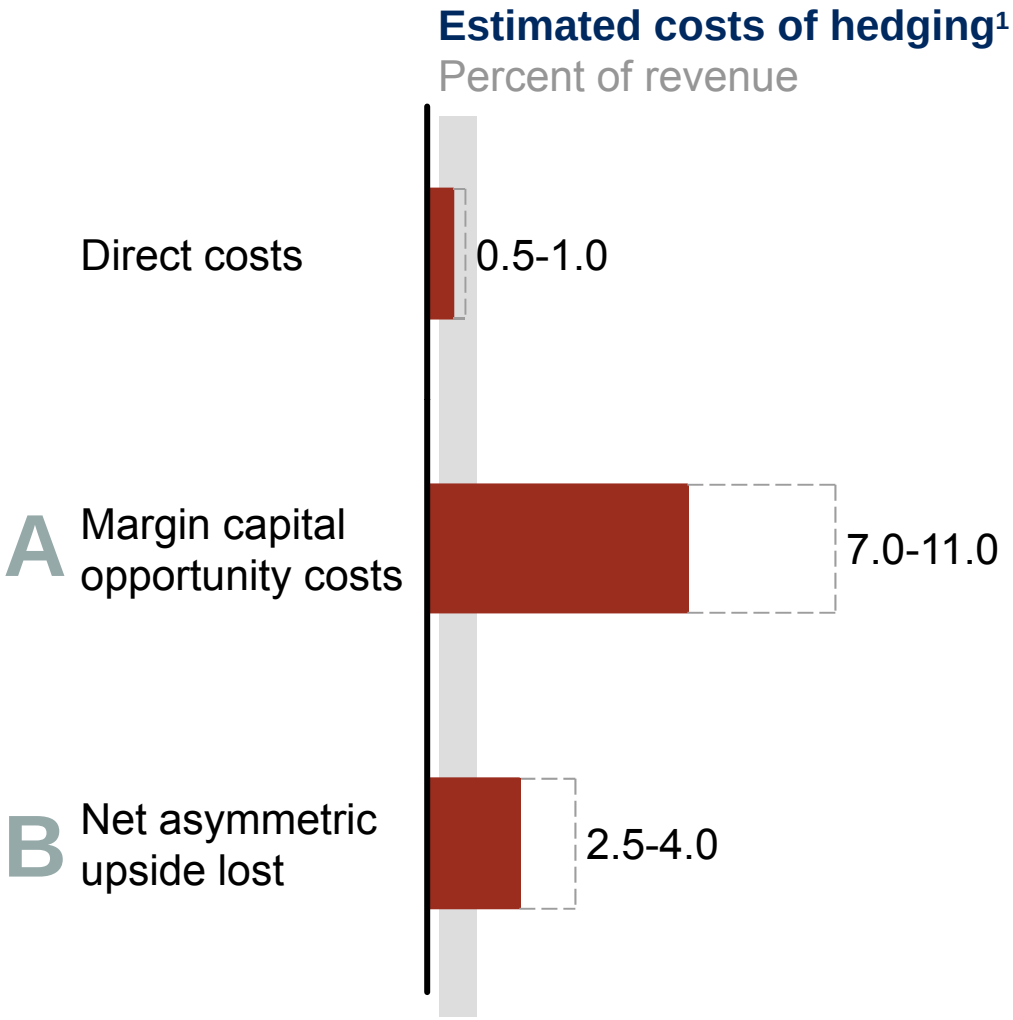
Simulated WTI prices in 2014 fluctuate between $49 and $160/Bbl

1 5,000 monte carlo simulations; model uses market forwards, implied volatilities and mOU process calibrated with historical prices from 1999-current. A correlation of 23% is assumed between WTI and HH

SOURCE: Forward curve and implied volatility from Bloomberg. Used 30 day averages with prices through May 25

Direct costs are only a fraction of total cost of hedging

E&P EXAMPLE



Description

- Bid/ask spread
- Banking/origination fees

- Opportunity cost of margin capital required to withstand significant price moves (two sigma event)

- Overall decline in expected cash flow
- Log normal distribution of commodity prices makes protected downside less than lost upside
- Higher natural floors lead to greater asymmetric upside

SOURCE: McKinsey Energy Hedging Model

A variety of levers beyond traditional financial instruments are available to address risk-return decisions

Examples

Financial

- Leverage traditional financial instruments

Contracting (sales and purchasing)

- Align purchasing and sales contracts in timing/terms
- Use escalator clauses and/or formula pricing

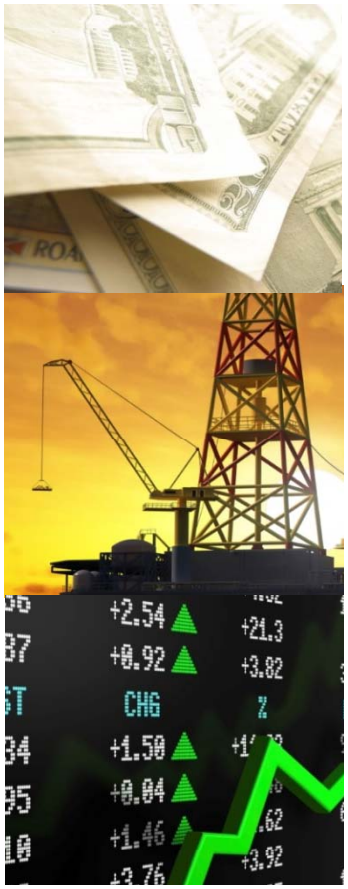
Strategic

- Integrate vertically to balance buy-side/ sell-side
- Develop partnerships
- Invest in pure plays or counter-cyclical businesses

Operational/ merchandising

- Develop alternate product formulations/ wider specifications
- Leverage inventory
- Optimize pack size/ price/quality across channels/geographies
- Optimize trade spend/ marketing dollars

Today's discussion



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Commodity hedging review

Hedging strategy

- Reduce Price Uncertainty – Ensure Predictability of Cash Flows
- "Lock in" Acquisition Economics

Peer group evaluation

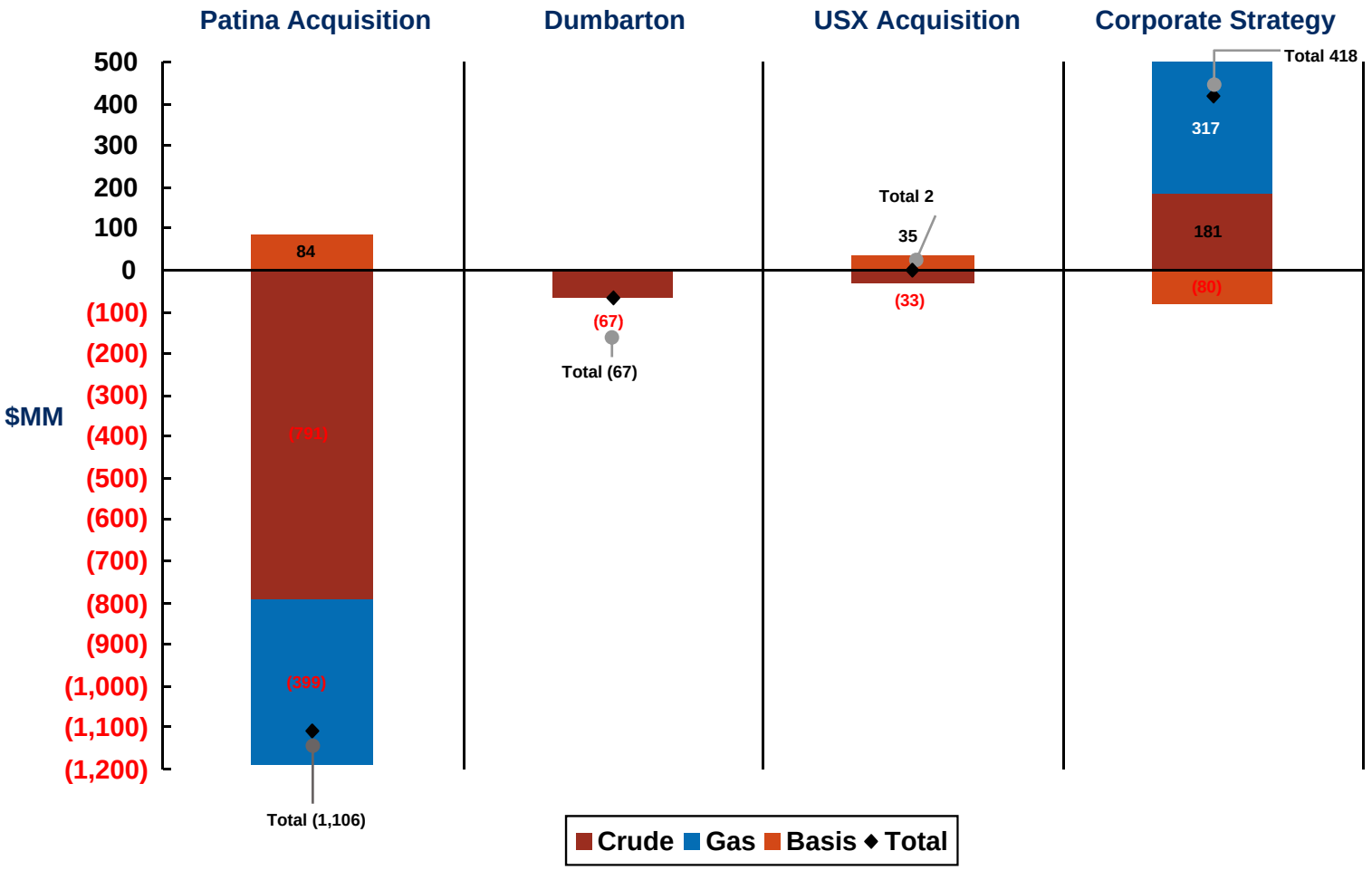
- "There's No One Best Way" as Peer Group Employs a Wide Range of Hedging Strategies

Conclusions from review

- Hedging Program Has Been Effective But Has Entailed Opportunity Cost
- Company Valuation Impact – Inconclusive
- MTM Accounting Well Understood and Endorsed by Investors
- NBL's Governance and Control Framework is Robust
- Enhancing Current Program by Employing Best Practices
  - Use of a Range of Hedging Instruments Including Costless Collars, Purchased Puts
  - Employing "Proactive" Management to Commodity Risk Management
  - Application of Cash Flow at Risk

Doing fine but striving for continuous improvement

Hedge settlements[1] by program and type 2005-2009



Recent post mortem on hedge program results led to new thinking around hedge execution

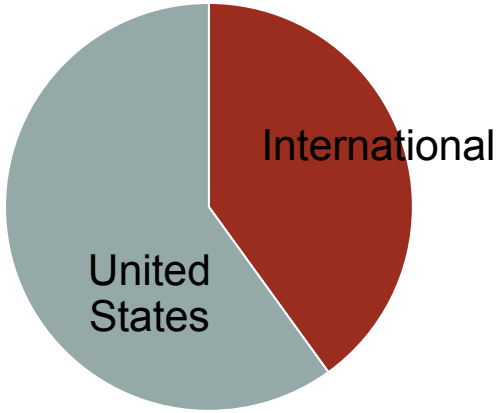
1 Settlements Represent the Close Out of the Hedge Position with the Counterparty For Cash: (Noble Cash Payment to Counterparty) / Noble Cash Receipt From Counterparty

Noble Energy (NYSE: NBL)

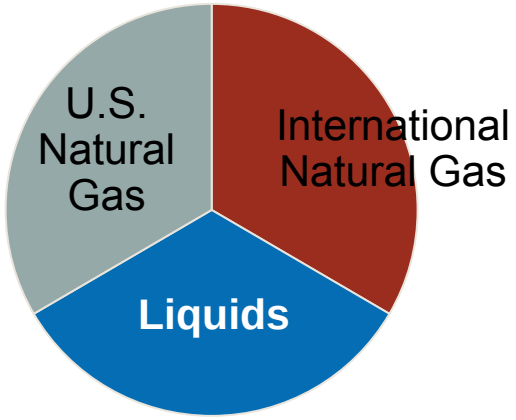
Leading independent energy company

- **Oil and Gas Exploration and Production**
  - Member of S&P 500
- **Diversified and Balanced Asset Portfolio**
  - Leverage to U.S. and international markets
  - Exposure to crude oil and natural gas
  -
- **Key Operating Areas**
  - Onshore U.S.
  - Deepwater Gulf of Mexico
  - Eastern Mediterranean (Israel and Cyprus)
  - West Africa (Equatorial Guinea and Cameroon)
- **1,600+ Worldwide Employees**
- **Market Value: $14 Bn**

Reserves YE 2009
820 MMBoe



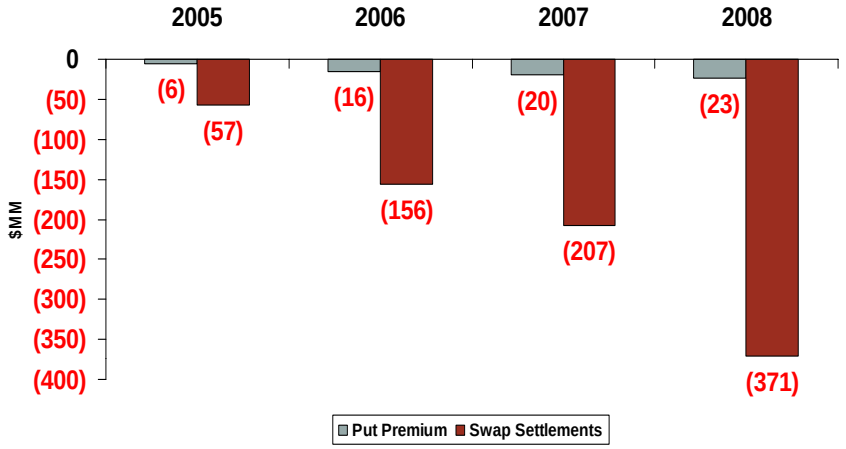
Volumes 2010E
214 to 217 MBoe/d



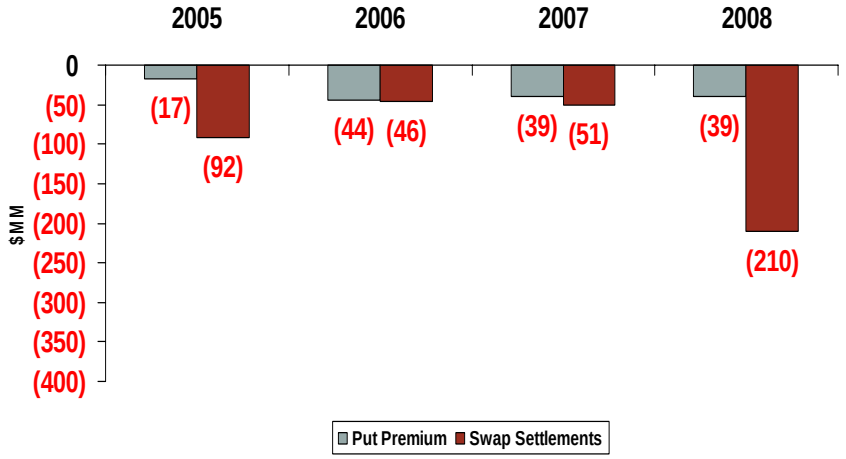
Acquisition case: Patina look-back
Oil and gas put vs. swap strategy

Alternative instruments can create value

Oil
$65 MM put premium vs. $791 MM swap settlements



Gas
$138 MM put premium vs. $399 MM swap settlements



The Patina Swap Strategy, While Initially Costless, Incurred Large "Indirect Costs" Due to Lost Upside Opportunity

For Future Large Acquisitions, Consider:

- Purchasing Puts as Insurance to Protect the Downside and Retain the Upside rather than use swaps (Include Put Premium Cost in Acquisition Economics)

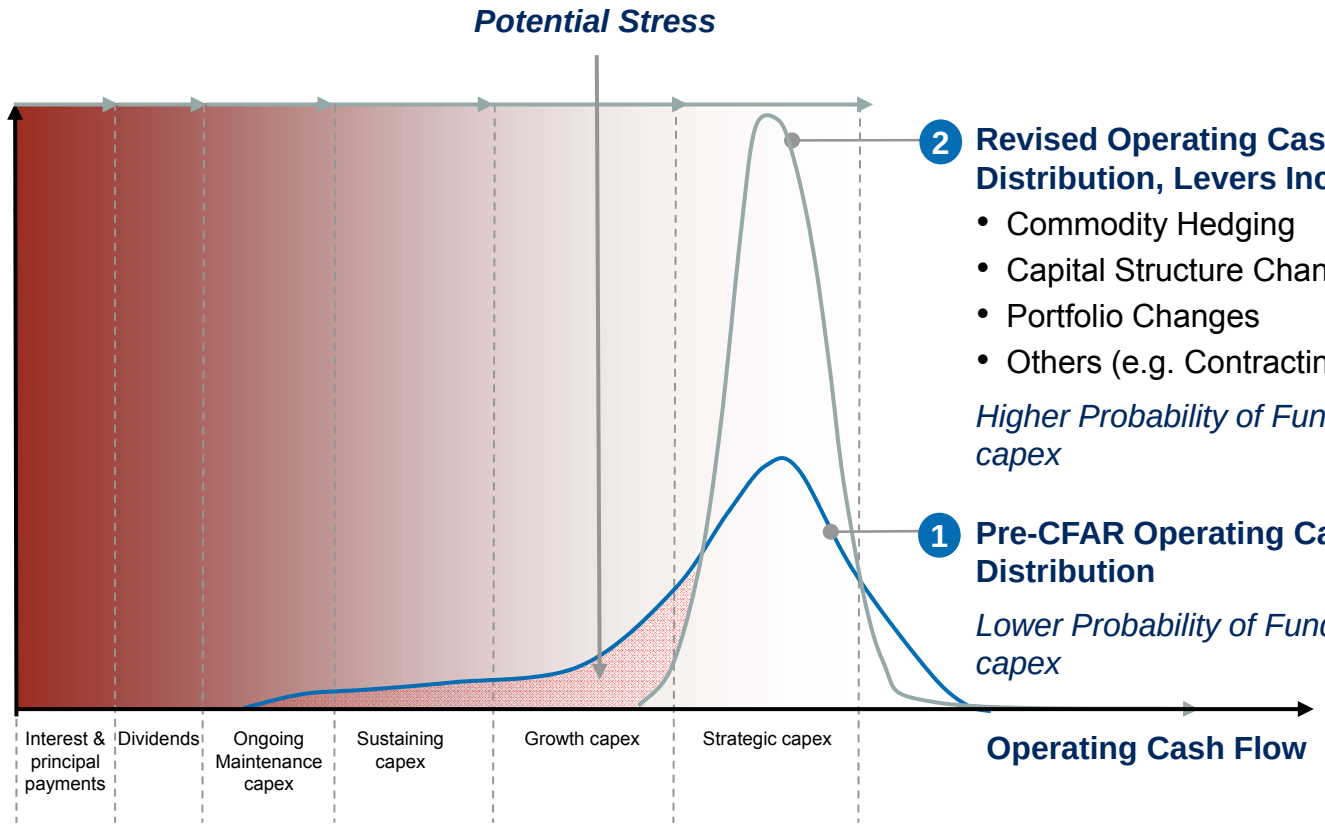
AND / OR

- Proactively Monitor / Manage Hedge Positions–If Market Dynamics and NBL's Commodity Price View Changes Significantly From the Time Hedges Were Originally Put in Place, Consider Early Settlement and Reset of Hedges

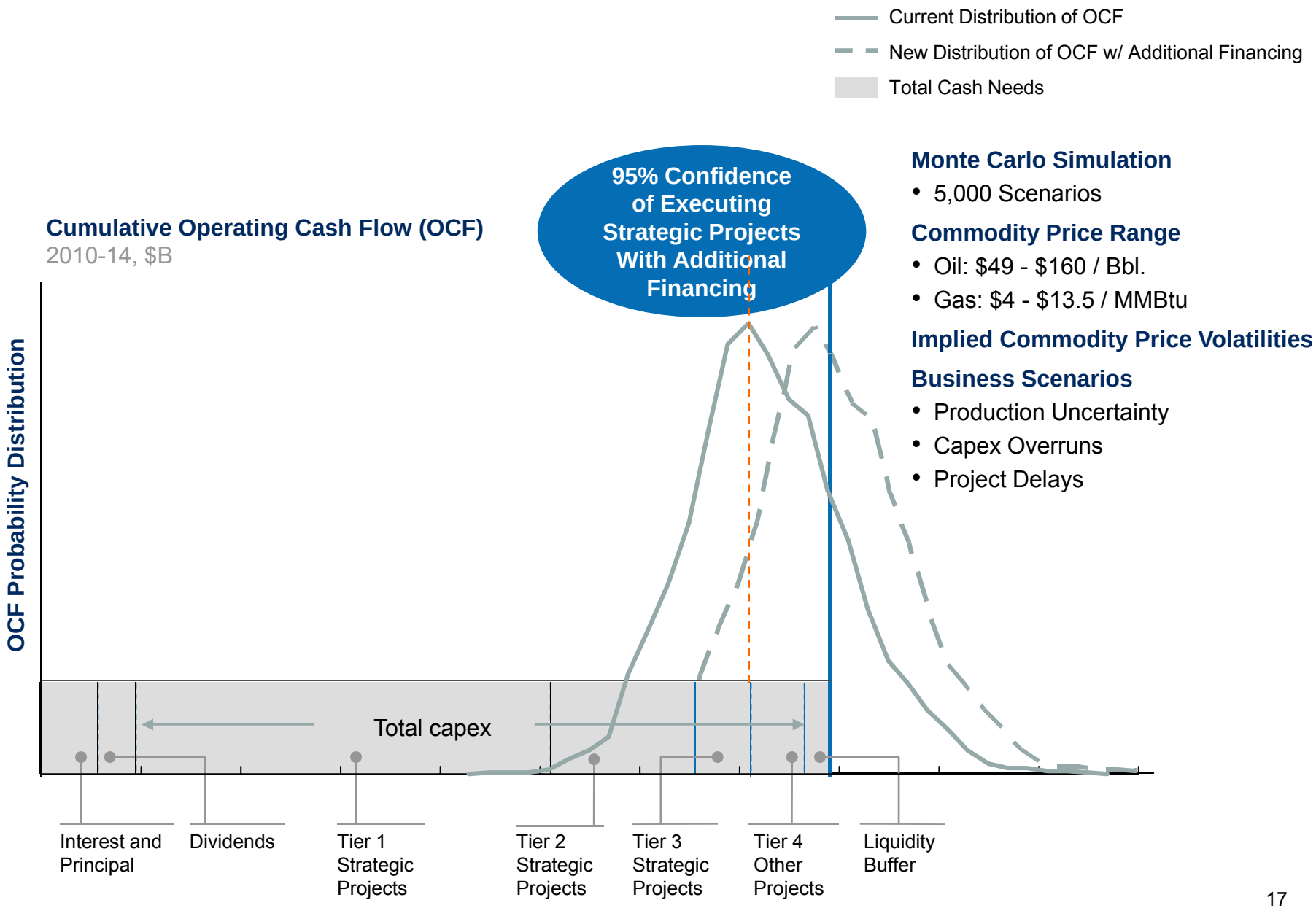
NOTE: Put Strike Prices Set Equal to Actual Swap Hedge Rates

A new hedging approach linked to capital structure planning

Illustrative Example



Cash flow at risk – highly confident of meeting objectives



Monte Carlo Simulation

- 5,000 Scenarios

Commodity Price Range

- Oil: $49 - $160 / Bbl.
- Gas: $4 - $13.5 / MMBtu

Implied Commodity Price Volatilities

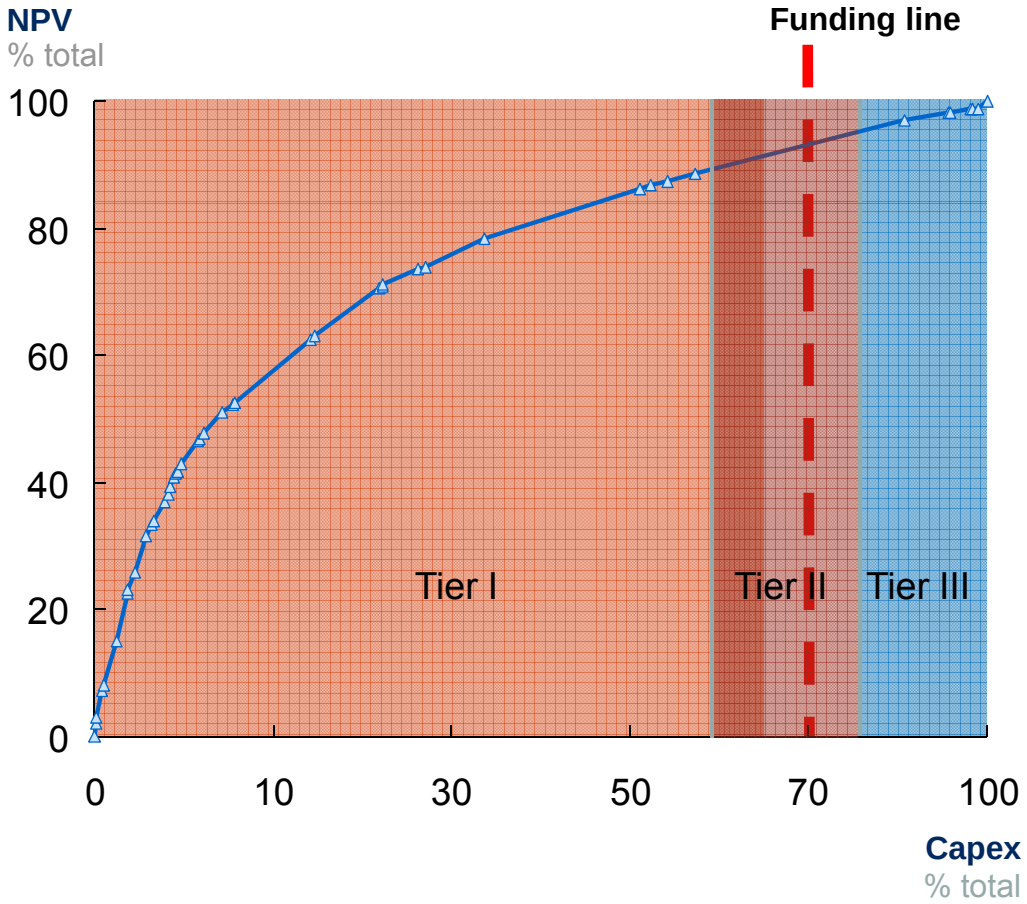
Business Scenarios

- Production Uncertainty
- Capex Overruns
- Project Delays

Prioritizing capex based on incremental NPV returns reduces cash requirements for protecting marginal projects

ILLUSTRATIVE

Cumulative NPV from capex Investments



Cost-benefit analysis of capex funding

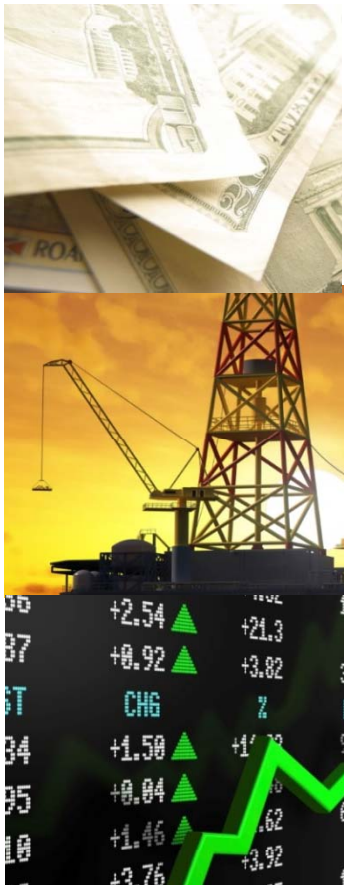
$ Millions

	Tiers covered @ 95% level	External liquidity required	NPV benefit less liquidity cost
	I	0	N/A
	II	500	100
	III	1,000	(73)

- Capex Tiers I & II represent attractive projects to “protect” (protect 70% of total capex program with 95% confidence interval)
- However, Tier III capex does not provide a sufficient return to hedge cash flows to ensure delivery

SOURCE: McKinsey Risk Management Practice

Today's discussion



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“Discovery” To Application Conclusions

- Risk Management Programs Should be Strategically Focused
  - Integrated Into Business Plan to Sustain Competitive Advantage
  - Potential Exists for Shifting Emphasis From Pure Risk Reduction to the Management of Competitive Risk/Opportunity
  - Recognizes that Management Has a View on Future Commodity Price Moves

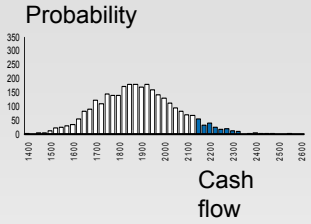
- Evaluate Risk Management Program in Terms of Assessing Likelihood of Achieving Targeted Objectives
  - Knowing Cash Flow at Risk (CFAR) Profile Assigns Probability of Achieving Business Plan
    - Operating Gains -- Fewer Forced Modifications to Business Plan and Lower Plan Execution Costs
    - Financing Gains – Using Hedges to Create Good Match Between Cash Flow Generated and Cash Flow Requirements Reduces the Need to Maintain Excess Liquidity (Capital Structure Linkage)

- Matching Cash Inflow to Outflows Coupled with Internal View on Commodity Price Movements Implies Use of Multiple Types of Hedging Instruments
  - Swaps for anticipated down markets; Purchased Puts for up markets

Risk optimization approach and principles

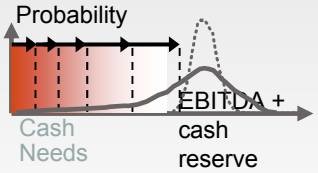
Key objectives

1



Construct risk compass based on cash flow-at-risk (CFAR) model

2



Evaluate risk/ return optimization strategies including hedging and optimal capital structure

3

Define governance model and required implementation plan

Key principles

Develop practical tool for that can be integrated into decision making process

- Risk compass should be robust enough to "test" various business scenarios but also user-friendly to incorporate in on-going decision making

Ensure Risk Compass addresses key business uncertainties and risks

- Focus on both market risks (e.g., commodity prices) and business risks (e.g., capex and opex overruns for new mega-projects)

Collaborative and iterative team approach

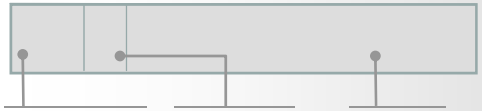
- Interact and problem solve with working team on ongoing basis to develop relevant solutions

SOURCE: McKinsey Risk Management Practice

Risk Compass compares business cash requirements with dynamic forecasts of operating cash flow availability

ILLUSTRATIVE

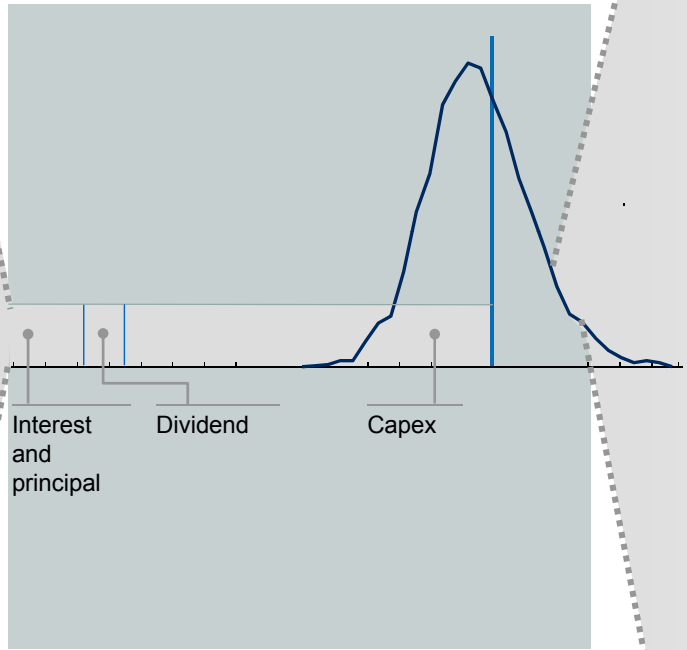
Business cash requirements



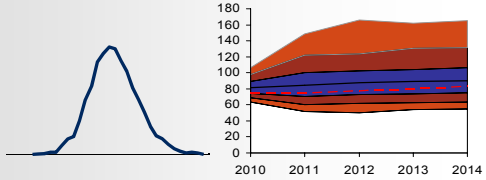
Segmentation of capex

- Lowest priority
- Medium priority
- Top priority
- Strategic importance

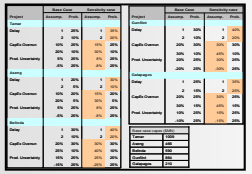
Risk Compass



Operation cash flow distribution1



- Commodity price forecasts
  - 5 year average prices based on forward curve
  - Volatilities based on implied volatility from traded options



- Operational risks
  - Project delays
  - Capex overruns
  - Production changes

SOURCE: McKinsey Risk Management Practice