



# Shale Gas Investment in Ukraine

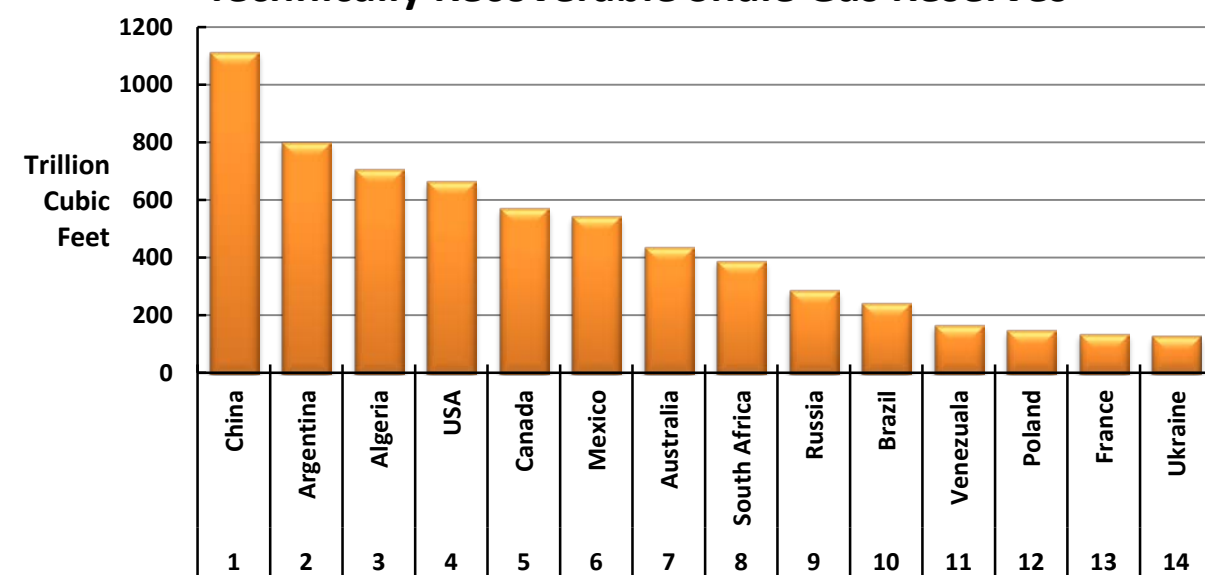
## Deterministic and Monte Carlo Simulation Analysis of the Risks and Returns

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### Introduction

- Study analyses feasibility of shale gas development within Ukraine's licensing regime
- EIA (2013) estimate 128 trillion cubic feet of technically recoverable shale gas reserves (4<sup>th</sup> in Europe, 14<sup>th</sup> worldwide)
- Deterministic cash flow analysis (under several combinations of production and CAPEX scenarios)
- Sensitivity analysis
- Monte Carlo financial simulation

Technically Recoverable Shale Gas Reserves



- Fiscal regime is an important element to attract development in Ukraine's shale gas industry

### Ukraine Fiscal Regime

- No specific legislation governing shale gas E&P
- Current fiscal regime offers no special provisions for shale gas

Fiscal Terms		
Depth	Subsoil Use Rate	Corporate Profit Tax Rate
Extracted entirely below 5,000 meter depth	15%	18%
Extracted entirely or partly up to 5,000 meter depth	28%	18%

### Methodology

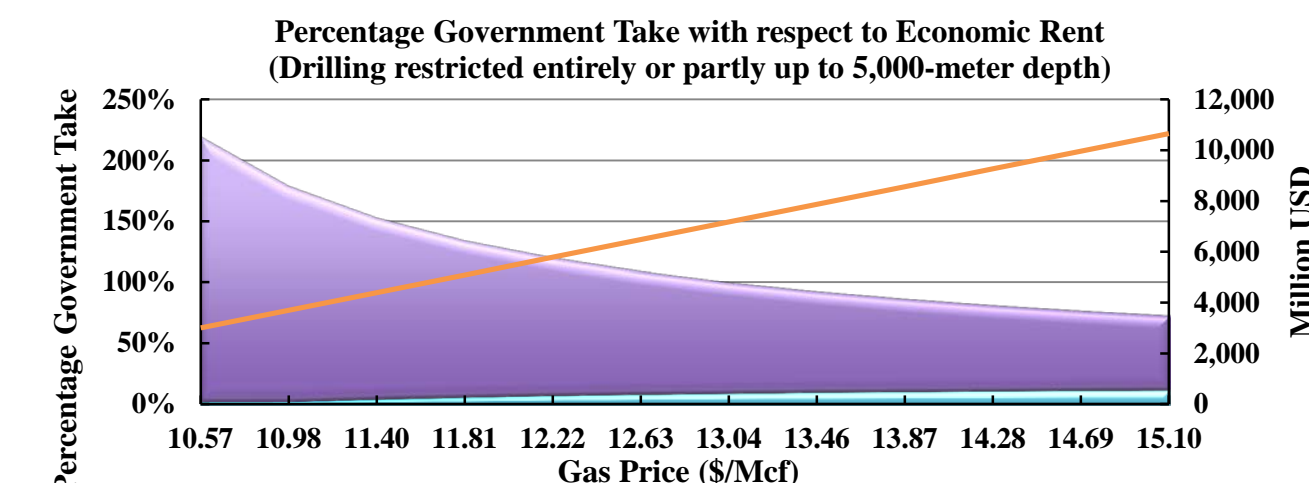
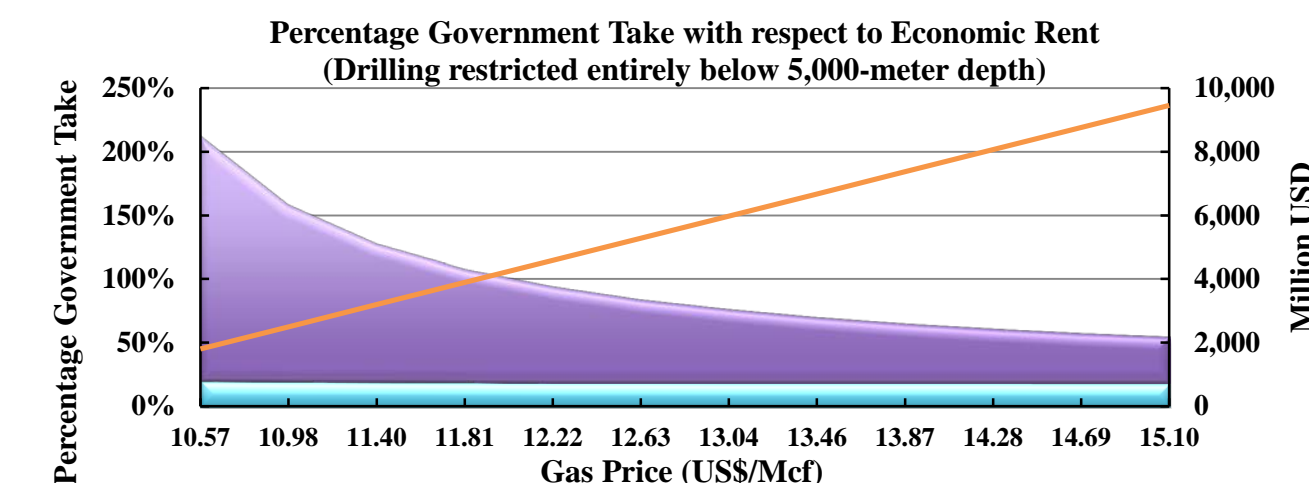
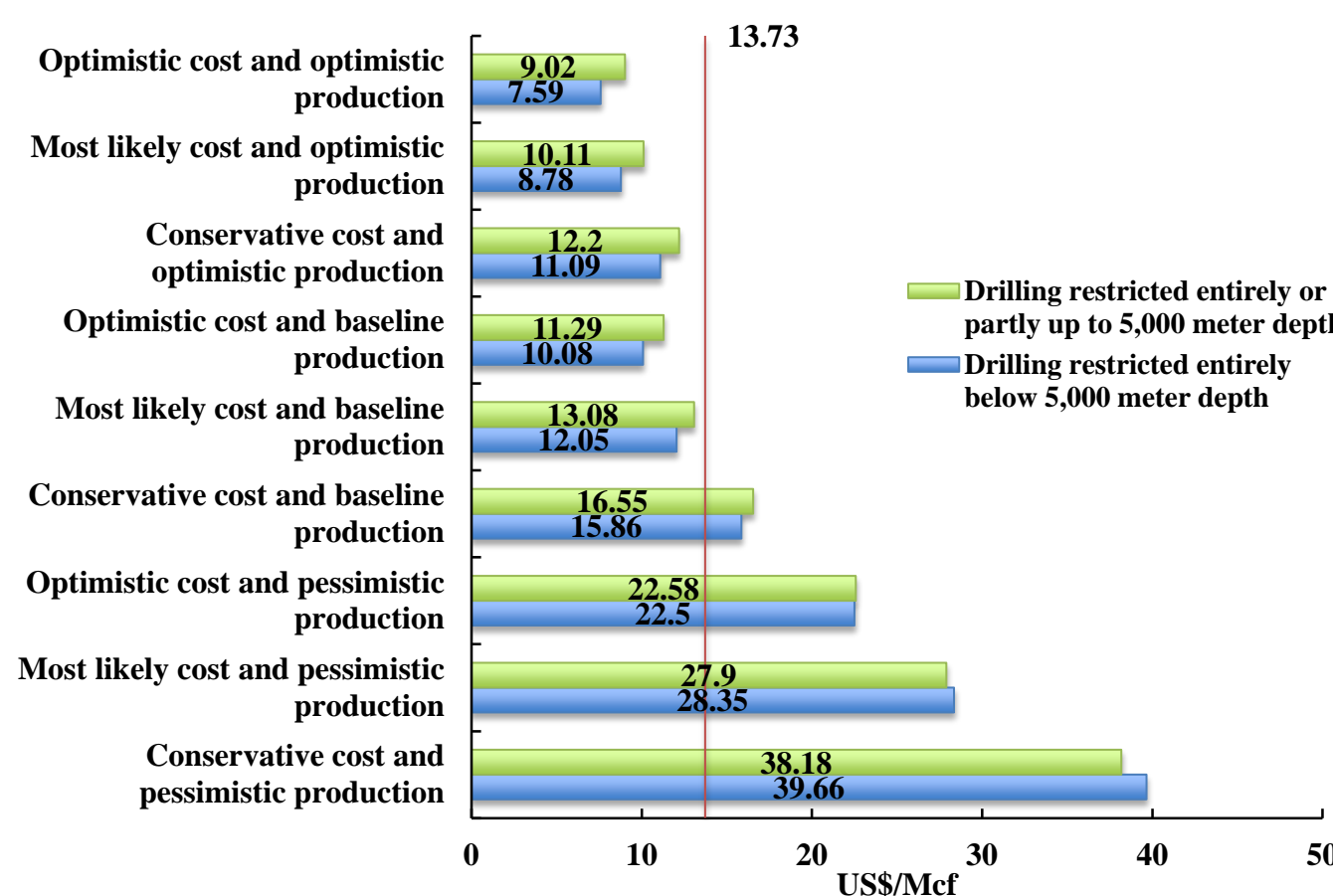
Financial model captures risk and return to shale gas development in Ukraine in the current licensing regime under two scenarios: drilling restricted entirely or partly up to 5,000 meter depth (Deep) and drilling restricted entirely below 5,000 meter depth (Shallow)

Production Scenarios		
Scenarios	EUR/Well (Bcf)	Initial Flow Rate (Bcf/year)
Pessimistic	1	0.155
Baseline	3	0.46
Optimistic	5	0.76

CAPEX Scenarios		
Scenarios	Deep Cost (\$/well)	Shallow Cost (\$/well)
Optimistic	12,060,000	13,266,000
Most likely	15,830,000	17,413,000
Conservative	23,110,000	25,421,000

### Results

Shale Gas Break-Even Price in Ukraine (US\$/Mcf)



- Sensitivity analysis identified production parameters, CAPEX, wellhead gas price and average customs value of natural gas imported as most influential to risk and return
- Monte Carlo analysis was conducted assuming these variables simultaneously stochastic

	Deep Scenario		Shallow Scenario	
	Before tax	After tax	Before tax	After tax
Mean NPV (\$M)	6,751	1,851	7,946	309
68% within (\$M)	-871 and 14,385	-3,998 and 5,876	321 and 15,571	-5,257 and 5,876
Prob. of loss	18%	40%	13%	50%

- The initiatives are only marginally profitable after tax with significant levels of risk.

### Conclusion

- Highly regressive fiscal regime
- Unattractive environment for shale gas development