@ENERGY/Storage

Pricing, hedging and optimization of gas storage contracts and facilities.

Product Description

@ENERGY/Storage is a real options-based decision support, optimization and valuation tool for aquifer, reservoir and salt dome storage facilities and contracts, including park and loan agreements. Storage developers, storage operators, energy marketers and private-equity backed firms use @ENERGY/Storage to value, manage and hedge storage assets dynamically.

What makes @ENERGY/Storage unique?

Main Benefits

- Mark-to-market and quantify expected future profitability.
- Assess the probability and nature of extreme storage scenarios.
- Maximize storage value by deriving the optimal forward hedge positions.
- Support decisions for daily injection/withdrawal and adjusting forward hedges.

Key Features

Comprehensive Contract Definition.

- General Specifications — capacity, inventory start level, variable injection/withdrawal intervals.
- Inventory Requirements — a flexible schedule for required minimum and maximum inventory levels.
- Operational Constraints — a flexible schedule for variable injection and withdrawal rates with their associated per-unit and fuel costs as functions of inventory levels ("ratchets").
- Inventory Payout and Penalty Provisions — variable payout structures for inventory borrowed or loaned at the end of the contract term.

Multiple Trading Strategies.

- Intrinsic — trading spot and forward contracts on value date.
- Rolling Intrinsic — trading spot, balance-of-month and forward contracts to add profit incrementally, while maintaining a risk-free intrinsic hedge.
- Basket of Spreads — delta hedge storage value as a basket of calendar spread options with forward contracts, while adding profit incrementally from spot and balance-of-month trading.
- Optimal (spot only) — trading spot using optimal buy/sell rules to maximize expected profit.
- Rule-based (spot only) — trading spot using user-defined buy/sell price trigger "rules".

Figure 1

Enter complete market data and detailed inventory ratchets.

Forward price curve

Date	Bid Price	Ask Price	Payment Date
4/14/04	5.170	5.200	5/25/04
4/15/04	5.200	5.230	5/25/04
5/1/04	5.210	5.250	6/25/04
6/1/04			
7/1/04			
8/1/04			
9/1/04			
10/1/04			
11/1/04			
12/1/04			
1/1/05			
2/1/05			
3/1/05			

Cash volatility curve

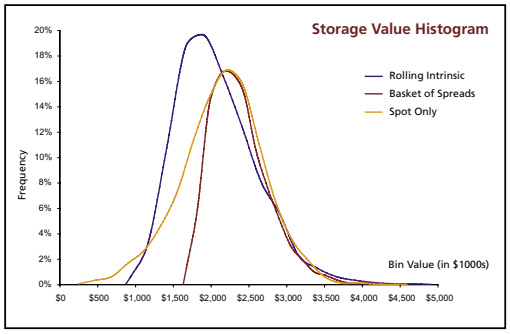
Date	Volatility
4/30/04	60.00%
5/31/04	55.00%

Implied volatility curve

Expiry Date	Volatility
4/30/04	44.50%
5/31/04	39.50%

Operation Schedule

Date	Inventory Level	Injection Rate	In Unit Cost	In Fuel Cost	Withdrawal Rate	Out Unit Cost	Out Fuel Cost
4/1/04	0%	18,000	0.025	2.40%	20,000	0	0.00%
	20%	16,500			20,000		
	40%	15,775			20,000		
	60%	14,500			21,500		
	80%	14,000			22,500		
11/1/04	0%	17,000	0.015	0.50%	23,000	0.015	2.15%
	50%	15,000			26,000		
	67%	14,000			26,000		



Intrinsic Hedge On Value Date (Rolling-intrinsic)

Delivery Date	Amount	Price
4/1/04	442,368	5.230
5/1/04	342,835	5.250
6/1/04	0	5.240
7/1/04	76,186	5.250
8/1/04	0	5.270
9/1/04	331,776	5.230
10/1/04	342,835	5.250
11/1/04	0	5.380
12/1/04	(496,000)	5.540
1/1/05	(403,000)	5.660
2/1/05	(336,000)	5.630
3/1/05	(265,000)	5.455

View expected future profitability and hedge schedule.

Multiple Price Process Models.

- One-factor, lognormal mean-reverting model. Accommodates price and cash volatility term structure.
- Multi-factor, lognormal mean reverting model. Multi-factor seasonal principal components analysis forward curve model that can capture the seasonal correlation and volatility term structures among different forward contracts, while fully matching market implied volatilities. Storage internally calibrates many of the necessary model parameters, and allows modification prior to simulation and valuation.

Detailed Valuation Results.

- Expected contract value, lower bound value (rolling intrinsic only) and hedge curve.
- Cash flow, inventory and value histograms (used to pick percentiles for bidding, reserves and risk management, and to monitor storage operations and capital requirements).
- Day-to-day decision support features.
- Sample trajectories of inventory, cash flow and MTM value.
- All simulated prices and suggested trades.

Software Architecture @ENERGY/Storage is available in two forms:

Microsoft Excel® Add-In that is written completely in C/C++ providing extremely fast results. It includes customizable Excel templates and documentation. Library for UNIX and Windows (Erglib/Storage) to allow integration of Storage into custom and third-party C, C++, Visual Basic, and SQL database applications.

About FEA

Focusing on the energy, financial, and commodities markets sice 1989, Financial Engineering Associates, Inc., an MSCI Barra company, is a leader in the development of financial derivatives valuation models and portfolio risk management software. Powered by innovation and excellent technical support, FEA has established leadership in develop-ing a broad range of energy derivatives analytics and works closely with clients to adapt pricing models to changing market conditions. FEA leverages a network of selected system vendors and value-added distributors. FEA software systems are used by more than 250 institutional clients that include energy firms, money center banks, Fortune 500 companies, trading enterprises, and leading financial firms.

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