Measuring the Impact of High Oil Prices and Federal Policy Initiatives in Offshore Gulf of Mexico Exploration, Development and Production Activity

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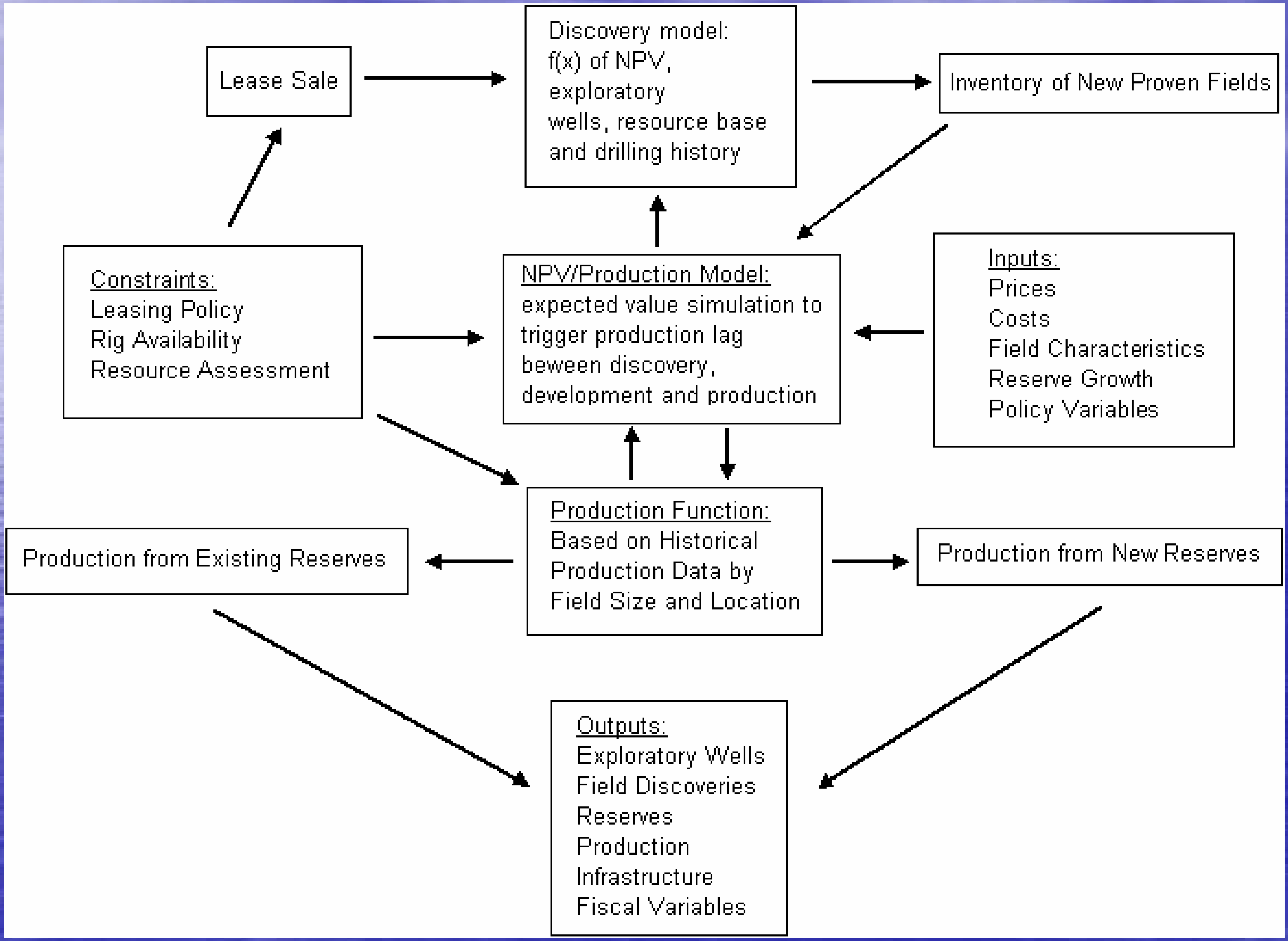
Overview

- Modeling objectives
- IIC EDP Model
- Resource inputs
- High oil and gas prices
- Alternative royalty initiatives
- Future research/applications
- Conclusion/Acknowledgements

IIC EDP Model Objectives

- Developed for Minerals Management Service
  - Assist Resource and Evaluation, and Economics Divisions
  - EIS, Leasing Programs, Policy Analysis
- Ties economics to traditional discovery, production processes
  - Projects future exploration, development and production activity at a *field-level*
- Specific to Offshore Gulf of Mexico
  - Allows user-defined geographic boundaries
    - Current project: 21 "areas"
      - 3 planning areas (CGM, WGM, EGM)
      - 7 water depth categories (0-60, 60-200, 200-400, 400-800, 800-1600, 1600-2400, 2400+ meters)
- Easily applicable to other global offshore regions

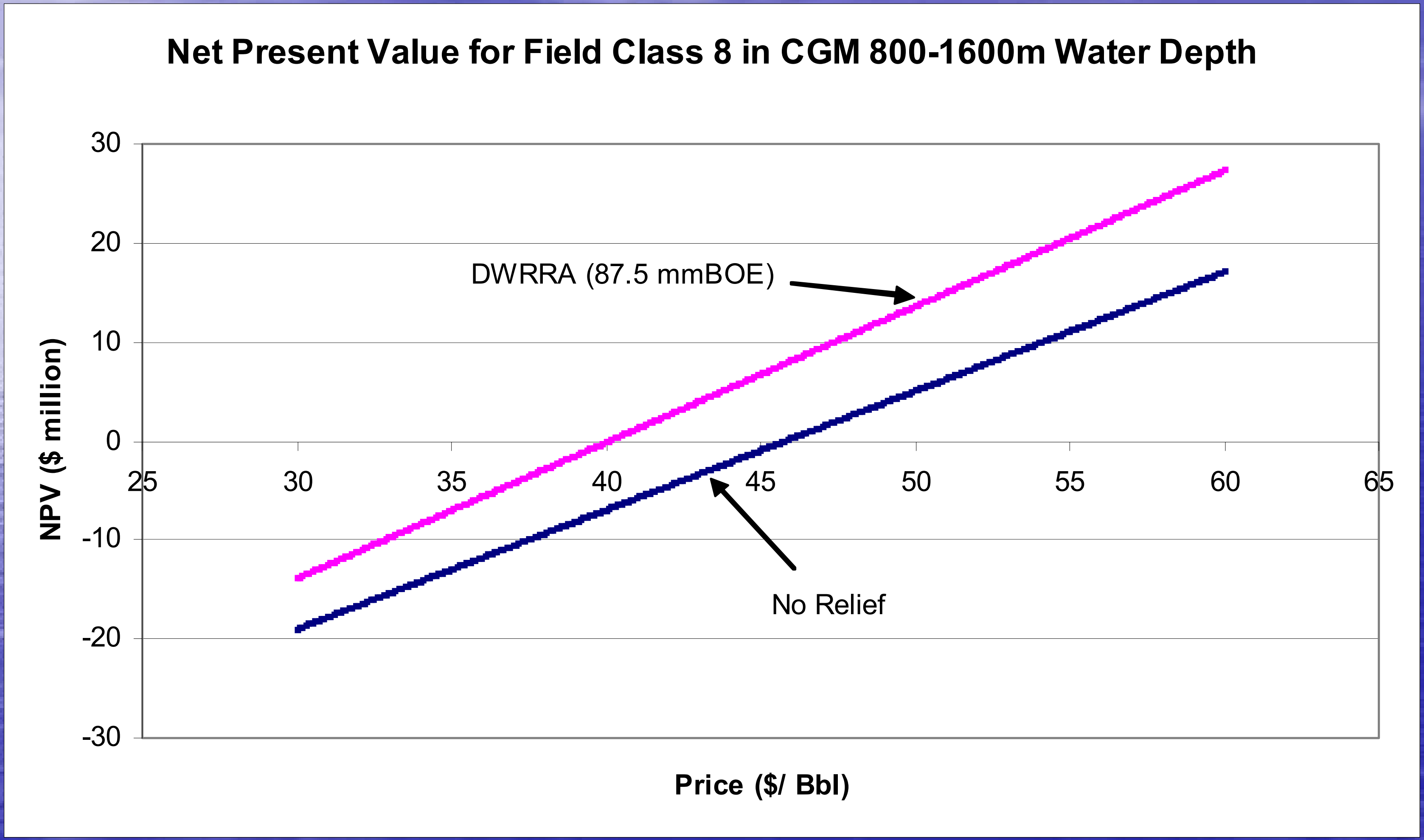
IIC EDP Model Schematic



Field-Level Economics

- Two primary uses
  - Decision making process of when and where to explore (drill) for resources
  - Development process: field feasibility
- Discounted cash flow (DCF) net present value (NPV) component
  - Annual cycle of computing the economic value of developing and producing newly discovered fields
  - Performed for all fields by
    - Area (planning area and water depth category)
    - Field size (USGS Classification): Defined by the range (mmBOE) $0.03125*2^{(n-1)}$ though $0.03125*2^{n}$, where n = field size
- How do prices/royalty policy affect field-level economics?
  - Revenue component: (Price * Production) – Taxes – Royalties

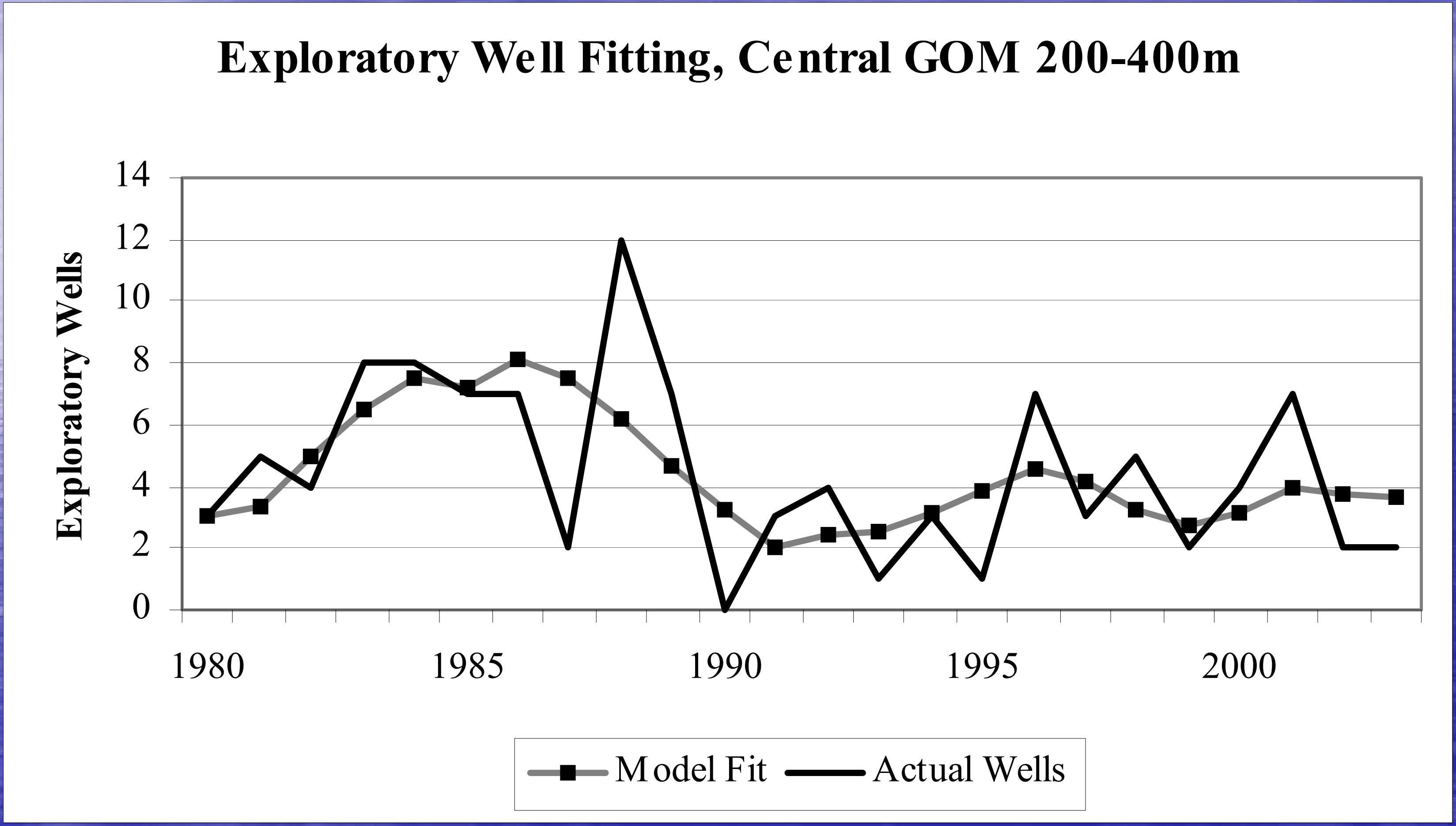
Field-Level Economics



Exploratory Well Drilling

- Initial step in process
  - Exploratory wells discover new fields
  - IIC defined "E" wells
- Developed exploratory well equations
  - Function of net present value of discovered fields and expected discoveries
    - Assumption that oil and gas companies react to possibility of future profitable discovery and value of past discoveries
  - Historic exploratory well drilling fit using an optimization procedure
    - Using multiple years to fit – not limited to one year

Exploratory Well Drilling



Discovery, Development and Production

- Exploratory wells find new fields
- Development decision based on field-specific NPV
  - Field feasible with positive NPV
  - Restraints and lags
- Production
  - $P_t = \beta * (RE_{t-1} + RA_t - CP_{t-1})$
    - β = production coefficient (historic modeling)
    - RE_{t-1} = Reserve estimate last year
    - RA_t = Reserves added this year (MMS appreciation)
    - CP_{t-1} = Cumulative production through last year
  - Dependent on in-field drilling to maximize RA
  - Production wells take precedence over exploration wells

Forecast Period and Resource Inputs

- Model forecast period: 2003-2042
  - Data limitations
  - Model calibration
- Resource distributions
  - Undiscovered Resources
  - Discovered Resources
- Price Scenarios
  - Reference case: $30/bbl and $4.54/mcf
  - Static high price case: $45/bbl and $6.81/mcf
  - High spike price case: to $70/bbl in model year 3 (2005), followed by a decline to reference case
  - All scenarios assume a 12 percent discount rate, 35 percent tax rate

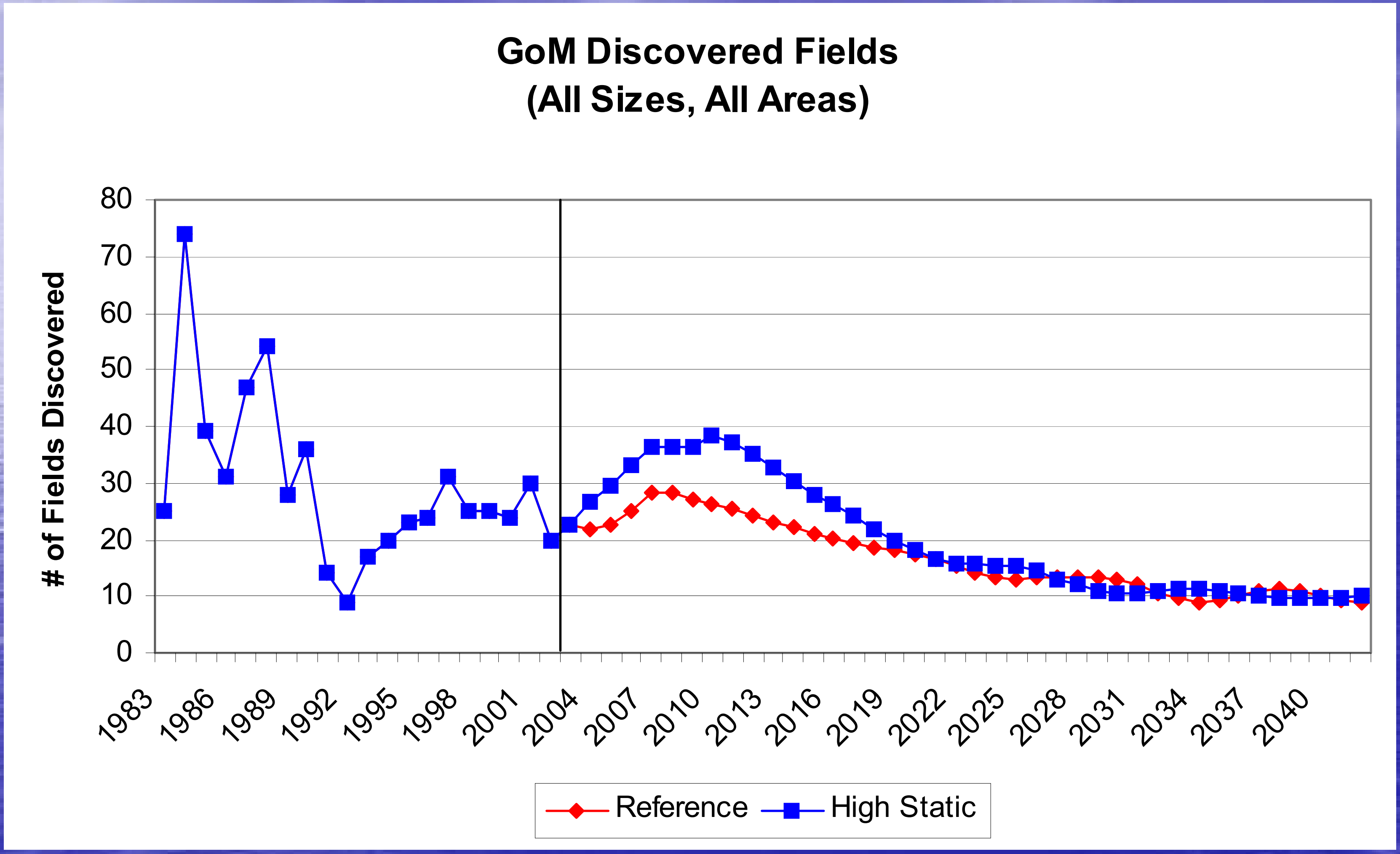
Price Forecast Results

Summary of Impacts Under Different Price Scenarios

	Reference	High Static	High Spike
Exploratory Wells Drilled	7,607	9,837	8,195
% Increase From Reference		29.3%	7.7%
Fields Discovered	672	792	704
% Increase From Reference		17.9%	4.7%
Reserves Discovered (mmBOE)	49,005	57,137	51,263
% Increase From Reference		16.6%	4.6%
Oil Production from Forecasted Discoveries (mmBOE)	16,356	20,383	18,577
% Increase From Reference		24.6%	13.6%
Gas Production from Forecasted Discoveries (Bcf)	96,521	117,065	107,675
% Increase From Reference		21.3%	11.6%

Cumulative Impacts to 2042

Price Forecast Results



Alternative Royalty Initiatives

- Applied on annual lease sales beginning in 2003
- Deepwater Royalty Relief Act (DWRRA)
  - Field-level suspension volumes
    - 200-400 meters: 17.5 mmBOE
    - 400-800 meters: 52.5 mmBOE
    - 800 meters and greater: 87.5 mmBOE
- "Current" DWRR program
  - Lease-based suspension volumes
    - 400-800 meters: 5 mmBOE
    - 800-1600 meters: 9 mmBOE
    - 1600 meters and greater: 12 mmBOE
- No future relief

Alternative Royalty Initiatives Results

Summary of Impacts Under Different Deepwater Royalty Relief Programs

Royalty Regime	Grown Reserves Discovered (mmBOE)	Total Production from New Discoveries (mmBOE)	Present Value Total Royalty Revenue from New Discoveries ($ millions)
Original DWRR	49,005	33,531	$16,114
% Change from No Relief	2.1%	2.5%	-17.7%
Current DWRR	48,692	33,281	$17,504
% Change from No Relief	1.4%	1.8%	-10.6%
No Relief	47,999	32,706	$19,580

Cumulative Impacts to 2042

Future Research and Other Applications

- Sustained high prices ($60-$70 per barrel)
  - NPV concerns with historical fits
  - Re-calibration of model algorithms depending on drilling/discovery events (2003-2007)
- Deep gas initiatives
  - Shallow water initiatives
  - How to segregate "areas" (drilling depth)?
- Use Lease Distributions
  - Expand set "lag" for royalty initiatives
- Global expansion
  - Assist government agencies in looking at Offshore regions
  - Tailor to specific oil company areas, expectations

Conclusions and Acknowledgements

- High resource prices (oil and gas)
  - Lead to increase in expected exploration activity
  - Higher field feasibility – increased production
- Price shock
  - Leads to a "bump" in exploration, development, production activity
  - In reality, dependent on expectations?
- Royalty Initiatives
  - Stimulate exploration, development, production activity
  - Trade-off in reserves discovered and royalty revenue
  - Helps the marginal fields achieve profitability
- Acknowledgements

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