ECONOMIC RANKING OF NORTH AMERICAN GAS BASINS

1st Edition

A Multi-Client Study

Pages: 92
Figures: 64
Tables: 23
Basins Assessed: 24
Over Plays: 85
LNG Regions: 3

Spring 2008

ziff ENERGY GROUP
Global Energy Advisors

06GC-6002-10

180, 6025 - 11th Street S.E. Calgary, Alberta T2H 2Z2
Tel: (403) 234-4299 Fax: (403) 261-4631
E-mail: bill.gwozd@ziffenergy.com
Toll Free 1-800-853-6252, local 299

4295 San Felipe, Suite 350 Houston, Texas 77027
Tel: (713) 627-8282 Fax: (713) 627-9034
E-mail: paul.ziff@ziffenergy.com
Toll Free 1-888-736-5780

CONFIDENTIALITY

This Study has been prepared by Ziff Energy Group and contains confidential information. Copyright to this Study is held exclusively by Ziff Energy Group. The Study is provided to you strictly for your *internal company use* on the basis that your company and its employees maintain its confidentiality, and it may not be used for any other purposes. The Study may not be reproduced, distributed, transmitted or presented, in whole or in part, in any form whatsoever to any party outside of your company, without the express written consent of Ziff Energy Group.

The data contained in this Study, although believed to be accurate, are not warranted or represented by Ziff Energy Group to be so. Ziff Energy Group expressly disclaims all responsibility for, and liability in respect of all loss and/or damage howsoever caused, including consequential, economic, direct or indirect loss, to any party who relies on the information contained in the Study.

ECONOMIC RANKING
OF NORTH AMERICAN GAS BASINS

TABLE OF CONTENTS

SUMMARY

Introduction

While natural gas prices are transparent at major marketing hubs across North America, a key question remains outstanding. What are the full cycle costs for new gas in the various traditional gas basins and especially the promising new gas sources: onshore, offshore, frontier, and imported LNG? The answer is critical to assess North American new gas supply dynamics, where most activity is developing Unconventional Gas.

To address this question, Ziff Energy uses its widely recognized specialty knowledge gained from two decades of producer Finding and Development Cost assessments, numerous in-depth gas basin operating cost studies, gas supply analysis, key regional producer interviews, investor presentations, and industry research. The analysis covers full cycle costs for 6 new gas types[1]:

- Conventional Gas
- Tight Gas
- Coalbed Methane
- Shale Gas
- Offshore and Frontier Gas
- LNG.

The study helps producers prioritize which gas basins to focus on. Many of the gas basins provide full cycle costs for several play types.

Scope of Multi-client Assessment

The multi-client assessment is organized into:

- a summary of the full cycle gas costs for each of the 2 dozen production areas analysed, providing an 'apple to apple' comparison of full cycle costs for new gas supply
- a detailed assessment of each basin's new gas supply cost grouped into the 6 gas types
- for completeness, Ziff Energy includes a brief summary of the initial project description and related company literature in Appendices B and C.

Figure 1.1
Cost Components

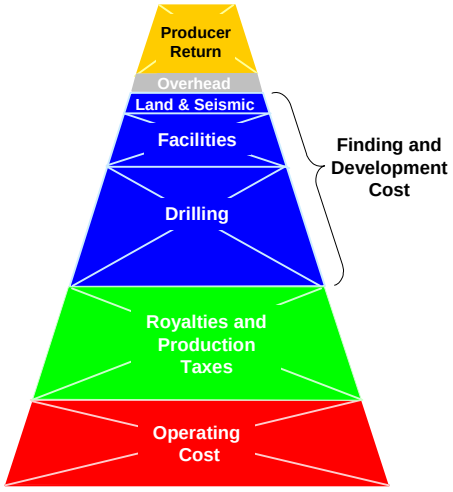

Figure 1.1 presents the cost categories used in the report:

- Operating Costs to the point of gas sale
- Royalties and Production Taxes
- Finding and Development capital costs and the ultimate recoverable reserves, with an allowance for dry holes (success rate varies between explorers)
- Overhead includes all general and administrative expenditures
- Ziff Energy calculated a 15% before income tax rate producer rate of return.

[1] Ziff Energy excludes analysis on Gas Hydrates and Offshore west Canada due to the 10 to 15+ years to develop

Gas Basins Analysed

Table 1.1 provides a matrix of the gas areas assessed and supply types, allowing a client to identify similar gas types.

Table 1.1
Matrix of Gas Types and Basins Evaluated

	Basin	Gas Type				
		Conventional Onshore	Tight Gas	Coalbed Methane	Shale Gas	Offshore and Frontier
1	Western Canada	✓ (4)	✓	✓	✓	
US ONSHORE						
2	Arkoma	✓	✓		✓	
3	Anadarko	✓				
4	Hugoton	✓				
5	Appalachia	✓				
6	Permian Basin	✓				
7	Greater Green River		✓			
8	Uinta		✓			
9	Piceance		✓			
10	East Texas		✓			
11	North Louisiana		✓			
12	South Texas		✓			
13	Powder River			✓		
14	San Juan			✓		
15	Raton			✓		
16	Barnett Shale (Ft. Worth)				✓	
17	Fayetteville Shale				✓	
OFFSHORE NORTH AMERICA						
18	GOM Deepwater					✓
19	Deep Shelf					✓
20	Shelf					✓
21	East Coast Canada					✓
FAR NORTH						
22	Alaska North Slope					✓
23	Mackenzie Delta					✓
LNG						
24	LNG Atlantic Basin					✓
25	Pacific Basin					✓
26	Middle East					✓

Figure 1.2 illustrates that the *gas basins* studied and analysed represent *about 90%* of recent North American gas production. Where appropriate, Ziff Energy divides some gas basins into smaller areas. For example, Western Canada is divided into 6 sections: Deep, Foothills, Tight Gas, Medium Depth, Shallow, and CBM. The Gulf of Mexico is allocated into the Deepwater, and the Shelf.

Figure 1.2
North American Gas Basins Analysed (Bcf/d)