



Connecting Western Supply to Downstream Markets

A Multi-Client Study

Pages: 55

Figures: 47

Tables: 2

February 2011

ziff

**ENERGY
GROUP**

Global Energy Advisors

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 ext.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

11GC-2006-02

COPYRIGHT NOTICE

Reprint only with express written permission from Ziff Energy Group.

All ownership rights, title, and other property rights to all text, image and other materials contained or displayed in this Ziff Energy Group document, specifically “Connecting Western Supply to Downstream Markets” belongs to Ziff Energy Group and constitutes valuable intellectual property. No material from any part of this document is authorized or intended by Ziff Energy Group to be assigned or licensed to any party and may not be downloaded, transmitted, broadcast, reproduced, or in any other way used or otherwise disseminated in any form, in whole or in part to any person or entity. All unauthorized duplication or any other use of this document including, but not limited to publishing in whole or in part, excerpting portions for presentations, shall constitute intentional infringement(s) of Ziff Energy Group intellectual property and shall further constitute a violation of our trademarks, copyrights, and other rights, including, but not limited to, rights of privacy. Without further notice we will prosecute to the fullest extent allowed by law.

CONFIDENTIALITY AND NON-DISCLOSURE NOTICE

This Study has been prepared by Ziff Energy Group and constitutes Ziff Energy Group's Confidential Information. The Study is provided to Sample Co. (Company) strictly for its' internal company use on the basis that the Company and its employees, officers, contractors, and any other party receiving this Study by the Company maintain its confidentiality.

The Company shall be responsible in all cases for the enforcement of this Confidentiality requirement and shall bear all liability for any violations of this provision by its subsidiaries, affiliates, joint ventures, consultants, agents, third party contractors and related persons or entities that are controlled by or under common ownership and control of the Company.

WARRANTY

The data contained in this Study, although believed to be accurate, is 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.

CONNECTING WESTERN SUPPLY TO DOWNSTREAM MARKETS

TABLE OF CONTENTS

| Section | Page |
|---|------|
| INTRODUCTION..... | 1 |
| CONCLUSIONS..... | 2 |
| Opening the Door..... | 2 |
| Western Canada..... | 2 |
| Gas Basis..... | 2 |
| Eastern Canada..... | 2 |
| WESTERN CANADA..... | 3 |
| Gas Supply to 2025..... | 3 |
| Production by Strategy Area..... | 4 |
| Competiveness of Western Canada Gas Supply Costs..... | 5 |
| Production by Type..... | 6 |
| Conventional Gas..... | 6 |
| Unconventional Gas..... | 7 |
| Shale Gas..... | 8 |
| Tight Gas..... | 9 |
| Alberta Tight Gas - Development Entity No. 2..... | 10 |
| CBM (Coalbed Methane)..... | 11 |
| Other Potential Western Canada Gas Supply..... | 12 |
| Northern Gas..... | 13 |
| Alaska..... | 13 |
| Mackenzie Delta..... | 13 |
| Other Potential Frontier Supply..... | 13 |
| Gas Demand 2025..... | 14 |
| Alberta Oil Sands..... | 15 |
| Alberta Power Generation..... | 16 |
| Alberta Nuclear Options..... | 16 |
| Forecast of Western Canada Gas Disposition to 2025..... | 17 |
| Flows Out of Western Canada..... | 17 |
| Kitimat LNG Export..... | 18 |
| Drivers..... | 18 |
| Timetable..... | 19 |
| Long-Haul Tolls Forecast – Business As Usual..... | 20 |
| Pipeline Toll Methodology..... | 20 |
| TransCanada Empress to Dawn Toll to 2018..... | 20 |
| Tolls Comparison to Alliance and Northern Border..... | 22 |

| | |
|---|--------|
| GAS BASIS DIFFERENTIAL TO 2018 – BUSINESS AS USUAL | 23 |
| Basis Summary..... | 23 |
| AECO-NIT – Henry Hub..... | 24 |
| Dawn – Henry Hub..... | 24 |
| Chicago – Henry Hub..... | 25 |
| Niagara – Henry Hub | 25 |
| Iroquois – Henry Hub | 26 |
| Stranded Pipeline Effect on Western Canada Supply..... | 27 |
| EASTERN CANADA..... | 29 |
| New Supply on the Doorstep to 2025 | 29 |
| Quebec Shale Gas..... | 30 |
| Marcellus and Appalachia | 31 |
| Rockies Supply via REX..... | 32 |
| Ontario Gas Production..... | 32 |
| East Coast Canada | 33 |
| LNG via Canaport™ LNG Facility | 34 |
| Gas Demand to 2025..... | 35 |
| Ontario and Quebec..... | 35 |
| Ontario Power Generation..... | 36 |
| Demand Pull From the U.S. Northeast – Stacking the Supply | 37 |
| Transportation Challenges..... | 38 |
| Business as Usual Results in Prohibitive Tolls..... | 38 |
| Potential to Strand the Dawn Hub | 38 |
| Potential to By-Pass the Eastern Zone..... | 39 |
| OPENING THE DOOR TO ATTRACT SUPPLY..... | 41 |
| Ziff Energy’s Concept to Reconfigure TCPL System | 42 |
| Attractive Eastern Zone | 43 |
| Proposals to Link New Supply to the Eastern Zone | 44 |
| Iroquois Pipeline..... | 44 |
| National Fuel Pipeline | 44 |
| Tennessee Pipeline..... | 44 |
| Cost of Delivering Marcellus to U.S. Northeast via Dawn..... | 45 |
| Making TransCanada Long-Haul Tolls Competitive | 46 |
| Tolls Comparison to Alliance Pipeline and Northern Border..... | 47 |
| Enhancing the Eastern Gas Storage Hub | 48 |
| Dawn Storage | 48 |
| Michigan Storage | 49 |
| APPENDIX A – REVENUE REQUIREMENT ASSUMPTIONS | 51 |
| APPENDIX B – GAS SUPPLY, DEMAND & EXPORT | 52 |
| APPENDIX C: OVERVIEW OF ZIFF ENERGY | 53 |
| Ziff Energy’s Gas Team | 54 |

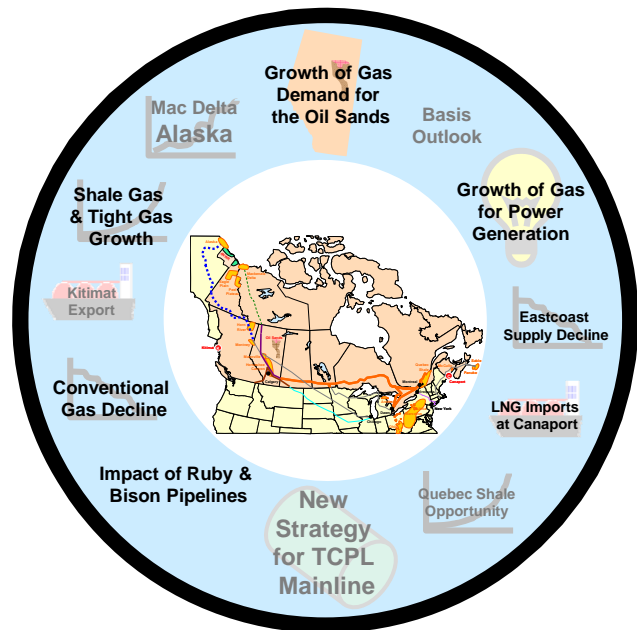
INTRODUCTION

Industry dynamics are influencing transportation tolls to downstream markets. Growing supply from unconventional gas contrasts with declines in traditional Western Canada supply sources. New legislation for gas fired power generation, growth of gas requirements for Alberta oil sands projects, and proposed LNG exports will result in less gas for long haul transport and a direct impact on transport tolls. The Ruby and Bison pipelines will push gas back into Western Canada with a negative impact on AECO-NIT basis. Supply growth in non-traditional areas such as the Marcellus Shale and in Quebec provides downstream markets with enhanced access and choice.

Figure 1 summarises the fundamental gas issues influencing the TransCanada Mainline Toll. This study assesses midterm (next 8 to 15 years) supply, demand, transport tolls, storage, and basis differentials. Implications of the status quo on long haul transportation tolls are examined and Ziff Energy's concept for reconfiguring the TransCanada Pipeline System is offered. The study is comprised of 4 sections:

1. Western Canada gas supply and demand to 2025
 - gas supply & demand – oil sands, power generation, and potential LNG exports
 - transport and basis outlooks to 2018
2. Gas Basis Differential Forecast to 2018 – business as usual on TransCanada
 - AECO-NIT, Dawn, Chicago, Niagara & Iroquois Basis Differentials
3. Eastern gas supply & demand to 2025
 - growth of Shale Gas and gas demand for power generation
 - TransCanada tolls forecast assuming status quo
4. Opening the Door to New Opportunities
 - Ziff Energy's suggestion for TransCanada toll design and reconfiguration
 - attracting new gas to Dawn, examination of bypass, and transportation proposals
 - enhancing Dawn Hub, short haul transportation, and gas storage.

Figure 1
Overview of Gas issues



Ziff Energy's Gas Team



Paul Ziff – CEO, founded Ziff Energy Group in 1982 and co-led the international expansion of Ziff Energy Group, which is now active in 35 countries. He conceptualized the theme of ‘World Asset Types’. Mr. Ziff has three decades of assessment experience for the oil and natural gas industry. A specialist on natural gas industry strategies and upstream corporate performance, Mr. Ziff conceived and directed a wide range of benchmarking studies and consulting projects in upstream corporate performance. Prior, he directed energy research for a major investment firm, gas pricing analysis for a key Alberta government agency, and energy lending analysis for a major bank. Mr. Ziff is an honors graduate of Harvard University, and attended the Université de Paris (Sorbonne) and the Institut d’Études Politiques.



W.P. (Bill) Gwozd, P.Eng. – Vice President, Gas Services, has over three decades of natural gas experience regarding gas supply contractual purchases and gas storage strategies, directing gas control functions for transportation contractual arrangements, and preparing written regulatory applications. Other experience includes transportation planning of natural gas liquids pipelines and storage facilities. Mr. Gwozd oversees forecast assessments, semi-annual client debriefings, and our expert witness testimony service offerings. Focus is on long-term natural gas price outlooks for LNG, LDC, Pipeline, power, and acquisitions. Mr. Gwozd is a frequent guest contributor to various TV stations, radio, newspapers, and magazines.



Edward Kallio – Director, Gas Consulting, has over three decades of gas industry experience in trading, marketing, portfolio management, supply, forecasting and policy analysis in the private and public sectors. Mr. Kallio’s experience includes analysis of pipeline rate applications, economic analysis of major domestic and cross-border gas transactions and contracts, and negotiation of storage, transportation and supply arrangements. He has advised clients with respect to natural gas and electricity supply transactions and hedging programs. Mr. Kallio has traded natural gas in several North American gas supply basins and managed production and supply portfolios in eastern and western Canada and the U.S. He has advised Canadian and U.S. companies with respect to deregulation of retail energy markets. At Ziff Energy, Mr. Kallio conducts analyses of gas and liquids issues and fundamentals and leads client presentations and briefings.



Simon Mauger, P.Geol. – Director, Gas Supply and Economics, has three decades of experience in the upstream oil and gas industry as an exploration and development geologist in the Western Canadian Sedimentary Basin and other locations. Mr. Mauger planned, evaluated, and economically modeled gas resources for a leading international exploration and production company; prepared and optimized long term gas supply plans for growing gas markets; and developed the regional exploration component of the North American integrated natural gas strategy. Mr. Mauger develops a gas supply outlook for each North American gas producing region, authors technical research reports on supply, demand, and transport, issues, and assesses gas costs of North American gas basins.



Cameron Gingrich, B.Sc., B.A. – Senior Manager, Gas Services, has a decade of natural gas experience. Responsible for analytical support and in-depth customized data analysis, trending, and modeling. Focuses effort toward the North American Gas Strategies Retainer Service, multi-client studies, and custom consulting projects include: analysis of pipeline tolls, gas supply/storage load duration modeling, gas demand outlooks, and gas price modeling. Mr. Gingrich was the lead analyst on the Northern Gas and Evolution of Dawn Multi-client studies, and authored papers on: Summer Gas Storage Analysis, Canadian Gas Exports to 2025, Natural Gas Price Forecast to 2045, and LNG Outlook to 2035. In addition to the Canadian Securities Course, Mr. Gingrich has two degrees: a Bachelor of Science from the University of Alberta and a Bachelor in Arts in Economics from the University of Calgary where his studies focused on strategic energy and financial markets.



Dr. Lev Virine, P.Eng. – Lead Analyst, has over 2 decades of technical experience, economic evaluation of oil and gas reserves, decision and risk analysis, portfolio management, and oil and gas reserves management. He assisted leading national and international exploration and production companies in establishing reserves evaluation and decision analysis processes. Dr. Virine is the author of more than 40 scientific papers and articles, 7 patents, and two books. His current focus is gas production outlooks, gas supply decline analysis, and full cycle cost assessment. He has spoken at conferences and symposiums around the world. Dr. Virine received his doctoral degree in engineering and computer science from Moscow State University of Railway Engineering.



Zuzana Jurickova – Gas Analyst, for the past half dozen years, has assisted with projects in the areas of gas supply and demand research and forecasting analysis. Over this period she has worked on the Western Canada Reserve Replacement (F&D) Cost Study, a study on North American Cost Inflation for a major producer, and a study of North American pipeline expansions for a major steel producer. She is currently working on North American Gas Supply costs for 20 basins (and LNG). Prior to joining Ziff, Ms. Jurickova worked in corporate credit and finance. Ms. Jurickova obtained her five-year Degree in Economics from University of Economics in Bratislava, Slovakia.



Julia Sagidova – Gas Analyst, is responsible for gas supply (including LNG import/export analysis), gas demand, gas transport, gas storage, and gas price data management for the Gas Services team. Client project activity pertains to analysis of natural gas fundamentals and supporting analytics for North American regional multi-client gas studies, the North American Gas Strategy retainer service, and in-depth client consulting projects. Prior experience in petroleum economics and analysis of gas supply issues, along with pricing, forecasting, and analyzing gas market trends. Julia holds a Master's degree in Economics from University of Calgary.