A STRATEGIC ANALYSIS OF MARKET OPPORTUNITIES FOR A PORTABLE POWER PROVIDER

by

Bernard Maroney
B.S.Engr., University of Oklahoma, 1984
B.S.C.E., University of Oklahoma, 1986

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF BUSINESS ADMINISTRATION

In the Faculty of Business Administration

MBA-Management Of Technology

© Bernard Maroney 2006

SIMON FRASER UNIVERSITY

Fall 2006

All rights reserved. This work may not be reproduced in whole or in part, by photocopy or other means, without permission of the author.
Approval

Name: Bernard Maroney

Degree: Master of Business Administration

Title of Project: A strategic analysis of market opportunities for a portable power provider

Supervisory Committee:

Aidan Vining, Ph.D.
Senior Supervisor
CNABS Professor of Business and Government Relations
Faculty of Business Administration

Ed Bukszar, Ph.D.
Second Reader
Associate Professor, Associate Dean, Segal Graduate School of Business and Graduate Programs
Faculty of Business Administration

Date Approved: November 28, 2006
DECLARATION OF
PARTIAL COPYRIGHT LICENCE

The author, whose copyright is declared on the title page of this work, has granted to Simon Fraser University the right to lend this thesis, project or extended essay to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users.

The author has further granted permission to Simon Fraser University to keep or make a digital copy for use in its circulating collection (currently available to the public at the "Institutional Repository" link of the SFU Library website <www.lib.sfu.ca> at: <http://ir.lib.sfu.ca/handle/1892/112>) and, without changing the content, to translate the thesis/project or extended essays, if technically possible, to any medium or format for the purpose of preservation of the digital work.

The author has further agreed that permission for multiple copying of this work for scholarly purposes may be granted by either the author or the Dean of Graduate Studies.

It is understood that copying or publication of this work for financial gain shall not be allowed without the author's written permission.

Permission for public performance, or limited permission for private scholarly use, of any multimedia materials forming part of this work, may have been granted by the author. This information may be found on the separately catalogued multimedia material and in the signed Partial Copyright Licence.

The original Partial Copyright Licence attesting to these terms, and signed by this author, may be found in the original bound copy of this work, retained in the Simon Fraser University Archive.

Simon Fraser University Library
Burnaby, BC, Canada

Revised: Fall 2006
STATEMENT OF ETHICS APPROVAL

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

(a) Human research ethics approval from the Simon Fraser University Office of Research Ethics,

or

(b) Advance approval of the animal care protocol from the University Animal Care Committee of Simon Fraser University;

or has conducted the research

(c) as a co-investigator, in a research project approved in advance,

or

(d) as a member of a course approved in advance for minimal risk human research, by the Office of Research Ethics.

A copy of the approval letter has been filed at the Theses Office of the University Library at the time of submission of this thesis or project.

The original application for approval and letter of approval are filed with the relevant offices. Inquiries may be directed to those authorities.

Simon Fraser University Library
Burnaby, BC, Canada
Abstract

This paper provides a strategic analysis of stated market opportunities for a distributor/manufacturer of portable power generators. Detailed study of customer segments and an industry analysis is performed, with a limited internal organizational analysis. Results show a need for the firm to demonstrate core competencies in relationship management, externally with customers and supply partners while internally in team sales management. Derived demand shows promise, requiring customer segment aggregation to identify long-term sales opportunities. Penetration advances from recruiting and retaining personnel with team sales experience, establishing brand with learned product and market knowledge. Strategy definition must include aligning goals with all stakeholders' perspectives using focused metrics. Development of sales proficiencies and supply chain security will require increased cash flow to instill customer loyalty in key geographic markets and customer segments.
Acknowledgements

I would like to thank:

- Mr. Clayton McAllen of Allinda PowerGen for his permission to perform this analysis of his firm for my MBA final project, and for his cooperation and wisdom as a vital source of information.

- Dr. Aidan Vining, Dr. Colleen Collins-Dodd, and Dr. Ed Bukszar of the Segal Graduate School of Business at Simon Fraser University for their counsel and guidance in preparing, editing, and completing this project.

- Mr. Anthony Durocher for his knowledge and insight in helping me understand the operational aspects of Allinda PowerGen, and the scope of their undertaken projects.

- Mr. Brent Powers of Alberta Governor Services, Ltd. for his assistance and information in understanding providers to the oil and gas fields of the WCSB.

- Mr. Larry Meyer, Mr. Derek Henriques, and Mr. Jeff Barker of BC Hydro for their assistance in understanding power demand load and providing statistics for use in this project, and Dr. Peter Flynn of the University of Alberta for providing the introduction to Jeff Barker for these purposes.

- The Canadian Society for Unconventional Gas (CSUG), National Research Council of Canada (NRC), National Energy Board (NEB), Alberta Energy and Utilities Board (AEUB), BC Hydro, and the Alberta Department of Energy for allowing me to use their graphics.

I would especially like to thank Dr. Elicia Maine, Dr. Ed Bukszar, Dr. Carolyn Egri, Mr. Ian Hand, Dr. Colleen Collins-Dodd, Dr. Michael Brydon, Dr. Ian McCarthy, and Mr. Jan Kietzmann for sharing their wisdom and encouraging me to pursue risks and challenge myself in completing this degree program.
# Table of Contents

Approval ........................................................................................................................................ ii
Abstract .......................................................................................................................................... iii
Acknowledgements ...................................................................................................................... iv
Table of Contents .......................................................................................................................... v
List of Figures ................................................................................................................................. vii
List of Tables .................................................................................................................................... ix
Glossary ........................................................................................................................................... x

1.0 Allinda Today ............................................................................................................................. 1
  1.1 Allinda Inc. ............................................................................................................................. 1
    1.1.1 Allinda PowerGen ......................................................... 1
    1.1.2 Allinda Principals ......................................................... 3
  1.2 APG Opportunities .......................................................................... 3
  1.3 APG Products and Supply Chains ................................................................. 5
    1.3.1 Power Generators .............................................................. 5
    1.3.2 Industrial Engines .............................................................. 15
    1.3.3 Other APG Products ........................................................... 17
  1.4 Analysis of APG’s Markets ........................................................................... 18
    1.4.1 APG’s Demand ................................................................. 18
    1.4.2 Segmentation of APG’s Customers ............................................. 25
    1.4.3 Competitors of APG ............................................................ 59
  1.5 Product-Customer Analysis ......................................................................... 64
    1.5.1 APG Product-Customer Matrices ............................................. 65
    1.5.2 Industry Product-Customer Matrices ........................................... 66
  1.6 Analysis of the Portable Power Generator Industry .................................. 69
    1.6.1 Rivalry among Generator Industry Competitors ......................... 72
    1.6.2 Bargaining Power of Generator Industry Suppliers ......................... 77
    1.6.3 Bargaining Power of Generator Customers .................................... 79
    1.6.4 Threat of Entry of New Competitors in the Generator Industry ........... 80
    1.6.5 Plausible Competition from Substitutes to Generators ..................... 82
1.7 Internal Analysis of APG Resources .......................................................... 82
  1.7.1 APG's Fixed Resources ..................................................................... 83
  1.7.2 APG Human Resources ..................................................................... 84
  1.7.3 APG's Intangible Resources ............................................................... 85
  1.7.4 APG's Technological Resources ......................................................... 86
1.8 Financial Performance of Allinda .............................................................. 86
  1.8.1 Allinda's Financial History .................................................................. 86
  1.8.2 Current Financial Status of Allinda .................................................... 89
  1.8.3 Allinda's Cash Flow .......................................................................... 91
  1.8.4 Allinda's Stated Prospectus ................................................................. 93
1.9 APG's Strategy ........................................................................................ 94
  1.9.1 Allinda Corporate Strategy ................................................................. 94
  1.9.2 APG's Competitive-Level Strategy ...................................................... 95
2.0 Assessment ............................................................................................... 96
  2.1 Industry Assessment ............................................................................. 97
  2.2 Assessment of APG's Defined Customer Segments ................................. 99
  2.3 Assessment of APG's Products and Supply Chains ................................. 100
  2.4 APG's Sales and Demand ..................................................................... 102
  2.5 APG's Financial Status .......................................................................... 104
  2.6 Expected Performance under APG's Current Strategy............................ 105
3.0 Solutions for APG .................................................................................... 106
  3.1 Defining Customer Segments ................................................................. 106
  3.2 APG's Sales and Marketing ................................................................. 108
    3.2.1Knowing Demand ............................................................................. 108
    3.2.2 Sales Force Management ................................................................. 110
  3.3 Measuring Progress .............................................................................. 111
    3.3.1 Benchmarking APG ......................................................................... 111
    3.3.2 Setting a Balanced Scorecard ........................................................... 113
    3.3.3 Multi-Goal Analysis ......................................................................... 116
  3.4 Expected Impacts of Solutions ............................................................... 117
  3.5 Implementation of Recommended Solutions for APG ........................... 118
4.0 Bibliography ............................................................................................. 119
List of Figures

Figure 1-1: Ingersol Rand 125 kW power generator with John Deere engine (open, non-sound attenuated) ................................................................. 6
Figure 1-2: New power generator supply chain ............................................. 8
Figure 1-3: APG’s ALLINEX power generator supply chain ................................. 9
Figure 1-4: Used power generator supply chain .............................................. 12
Figure 1-5: APG’s custom-built power generator supply chain ............................. 14
Figure 1-6: APG’s engine supply chain .......................................................... 17
Figure 1-7: Market prices for natural gas, 2004 – 2007 (projected) ....................... 26
Figure 1-8: Conventional gas production rate and cumulative production in Canada, 1998 – 2007 (projected) .......................................................... 27
Figure 1-9: Major coal and coal bed methane deposits in North America .......... 29
Figure 1-10: Western Canada Sedimentary Basin ............................................. 30
Figure 1-11: Illustration of well depths of “dry” vs. “wet” gas wells vs. water injection wells .................................................................................. 31
Figure 1-12: Coal formations in Alberta with potential for CBM .......................... 32
Figure 1-13: Existing CBM well locations in Alberta, January 2005 .................... 33
Figure 1-14: The Midale Play Area of heavy oil in the Carboniferous zone ........ 38
Figure 1-15: Recoverable heavy oil volume in Carboniferous plays .................. 38
Figure 1-16: The Shaunavon Play Area of heavy oil in the Jurassic zone .......... 39
Figure 1-17: Cretaceous zone heavy oil play areas ......................................... 40
Figure 1-18: Map highlighting the Lloydminster Region of the Cretaceous zone .... 41
Figure 1-19: Recoverable heavy oil volume in Cretaceous plays ....................... 42
Figure 1-20: Current and predicted daily heavy oil production rates in the WCSB .... 44
Figure 1-21: BC Hydro availability as percentage of time for all customers, 2002-2006 ................................ .................................................. 49
Figure 1-22: BC Hydro average interruption duration, 2002-2006 ...................... 50
Figure 1-23: Solution gas conserved, flared, and vented in Alberta, 1993-2005 .... 53
Figure 1-24: Reductions in gas flared or vented in Alberta .............................. 54
Figure 1-25: Total volume of solution gas vented in Alberta from all resource sources .................................................................................. 55
Figure 1-26: Past and projected well count and annual drill days in the WCSB, 2000-2007 ............................................................................... 57
Figure 1-27: Projected conventional gas and CBM connections in the WCSB, 2005-2007 ............................................................................... 58
Figure 1-28: Competitor Product-Customer Matrix for generator and engine providers serving the oil and gas fields in the WCSB ............................. 67
Figure 1-29: Diagram of Porter’s Five Forces of the portable power generator and engine industry in the oil and gas fields .............................................. 71
Figure 1-30: Rivalry among existing competitors in the generator industry .......... 72
Figure 1-31: Bargaining power of suppliers to the generator industry .................. 77
Figure 1-32: Bargaining power of customers of the generator industry ................. 79
Figure 1-33: Threat of entry of new competitors in the generator industry .......... 81
Figure 1-34: Threat of substitutes being adopted by customers of the generator industry ................................................................................................. 82
Figure 1-35: Allinda quarterly Profit & Loss, 2004 – 2006, in thousands of dollars ($000s) .................................................................................................................. 87
Figure 1-36: Allinda quarterly Assets / Net Worth, 2004 – 2006, in $000s .......... 88
Figure 1-37: Allinda Net Income 2006, in $000s ................................................. 89
Figure 1-38: Allinda key financial ratios, 2004 – 2006 .......................................... 90
Figure 1-39: Allinda quarterly cash flow, 2004 – 2006, in $000s ....................... 92
Figure 1-40: Allinda monthly cash flow (current and forecast), in $000s .......... 93
Figure 1-41: Allinda annual Net Income, 2004 – 2007 prospectus, in $000s ... 94
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>APG new generator product line</td>
<td>7</td>
</tr>
<tr>
<td>1-2</td>
<td>Sample list of APG used generator product line</td>
<td>11</td>
</tr>
<tr>
<td>1-3</td>
<td>Sample list of APG custom-built generators</td>
<td>13</td>
</tr>
<tr>
<td>1-4</td>
<td>Sample list of APG engines</td>
<td>16</td>
</tr>
<tr>
<td>1-5</td>
<td>NEB calculations of heavy oil resources in the Carboniferous zone</td>
<td>37</td>
</tr>
<tr>
<td>1-6</td>
<td>NEB calculations of heavy oil resources in the Jurassic zone</td>
<td>39</td>
</tr>
<tr>
<td>1-7</td>
<td>NEB calculations of heavy oil resources in the Cretaceous zone</td>
<td>40</td>
</tr>
<tr>
<td>1-8</td>
<td>Summary of heavy oil in the WCSB</td>
<td>43</td>
</tr>
<tr>
<td>1-9</td>
<td>Heavy oil pools in plays within APG geographic target segments</td>
<td>45</td>
</tr>
<tr>
<td>3-1</td>
<td>Sample Balanced Scorecard indicators for APG</td>
<td>116</td>
</tr>
</tbody>
</table>
## Glossary

**Alternator**  
Generator component which converts engine thrust to electrical power.

**Attenuated**  
Sound-controlled by means of an insulated cover or encapsulation.

**Carboniferous zone**  
NEB classification of the sedimentary deposits in the WCSB estimated to have formed during the Carboniferous time period, from roughly 359 million years ago (Ma) to 299 Ma.

**Coal-bed methane (CBM)**  
Methane, or "natural gas," found between the seams of coal beds. Also called Natural Gas from Coal (NGC); CBM is gaining prominence in North American lexicon.

**Connection**  
A successful exploration well site; when a drilled well site produces the intended resource and converts to resource production.

**Connection ratio**  
The ratio of successful exploration well sites to total sites drilled; the number of connections to total drilled well sites.

**Conventional gas**  
Natural gas trapped by hydrodynamic processes, with a well-defined gas-water contact at the base of accumulation, which enables discrete accounting of reserves. *(Source: US Geological Survey, www.usgs.gov)*

**Cretaceous zone**  
NEB classification of the sedimentary deposits in the WCSB estimated to have formed during the Cretaceous time period, from roughly 146 million years ago (Ma) to 136 Ma.

**Cryogenic treatment**  
Cryogenic treatment is intense freezing, to low Kelvin temperatures, of materials to improve the tensile strength and hardness, providing wear resistance and dimensional stability.

**Direct drive**  
An oil extraction system where the pump acts like a screw continuously turning which raises the heavy oil out of the ground.

**Eastern Canada**  
Canadian provinces east of the Manitoba-Ontario border.

**EP**  
Engine Packaging, generator "packager," or assembler; a wholly-owned subsidiary of SRC.

**Gas hydrates**  
Natural gas that is hydrated (found mixed with water).

**Gas shales**  
Natural gas pockets found in organic shales.

**Greenfield**  
A method of foreign direct investment (FDI), whereby a firm enters a host market by establishing operations independently (as opposed to by acquisition of or joint venture with a host firm). The term is a metaphor to 'building upon a green field,' or building the firm from scratch.
Heavy oil  
Crude oil with a ‘heavy’ density of greater than 900 kg per cubic metre. Heavy oil differs from ‘light’ oil since it “is not recoverable in its natural state by ordinary production methods,” often requiring heat or another diluting method to allow it to flow through a pipeline. Heavy oil is often extracted using Top Drive methods. *(Source: Canadian Centre for Energy, www.centreforenergy.com)*

Jurassic zone  
NEB classification of the sedimentary deposits in the WCSB estimated to have formed during the Jurassic time period, from roughly 200 million years ago (Ma) to 146 Ma.

Natural gas  
Methane found existing in its natural state in pockets underground.

Naturally Aspirated NGC (Natural Gas from Coal)  
Another name for Coal-bed methane, previously used in Canadian industry, now losing favour in lexicon to CBM.

OEM  
Original Equipment Manufacturer.

Play  
An oil or natural gas exploration or production site, sometimes referred more generally as a locale where potential for wells exists.

Positive Crankcase Ventilation (PCV)  
Engine valve system used to regulate crankcase ventilation; used in conjunction with pumps to utilize the vacuum created by the PCV valve to create a source of pump suction.

Power Take-Off (PTO)  
A mechanism attached to an engine that allows the transfer of torque and power to another device, such as a Direct Drive unit, a pump, or a hydraulic pump or jack.

Prime Power  
Large commercial generators capable of providing primary power to commercial, industrial, or remote facilities, typically 150 kW and larger.

SRC  
System Rebuilding-Columbia, of Columbia, MO.
Remanufacturer of engines, with exclusive supplier agreement with APG.

Tight gas  
Natural gas found in low permeability sandstones or limestone.

Top drive  
A system where the power unit that drives the pump for a well sits at the top of the well. A top drive can be connected to either a hydraulic power pack or a direct drive power unit.

Transfer switch  
An automated control switch which will transfer power to source from the generator when the main power supply falters or fails, and transfers source back to the main supply when it reactivates.
Turbocharged

Engine design where air is compressed prior to mixing with the fuel, providing greater oxygen content to the air-fuel mixture. The turbocharger consists of a turbine driven by the exhaust gas by a pump. This results in stronger power with little gain in weight.

Turbocharged aftercooled

“Aftercooled” refers to cooling the compressed air after turbocharging, thereby further compressing the air (increasing the density as it cools) to provide more charge. A more contemporary term used is “intercooled.”

Unconventional gas

“natural gas that is contained in ‘difficult to produce’ rock formations, which require different or special completion, stimulation, and/or production techniques to retrieve the resource.” (CSUG, 2006).

Western Canada

Canadian provinces west of the Manitoba-Ontario border.

Western Canada Sedimentary Basin (WCSB)

Geographic area in western Canada with rich energy resources due to specific geological phenomena. See map in Figure 1-10, on page 30.
1.0 Allinda Today

1.1 Allinda Inc.

Allinda Inc. (Allinda) was formed in 2003 by former employees of Banks Automation Canada (BAC), a firm that designs and provides automated control systems used in manufacturing systems, such as the semiconductor industry (Banks, 2006). Allinda's initial purpose was to support legacy software products for existing BAC customers, and evolved to provide programming and support to other automation firms in electronics manufacturing (Allinda, 2006a). Allinda is in the process of transforming into a holding company for its two businesses: Allinda Control Services (ACS), consisting of the control automation services; and Allinda PowerGen (APG) (Allinda, 2006b).

1.1.1 Allinda PowerGen

Allinda PowerGen (APG) was created with the purchase by Allinda of Genacqua Industries, a manufacturer and reseller of power generators in April, 2005 (Allinda, 2006c). Genacqua began in 1996, and had been providing power systems (mobile and stationary power generators) from 15 kiloWatts (kW) to 2,000 kW. A typical residence in British Columbia (BC) uses 10,000 kiloWatt-hours (kWh) per year; one kWh is the use of one kW of power for one hour (BC Hydro, 2006a). BC Hydro recorded average demand load of 4.7 kW per residential account during its peak demand hour in fiscal 2004-2005, with the highest regional average residential demand load of 5.4 kW on Vancouver Island (BC Hydro, 2006b). A 15 kW generator is then capable of powering a typical residence even under high demand conditions. The highest regional average demand load per general account during BC Hydro's peak demand hour in fiscal 2004-
2005 was 17.4 kW in the Lower Mainland (BC Hydro, 2006b). A general account consists of commercial or office facilities not classified as industrial. A 2,000 kW generator is deemed capable of providing enough power for a 100,000 total square foot commercial (non-industrial) facility even during peak demand (BC Hydro, 2006b).

Genacqua’s strengths were in sales and marketing, with strong customer relationships management. Genacqua lacked expertise in operations, control systems, and the experience effects of growing beyond their local market. Allinda’s proficiencies in control systems design with many years’ experience growing BAC provides APG with an opportunity to develop a stronger product line to broach new markets.

APG sells, rents, and services power systems, competing by differentiating its product offerings with enhanced control systems capabilities. APG builds custom generators using components supplied by partners, and is developing partnerships with firms to produce greater quantities of standard generator designs using supplied components for emerging niche markets in the oil and gas production industry (McAllen, 2006a). APG has recently entered into an exclusive agreement with an engine remanufacturing firm in the U.S., which will increase APG’s capacity to build generators, and to enter new markets for the engines with non-generator use (such as powering hydraulic pumps). A more detailed examination of APG products is provided in Section 1.3 on page 5.
1.1.2 Allinda Principals

Allinda Inc. is a private Canadian corporation. ACS and APG are separately located in Delta, BC. Allinda is owner-controlled by the four founders (Allinda 2006b), listed in decreasing order of share percentage:

- Larry Michaelsen, President. Mr. Michaelsen is the former Vice-President (VP) and General Manager (GM) of Banks Automation Canada (BAC). He joined BAC when they acquired Techware Systems, which he founded.
- Clayton McAllen, VP Sales and Marketing. Mr. McAllen is the former Director of Marketing of BAC, with over twenty years experience in international sales and marketing.
- James Richards, VP Engineering. Mr. Richards is the former Director of Engineering of BAC, with over twenty years experience in software engineering and management.
- Harald Gerstein, Power Systems Sales. Mr. Gerstein is the former owner of Genacqua Industries, with over thirty years experience in the power generation market.

Ten percent of share ownership is set aside for employee contributions and incentives.

1.2 APG Opportunities

APG has several opportunities available to expand their operations serving the oil and gas production industry, primarily in Alberta. While their choices are many and attractive, limited resources and capacity provoke the need to analyze the opportunities
and prioritize them for profit maximization. APG has narrowed their plausible alternatives to these four markets (Allinda, 2006b; McAllen, 2006a):

1. Natural gas market generator, characterized by:
   a. new drilling sites for unconventional gas (UG)\(^1\), with generator needs of less than 150 kW power, and
   b. the replacement market for existing UG sites using competitors’ generators powered by General Motors (GM)/Arrow engines.

2. The International Harvester 466 (IH466) engine market, characterized by:
   a. applications in the Top Drive market, and
   b. irrigation sites in the oil and gas production industries.

3. The Standby market, where generators are used as backup power sources, characterized by:
   a. high-end residential customers with generator needs of 15 to 30 kW,
   b. small- to mid-size commercial customers with generator needs of 30 to 100 kW, and
   c. large commercial customers with generator needs greater than 100 kW.

4. Prime Power market, characterized by:
   a. heavy oil drilling or production sites,
   b. conventional gas drilling or production sites, and
   c. remote operations, such as lodges, and mining operations.

---

\(^1\) Unconventional Gas (UG) is natural gas extracted from unconventional sources, such as from rock formations where it is more difficult to extract than conventional natural gas sources. A more detailed definition of unconventional gas is provided in Section 1.4.2.1, and is available from the Canadian Society for Unconventional Gas (CSUG), at [http://www.csug.ca/faqs.html#Un](http://www.csug.ca/faqs.html#Un).
APG needs to understand the prospects and constraints of each of these opportunities, in order to prioritize their strategy and focus their operational efforts to maximize profitability within two years. A more detailed analysis of each market is developed in Section 1.4.2, beginning on page 25.

1.3 APG Products and Supply Chains

APG purchases new and used generator components, builds the generators, and provides them to end-users through rental or sales agreements, often with ongoing service agreements attached.

APG offers new generators from many of the largest manufacturers with well-established brands, from three distributors. APG offers used and remanufactured generators (whereby the engines, the alternators, or both have been rebuilt) for sale, rent or lease. APG will custom-build generators for special purposes, such as the Prime Power market, or standby generators for large commercial or industrial facilities.

APG sells remanufactured engines for generators or other uses, such as to power hydraulic pumps or direct drive pump shafts for heavy oil extraction. APG sells new generator components such as alternators and transfer switches separately if desired.

1.3.1 Power Generators

APG sells new, used, remanufactured, and custom-built power generators. Generators consist of two main components: a combustion engine and an alternator that converts the engine thrust to electrical power. APG’s remanufactured and custom-built power generators are built upon remanufactured GM or IH engines that have been
cryogenically treated allowing them to run on natural gas (which burns at a higher temperature) and enable a longer lifespan with longer maintenance cycles.

Figure 1-1: Ingersol Rand 125 kW power generator with John Deere engine (open, non-sound attenuated)

Source: Developed by the author based upon equipment owned by Allinda PowerGen.

1.3.1.1 New Power Generators

APG’s new generators suit many purposes, from portable camp or lodge generators at 3.3 kW and higher, to large commercial applications providing 2000 kW of power. All new generators come complete with full Original Equipment Manufacturer (OEM) warranties, with servicing available through APG or any licensed warranty service provider. A sample list of new generators sold by APG is shown in Table 1-1.
<table>
<thead>
<tr>
<th>Distributor</th>
<th>Manufacturer</th>
<th>Purpose</th>
<th>Fuel type(s)</th>
<th>Low Range High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allinda</td>
<td>Allinda (pkgd by EP) IH 466 engine</td>
<td>Mid – Large commercial / industrial</td>
<td>Diesel Natural gas Attenuated</td>
<td>60 kW to 125 kW</td>
</tr>
<tr>
<td>Baldor</td>
<td>Baldor</td>
<td>Home Standby</td>
<td>Propane Natural gas</td>
<td>8 kW to 25 kW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small – Mid Commercial</td>
<td>Propane Natural gas</td>
<td>30 kW to 125 kW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portable</td>
<td>Diesel</td>
<td>3300 W and 6000 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Towable (trailer-mounted)</td>
<td>Diesel</td>
<td>25 kVA to 175 kVA</td>
</tr>
<tr>
<td>Peco</td>
<td>Peco</td>
<td>Home Standby</td>
<td>Diesel</td>
<td>12 kW to 26 kW</td>
</tr>
<tr>
<td>Peco</td>
<td>Motion Picture</td>
<td>Diesel</td>
<td>600 and 1400 Amp AC</td>
<td></td>
</tr>
<tr>
<td>Volvo</td>
<td>Mid – Large Commercial</td>
<td>Diesel</td>
<td>70 kW to 550 kW</td>
<td></td>
</tr>
<tr>
<td>Cummins</td>
<td>Mid – Large Commercial – Prime Power</td>
<td>Diesel</td>
<td>30 kW to 2000 kW</td>
<td></td>
</tr>
<tr>
<td>Armstrong</td>
<td>Armstrong</td>
<td>Standby – Lg. Commercial – Prime</td>
<td>Diesel Natural Gas</td>
<td>4 kW to 2000 kW</td>
</tr>
<tr>
<td>John Deere</td>
<td>Standby – Lg. Commercial</td>
<td>Diesel Natural Gas</td>
<td>18 kW to 400 kW</td>
<td></td>
</tr>
<tr>
<td>Cummins</td>
<td>Mid – Large Commercial</td>
<td>Diesel</td>
<td>40 kW to 1500 kW</td>
<td></td>
</tr>
<tr>
<td>Iveco</td>
<td>Mid – Large – Prime</td>
<td>Diesel</td>
<td>100 kW to 2000 kW</td>
<td></td>
</tr>
<tr>
<td>Lombardini</td>
<td>Portable – Small Commercial</td>
<td>Diesel</td>
<td>4 kW to 50 kW</td>
<td></td>
</tr>
</tbody>
</table>

*Developed by the author based upon information supplied by Allinda PowerGen.*
APG’s distributorship agreements with their suppliers are non-exclusive aside from SRC, and capacity limits have not been tested. To date, no orders placed by APG for generators in quantity have resulted in back-ordering.

Figure 1-2: New power generator supply chain

Developed by the author based upon information supplied by Allinda PowerGen.

The supply chain for new power generators is unlikely to experience disruptions significant enough to negatively affect APG’s new OEM generator business. APG’s inventory is distributed among multiple suppliers with many brands each, thus protecting the supply chain from any single brand interrupting revenues. APG’s three distributors carry numerous brands, and no dominant manufacturers’ suppliers of components exist.

APG has partnered with Engine Packaging (EP), a wholly-owned subsidiary of System Rebuilding-Columbia (SRC), to package generators under the APG brand with model name ALLINEX. Under this agreement, SRC cryogenically treats IH DT466 engines; EP then connects them to new alternators, and other generators components, and
encloses them for full sound attenuation. APG ships the completed generator unit directly from the EP facility in Columbia, MO, to the APG customer.

The engines are available:

- naturally aspirated at 105 British horsepower (bhp), which produce generator power of 65 kW;
- turbocharged at 165 bhp, producing generator power of 95 kW; and
- turbocharged aftercooled at 205 bhp, producing generator power of 125 kW.

**Figure 1-3:** APG’s ALLINEX power generator supply chain

![Diagram of APG's ALLINEX power generator supply chain]

**Legend:** Generators distributed to End User via APG
Generators distributed directly to End User by EP on behalf of APG, per agreement

*Note: Engines are received by the Engine Recycler by various means, such as through salvage, insurance companies, engine mechanics, used wholesalers, engine distributors, and engine equipment owners. Developed by the author based upon information supplied by Allinda PowerGen.*

As of October 15, 2006, one prototype ALLINEX generator has been operating in the field for four months without interruption; a second prototype had recently been shipped to a customer in Alberta. The largest quantity ordered by APG is 75 ALLINEX generators, which are scheduled to be delivered in January, 2007. The agreement with
SRC calls for volumes available of at least one hundred generators per month, delivered sixteen weeks after receipt of order (ARO), to account for capacity scheduling.

The surety of APG’s ALLINEX supply chain is subject to:

- the capacity of SRC to acquire, remanufacture, and cryogenically treat the IH 466 engines;
- the capacity of EP to assemble generators;
- EP’s generator component suppliers;
- transport logistics and costs;
- trade / border issues; and
- cash flow maintenance from APG’s customers through APG to SRC and EP.

APG has chosen to position this product as its anchor, thus responsible for a large forecasted share of revenues. Maintenance of the supply chain is critical, in particular the relationships with SRC and EP which can be impacted by APG’s ability to ensure cash flow. SRC has an exclusive agreement with IH to remanufacture the IH 466 engines, which provides confidence in the initial supply of engines to SRC. Trade and border issues will require vigilant monitoring of external events and retaining expert legal counsel.

1.3.1.2 Used Power Generators

APG offers a large selection of used and remanufactured generators, from several manufacturers such as Baldor, Cummins, Honda, and John Deere. Power capacities range from 700 W to 1100 kW, with purchase prices from below $1000 (CAD) to over $150,000. Some used products are in attenuated enclosures to decrease external sound
effects. Units are available with varying degrees of portability, from carry units to wheeled, trailer-mounted, skid-mounted, or railcar-enclosed. Some used units have limited availability, while others are standard generator sizes obtained from distributors.

A typical sampling of used generators available from APG follows in Table 1-2.

Table 1-2: Sample list of APG used generator product line

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Purpose</th>
<th>Fuel Type</th>
<th>Power</th>
<th>Suggested Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honda</td>
<td>Portable Attenuated</td>
<td>Diesel</td>
<td>700 W</td>
<td>$ 837</td>
</tr>
<tr>
<td>Honda</td>
<td>Residential Standby</td>
<td>Diesel / NG</td>
<td>12 kW</td>
<td>$ 6875</td>
</tr>
<tr>
<td>Baldor</td>
<td>Standby skid</td>
<td>Diesel</td>
<td>25 kW</td>
<td>$ 12,650</td>
</tr>
<tr>
<td>kWiet Power</td>
<td>Standby trailer</td>
<td>Diesel</td>
<td>60 kW</td>
<td>$ 39,372</td>
</tr>
<tr>
<td>(Isuzu engine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingersol Rand</td>
<td>Lg. commercial open skid</td>
<td>Diesel</td>
<td>125 kW</td>
<td>$ 22,450</td>
</tr>
<tr>
<td>(John Deere engine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggreko</td>
<td>Lg. commercial enclosed</td>
<td>Diesel</td>
<td>300 kW</td>
<td>$ 39,500</td>
</tr>
<tr>
<td></td>
<td>attenuated skid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom-built</td>
<td>Lg. commercial weather-encl.</td>
<td>Diesel</td>
<td>750 kW</td>
<td>$ 69,500</td>
</tr>
<tr>
<td>(Cummins engine)</td>
<td>pup trailer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom-built</td>
<td>Prime power rail-car</td>
<td>Diesel</td>
<td>1100 kW</td>
<td>$ 149,000</td>
</tr>
<tr>
<td>(EMD engine)</td>
<td>enclosed</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Developed by the author based upon information supplied by Allinda PowerGen.

APG obtains used generators by buying them from generator recyclers/remanufacturers, used equipment brokers, or equipment movers. APG reconditions used generators prior to offering them for sale or rent, servicing or replacing components, then testing them to offer verification and limited warranty.
APG’s used generator supply is inconsistent; APG is relying upon used generators only as an additive to attract new customers by accepting the trades, and to dispose of these receipts to lower-end consumers with the hope they will develop loyalty and upgrade in the future. Internal reconditioning is available providing APG retains maintenance services, currently only available in the Delta office. If APG plans to accept used generators for trade and recondition them for resale in Calgary, APG will need to either initiate maintenance services there or outsource them.

1.3.1.3 Custom-built Power Generators

APG will custom-build generators for special high-power needs. Typical of such demand are large-scale commercial generators, often called “Prime Power,” which provide sufficient supply to provide primary power as the sole power source or during grid power failures, of capacity 150 kW and higher. APG recently built and delivered a 3500 kW generator to supplement the standby capacity of the Harbour Centre in downtown Vancouver. This generator is capable of providing primary power to a commercial (non-industrial) building of approximately 20,000 sq ft per floor, six floors high, even during peak demand (BC Hydro, 2006). A sample list of generators that APG has custom-built is shown in Table 1-3.
Table 1-3: Sample list of APG custom-built generators

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Facility</th>
<th>Fuel type</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime standby</td>
<td>Office / commercial</td>
<td>Diesel attenuated</td>
<td>2000 kW</td>
</tr>
<tr>
<td>Prime standby</td>
<td>Multi-story office / commercial</td>
<td>Diesel attenuated</td>
<td>2800 kW</td>
</tr>
<tr>
<td>Prime standby</td>
<td>Multi-story office / commercial</td>
<td>Diesel attenuated</td>
<td>3500 kW</td>
</tr>
</tbody>
</table>

Developed by the author based upon information supplied by Allinda PowerGen.

APG acquires components for custom-built generators on an as-needed basis, and assembles the generators either at its Delta maintenance facility or partially on-site, depending on logistics. Component suppliers vary according to the end product power capacity required. APG partners with firms if supplementary needs exist; for instance, construction engineers and an industrial/commercial construction firm worked on the project to design and install the custom generator recently installed in the Harbour Centre in Vancouver, due to structural considerations peculiar to this project.
APG’s supply chain for custom-built generators is dependent on the ability of suppliers to meet contractual obligations. Suppliers are included as project partners, with stipulated quality controls, prices, and delivery dates, barring unforeseen circumstances. Each project partner bears responsibility for fulfillment of their segment of the project, and shares responsibility for successful project completion, per agreement.

Legend: Engines may be supplied by SRC or OEM suppliers dependent on needs of generator design and power.
1.3.2 Industrial Engines

APG sells remanufactured engines obtained through a distribution agreement with System Rebuilding-Columbia (SRC) of Columbia, MO. Exclusivity is provided for Western Canada, with non-exclusive distribution rights for Eastern Canada, where SRC also distributes their products through subsidiary SRC Canada (McAllen, 2006a; SRC, 2006). APG carries GM engines ranging from 3.0 L to 8.1 L, and International Harvester (IH) 466 cubic inch engines, remanufactured to OEM specifications (certified using OEM components) which can be configured to run on natural gas or diesel fuel. APG markets these engines as replacements to upgrade generators and for complementary uses, such as to power hydraulic pumps, positive crankcase ventilation (PCV) pumps, or direct drive extraction pumps. A sample list of engines offered by APG is shown in Table 1-4.

These remanufactured engines have been cryogenically treated², dramatically increasing the lifespan and length between maintenance cycles, and allowing them to run at higher temperatures needed to burn natural gas. The treatment increases the lifespan of the engines to 80,000 running hours with scheduled maintenance (such as oil changes) up to 1500 running hours apart (SRC, 2006; McAllen, 2006b). Untreated OEM diesel engines have lifespans of approximately 30,000 running hours, with scheduled maintenance every 250 to 500 running hours (Pascoe, 2006; SRC, 2006). The increased lifespan allows a differentiation in lifetime engine replacement costs from competitors.

With labour scarce in Alberta, for the oilfields and other occupations, the increased time

² Cryogenic treatment of engines allows higher temperature fuel-burning, with wider variance of thrust. Cryogenic treatment involves intense freezing (to low Kelvin temperatures) of materials, which removes the kinetic energy of atoms, improving the tensile strength and hardness of materials, providing wear resistance and dimensional stability. (Source: Integrated Cryogenic Systems, http://www.cryointegrity.com). Pratt & Whitney is cryogenically treating engines to be used as propulsion devices in NASA’s new moon program (Source: http://www.pratt-whitney.com).
between scheduled maintenance allows differentiation with the costs and need for labour to carry out the maintenance.

The remanufactured and cryogenically-treated IH 466 (cubic inches) engines are being offered separately to APG, and being packaged with new alternators to create the APG-branded ALLINEX generator, with power capability of 65 kW to 125 kW, depending on the engine modification (see Table 1-4 for engine details). The packaging is being performed by Engine Packaging, a wholly-owned subsidiary of SRC, also located in Columbia, MO.

Table 1-4: Sample list of APG engines

<table>
<thead>
<tr>
<th>OEM</th>
<th>Size</th>
<th>Modification</th>
<th>Fuel type</th>
<th>Thrust (bhp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM</td>
<td>3.0 L</td>
<td>Cryogenically treated</td>
<td>Diesel, natural gas</td>
<td></td>
</tr>
<tr>
<td>GM</td>
<td>5.7 L</td>
<td>Cryogenically treated</td>
<td>Diesel, natural gas</td>
<td></td>
</tr>
<tr>
<td>GM</td>
<td>8.1 L</td>
<td>Cryogenically treated</td>
<td>Diesel, natural gas</td>
<td></td>
</tr>
<tr>
<td>IH</td>
<td>466 cu. in.</td>
<td>Cryogenic; Naturally Aspirated</td>
<td>Diesel, natural gas</td>
<td>105 bhp</td>
</tr>
<tr>
<td>IH</td>
<td>466 cu. in.</td>
<td>Cryogenic; Turbo</td>
<td>Diesel, natural gas</td>
<td>165 bhp</td>
</tr>
<tr>
<td>IH</td>
<td>466 cu. in.</td>
<td>Cryogenic; Turbo after-cooled</td>
<td>Diesel, natural gas</td>
<td>205 bhp</td>
</tr>
</tbody>
</table>

*Developed by the author based upon information supplied by Allinda PowerGen.*
Threats to the supply chain include trade and border issues, cash flow, and capacity of the suppliers. APG has mollified these concerns through its agreement with SRC.

### 1.3.3 Other APG Products

APG sells and installs new alternators as replacements or to pair with engines to customize generators. APG sells transfer switches and other control system components to upgrade generator set functionality. APG provides maintenance services on standby and contract bases for all types of power generators, including installation, repair, and power systems integration. APG provides engineered support and design for commercial, municipal, property management, residential, and remote needs. APG has designed projects for co-generation applications, stored energy, and alternative energy purposes.
1.4 Analysis of APG's Markets

Meredith (2006) and Collins-Dodd (2006a) both recommend demand-side market analysis in order to assess market opportunities and formulate market plans. Meredith (2006) describes the need to segment demand according to causation, including consideration of substitutes. Collins-Dodd (2006a) posits the effects of import or export possibilities, either by the firm in question or capable competitors should be included.

Smith (1956) suggested the notion of differentiating products according to market segments in order to more appropriately satisfy distinct segment needs while carving a niche for the firm to occupy. It is appropriate to analyze market segments according to the opportunities previously identified by the client.

1.4.1 APG's Demand

Demand for APG’s products is created in three classes: direct, derived, and complementary (Meredith, 2006). Demand can be negatively affected by direct or indirect substitutes, and can further be increased or decreased by international effects, such as foreign entries into the market or trade by a market player (Collins-Dodd, 2006a; Meredith, 2006).

1.4.1.1 Direct Demand for APG Products

Direct demand is the opportunity to sell to any market with a need for products of the type APG currently offers (generators or engines) with their identified use (Meredith, 2006). Any commercial, industrial, or residential party that has a need for generated electrical power or an engine to provide thrust represents direct demand for APG
products. Any current or potential user of generators or engines with a greater need for automated control over these systems represents direct demand for APG’s differentiated products with automated control systems. Any current or potential user that cannot provide maintenance to engines or generators is direct demand for APG’s service provisions, which is limited to a geographical area within one hundred kilometres of APG’s physical locations.

1.4.1.2 Derived Demand Creation for APG Products

Demand is derived for APG products when demand in a client market is created (Meredith, 2006). In established industries, such as oil and gas exploration and production, this happens when a current market segment expands and is made aware of APG products. This occurs either by a new entry into the market or by the expansion of sites of a current segment member (actual or potential customer), increasing the customer’s needs for APG’s products (Meredith, 2006). Customers with the potential for current or future multiple sales can be considered as:

- having current need for more than one unit providing immediate multiple sales (direct demand);
- being expected to have additional demand as they expand operations or as their current units from other providers need replacement, both representing future additional sales (derived); or
- references to other customers, allowing an opportunity for a loyalty or referral program to be established (derived).
Demand is also derived when APG’s product awareness encourages deliberation by a customer to compare the benefits of using portable power generation rather than paying to install power lines to supply the site. Among the factors considered would be the length of time power service is needed, the remoteness of the site, the upfront charges to install a power line compared to generator cost, equity and depreciation of either option, maintenance which will be needed, or fixed service versus portability.

1.4.1.3 Complementary Demand Creation for APG Products

Complementary demand is created when additional uses for components of APG products are realized, when external firms or industries create demand based upon the complementarities of their products with APG products, or when existing customers spur demand for renewables, such as demand for parts, maintenance, or refitting (Meredith, 2006). APG is exploiting complementary demand through its recognition that its engines have purposes beyond powering generators. The use of engines in powering hydraulic pumps, top drive extraction, or other purposes constitutes complementary demand. APG continues to seek complementary markets for its engines within and outside their generator segments by learning more about the operational needs of its customers, and potential uses for portable engines.

APG can benefit from complementary demand when other uses of its generators are found. Such demand exists at heavy oil plays where natural gas (methane) is produced and currently “flared off,” or burned rather than being captured. Generators running on natural gas can be installed to create any electricity supply that may be needed, such as to heat or power site storage, to capture and compact surplus methane,
and to create an additional revenue source by supplying power back to an established power grid if the play is connected.

If APG’s maintenance services prove a worthy contributor to profit, ongoing maintenance contracts are complementary. However, if the resources required to develop or satisfy demand for maintenance services reduce profitability or detract from APG’s ability to develop or satisfy product demand, maintenance services may need to be abdicated to other providers. The only reasons to continue offering maintenance services in lower profit scenarios are if doing so provides competitive advantage, or if failing to do so reduces the barrier for new entrants. If APG can partner with maintenance service providers in or near product markets, it will assuage the threat of lost advantage or new entrants and reduce the need for APG to provide these services directly.

**1.4.1.4 International Effects upon APG**

The opening of Canadian markets to Chinese equipment imports makes the possibility of competition from Chinese engine and/or generator manufacturers possible. Due to labour cost benefits, the Chinese competitors would have a cost advantage should they enter through Greenfield, or by acquisition of an existing Canadian firm with strong distribution channels. The lack of a dominant (thus attractive) distributor or manufacturer in the Canadian markets decries the likelihood of a Chinese acquisition of a Canadian firm, and the depth of knowledge needed to penetrate the Canadian market with many small customers (requiring diligent in-market sales) makes Greenfield similarly unattractive. The likely option for foreign entrants is through partnership, licensing, franchising, or joint venture. APG is seeking an opportunity to enter into a licensing
arrangement with a Chinese partner, and would benefit from having lower-cost options to fend off price-competition as well as prevent domestic competitors from gaining this advantage. Licensing is the least cost of these options for APG, with little entry fees or liability, and simpler exit alternatives.

APG’s partnership with SRC for remanufactured engines provides an opportunity for an export market, especially in the U.S., where SRC’s location eliminates trade barriers and lowers transportation costs. If APG can negotiate an agreement with a Chinese manufacturer, it will provide a higher-capacity lower-cost product offering that may help penetrate the U.S. market. APG has no strategy in place to establish a sales presence and service mechanism in the U.S. The best opportunity is to partner with or acquire a sales firm in the U.S., with licensing to distributors a viable option.

Export markets to developing oil and gas production countries are less attractive due to the additional trade barriers and logistics. If APG develops a partnership with a Chinese manufacturer, it can be exploited in Asia, but will require establishing the APG brand with customers in those markets. APG should create derived demand by continuing relationships with North American-based customers who will develop operations in Asia needing portable power.

APG is counting on its exclusive distributorship of SRC engines and the packaging of generator sets by EP to establish its place in the Canadian market. APG is taking on additional risk by relying upon shipments of product from these U.S. suppliers directly to APG customers. APG shipments could be subject to transport and border complications, and fluctuating fuel costs.
Merger and acquisition (M&A) activity in the oil and gas fields is increasing due to three factors:

1. Increasing commodity prices providing cash for larger firms;
2. Entrepreneurial ventures entering with more well sites and capital investment available; and
3. Increasing international trade due to free trade agreements.

The increased M&A accommodates and contributes to the demand for more drilling sites, providing opportunities for providers and threats due to impending competition (Tambosso, 2006a; Tambosso, 2006b).

1.4.1.5 Direct Substitutes for APG Products

Direct substitutes for APG generators include competitors in the portable power generator market, either in sales or leasing. Competitors in the higher power category (over 150 kW) are typically large multinational firms making both engines and generators, selling either directly or through distributors. Some remanufactured generators of this size are available, typically through service providers selling to lower budget customers. Medium-power generators (from 60 to 150 kW) are available new, used, or rebuilt through distributors and service providers. Lower-power generators (less than 60 kW) are readily available through distributors, while the manufacturers do not offer these products directly to consumers due to the physical presence needed to provide volume.

Direct engine substitutes are available either new or remanufactured, with the latter more probable due to the availability of engine mechanics serving the general
public as well as industry. While rebuilt diesel automobile engines are sometimes used, they are lesser-suited for this purpose, with the smaller engines providing lower than optimal power and shorter lifespans under extreme heat operating conditions (caused by continuous use under duress). They are more difficult to modify to natural gas fuelling, and not considered to be viable competition. Larger diesel or natural gas remanufactured engines are available, generally General Motors (GM) or Arrow products, and represent the main competition for APG products. Many competitors offer remanufactured engines from a variety of OEMs, including Volvo, Isuzu, Daewoo, Nissan, Kubota, and others. See Section 1.4.3, beginning on page 59 for a full analysis of competitors and their product lines.

1.4.1.6 Indirect Substitutes for APG Products

Indirect substitutes consist of lined power, portable power rotated according to need by customers without adequate capacity (indicating an opportunity for APG), and portable power service providers (either by renting/leasing portable generators, or larger generating trucks). Lined power requires substantial initial investment, viable only when a continued need is determined, and often will entail standby power sources to be available. Remoteness of plays is a variable in lined power that favours the generator supply market. The resources needed to rotate portable units can be compared to the benefits of on-site portability; maintenance, transport, labour, and information efficiencies are all resource factors in unit rotation.
1.4.2 Segmentation of APG’s Customers

Businesses have segmented customers according to purchasers’ needs for over half a century; prior to this, marketing was used to draw consumers to the products most efficient or profitable for the provider to supply. Producers’ attempts to differentiate their products resulted in greater product variety, enabling consumer demands for particulars (Smith, 1956). The resulting demand-side economies pushed firms to attempt to classify segments to maintain production efficiencies. These consumer preference differences should not be exaggerated, leaving segments to be ignored. Further analysis of needs may identify commonalities which when modified may allow the firm to satisfy multiple segments’ needs with greater efficiency.

An analysis of customer segments not just for their differences but for plausible similarities allows segment aggregation (Moorthy, 1984). Firms prepare to satisfy the aggregate needs with basic product design, customizing the product in the latter stages for particular segments’ or customers’ desires. APG has designated the customer segments utilized in this report, primarily organized around product offerings and customer types.

1.4.2.1 Unconventional Gas Market for Generators

There is a rapid increase in drilling for unconventional gas due to the decline in new conventional gas reserve finds (Gatens, 2005). The U.S. National Petroleum Council reported in 2003 that the decline in conventional gas is inevitable, which will lead to the dependence of North American natural gas on the industry’s ability to develop efficient means to produce unconventional gas (NPC, 2003). The report predicted that fifty percent of gas produced and eighty percent of new drilling will be unconventional.
gas by the year 2025 (NPC, 2003). Tertzakian (2005) remarks that a rapid increase in drilling for natural gas will occur with the tripling of natural gas prices on the North American market over the 2005-6 winter, and with increasing demand in developing industrial nations such as China and India.

The National Energy Board of Canada has attributed the increase in market natural gas price from just over U.S. $5 per million British thermal units (MMBtu) to almost US $16 / MMBtu in winter 2005-2006 to decreased supply and speculation following the volatile hurricane season in the Gulf of Mexico in fall 2005 (NEB, 2006). Prices retreated to US $6 / MMBtu by summer 2006. The NEB projects market prices for natural gas to follow ‘normal’ seasonality barring other adverse events, with prices expected to reach US $10 / MMBtu in winter 2006-2007 (NEB, 2006).

**Figure 1-7: Market prices for natural gas, 2004 – 2007 (projected)**

![Recent Natural Gas Prices](https://www.neb.gc.ca/newsroom/releases/nr2006/nr0616FactSheet_e.htm) Used with permission.

Source: National Energy Board of Canada, [http://www.neb.gc.ca/newsroom/releases/nr2006/nr0616FactSheet_e.htm](http://www.neb.gc.ca/newsroom/releases/nr2006/nr0616FactSheet_e.htm). Used with permission.
The NEB expects North American consumer and commercial demand for natural gas to remain stable while developing countries’ demand increases, with additional increased demand worldwide for natural gas used in electricity generation (NEB, 2006). Unconventional gas plays must increase in number by a factor multiple since the average yield of conventional gas wells has dropped from one billion cubic feet (Bcf) of new reserves to 250 million cubic feet (MMcf) or less in the WCSB, (Tertzakian, 2005).

Figure 1-8: Conventional gas production rate and cumulative production in Canada, 1998 – 2007 (projected)

Unconventional gas is “natural gas (methane) that is contained in ‘difficult to produce’ rock formations, which require different or special completion, stimulation, and/or production techniques to retrieve the resource” (CSUG, 2006).

Rose and Pfannkuch (1982) identified five sources of unconventional gas:

1. Methane-rich coal beds
2. Tight gas formations found in sandstones or limestones
3. Gas-bearing Devonian shales (commonly called gas shales or organic shales)
4. Methane hydrate sediments (gas hydrates)
5. Dissolved methane in formation waters (also called gas hydrates)

Industry now refers to the latter two sources as gas hydrates and classifies four sources (CSUG, 2006; Gatens, 2005). Several different monikers exist for gas found in coal beds: in Alberta, the official term is “Natural Gas from Coal (NGC),” since its production is governed by regulations which apply to all sourced natural gas. The official moniker in B.C. is “Coal Bed Gas (CBG).” Industry commonly uses the term “Coalbed Methane (CBM),” which is gaining in popularity due to the dominance of American gas production companies wishing to standardize nomenclature (CSUG, 2006). This report uses the term “coalbed methane” (CBM) for continuity.

Gatens (2005) identifies CBM as the most rapidly increasing source of unconventional gas. The major sites for CBM potential are concentrated coal deposit areas with manageable gas recovery topography. Canada has total CBM resources in

---

excess of seven hundred trillion cubic feet (Tcf), with 550 Tcf in Alberta alone (Gatens, 2005; CSUG, 2006). The NEB (2005) estimates that with current technologies and accessibility, 75 Tcf of the identified CBM resources are recoverable. The estimate for conventional gas recoverable reserves remaining is 58 Tcf (NEB, 2005; CSUG, 2006).

Figure 1-9: Major coal and coal bed methane deposits in North America

Source: Canadian Society for Unconventional Gas. Used with permission.

Figure 1-9 shows that Canada’s richest CBM resource is in the Western Canada Sedimentary Basin (WCSB). The WCSB is the resource-rich area stretching eastward from the Great Continental Divide through most of Alberta, the southern half of Saskatchewan, and southwestern Manitoba, shown in Figure 1-10.
APG is pursuing the CBM production market for its generators and to a lesser extent for its engines. APG’s ALLINEX brand of generators, made with IH 466 engines remanufactured by SRC, is intended to supply different power needs from 60 kW to 125 kW, depending on the fuelling configuration. See Table 1-1 for ALLINEX generator information, and Table 1-4 for engine fuel configuration differences.

1.4.2.1.1 Existing Unconventional Gas Plays

Gatens (2005) states that ninety percent of new drilling for CBM in Alberta occurs in the “dry” Horseshoe Canyon coalbeds. Most coalbeds contain considerable saline water deposits, and the lack of water (thus “dry”) is unusual. Saline presence requires special recovery techniques in addition to re-injecting the water to saline aquifers.
deep in the ground. Dry plays also tend to be shallower, making exploration and recovery more efficient.

Figure 1-11: Illustration of well depths of “dry” vs. “wet” gas wells vs. water injection wells

The CSUG (2005) estimates that the dry coals of the Horseshoe Canyon possess 25% of the available CBM resource in Alberta. The Mannville “wet” coals containing saline which must be re-injected to aquifers are estimated to possess up to sixty percent of Alberta’s CBM reserves (CSUG, 2005). Only 62,000 cubic metres of saline was produced by 1560 connected CBM wells in the Horseshoe Canyon in 2004 (of which 24,000 came from three wells), compared to 548,000 cubic metres of saline from 127 connected CBM wells in the Mannville formation (AEUB, 2005). The Horseshoe Canyon coal beds are currently attracting about ninety percent of drilling activity for CBM in Alberta due to the less complicated extraction process (Gatens, 2005; CSUG, 2005).
Gatens (2005) states that there were nearly four thousand CBM plays in Alberta in mid-2005. The majority of them are in the Horseshoe Canyon, as shown in Figure 1-13. A study by the Alberta Energy and Utilities Board shows 3,575 CBM well sites as of December 31, 2004, of which 2,506 were added in 2004 (roughly seventy percent) (AEUB, 2005). Of the total CBM well sites 1,735 were connected (producing natural gas) (AEUB, 2005). These connected plays had produced 755 million cubic metres (26.7 Bcf) of natural gas (AEUB, 2005).
The subsequent study shows 7,764 CBM well sites as of December 31, 2005, with 5,419 producing natural gas (AEUB, 2006a). These wells had produced 2,089 cubic metres of natural gas (AEUB, 2006a). Over ninety-five percent of wells were in the Horseshoe Canyon or Belly River “dry” coals, with less than four percent in the “wet” Mannville coals (AEUB, 2006a). The statistics indicate that fifty-four percent of total well sites were drilled (“opened”) in 2005, and the connection ratio improved from forty-nine percent in 2004 to nearly seventy percent at the end of 2005. Both CBM exploration drilling activity and the accuracy of these explorations in converting them to producing CBM wells improved dramatically. The number of sites more than doubled the NEB
prediction of 3,441 CBM plays by the end of 2005, and is already almost forty-four percent higher than the prediction of 5,394 CBM plays by the end of 2007 (NEB, 2005).

These statistics indicate that at present, several thousand CBM plays exist, indicating substantial opportunity for APG to offer replacement generators for existing CBM plays, either for drilling, irrigation in drawing out the saline, or re-injection into saltwater wells in wet plays. Brent Powers, an oil and gas industry component service specialist with Alberta Governor Services, Inc., indicates that conventional industrial-grade diesel engines that power most generators on the market have an expected lifespan of 15,000 to 30,000 running hours, with oil servicing cycles of at longest every 500 running hours, and fuel servicing (filter changes) no more than 250 running hours apart (Powers, 2006). Powers states that engines will last with continuous operation at a CBM play for eight to twelve months, thus the replacement market consists of all plays more than one year old (Powers, 2006). It may be more cost efficient for customers to replace the entire generator rather than just the engine (connecting to the existing alternator and other generator components), depending on the lifespan of the alternators, the difficulties to replace only the engine (including on-site logistics), and the viability of other components.

1.4.2.1.2 New Unconventional Gas Plays

The pace of new drilling for CBM is increasing rapidly; in 2005, the NEB estimated that ninety percent of existing CBM well sites were connected in 2003 or 2004 (NEB, 2005). Statistics from the Alberta Energy and Utilities Board (2006a) show over 6

---

6 Confirmed from figures of required maintenance on top-performing industrial-grade diesel engines. Oil service every 30,000 miles, and fuel filter change every 15,000 miles, with expected average velocity of 60 mph. Source: Detroit Diesel, Diesel Service Intervals, http://www.detroitdiesel.com.
four thousand new well sites drilled in 2005, compared to just over 2500 in 2004. The rate of increase is expected to grow, yet even these figures provide ample opportunity in new CBM plays. Each new play requires a power source, and producers are unlikely to gamble on installing running power lines to each prospective play. Some carryover is expected taking existing generators from non-producing well sites to future drilling sites, but this decreases as the connection ratios increase. Over five hundred different drilling firms operated in Alberta in 2005, and without market dominance by any single generator supplier, potential customers are abundant even for small players. This rapid expansion provides opportunity to exploit derived demand.

1.4.2.2 IH466 Engine Market

APG intends to install the IH466 engine as its anchor component, primarily for use in its ALLINEX power generator line of products. The capacity of SRC, the engine supplier, to provide APG with these engines is far beyond the current expected demand of the ALLINEX generators. APG plans to target other markets for the engines by themselves, and with other component additions or modifications.

1.4.2.2.1 Top Drive Market

Top Drive is a system where the power unit that drives the pump sits at the top of the well. In this application, it comprises an oil extraction system where an engine is connected via a power take-off (PTO) unit to another mechanism to pull heavy oil from the ground.
There are three possible configurations for these engines to be used in the heavy oil production industry:

1. Direct drive, where the PTO is connected to a screw-like mechanism that draws up the heavy oil through its threading as it rotates;
2. Hydraulic pump, where the PTO is connected to a pump using hydraulic pressure to draw the oil; and
3. PCV pump, where the PTO is connected to a PCV pump and valve system, using the vacuum created by the system to draw the oil.

Industrial engines are used in the extraction of heavy oil due to the force or torque needed to pull the high viscosity material from the ground. With accessible resources of light and medium-weight oils in decline, Canadian oil producers have been developing technologies to extract and refine heavier weight oil resources for almost three decades (NEB, 2001). The Athabasca Oil Sands projects are special conditions of heavy oil, where the deposits reside close to the surface, mixed with sedimentary materials. These resources are often able to be withdrawn by traditional mining techniques, and then processed to reclaim the sediments for re-depositing on-site, leaving a less viscous bitumen mixture for transporting and later refining (NRC, 2003; OSDC, 2006). Typical heavy oil is located in deeper deposits (than the Oil Sands), with less sedimentary contamination. The Canadian government's definition of heavy oil is oil with a density of greater than 900 kg per cubic metre (Centre for Energy (CE), 2006).

The NEB (2001) estimates that strong undeveloped heavy oil resources exist in southern and southeastern Saskatchewan near Weyburn, Estevan and Shaunavon; and in the Lloydminster region, a radius of two-hundred miles around Lloydminster, SK. The
NEB classifies WCSB oil zones according to the estimated age of the deposits, labelled according to the time of the sedimentary foundation: the Carboniferous, the Jurassic, and the Cretaceous zones (NEB, 2001). Among these three zones several areas (liberally referred to as “plays” by the NEB) contain heavy oil, both in development and undeveloped. NEB calculations of heavy oil resources, cross-classified as discovered or undiscovered, by oil in place (OIP) or recoverable, in these three zones are shown in Table 1-5, Table 1-6, and Table 1-7, respectively, with a summary of heavy oil resources in the WCSB in Table 1-8 (NEB, 2001).

Table 1-5: NEB calculations of heavy oil resources in the Carboniferous zone

Resources of Carboniferous Plays (10⁴m³)

<table>
<thead>
<tr>
<th>Play</th>
<th>Discovered</th>
<th>Undiscovered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil in Place</td>
<td>Recoverable</td>
</tr>
<tr>
<td>Rundle Sweetgrass</td>
<td>11.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Mississippian Subcrop</td>
<td>58.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Souris-Tilston</td>
<td>48.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Frobisher-Alida</td>
<td>108.6</td>
<td>20.5</td>
</tr>
<tr>
<td>Midale</td>
<td>284.9</td>
<td>46.3</td>
</tr>
<tr>
<td>Ratcliffe</td>
<td>12.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Bakken</td>
<td>277.6</td>
<td>29.9</td>
</tr>
<tr>
<td>Total</td>
<td>801.7</td>
<td>108.1</td>
</tr>
</tbody>
</table>


The Carboniferous plays in the geographic market being targeted by APG include the Souris-Tilston, Frobisher-Alida, Midale, and Ratcliffe, all in southeastern Saskatchewan.

Figure 1-14 shows the Midale play area shaded, with the others visible.
Figure 1-14: The Midale Play Area of heavy oil in the Carboniferous zone


The Midale play contains the largest portion of recoverable heavy oil in the zone. Figure 1-15 shows heavy oil produced, identified reserves, expected undiscovered recoverable resources, and recoverable with improved technology (NEB, 2001).

Figure 1-15: Recoverable heavy oil volume in Carboniferous plays

The Jurassic zone contains three plays, and is the least productive of the three zones in heavy oil.

Table 1-6: NEB calculations of heavy oil resources in the Jurassic zone

<table>
<thead>
<tr>
<th>Play</th>
<th>Discovered</th>
<th>Undiscovered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil in Place</td>
<td>Recoverable</td>
</tr>
<tr>
<td>Sawtooth</td>
<td>90.2</td>
<td>28.1</td>
</tr>
<tr>
<td>Shaunavon</td>
<td>267.7</td>
<td>57.8</td>
</tr>
<tr>
<td>Roseray-Success</td>
<td>187.2</td>
<td>64.0</td>
</tr>
<tr>
<td>Total</td>
<td>545.1</td>
<td>149.9</td>
</tr>
</tbody>
</table>


The Shaunavon play is in the geographic market being targeted by APG, which covers a large area of southern Saskatchewan. This play contains the largest volume of heavy oil reserves in the zone.

Figure 1-16: The Shaunavon Play Area of heavy oil in the Jurassic zone

The Cretaceous zone contains numerous plays, encompassing the largest overall geographic area, most of Alberta and Saskatchewan.

Figure 1-17: Cretaceous zone heavy oil play areas

Table 1-7 shows heavy oil resources for all plays in the Cretaceous zone.

Table 1-7: NEB calculations of heavy oil resources in the Cretaceous zone

<table>
<thead>
<tr>
<th>Play</th>
<th>Discovered</th>
<th>Recoverable</th>
<th>Undiscovered</th>
<th>Recoverable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil in Place</td>
<td></td>
<td>Oil in Place</td>
<td></td>
</tr>
<tr>
<td>Lower Mannville</td>
<td>232.3</td>
<td>51.1</td>
<td>131.8</td>
<td>10.3</td>
</tr>
<tr>
<td>Upper Mannville</td>
<td>313.8</td>
<td>66.6</td>
<td>160.4</td>
<td>13.8</td>
</tr>
<tr>
<td>Detrital</td>
<td>3.2</td>
<td>0.2</td>
<td>45.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Ostracod</td>
<td>2.9</td>
<td>0.3</td>
<td>14.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Glauconitic</td>
<td>78.2</td>
<td>11.1</td>
<td>37.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Dina</td>
<td>230.4</td>
<td>39.7</td>
<td>45.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Cummings</td>
<td>212.2</td>
<td>16.8</td>
<td>60.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Colony to Lloydminster</td>
<td>2417.2</td>
<td>220.5</td>
<td>1236.2</td>
<td>83.2</td>
</tr>
<tr>
<td>Cantuar</td>
<td>118.4</td>
<td>16.0</td>
<td>176.2</td>
<td>15.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3608.6</strong></td>
<td><strong>422.3</strong></td>
<td><strong>1907.7</strong></td>
<td><strong>139.7</strong></td>
</tr>
</tbody>
</table>

Three of the Cretaceous play areas are in APG’s geographic target markets: Dina, Cummings, and Colony to Lloydminster, comprising the Lloydminster Region.

Figure 1-18: Map highlighting the Lloydminster Region of the Cretaceous zone

![Map of Alberta and Saskatchewan](http://www.nrcan.gc.ca)

Developed by the author, adapted from Natural Resources Canada. [http://www.nrcan.gc.ca](http://www.nrcan.gc.ca)

Figure 1-19 illustrates the total recoverable volumes of heavy oil in the Cretaceous play areas. The Colony-Lloyd play is expected to be particularly productive with over four hundred million cubic metres of total recoverable heavy oil (NEB, 2001). This is equivalent to over 2.5 billion barrels of recoverable oil.\(^7\)

---

Figure 1-19: Recoverable heavy oil volume in Cretaceous plays

**Recoverable Volumes - Cretaceous**

Table 1-8 shows summary totals of heavy oil in the WCSB. The remaining recoverable figures indicate strong promise for future drilling of heavy oils, and a strong market for suppliers to the heavy oil extraction industry.

Table 1-8: Summary of heavy oil in the WCSB

<table>
<thead>
<tr>
<th>Zone</th>
<th>Metric (10⁶m³)</th>
<th>Oil In Place</th>
<th>Recoverable</th>
<th>Undiscovered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Discovered</td>
<td>Recoverable</td>
<td>Undiscovered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Established</td>
<td>Remaining</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reserves</td>
<td>Reserves</td>
</tr>
<tr>
<td>Carboniferous</td>
<td>801.7</td>
<td>612.2</td>
<td>108.1</td>
<td>33.8</td>
</tr>
<tr>
<td>Jurassic</td>
<td>545.1</td>
<td>336.2</td>
<td>149.9</td>
<td>28.6</td>
</tr>
<tr>
<td>Cretaceous</td>
<td>3608.6</td>
<td>1907.7</td>
<td>422.3</td>
<td>126.8</td>
</tr>
<tr>
<td>Other</td>
<td>76.4</td>
<td>38.7</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td>5031.8</td>
<td>2894.8</td>
<td>690.3</td>
<td>189.2</td>
</tr>
</tbody>
</table>


The current production of heavy oil in the WCSB is approximately ninety thousand cubic metres (566,000 barrels) per day (NEB, 2003). Production is expected to begin to decrease toward the end of 2008 as the volume of recoverable heavy oil with current technology in discovered resources is reduced, with production remaining above seventy thousand cubic metres (440,000 barrels) per day through 2015 (NEB, 2003). Figure 1-20 shows NEB (2003) estimated daily production rates for heavy oil in the WCSB through the year 2025.
The production rates for heavy oil indicate strong activity in drilling and production for the next twenty years. Research in improved heavy oil recovery will increase daily production, total recoverable assets, and extend the life of plays.

Clayton McAllen, through conversations with engine maintenance providers and remanufacturers serving the heavy oil industry, estimates that eighty-five percent of the engines currently in use are 5.7 L engines made by GM (McAllen, 2006b; Powers, 2006). None of these remanufacturers are cryogenically treating the engines, thus conventional lifespans and maintenance cycles apply (McAllen, 2006b, Powers, 2006). The remanufacturing or replacement cycle for the conventional engines is eight to twelve months long (Powers, 2006). APG is able to receive this specific engine from SRC cryogenically treated, expanding both the maintenance cycle and lifespan. APG’s agreement with SRC allows APG to offer these engines at a lower price than current market conventional engine suppliers offer (McAllen, 2006b). APG expects to offer the
GM 5.7L cryogenically-treated industrial grade engines at under $20,000 CAD, compared to competitors’ conventionally-remanufactured (non-cryogenic) engines at or near $27,000 CAD (McAllen, 2006b).

The number of drilling and production sites for heavy oil at any one time is not known, with varying well lifespans. Heavy oil extraction wells can have profitable production up to ten years, but over fifty percent of the heavy oil using that well’s technology is recovered in the first two years, and over eighty percent in the first four years (NEB, 2001). Multiple wells known to be drawing from the same reserve, (within a “section”) are classified as “pools” (NEB, 2001). Table 1-9 shows the total number of heavy oil pools within the play areas designated by APG as within their geographic targets (NEB, 2001).

<table>
<thead>
<tr>
<th>Play</th>
<th>Geographic Area</th>
<th>Discovered Pools</th>
<th>Undiscovered Pools</th>
<th>Total Pools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Souris-Tilston</td>
<td>SE Saskatchewan</td>
<td>29</td>
<td>186</td>
<td>215</td>
</tr>
<tr>
<td>Frobisher-Alida</td>
<td>SE SK</td>
<td>118</td>
<td>2009</td>
<td>2127</td>
</tr>
<tr>
<td>Midale</td>
<td>SE SK</td>
<td>74</td>
<td>739</td>
<td>813</td>
</tr>
<tr>
<td>Ratcliffe</td>
<td>SE SK</td>
<td>20</td>
<td>566</td>
<td>586</td>
</tr>
<tr>
<td>Shaunavon</td>
<td>Southern SK</td>
<td>131</td>
<td>895</td>
<td>1026</td>
</tr>
<tr>
<td>Dina</td>
<td>Lloydminster Region</td>
<td>219</td>
<td>1157</td>
<td>1376</td>
</tr>
<tr>
<td>Cummings</td>
<td>Lloydminster Region</td>
<td>157</td>
<td>1982</td>
<td>2139</td>
</tr>
<tr>
<td>Colony-Lloyd</td>
<td>Lloydminster Region</td>
<td>1320</td>
<td>21790</td>
<td>23110</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td></td>
<td><strong>2068</strong></td>
<td><strong>29324</strong></td>
<td><strong>31392</strong></td>
</tr>
</tbody>
</table>

*Developed by the author based upon data from NEB (2001).*
The number of wells increases as the expected cumulative production of single wells decreases with the extraction of heavy oil from the most productive pools. Therefore the total number of wells expected to need engines to power the extraction drives or pumps will increase substantially in the coming years. With over ninety-three percent of the pools in the designated play areas undiscovered, there is significant future demand for suppliers to the heavy oil extraction industry (NEB, 2001). The number of heavy oil drilling companies is dynamic, with employees forming entrepreneurial ventures, and considerable merger and acquisition (M&A) activity in the industry (Tambosso, 2006a; Tambosso, 2006b). This reinforces the effects of derived demand, both by increasing activity and network effects enhanced by M&A activity.

1.4.2.2.2 Irrigation Sites

Engines are used with PTO units to power hydraulic and PCV pumps at irrigation sites, such as:

- Agricultural sectors;
- Water wells;
- Reservoirs and dams;
- Drainage sites;
- Overflow protection sites, such as levees;
- Saline extraction sites, such as “wet” plays; and
- Re-injection sites.
There are no conclusive figures available to estimate the number of existing or possible irrigation sites. Demand cannot be accurately predicted, but within industries some dissection is indicative. The discussion of unconventional gas plays in Section 1.4.2.1 included the distinction of “wet” plays, where natural gas is drawn with saline, which much be re-injected into subsurface saline aquifers. These wet plays provide two opportunities to sell engines: to power the pumps that withdraw the saline in extraction of natural gas, and the pumps that re-inject the saline. As the currently favoured dry plays are depleted, wet plays will increasingly be developed. This exhibits another derived demand opportunity for engines, to generator customers whose natural gas production progresses to include wet plays.

Other irrigation opportunities are dependent on external conditions such as weather events causing sporadic need to irrigate or drain, or residential expansion causing increased demand for water resources. Unpredictable demand is less investable, so interest in marketing engines to power irrigation sites should focus on more dependable demand sources where network effects are expected.

1.4.2.3 Standby Generator Market

The markets for standby generators are define by power needs. Residential customers represent demand for smaller, portable generators of power less than 30 kW, with 15 kW meeting most residential needs, even in peak demand hours (BC Hydro, 2006b). Commercial customers are categorized as small- to mid-size with power generation needs of 30 kW to 100 kW, or large-size with power generation needs over 100 kW.

An exhaustive search of Euromonitor and Statistics Canada databases was conducted.
1.4.2.3.1 Residential Customers

Residential customers would need generators during outages when electrical reinstatement is expected to be delayed, and when critical systems (such as refrigeration or electrical heating) must be maintained. Such conditions may exist in remote communities where electrical infrastructure is aging and service suppliers for maintenance and repair are not local. Additional demand may occur in climates where extreme weather conditions are known to occur. In order to estimate demand, historical outage statistics for number of dwellings affected, typical electrical load, and time to reinstatement must be examined. BC Hydro does not keep statistics mined to that level, but does release average availability as a percentage of total time, adjusted for all customers. Figure 1-21 shows BC Hydro availability annual averages for 2002 through 2006, and their target for 2007. Figure 1-22 shows the average duration of outages (interruptions of service) for all BC Hydro customers for 2002 through 2006, with their target for 2007.

In order to capitalize on these demand conditions, APG must be able to penetrate the market with high volume, requiring increased supplier capacity, inventory, logistics, distribution channels, and brand presence.
1.4.2.3.2 Small- to Mid-size Commercial Customers

Smaller commercial customers need generators to provide standby power during outages to protect inventory, maintain service levels, protect data integrity, and avoid equipment failure. These customers exist in every community, but in greater intensity in higher population areas. Demand cannot be estimated using outages, leaving every facility of requisite size and historical electricity usage as viable candidates. In order to satisfy demand APG needs the capacity to provide high volume, inventory, distribution channels, and to satisfy customer needs for return on investment (ROI) in terms of avoiding potential loss. Customer maturity is necessary to appreciate the risk, assess the costs and benefits of standby power, and have the cash flow necessary for systems in this price range.
Generator needs up to 100 kW in this category would require automated transfer capabilities to provide uninterrupted service. Customers would require ongoing maintenance services either included as part of the sale, in warranty, or available as needed. Customers expect the vendor to offer these maintenance services directly or through contracted agreement with a reputable service provider within a reasonable distance.

1.4.2.3.3 Large-size Commercial Customers

Large commercial customers, with needs for generators of 100 kW and greater, have greater need to protect critical resources. Most such customers seek generators when developing their infrastructure as part of their risk management. Generators are often custom-built for these purposes, and include highly automated monitoring systems.
and uninterruptible transfer capabilities. As a result, large generator providers include original manufacturers as well as distributors and custom providers, increasing competition and driving down margins. The high profile gained when large project contracts are obtained is valuable brand building, which justifies the low margins providing the firm has significant resources to invest in this market. Jobs are often bid out, requiring process knowledge, a significant network of suppliers willing to share the risk (for smaller players), and the ability to complete projects on time and on budget requiring sophisticated contingency plans to eliminate risk of failure.

Demand figures would typically exclude current facilities. Future customers can be predicted only when construction projects are announced, and knowledgeable providers must seek inclusion in Request for Proposal (RFP) lists to avail opportunities. Maintenance services are expected as inclusions in the sale agreement, in warranty, or provided as needed by the vendor or a trusted partner.

1.4.2.4 Prime Power Generator Market

Prime power is being supplied when the generator is the primary source of power for the facility, typically due to remote location where lined power does not exist and/or is not feasible logistically or economically. The need for power is temporary in most circumstances. The power level needed depends on the size of the facility and extreme load; the generator must be able to supply power under conditions of duress, without want for backup or standby systems. Remoteness affects the ability to maintain generators and replace fuel supplies, so generators must have high reliability, extended maintenance cycles and preferably run on fuels that are easily stored or supplied.
Sales opportunities for higher power generators are fewer than for smaller generator sizes, and have stronger competition from generator manufacturers as well as distributors. Profit margins are smaller due to the intense competition. Customers with many locations of oil or gas production sites, such as major resource producers, draw the attention of the stronger competitors, so opportunities for smaller generator providers will be more likely among independent producers.

1.4.2.4.1 Heavy Oil Drilling and Production Sites

The heavy oil industry has been discussed in Section 1.4.2.2.1, and shows strong presence and growth for at least the next twenty years. Heavy oil plays are typically remote, making generators more cost-efficient than installing power lines. Generators can be configured to run on natural gas that is produced by heavy oil wells, and excess gas beyond what is needed to run generators can be collected and compressed on-site.

The Petroleum Technology Alliance of Canada notes that methane emissions from oil and gas production comprise eight percent of Canada’s greenhouse gas (GHG) emissions (PTAC, 2001). These methane emissions are often in the form of solution gas, which is natural gas dissolved in a solution of fluids drawn from oil or gas wells or reservoirs. Changes in pressure or temperature as the solution gas is drawn may free it to become gaseous or other separation procedures may be used to convert it to freed natural gas.9

Solution gas from other resource extraction is typically vented (released into the atmosphere) or flared (alighted). Flaring is the preferred method of these two since it is

less harmful to the environment (AEUB, 2006c). Industry practice has long been to either vent natural gas emitted by heavy oil wells during drilling and production, or to “flare” it, lighting the gases to burn them as they exit the drilled gas vent.

Industry efforts are underway to better utilize solution gas to reduce harmful GHG emissions, to create an additional resource source by collecting and processing solution gas or generating electricity with it, and to create revenue opportunities from what once was considered extraction waste. As of December 31, 2005, the proportion of solution gas that is conserved (used or collected) had risen to 96.3% of total solution gas produced leaving less than four percent that had been vented or flared (AEUB, 2006c). Figure 1-23 shows the percentage of solution gas conserved and volume of solution gas flared or vented in Alberta from 1993 to 2005.

Figure 1-23: Solution gas conserved, flared, and vented in Alberta, 1993-2005

![Graph showing percentage of solution gas conserved and volume of solution gas flared or vented in Alberta from 1993 to 2005.]

Efforts to reduce emitting solution gas have been very successful since baselines were enacted for flaring reduction in 1996 and venting reduction in 2000 (AEUB, 2006c). The reduction in gas flared since 1996 is 72% through 2005, while venting has been reduced 59% (AEUB, 2006c). Figure 1-24 shows the reductions in flared or vented gas in Alberta since the baseline years.

Figure 1-24: Reductions in gas flared or vented in Alberta

<table>
<thead>
<tr>
<th>Year</th>
<th>Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>30</td>
</tr>
<tr>
<td>2000</td>
<td>38</td>
</tr>
<tr>
<td>2001</td>
<td>53</td>
</tr>
<tr>
<td>2002</td>
<td>62</td>
</tr>
<tr>
<td>2003</td>
<td>70</td>
</tr>
<tr>
<td>2004</td>
<td>72</td>
</tr>
<tr>
<td>2005</td>
<td>72</td>
</tr>
</tbody>
</table>


The AEUB (2006c) found that heavy oil production released 177 million cubic metres of vented gas measured in Alberta in 2005, a reduction of almost 19% from 2004. This reduction came during a year when heavy oil production increased by fourteen percent (AEUB, 2006c). Total vented gas from all oil (crude and heavy) extraction in 2005 was 291 MM m³, with an additional 42 MM m³ vented from natural gas extraction, well testing, and transmission lines (AEUB, 2006c). Figure 1-25 shows the total volume of solution gas vented in Alberta from all resource production and transmission sources from 2000 to 2005.

---

10 "Heavy oil," the common nomenclature, is referred to in the report by its scientific moniker "crude bitumen." AEUB (2006c).
The Saskatchewan government enacted new regulations in 2003 restricting the amount of natural gas that can be produced from heavy oil production (Sereda, 2003). The purpose was to restrict GHG emissions from natural gas venting. The 2003 regulations set natural gas emission rates from heavy oil wells to no more than 3500 cubic metres of natural gas per day, or a ratio of 177 m\(^3\) of natural gas vented/flared to each cubic metre of heavy oil produced (Sereda, 2003).

The Clean Air Strategic Alliance (CASA), a coalition of government agencies, industry firms and environmental groups, conducted a study on natural gas emissions from heavy oil production in 1997. The report proposed eliminating venting and flaring of natural gas at heavy oil production sites as a routine practice, and reducing overall GHG emissions from non-routine instances by introducing industry emission standards. The report recommended reducing overall natural gas emissions via venting or flaring.
from heavy oil production in Alberta be reduced to 2.5 million cubic metres per year (MM m$^3$/ yr) by the end of 2000, with a further reduction to 1.5 MM m$^3$/ yr by the end of 2001. The report recommended several other measures to increase flare efficiency$^{11}$, including eliminating the use of liquid hydrocarbons directed at the flare, while controlling air pollution by limiting the opacity of the resulting visible emissions (CASA, 1998).

The demonstrated need to provide other uses for natural gas drawn from heavy oil wells creates opportunities for providers of generators fuelled by natural gas. Generators can provide the power necessary to run equipment at the wellsite including any maintenance facilities or equipment using electricity, including natural gas compressors and collection tanks. Wellsites close in proximity which may be connected to the power grid can use generators as standby (rather than prime), yet benefit from generating electricity using the drawn gas to put power back into the grid, which may create another revenue source for the producer.

1.4.2.4.2 Conventional Gas Drilling and Production Sites

The expected increase in well drilled for unconventional gas and heavy oil has been demonstrated. The rapid increase in unconventional gas is due to the projected decline in availability in conventional gas resources as a whole, and the coincidental increase in demand for natural gas worldwide. Despite the decline in overall output, the number of conventional gas wells drilled is projected to remain at peak levels due to the

$^{11}$ Flare efficiency refers to the rate of consumption of flared natural gas per time period, directly related to the gas/air compression ratio.
decrease in per-well production (NEB, 2005). Figure 1-26 shows past and projected well counts and annual drill days (total for all wells, in thousands) from 2000 through 2007.

**Figure 1-26: Past and projected well count and annual drill days in the WCSB, 2000-2007**

Conventional gas wells are represented as “gas-intent;” CBM wells show dramatic growth while new conventional gas well counts are stable. However, almost eighty percent of total gas connections are for conventional gas, with 16,063 of 20,248 total wells expected to be connected in 2006 (NEB, 2005). Figure 1-27 shows the number of projected well connections for both conventional gas and CBM wells in the WCSB, designated by area.
Figure 1-27: Projected conventional gas and CBM connections in the WCSB, 2005-2007

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Projected Conventional Gas Connections</th>
<th>Projected New Gas and NGC Annual Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Gas Connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alberta - Foothills</td>
<td>94</td>
<td>105</td>
</tr>
<tr>
<td>Alberta - Foothills Front</td>
<td>6814</td>
<td>6865</td>
</tr>
<tr>
<td>Alberta - East Central</td>
<td>1608</td>
<td>1732</td>
</tr>
<tr>
<td>Alberta - Central</td>
<td>1010</td>
<td>995</td>
</tr>
<tr>
<td>Alberta - Northwest</td>
<td>336</td>
<td>349</td>
</tr>
<tr>
<td>B.C. - Fort St John</td>
<td>262</td>
<td>262</td>
</tr>
<tr>
<td>B.C. - Fort Nelson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.C. - Foothills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan - Central</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan - Southwest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subtotal - Conventional Gas Connections</td>
<td>15725</td>
<td>16063</td>
</tr>
<tr>
<td>NGC Connections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alberta - NGC</td>
<td>3148</td>
<td>4185</td>
</tr>
<tr>
<td>Total - Conventional Gas plus NGC Connections</td>
<td>18873</td>
<td>20248</td>
</tr>
</tbody>
</table>


Strong opportunities still exist in the conventional gas fields to sell generators (and engines), to provide power sources. The increasing need for solution gas utilization increases demand for natural gas-burning generators in order to reduce venting, flaring, and power collection efforts.

1.4.2.4.3 Remote Operations (Lodges, mining operations)

Generators can be used in any remote operation needed electrical power. The cost of installing lined power is prohibitive, and utility providers will not run lines to remote locations without a significant population base established. Hunting and fishing lodges are necessarily remote, and need to provide primary power for lighting, standard
appliances, and heat. It is difficult to estimate demand, and existing lodges will already have installed prime power generators. New demand is best attracted by establishing relationships with sportsman’s associations, or other outdoor activity groups.

Mining operations are large in scope, and a few players hold much of the mining market share. Mining sites need large prime power sources, and relationships are developed with maintenance contracts due to the potential financial loss of electrical failure on the mine. Few new mines are dug each year, and new demand is small. Replacement demand is beneficial to generator providers with service history with the mining firms.

1.4.3 Competitors of APG

There are several competitors in each market for their staple products of generators and engines. Large firms such as Finning, Cummins, Waterous Detroit Diesel-Allison (Waterous) have extensive (not always exclusive) distribution rights and facilities for sales and service in key geographic markets. Smaller firms such as Simson Maxwell, Frontier Equipment, and Klassen Diesel have non-exclusive distributor agreements with smaller OEM generator brands, often targeting the replacement market for engines. No documented information is available for engine or generator market share, and there is no dominating market player or oligopoly\(^\text{12}\). A summary examination of competitors follows.

\(^{12}\) Euromonitor, Global Market Information Database showed no information available with a search of Geography: (Canada, U.S., North America, or World); Category: Industrial Markets>Industrial Machinery>Motors and Generators, or in >>Oil and Gas Field Machinery (Euromonitor, 2006).
Finning Canada (Finning) is a subsidiary of Finning International, the largest authorized Caterpillar engine and generator distributor in the world, with several locations in Alberta and BC providing sales and service\(^\text{13}\). Caterpillar equipment is best known in the construction industry, and Finning concentrates its efforts on supplying the entire line of Caterpillar construction equipment, including generators using Caterpillar engines. Finning has large financial reserves, supplemented by Caterpillar's financing programs which allow Finning to offer financing to customers and carry a large product stock. Finning is capable of supplying many equipment types for large projects, either by sale or rental, with service agreements. Finning employs mechanical and electrical engineers to design and build custom generator packages, including industrial heat and power installation, substations, and generation distribution. Caterpillar offers engines burning various fuel types with power from 50 to 10,000 hp, with specially-designed engines for gas compression.\(^\text{14}\)

Cummins distributes engines and generators primarily (but not exclusively) through its partnered subsidiary, Cummins Western Canada (CWC)\(^\text{15}\). CWC has several locations in all four western provinces, providing sales and service\(^\text{16}\), allowing them to target many different customer segments simultaneously. Cummins has large financial reserves enabling end-user financing and capital investment. CWC offers new and used equipment, and equipment rental. CWC's portable generator products range from 35 to 2000 kW, running on various fuel types. CWC also offers industrial turbine generators

\(^{13}\) Finning Canada, [http://www.finning.ca](http://www.finning.ca).
\(^{15}\) Cummins, [http://www.cumminspower.com](http://www.cumminspower.com).
\(^{16}\) Cummins Western Canada, [http://www.cumminspowerco/na/locator/canada/](http://www.cumminspowerco/na/locator/canada/).
up to 18 MW power running Kawasaki engines. All Cummins products are sound-attenuated.

Waterous Detroit Diesel – Allison (Waterous) is an authorized dealer for Detroit Diesel engines and Allison transmissions with the merger of the latter firms. Waterous’ main engine market is selling to and servicing the on- and off-highway truck market. Waterous is the Western Canadian authorized dealer for Kohler diesel generators for prime power, standby, and peak sharing purposes, and Mercedes Benz industrial engines. These OEMs offer financing options for Waterous’ customers, supplementing Waterous’ large financial reserves. Waterous custom designs and manufactures natural gas fuelled prime power units and standby generators built upon GM or MTU engines. Waterous has extensive parts and service capabilities, and is recommended by the Alberta government to industry for providing hard-to-find or obsolete engine and transmission parts. Waterous is aggressive in pursuing bids for large commercial power generation projects with power needs of 500 kW and higher, with a dedicated bid-spec team. Waterous has six locations in Alberta, and one in northern B.C., with two fully accredited product training centres in Calgary and Edmonton.

Industrial Engines Ltd. (IEL) is an authorized distributor for Ford, Lister-Petter, Mitsubishi, and Hatz engines, based in Vancouver, BC. IEL recently lost their distributorship for Kubota engines to competitor Frontier Equipment. IEL has locations

18 MTU is the descendent of Motoren and Turbinen-Union, a German engine manufacturer. MTU is partnered with Detroit Diesel Corp (DDC) in generator production. http://www.ddcmftupowergeneration.com.
21 Industrial Engines Ltd., http://www.industrialengines.ca.
in Edmonton, AB, and Vancouver, BC, for sales and service. IEL pairs remanufactured engines with new alternators to create “as new” generators in-house, with power ranging from 4 kW to 500 kW. IEL builds custom engine packages for irrigation or hydraulic pumps. IEL’s standard generator engine model is the Ford 300 CID, which reaches turbocharged power of 80 bhp, producing generator power of approximately 60 kW. IEL also exports engines and generators to the U.S. and Mexico. IEL’s stated target markets are the industrial and marine portable power segments.

Frontier Power Products, Ltd. (Frontier) is an authorized dealer for John Deere, Nissan, and Kubota industrial engines (and others), and Kohler and Kubota generators, based in Delta, B.C. Frontier has sales and service locations in Delta, Calgary, and Edmonton. Frontier is attempting to develop a strong position in portable residential standby power with Kohler generators. Frontier’s Kohler line provides power from 8.5 to 100 kW, sound-attenuated, with automatic transfer switches. Frontier can install the Kohler residential generators for essential loads power distribution or configured to support the entire residence’s standby power needs. Frontier manufactures its own “PowerLine” generators, using Kubota diesel engines, providing power from 6.5 to 33 kW. Frontier offers Kohler diesel industrial generators up to 2800 kW, and Kohler propane and natural gas generators up to 800 kW. Frontier offers its “Long Run” generators, which are modified to include an oversized oil sump (pump) and other mechanical features intended to extend maintenance cycles. These engines are not cryogenically treated. Frontier’s other products and services include turnkey solutions and remote operational generators with communication capabilities for monitoring.

22 Frontier Power Products, Ltd. [http://www.frontierpower.com].
purposes. Frontier targets the marine, remote, and industrial generator market, and the industrial engine market for irrigation and saline injection purposes.

Simson-Maxwell has seven locations in B.C., Alberta, Ontario, and Quebec. Simson-Maxwell is an authorized distributor for Perkins, Volva, Kubota, and Deutz engines, and Kubota and Stamford generators. Simson-Maxwell offers manufactured natural gas generators from 25 to 300 kW using Daewoo engines, and manufactured diesel generators from 10 to 600 kW using various supplier remanufactured engines. Simson-Maxwell provides service to the construction, agriculture, and manufacturing industries, with oilfield customers in Alberta and B.C.

Klassen Diesel Sales Ltd. offers a wide variety of engines and generators as authorized distributors of Isuzu, Mitsubishi, and Daewoo products. Klassen has locations in Delta and Saanichton, B.C., and Seattle, WA, primarily serving the marine, boat construction, and logging industries.

SimPower Ltd. of Maple Ridge, B.C. builds custom generators from 500 – 2000 kW fuelled by diesel or natural gas for large industrial projects, with a large manufacturing facility in Red Deer, AB. SimPower is an authorized distributor for Generac power generators, from three to six hundred kW in diesel and natural gas, or modular systems up to 3000 kW. SimPower has extensive experience exporting custom generators, and assembling large project generators onsite in several countries. SimPower’s recent focus is developing a custom generator market in China.

---

Land-Sea Power Ltd. of Delta, B.C. offers new and used generators made with Scania and Yanmar engines. Land-Sea’s strength is in its chain of distributors of its products, primarily to marine markets and small industrial customers.

Several other smaller firms operate in Alberta and B.C. offering manufactured or custom-built engines and generators with various niche markets among small manufacturing, marine, oil and gas service, irrigation, and agricultural industries.

1.5 Product-Customer Analysis

Boardman and Vining (1996) describe the strategic value of product-customer matrices (PCM). The authors explain that both the process of gathering the information and analyzing the results provide insight into product development and customer segments, provoking insight into the current state of the firm and/or the industry, pending which type of PCM used (Boardman and Vining, 1996). The evidence confirms or dispels assumptions made and provides guidance for future product and market development (Boardman and Vining, 1996).

The general structure of a PCM is a matrix (or spreadsheet) with the products (or product groups, as appropriate) on the left, or vertical axis, and the customer segments on the top, or horizontal axis. The cells of the matrix contain data differing according to the specific type of purpose of the PCM, which may be firm- or industry-focused (Boardman and Vining, 1996). Veracity is necessary for PCMs to be useful; anticipation for prospective products or customers can be differently noted, but must be appropriately considered if the tool is to be useful.

1.5.1 APG Product-Customer Matrices

Boardman and Vining (1996) suggest several firm-level PCMs that are useful.

- The Customer PCM identifies the firm's current or prospective customers (using separate denotation, such as italics) as belonging in one or more customer segments and purchasing (or targeted) one of more product types from the firm. To minimize space, customers are typically denoted by an initial, with a legend to define participants. This reveals the breadth, or scope, of a particular customer across product lines and segments, which is useful in making more efficient sales contacts and strengthening the customer relationship.

- The Revenues PCM shows the rents currently being earned by each product group from each customer segment. This is useful in identifying sources of cash flow, where sales emphasis has been, and in combination with other PCMs can disclose the appropriateness of current actions in pursuit of stated strategy. Variants of this PCM include Sales Units, which show the number of units sold independent of revenues guiding sales activities; and Prospective Revenues, which would include anticipated revenues from sought clientele. These latter two can be constructed either individually or in combination with current revenues using distinct notation for simpler analytics.

- The Margins PCM distinguishes percentage or dollar profit margins for each product group from each customer segment. It is important to remember that these are unit profits, and more detailed information is needed to include
overhead attributable to sales per unit. A variant includes overhead and is properly identified.

- A more detailed examination of revenues that reveals current focus is the Share Revenues PCM. Each cell contains the proportion, or share, of the firm's revenues generated by each product group from each customer segment, in decimal form. The sum of all cells is necessarily exactly one.

- The firm will find it useful to analyze the contribution to profit made by each cell in the Share Profits PCM. Each cell's proportional contribution is detailed, again summing to one.

APG chose not to disclose financial particulars needed to construct many of the aforementioned PCMs; as with many firms, the accounting detail needed is atypical of their practices, and time constraints during a hectic sales period prohibited further analysis. It will be beneficial to utilize this tool as soon as possible.

**1.5.2 Industry Product-Customer Matrices**

A broader-based industry focus can provide knowledge of the direction competitors, customer segments, or suppliers are going or will go. Typical industry-level PCMs include the Suppliers PCM, which identifies all (or as many as possible) suppliers to industry firms selling within product groups to customer segments, and the Competitors PCM, which can reveal strategies sought by known and potential competitors. These both should include not only the firm's current product groups and customer segments, but all those served by the suppliers or competitors (as appropriate), in order to disclose potential opportunities or threats to the firm's position.
Figure 1-28: Competitor Product-Customer Matrix for generator and engine providers serving the oil and gas fields in the WCSB

<table>
<thead>
<tr>
<th>Products</th>
<th>New Generators</th>
<th>Used Generators</th>
<th>Custom-built</th>
<th>Generator Rentals</th>
<th>Engines</th>
<th>Service</th>
<th>Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;= 30 kW</td>
<td>&gt; 30 kW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lloyd Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE Sask</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commerical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sm - Mid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lodges</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forestry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- A: Allinda PowerGen
- FP: Frontier Power Products
- IE: Industrial Engines Ltd.
- IM: Ingersoll Rand
- IMPCO: Industrial Marine Products Co.
- WD: Waterous Detroit-Diesel
- SP: SimPower
- LS: Land-Sea Power Ltd.
- KED: Klassen Equipment
- WP: West Power
- KD: Klassen Diesel
- KG: Klassen Generator
- IM: Ingersoll Rand
- BE: Buck's Engines
- KEM: KEM Equipment
- IS: Industrial-Irrigation Services

Developed by the author based upon Boardman and Vining (1996).
Figure 1-28 illustrates the Competitor PCM for the generator and engine providers in the oil and gas fields of the WCSB. The data shown is gleaned from publicly available sources, primarily from competitors’ websites. The analysis reveals high concentrations of generator providers in the commercial sectors, but is limited in defining the full spectre of competitors in the oil and gas fields due to many independent distributors in the region. Only the major players in the industry openly market to the oil and gas fields, with the strongest players being Finning, Cummins, Waterous, and Frontier Power. This reflects the difficulty in establishing firm reputation throughout the oil and gas production industries, and emphasizes the importance of creating and maintaining excellent customer relationships to avoid combating unknown rivals.

The matrix reveals a lack of competitor concentration in the heavy oil industry in Saskatchewan, for engines, generators, and service providers. The evident lack of competitors offering generators to the residential market is due to the availability of smaller wattage portable generators from any number of distributors of major manufacturers, including hardware superstores such as Home Depot. The low concentration designating lodges as segments is due to the difficulty in targeting potential customers.
1.6 Analysis of the Portable Power Generator Industry

Michael Porter (1979) describes five contending forces which he posits must be considered in developing a firm’s strategy: existing rivalries among competitors in the industry; the bargaining power of industry suppliers; the bargaining power of industry customers; the threat of new firms entering the industry; and the threat of customers opting to use substitute products or services. Others have argued for a sixth force to be considered, such as complementors to the industry or environmental influence such as the public interest as represented by the government or activist groups (Brandenburg and Nalebuff, 1995; Carr, 2005; Porter, 2000). Environmental influences were discussed in Section 1.4.2.4.1, in considering motivation for reducing GHG emissions.

The power generator industry has many players of various sizes:

- Small operations who are primarily distributors with some custom building using supplied components.

- Large distributors with strong distribution agreements and some manufacturer support in brand affiliation, and certified servicing. These firms do more custom building of generators, and offer maintenance service contracts. Many have multiple locations, typically in major centres.

- Large distributors with exclusive distribution agreements, strong manufacturer support in branding and advertising, warranty servicing, and purchase financing. These firms actively seek to bid on large custom projects, often with dedicated sales teams and bidding specialists. These firms have multiple locations offering sales and service, in major centres and smaller facilities near customer bases.
Manufacturers who have integrated forward in the supply chain by establishing or acquiring distribution operations. They have more centralized sales and marketing, pursue contracts with multiple unit sales and long-term servicing, and actively seek bid opportunities.

Most generator providers also offer industrial-grade engines, either as components in remanufacturing generators, with power take-off (PTO) units, or stand-alone. Large providers with service capabilities offer generator reconditioning by replacing components. Some facilities perform engine reconditioning or remanufacturing. Many generator firms acquire engines from certified OEM engine remanufacturers, acting as distributors for the engines as well as using them for custom generators or rebuilds.

Demand in the generator industry sector that is serving the oil and gas production industry is growing due to rapid increases in drilling to take advantage of higher resource prices. Production from individual wells is declining as the largest reserves are depleted, leaving smaller reserves as the targets. The net effect is more wells need to be drilled in order to extract the same total volume of the resource. Drilling costs are increasing since the more fluid resources, which are easier to extract, decline and the industry focuses on more difficult and costly extraction resources and methods. Some economies of scale exist in supply acquisition. Considerable experience curve effects apply, especially in locating and drilling successful wells. Emphasis in efficiencies is on increasing the connection ratio, the rate of successful wells to total wells drilled. Figure 1-29 shows a summary of Porter’s (1979) Five Forces analysis as applied to this industry.
Figure 1-29: Diagram of Porter’s Five Forces of the portable power generator and engine industry in the oil and gas fields

Portable Power Generators and Engines Industry

- **Threat of Entry**
  - Moderate to High
  - (+) Can enter industry effectively at small scale
  - (-) Small initial and ongoing capital requirements
  - (+) Shallow learning curve
  - (+) Experience curve in establishing relationships
  - (-) Lack of customer concentration
  - (-) Very difficult to find experienced sales force
  - (+) Most are distributors, brand equity held by suppliers
  - (+) Few economies of scale / large players have access to capacity

- **Bargaining Power of Suppliers**
  - High
  - (-) Many suppliers of engines / generators
  - (+) Strong supplier-brand equity
  - (+) Industry is smaller buyer of suppliers than trucking, construction, or military
  - (+) Labour difficult to retain, no loyalties
  - (+) Reliance on outsourced service capabilities
  - (+) Suppliers maintain capacity for sellers
  - (+) Distribution channels must be maintained
  - (+) Input costs high relative to selling price

- **Rivalry Among Existing Competitors**
  - Moderate-Fzave
  - (+) Industry growth is steady with some consolidation (M&A, integrator)
  - (+) Competitor concentration is low
  - (+) Homogeneous products and service offerings
  - (+) High power generators provide brand visibility
  - (+) Low power generators readily available
  - (+) Low consumer switching costs
  - (+) Higher large customer switching costs
  - (+) Price leadership rare
  - (-) Low inventories or overcapacity
  - (-) Low fixed infrastructure costs
  - (-) High sales overhead costs
  - (+) Increasing scarceness of skilled labour -- Sales or service/maintenance
  - (+) High observability of prices, terms -- price adjustments can be made quickly
  - (-) Low exit costs

- **Rivalry Among Customers**
  - Moderate
  - (-) Lack of customer concentration
  - (+) Opportunity for multiple purchases or derived demand
  - (+) Low small-generator switching costs
  - (+) Higher large-generator switching costs
  - (+) Homogeneous services
  - (+) Information asymmetry fading -- Terms and prices easily available
  - (+) Easily compare service offerings
  - (+) Low price sensitivity, but increases with higher volume orders
  - (-) Little excess capacity

- **Threat of Substitutes**
  - Low
  - (-) Only real substitute is lined power
  - (-) Expensive to install power lines

*Developed by the author based upon Porter (1979).*
1.6.1 Rivalry among Generator Industry Competitors

Rivalry in the generator industry is directly related to the size of the generator. Firms providing high power generators behave very competitively, while little rivalrous behaviours exist in the market for smaller generators. The engine market (in the heavy oil industry) is dominated by the GM 5.7L engine, but no single provider dominates, and rivalry is low.

Figure 1-30: Rivalry among existing competitors in the generator industry

| (+) | Industry growth is steady with some consolidation (M&A, integration) |
| (-) | Competitor concentration is low |
| (+) | Homogeneous product and service offerings |
| (+) | High power generators provide brand visibility |
| (-) | Low power generators readily available |
| (+) | Low consumer switching costs |
| (-) | Higher large customer switching costs |
| (-) | Price leadership rare |
| (-) | Low inventories or overcapacity |
| (-) | Low fixed infrastructure costs |
| (+) | High sales overhead costs |
| (+) | Increasing scarceness of skilled labour -- Sales or service/maintenance |
| (+) | High observability of prices, terms-- price adjustments can be made quickly |
| (-) | Low exit costs |

Developed by the author based upon Porter (1979).

1.6.1.1 Market Share and Competitor Concentration

No reliable figures are available to determine revenues or market shares for generator or engine manufacturers or distributors in Canada. The best estimates are obtained by communicating with firms in service or supply positions for components or complementary products. Brent Powers of Alberta Governor Service Ltd., a distributor
and service provider for electrical and mechanical control systems in the oil and gas fields of Alberta, confirms that no single manufacturer or distributor controls strong market share in selling generators or engines to the oil and gas fields (Powers, 2006).

With the demand for generators growing due to increased drilling, the generator industry is growing steadily. As smaller players enter the market creating competition for large firms with high cash resources (such as Finning, Waterous, or Cummins), some acquisitions are taking place. Aside from the few large players, most competitors are small, with little power. This sub-competition for acquisition of small firms increases the rivalry among large players, which previously extended outside these customer markets to construction and heavy equipment. However, the overall rivalry resulting from low concentration of competitors is quite low.

The engine market has a dominant product in the GM 5.7L engine. This product is available from hundreds of competitors, none with high market share. Service of engine is a necessity, so providers must service the engines or have a relationship with a reliable service provider near the customer.

1.6.1.2 Product and Service Offerings, Branding, and Pricing

There is little difference in the products and services being offered by generator industry players. This homogeneity would normally be expected to increase price rivalries, but the cash position of the customers in the oil and gas production industries which attracts all suppliers is discouraging unnecessary price competition in most instances. Some differentiation attempts are occurring, stressing greater product
reliability and service provision to offset a dire lack of skilled labour in Alberta. Many differentiation attempts are emphasizing brand recognition.

High brand visibility results from large project engine or generator sales (especially those over 500 kW), and the market is quite competitive with lower percentage margins as a result. Project bidding is very competitive, with manufacturers cooperating with distributors to obtain contracts for large standby commercial generators or high prime power generators, often with service riders. Lower generator sizes (less than 150 kW) carry less brand recognition attributable to the provider so attempts to penetrate the market are less pervasive. Providers rely upon existing brand recognition of key generator components, especially engines. Price distribution among comparable products is narrow, though with many product variations comparisons are difficult.

1.6.1.3 Switching Costs and Customer Loyalty

Switching costs for small generators and engines are very low; with little product differentiation, one is as good as another. If service agreements exist, they expire when the product dies, leaving the customer free to choose any provider. Customer loyalty is somewhat dependent on service provision, moreso for larger generators. Switching costs for large generators are very high due to the service needs, especially for custom-built products. Loyalty then is directly related to the size and power of the generator provided.

1.6.1.4 Inventory and Capacity

Larger generators and industrial engines are custom ordered, with generators often built to project specifications. No inventory is kept for key components, though connecting parts may be held at little cost. Capacity is dependent on the terms of sale,
which often include some payment upon order to ensure continuity of cash flow for the generator provider. Capacity is augmented as needed in small increments.

Smaller generators are sold by distributors rather than the manufacturers, with capacity for provision dependent on the relationship with the manufacturer or wholesaler. These relationships are typically dependent on cash flow, so firms with an established client base or competent sales and management have few capacity troubles. Overcapacity is rare, so the impetus to reduce inventories through price competition would be highly unusual. Inventory costs are not usually problematic, unless a firm has supply chain problems or a poor balance of sales and forecasting.

Engines are kept in inventory more often than generators, since they are needed for replacement in generator or other component repairs, often with short notice. Overcapacity is possible, but with high demand turnaround is quick. Inventory maintains liquidity, with very few technological advances that would create obsolescence.

1.6.1.5 Cost Structure

Distributors of generators can operate with low fixed infrastructure costs if they do not need service facilities or can establish relationships with service providers. Firms who choose to differentiate via service offerings have higher fixed costs, in infrastructure, equipment, and labour. Skilled maintenance workers are difficult to find with many opting for lucrative positions in the oil and gas fields. Firms who outsource maintenance often need to assure response by securing secondary agreements.

Larger firms establish smaller facilities near the customer base, requiring more fixed investment, and assurances to retain skilled labour. Smaller firms who wish to
compete with larger players open new locations by Greenfield or acquisition, attempting to differentiate by service and availability. This increases rivalrous behaviour to build client bases and raise cash flow levels to satisfy increased overhead.

Experienced sales people are difficult to find and retain. Sales people with experience in the oil and gas industry are particularly valuable, requiring strong base pay and commissions to develop loyalty to the generator firm. This rarity increases competition for valuable sales people, and poaching is occurring. Ambitious sales people have left to open their own firms, relying on their contacts and knowledge of supply chains and distribution channels to establish presence. Sales expenses are high since initial contacts are preferred face-to-face, thus travel in the field is a staple. Customer loyalty requires investment.

1.6.1.6 Information Asymmetry

Competitors can easily observe prices and terms of sale, despite attempts at confidentiality. Firms who seek information about their competitors can do so easily, either through complementary suppliers or electronic sources. Terms can be altered easily, but with flush cash flows in the market, these competitive behaviours are evident only for higher-end products. The decline in information asymmetry serves to deter price competition among lower-end products.

1.6.1.7 Exit Costs

Exit costs are low for smaller firms; larger firms are unlikely to choose to exit. The increasing pace of acquisitions make exiting viable if the firm has established customer loyalty, controlled overhead, and established supplier and service relationships.
1.6.2 Bargaining Power of Generator Industry Suppliers

Suppliers to the generator/engine industry include product and component manufacturers, remanufacturers, and wholesalers. Distribution channels include transportation firms, trade and logistics facilitators, partners, service providers, and labour.

Figure 1-31: Bargaining power of suppliers to the generator industry

<table>
<thead>
<tr>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
<tr>
<td>(+)</td>
</tr>
</tbody>
</table>

Developed by the author based upon Porter (1979).

1.6.2.1 Supplier Concentration and Volume

Many suppliers of generators, engines, and components serve the industry, but sales are often dependent on the brand equity of the supplier’s products. Switching costs for sellers are low if they have not become dependent on the brand identity of their suppliers. Switching costs for suppliers are very low with a higher concentration of industry sellers than suppliers. Generator providers serving the oil and gas fields purchase small volume compared to overall supplier sales, with other industries such as trucking, construction, or the military buying a larger share of suppliers’ products. Input
costs comprise a large portion of the final selling price, especially in the higher-end (custom-built or prime power) generators where competition spurs lower margins.

Some manufacturers have entered the market, vertically integrating forward, to augment larger market (such as construction) provision, using the oil and gas industry as cash flow generators to extend their brand and maintain salesforce efforts. Backward integration by industry distributors, such as APG, is unlikely apart from custom assembly using suppliers' components, and some rebuilding.

1.6.2.2 Labour and Outsourcing

Labour wields considerable power due to scarce skills, and knowledgeable sales people. As a result, much work is outsourced in service provision, logistics, and even some sales outsourcing. Industry players who attempt to differentiate based upon outsourced services are highly dependent on these suppliers, making relationship management costly and time-consuming. Loyalty is difficult to establish and expensive to maintain, especially in the scarce labour market.

1.6.2.3 Inventory and Distribution

Since little inventory is kept by providers, the suppliers' ability to maintain agreements made by industry firms is critical. The providers' capacity is dependent on the supplier relationships, which are in turn dependent on management of the supply chain and cash flow fluidity. Differentiation among products is small aside from custom-built products.
Distribution channels influence sellers’ ability to meet obligations, as a method of reducing or eliminating provider inventories. Any factor which may affect distribution, such as transportation, trade or border issues, or the ability of chosen logistics providers to deliver products to end users will reflect upon the reputation of the provider.

1.6.3 **Bargaining Power of Generator Customers**

Customers considered are exploration and production firms in the oil and natural gas industries, primarily in Alberta with some heavy oil and gas production in Saskatchewan.

Figure 1-32: Bargaining power of customers of the generator industry

<table>
<thead>
<tr>
<th>Bargaining Power of Customers</th>
<th>Developed by the author based upon Porter (1979).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moderate</strong></td>
<td></td>
</tr>
<tr>
<td>(-) Lack of customer concentration</td>
<td></td>
</tr>
<tr>
<td>(+) Opportunity for multiple purchases or derived demand.</td>
<td></td>
</tr>
<tr>
<td>(+) Low small-generator switching costs</td>
<td></td>
</tr>
<tr>
<td>(-) Higher large-generator switching costs</td>
<td></td>
</tr>
<tr>
<td>(+) Homogeneous services</td>
<td></td>
</tr>
<tr>
<td>(+) Information asymmetry fading-- Terms and prices easily available</td>
<td></td>
</tr>
<tr>
<td>(+) Easily compare service offerings</td>
<td></td>
</tr>
<tr>
<td>(-/++) Low price sensitivity, but increases with higher volume orders.</td>
<td></td>
</tr>
<tr>
<td>(-) Little excess capacity</td>
<td></td>
</tr>
</tbody>
</table>

1.6.3.1 **Buyer Concentration and Volume**

Hundreds of firms operate in these industries in these geographic markets, and no single buyer holds significant market share. However, the attractiveness of multiple purchases and derived demand increases customer power. While not price sensitive due to high cash flows and record profits in the customers’ industries, large volume purchases
become more competitive at the price per unit scale. For smaller industry players, such multiple purchases can establish the firm's brand, help maintain sales force loyalty, and provide cash flow assurance enabling other opportunities. Most purchases are for smaller volumes providing little price competition.

1.6.3.2 Switching Costs and Loyalty

Customers of low-power generators have few switching costs, even when service provision is contracted or warranted. Service agreements often end with the product life, and attaching riders or denouement penalties is ill-advised with numerous industry competitors. High-power generator customers have higher switching costs due to the extended product life and maintenance services; provision of these services is policed by the customer. Brand equity and loyalty are dependent on the firm's ability to meet customer needs at any level, with high homogeneity of product offerings.

1.6.3.3 Information Asymmetry

Customers can easily obtain comparisons of industry products and services, though wide variety makes comparisons more difficult. Customers will use a litmus test as to whether or not the product will provide needed power with demonstrated efficiency and reliability, often requiring service riders as a guarantee of uninterrupted performance.

1.6.4 Threat of Entry of New Competitors in the Generator Industry

There are few barriers to entry for new entrants in selling generators and engines to the oil and gas production industry. Firms may enter without considerable initial capital outlay, and providing they can establish supply they can operate without accumulating inventory or incurring ongoing capital demand.
Figure 1-33: Threat of entry of new competitors in the generator industry


\begin{center}
\begin{tabular}{|c|}
\hline
\textbf{Threat of Entry} \\
\hline
\textbf{Moderate to High} \\
(+) Can enter industry effectively at small scale \\
(+) Small initial and ongoing capital requirements \\
(+) Shallow learning curve \\
(-) Experience curve in establishing relationships \\
(+) Manufacturers are integrating forward \\
(-) Products are often bundled with services to differentiate \\
(-) Low customer concentration \\
(-) Very difficult to find experienced sales force \\
(+) Customer market is cash heavy \\
(+) Most are distributors, brand equity held by suppliers \\
(+/-) Few economies of scale / large players have access to capacity \\
\hline
\end{tabular}
\end{center}

Developed by the author based upon Porter (1979).

1.6.4.1 Experience

The learning curve to enter the industry consists only of some knowledge of where to access supply, sales experience, and initial industry contact. Firms with sales experience specific to the customer segments are further down the experience curve, and with skilled sales people in scarce supply this is an obstacle to entry. This creates an opportunity in the minds of some sales people to work for themselves, and some new firms have entered with experienced sales people at the helm. This experience is vital with low customer concentration, and firms without industry contacts will incur additional expense to develop relationships. The cash heavy customer base is considerable enticement for small entry.

1.6.4.2 Economies of Scale

Few economies of scale exist, aside from potential wholesaler or manufacturer discounts when multiple unit sales are made. Larger competitors are most likely to access economies of scale through multiple supply requisitions to be distributed among
many smaller end user sales. This extends to include quicker response time due to increased capacity of larger firms. Large firms are often able to bundle service contracts with sales, both internally and with established maintenance relationships. Manufacturers are integrating forward, which is inhibitive to new entrants being competitive in markets that have captured the manufacturers’ attention.

1.6.5 Plausible Competition from Substitutes to Generators

The only plausible substitute for generators to provide electric power supply is lines connected to the grid, which are expensive to install and maintain. Power utilities will not fund nor construct power lines for temporary commercial or industrial applications such as oil and gas wells. Mobile high power units are possible, but are very expensive and require more labour and logistics to move from site to site.

Figure 1-34: Threat of substitutes being adopted by customers of the generator industry

Low

- Only real substitute is lined power
- Expensive to install power lines

Developed by the author based upon Porter (1979).

1.7 Internal Analysis of APG Resources

An analysis of resources held or available to APG will determine their ability to pursue their intended strategy in their defined markets. This section focuses of physical, human, intangible, and technological resources. Financial resources are analyzed in depth in Section 1.8, beginning on page 86.
1.7.1 APG’s Fixed Resources

APG’s fixed resources, such as property and equipment, affect their ability to establish a physical presence in their target markets. Local presence aids in developing and maintaining customer relationships in sales and service.

1.7.1.1 APG Facility

APG leases the property and has recently refurbished their sales and service facility in Delta, B.C., which was originally leased by Genacqua and shared with another firm. APG increased the leased footage of the property in 2005 rather than relocating to secure long-term lease rates approximately sixty percent of comparable industrial spaces in the lower mainland. The property is one acre (43,560 sq. ft.), with total facility size of 12,000 sq. ft. including service area (including custom-manufacturing abilities) of 5000 sq. ft. The yard includes parking and delivery, with a tented area of more than ten thousand square feet usable for large generator assembly, painting, and packaging. Inventory space is limited, reflecting their intent to distribute product directly from the outsourced manufacturer rather than retain capacity on-site. The area is rural-industrial, with expansion capacity if necessary.

1.7.1.2 APG’s Equipment

APG owns several pieces of equipment used in servicing engines, reconditioning generator components (such as alternators), and assembling generators of any size. The custom-built generator installed at Harbour Centre was built on-site. APG has servicing vehicles, tools, and hydraulic equipment enabling it to service or deliver product.
1.7.2 APG Human Resources

APG's human resources are based upon the technical knowledge of their principals, and the technical sales experience of V.P. Clayton McAllen.

1.7.2.1 APG Management

APG is managed by Allinda V.P. of Sales Clayton McAllen, who oversees operations of both the Delta and Calgary offices. Mr. McAllen is based in Delta, and travels frequently between the two locations. Mr. McAllen has worked in technical sales for several years, with much international experience. Harald Gerstein is the former owner of Genacqua, and directs the daily sales efforts in Delta. Mr. Gerstein has many years' experience in the generator industry, with established sales and supply contacts throughout Western Canada.

Anthony Durocher is a project manager for custom-built generators in the Delta office, overseeing project design, assembly, and installation for mid- to large-sized generators in commercial facilities. Mr. Durocher also oversees the service department, who recondition and assemble generators and provide contract service for all generators held by the city of Surrey, B.C. Mr. Durocher has years of experience as a commercial development project manager across Canada.

1.7.2.2 APG's Sales Staff

APG's sales personnel work in both the Delta and Calgary offices. The newer Calgary staff concentrates on establishing local presence in the oil and gas industries; many were hired based upon prior experience with the desired market, with some experience selling generators and engines.
The compensation system employed by APG for its sales staff includes base pay plus individual commissions, with office-based ‘team’ bonuses based upon fiscal period sales and meeting sales targets. The rabid sales market provides ample opportunity for commissions to be made, but the concurrent shortage of experienced sales people renders the firm liable to poaching efforts. Competitive wages may not be sufficient to maintain loyalty among the sales force, and the employee relationship must be closely managed. Consistency in sales personnel will assist the firm in maintaining vital customer relationships in order to build cash flow.

1.7.2.3 APG’s Skilled Labour

APG employs four skilled power mechanics for servicing engines and generators in their Delta facility, on-site for large commercial generators and in fulfilment of their contract with the city of Surrey. The service staff are full-time employees managed by Mr. Durocher, the project manager. Genacqua employed mechanics on a contract basis prior to its acquisition, which was not adopted by APG due to the tight skilled labour market in the Lower Mainland of B.C. and the experience curve advantages Mr. McAllen wishes to develop within APG. New skilled power mechanics are actively sought, and one junior member is currently being trained on-the-job.

1.7.3 APG’s Intangible Resources

APG’s is pursuing the establishment of its brand presence through the outsourced generator manufacturing relationship with EP with the APG-branded ALLINEX line of power generators. APG cannot effectively utilize the Allinda brand previously built in control systems without developed synergy between the product lines and customer
segments. APG is attempting to establish brand equity in the oil and gas fields through the employ of experienced industry sales personnel in the Calgary office.

1.7.4 APG’s Technological Resources

APG’s key technological resources lie in the engineering expertise of the principals and the design of its branded ALLINEX generator products. The exclusive distributor agreement with SRC for the IH 466 engines provides a technological differentiation from its competitors than can be exploited if APG demonstrates product superiority through dedicated sales efforts. The concurrent agreement with EP to package these engines to create the ALLINEX line, and especially the logistical arrangement to ship product directly to customers without accumulating inventory allows APG to focus efforts on developing sales contacts and consistent demand. The engine differentiation and APG’s design proficiencies are hoped to establish technological advantage with the generator line, again requiring market presence.

1.8 Financial Performance of Allinda

APG’s ability to compete depends on its ability to earn rents, based upon the successes of past investments in capital and customer development. It is typical for immature firms to struggle with cash flow, yet even the briefest history holds clues as to whether or not the firm is ably managing its finances.

1.8.1 Allinda’s Financial History

Allinda experienced slow revenue growth by its original control systems business line through 2004, with minimal profit. It was evident the firm needed to develop or
acquire another business line to generate cash flows necessary to grow operations and business equity. Revenues almost doubled in the first quarter following the acquisition of Genacqua, and utilizing the existing Allinda sales team revenues more than doubled in the next quarter, Q4 of 2005. Figure 1-35 shows corporate quarterly profits and losses from 2004 through 2006.

Profits continued to be minimal through 2006 as the firm reorganized, with Allinda becoming a holding company for ACS and APG. Allinda used profits to offset the Genacqua purchase to minimize interest debt, choosing to forego quick cash flow in favour of long-term cash equity and investment capability.

Figure 1-35: Allinda quarterly Profit & Loss, 2004 – 2006, in thousands of dollars ($000s)

Source: Developed by the author based upon information supplied by Allinda PowerGen.
Office development in Calgary drew direct sales efforts away from the new business line. Efforts to seek and orient experienced sales staff for the Calgary office and develop supplier relationships and customer contacts limited daily sales opportunities resulting in decreased revenues and negative profits for the first quarter of 2006. Revenues have rebounded since then, with profits remaining directed at decreasing debt. Figure 1-38 on page 90 shows the decrease of debt to equity during this period.

The resulting increase in total assets from the acquisition and the later installation of the Calgary office are shown in Figure 1-36. The difference in net worth reflects the firm’s efforts to offset debt related to the acquisition. As the leveraged value declines, the net worth will increase at a greater rate, and total assets will reflect more cash equity.

Figure 1-36: Allinda quarterly Assets / Net Worth, 2004 – 2006, in $000s

Source: Developed by the author based upon information supplied by Allinda PowerGen.

Total assets for Q4 of 2006 reflect increased Accounts Receivable (A/R) from contracted sales yet to be delivered, with deferred terms.
1.8.2 Current Financial Status of Allinda

Continued development of the sales team and client contacts for the Calgary office have reduced net income through 2006 as investments in human capital are made. Cost of Goods Sold (CoGS) for the firm increased largely due to investment in components needed for large commercial products delivered (such as Harbour Centre). Figure 1-37 shows sales, CoGS, and net income for 2006 in thousands of dollars.

Figure 1-37: Allinda Net Income 2006, in $000s

Source: Developed by the author based upon information supplied by Allinda PowerGen.

APG expects net income to increase slightly as revenue sources move to sales from the oil and gas fields, and CoGS decreases in relation to increased unit sales of the ALLINEX generator line with a smaller proportion of sales large commercial units.
1.8.2.1 Allinda’s Financial Ratios

APG’s current ratio compares its current assets to current liabilities, which is an indicator of how much capital it has available to pay accumulating short-term debt.\textsuperscript{27} APG adopted a debt liquidation stance in acquiring Genacqua, choosing to use working capital to retire the debt quickly, lowering the firm’s long-term cost of borrowing (McAllen, 2006a). Once this debt is fully retired, APG’s current ratio will increase, and APG expects to utilize newly available working capital to develop additional customer segments. Figure 1-38 shows Allinda’s current ratio and debt-to-equity ratio from 2004 through 2006.

Figure 1-38: Allinda key financial ratios, 2004 – 2006

\begin{center}
\includegraphics[width=\textwidth]{figure1-38.png}
\end{center}

Source: Developed by the author based upon information supplied by Allinda PowerGen.

Allinda carried little debt prior to the Genacqua acquisition; significant progress has been made in 2006 in reducing the firm’s debt-to-equity (D/E) ratio, which reflects

\textsuperscript{27} Forbes, \url{http://www.forbes.com}.
the relationships between long-term debt and shareholders' equity. The lack of significant debt will assist in increasing cash flow which will be sorely needed if they are to successfully establish presence in new customer segments, and survive initial overhead while the Calgary office becomes viable.

1.8.2.2 Capital Value of APG

The current capital value of APG is over six million dollars (CAD).

1.8.2.3 APG's Borrowing Capacity

APG has limited active credit capacity in order to retire its acquisition debt earlier. The firm currently has credit reserves of approximately one million dollars per covenant. Any further borrowing would require restructuring of current financing and investment agreements, including dilution of partners' shares and voting rights.

1.8.3 Allinda's Cash Flow

Prior to the acquisition of Genacqua, Allinda's quarterly cash flow was poor, and did not allow for development. The immediate cash flow effects of the acquisition were significant, causing two successive quarters of high negative cash flow. In 2006, first and third quarter cash flow returns were highly positive, with nil to negative cash flows in the second and fourth quarters, due to capital required to establish the Calgary office (Q2), and initial sales and marketing activities in Calgary (Q4).

Figure 1-39: Allinda quarterly cash flow, 2004 – 2006, in $000s

Source: Developed by the author based upon information supplied by Allinda PowerGen.

The forecast for the first quarter of 2007 is negative due to lingering effects of sales contact initiation in Calgary, and delayed receipt of receivables due to terms. APG expects payment periods of forty-five days to transfer cash from end-user payments to APG’s vendors (Allinda, 2006b). Cash flow forecasts for Q2-2007 are moderate, with abundant cash expected to be available beginning in Q3-2007 as demand from the Calgary office is satisfied with increased capacity available due to the supply chain and logistics relationships with SRC and EP.
APG expects increased cash flow in early 2007 due to revenues received from newly-developed customer relationships with the Calgary office and first delivery of the ALLINEX generators in January, 2007. Figure 1-40 shows current and forecasted monthly cash flow from May, 2006 through September, 2007.

1.8.4 Allinda’s Stated Prospectus

The rapid rise of revenues due to the development of APG is expected to continue in 2007. The firm expects investment in the Calgary office to bear fruit through supernormal revenues from the oil and gas producers. Net income will increase drastically as sales move from lower-margin large custom-built gensets to higher-margin APG-branded ALLINEX units delivered to the field. Figure 1-41 shows annual net income history and prospected 2007 values, in thousands of dollars.
Cash outflow remaining from the Genacqua acquisition will be completed in 2007, lowering D/E and increasing available cash for further investment in prospected geographic and customer segments, such as the heavy oil producers in the Lloydminster region and southeastern Saskatchewan. The firm expects continued increases in net margins as brand reputation is built for the ALLINEX line.

1.9 APG’s Strategy

An analysis of opportunities must include consideration of the firm’s stated strategy in order to evaluate whether or not the firm will succeed if it continues along its current path.

1.9.1 Allinda Corporate Strategy

Allinda is in the process of incorporating as a holding company, having separated the controls business from the power generation business. The stated corporate strategy
is to maximize revenues and establish a reputation of quality and customer service through demonstrated customer relationships (McAllen, 2006a). The firm intends to develop strong sales competencies with high technical product knowledge. The long-term objective is to set the firm up as an acquisition target within six years in order to cash out stakeholder equity.

1.9.2 APG’s Competitive-Level Strategy

APG is currently attempting to penetrate many customer segments at once with its generators and engines. The firm has not developed its own brand recognition, though its product line has established manufacturers’ brands. APG intends to build the ALLINEX generator brand and redefine the IH 466 engines branded as “APG remanufactured” with the cryogenic treatment as a differentiated quality. APG has a slight cost advantage resulting from its exclusive distributorship of the SRC-remanufactured engines, and its generator packaging relationship with EP. Penetration of the market to develop the APG brand is being attempted through price reduction, which they intend to alter once their brand recognition is in place. The current price reduction still allows small margins, but limits working capital. APG believes even with higher product quality due to extended product life and maintenance cycles, they cannot charge premiums until their product differentiation is accepted by the individual markets (McAllen, 2006a).

1.9.2.1 APG’s Strategy for Managing the Value Chain

APG is changing their strategy for adding value. The firm’s initial strategy to add value through custom-assembling large commercial generators in the Lower Mainland and providing contract service to large municipal governments did not generate
anticipated cash flow growth, largely due to low margins from the highly-competitive large commercial generator market. Margins are valuable in service provision, but the lack of available skilled labour and rising labour rates are obstacles to increasing capacity. APG has recently declined to add clients to its contract service in light of the latter problems.

APG’s decision to pursue generator sales in the oil and gas fields in Alberta shifts their value chain role from being an assembler/manufacturer and service provider to a distributor. The firm’s relationships with SRC and EP are considered links in the APG value chain as outsourced capabilities providing product differentiation exclusive to APG (Vining and Globerman, 1999). APG is depending on the long-term partnership agreements with SRC and EP to provide greater value than transactional relationships typical with distributor arrangements (Kakabadse and Kakabadse, 2002). APG is focusing internal activities on sales, shown by recent investments of increasing sales staff in Delta and establishing the Calgary sales office.

APG is not developing synergies with its sister firm, ACS, in adding value by differentiating generators using ACS control components. APG has decided that control components currently used in the generator industry are competent, and sees no advantage in R&D investment by ACS for this purpose.

2.0 Assessment

APG needs to consider several aspects of it operational strategy in order to maximize profit potential. APG need to consider:

- industry conditions, especially the positions of rivals and suppliers;
• how they define customer segments as it pertains to their marketing efficiency and their targets;
• their product line and supply chain maintenance;
• their sales management and demand considerations in establishing customer relationships;
• the implications on their operations of early-stage finances; and
• the congruence of their operations and their stated strategy.

2.1 Industry Assessment

The overall strategic attractiveness of the generator industry is moderate at best. The few barriers to entry combined with customer segments flush with cash and ambitious sales people's tendency to branch out on their own creates an ever-growing roll of competitors. It is increasingly difficult to monitor rivals, and the transparency of product lines, prices, and terms via technological sources and complementary providers makes any competitive behaviour vulnerable to quick duplication or more destructive margin depletion. The levelling factors include the lack of experienced sales contacts and the increasing need for service provision to distinguish durable players. These factors prevent price competition in the growing market, which in the short-term will keep generator sellers with a capable sales force alive.

With homogeneity among products, and low margins for custom-built or large power generators, maintaining strong relationships with suppliers upon whose brands sales are reliant is imperative. This requires cash flow, which is generated by volume sales again resulting from a capable sales force. The abundance of firms in the industry
provides customers with leeway, disabling supernormal unit profits. The best strategic option is to profit from volume sales, either by large customers (who are more easily identified and approached by large players) or by those expected to create derived demand. It is possible to differentiate the product, but must be demonstrated through the experience and reference of influential customers prior to allowing premium rents to be collected.

In summary, success in the short-term requires:

- strong employee relationships to maintain an experienced, motivated, and loyal sales force;
- strong service provision, either internally or through trusted relationships;
- competitive offerings and prices, but not hyper-competitive;
- focus on supply chain relationships, including logistics;
- focus on value chain relationships, including outsourced efforts (such as product maintenance);
- focus on customer relationships to develop loyalty and derived demand; and
- cash flow, which feeds all the previous provisions.

If APG ensures these conditions are met, the firm will survive the shakeout occurring as new entrants multiply, and either fail or succeed to acquisition.

Some differentiation through strong supplier relationships or advanced product or service capabilities is necessary to retain multiple-purchase customers and allow collection of premiums over the long term. Superiorities in sales must be maintained to capitalize on these abilities regardless of differentiation.
2.2 Assessment of APG’s Defined Customer Segments

APG’s designation of opportunities in Section 1.2 defines their targeted market segments. The demand analysis shows there is considerable overlap among these targets, and if pursued separately will create confusion in customer development as sales efforts are made redundantly, perhaps even by separate sales agents from the same office.

Meredith (2006) shows that improper customer classifications can result in incorrect demand estimates leading to inefficient sales strategies and wasted efforts. The consequences will be decreased cash flow, poor satisfaction among sales team members, and finally customer disenchantment. Athanassopoulos (2000) warns that failing to maintain service quality (here in the form of coherent sales representation) can cause customer dissatisfaction despite advantages in price, convenience, and product quality or differentiation. The author shows that service quality deteriorates when managers classify customers into segments improperly, which decreases customer valuation of switching costs ultimately inducing switching behaviour (Athanassopoulos, 2000).

Dickson and Ginter (1987) advocate constructing “product preference maps” to create customer segments based upon the products that customers choose with appropriate features. This is similar to Boardman and Vining’s (1996) use of Product-Customer Matrices, as described previously in Section 1.5.1. The latter authors’ Customer PCM provides a greater variety of information to identify customer product choice and emphasizes customers who may occupy cells in different defined customer segments, allowing greater knowledge of customer interests and more efficient sales
tactics (Boardman and Vining, 1996). PCMs should also be used to identify financial benefits and influences on firm performance from distinct product-customer mixes.

Moorthy (1984) argues for customers' self-selection into segments as noted by their product choices, which allows firms to aggregate customer segments. The firm will more efficiently isolate preferred customers and gain knowledge of and advantage over competitors (Moorthy, 1984). Grover and Srinivasan (1987) concur, positing that firms should consider customer segmenting based upon the homogeneous probability of customers choosing product attributes.

These studies point to APG's need to redefine their opportunities according to appropriate customer segments based upon the customers' likelihood to prefer types of products, moreso than by the customer's base industry. Industry presence may place firms in different locales and provide distinct customer business knowledge helpful in establishing rapport, but is not essential to targeting; in fact, efficient sales teams may aggregate efforts across customer industries if locations are not diverse.

Information to construct a Customer PCM was not available during the period this study was performed, due to other matters requiring firm attention. It will be helpful for APG to construct these PCMs soon in order to utilize this knowledge and combine sales efforts, especially with many possible customers and competitors.

2.3 Assessment of APG's Products and Supply Chains

APG's remanufactured IH 466 engines from SRC, and ALLINEX generators are differentiated due to the cryogenic treatment which provides extended lifespans and
service cycles. There are few barriers to entry against APG due to low switching costs (barring contractual agreements) for most potential customers, the lack of a dominant market player, and the short lifespan of competitor products, given APG's product and sales capabilities. Carpenter and Nakamoto (1989) showed that pioneering advantages (as opposed to 'first-mover' advantages) can be established when brands can be repositioned and minimal switching costs exist, even in mature markets. APG's uses of modified International Harvester engines under these market conditions meet the authors' criteria. There is an opportunity for APG to create pioneering advantages if APG can understand how demand exists and can be generated. APG must know how potential buyers learn about their products, which will differ according to type of demand and customer segmentation, in order to change customer preferences and attain the pioneering advantage (Carpenter & Nakamoto, 1989). The critical factors will be to discover if APG can capably demonstrate the product superiority as an advantage, if potential customers value the differentiated product, and if its consideration as an innovation overcomes any risk associated with its adoption, thus reducing switching costs (Fichman and Kemerer, 1993).

A popular brand could be affected by supply disruption, which would hamper APG revenues if that brand represented a large proportion of APG revenues. This increases the need for APG to construct CPMs with even greater product detail to identify currently-carried products making greater contributions; the analysis will need to be repeated regularly to discover diffusion effects of the ALLINEX line, and if it is diluting other product lines. The decision then rests upon experiences in managing the supply chain and whether the home brand is contributing at levels equivalent to or expected to
surpass those of distributed brands. Management must judge the importance of establishing its own brand in increasing the net worth of the firm based upon stated intent to create an attractive acquisition target.

This study was limited in financial mining, thus saw no evidence that any particular distributed brand contributes more than any other to APG's bottom line at present. The decision to invest in the ALLINEX line through the exclusive agreements with SRC and EP is appropriate. This combined with industry factors enhances the need to generated cash flow or acquire additional investment to secure these relationships. Further investigation of the stability of SRC is needed to generate confidence in this key supply link, which is also a dependent link of the APG value chain.

2.4 APG's Sales and Demand

The labour shortage in Alberta extends beyond manual labour to skilled sales people with experience in the oil and gas sectors. Sales, it is said, is sales: the ability to sell is less dependent upon knowledge of the product and the market than upon particular selling skills which must be cultivated by adept and innovative sales force management (Carter, 1998). The experience curve pertains to technical sales as advancement down the learning curve is greater with a technical background; product knowledge affects the immediacy of sales people generating cash flow in the same manner. The shortage of sales people with such experience, which precipitates the poaching of such people, forces APG to consider alternatives: pursue candidates with technical or product knowledge and train them to sell or candidates with demonstrated sales abilities and train them in product and market knowledge? The timeframe for developing a fully knowledgeable
effective sales force is dependent on management's devotion to training, and the
complexity of the technical product or market knowledge.

Derived demand offers the best potential for increasing sales over the long-term,
justifying targeting customers who possess greater likelihood for growth even if current
direct demand is lower. This amplifies APG's need for sales relationship management to
build goodwill. Weitz (1981) demonstrates that a key factor influencing sales
effectiveness is the customer-salesperson relationship. This suggests that those with
demonstrated sales experience and skills (without product or market experience) may be
more valuable with impending cash flow needs.

Typical compensation processes for sales people are to provide a modest base
salary, motivating unit sales through higher commissions. Recent sales management
trends have included team-based commissions and bonuses, based upon pre-set unit sales
goals or comparisons to past time periods. APG does not have the luxury of past sales,
and the determination of appropriate sales goals will be ad hoc found by iteration unless
they seek benchmarks for successful team-based sales goal-setting. Successfully
implementing team-based sales strategies will require recruiting team-oriented
individuals dedicated not only to goal attainment, but to both customer relationships and
internal (sales team) relationships (Weitz and Bradford, 1999). The authors note that
developing team behaviours in sales people with a history of individual goal pursuit is
difficult. The authors cite Kanter's (1994) position that successful sales team dynamics
leans toward that of marriage, with enhanced commitment to long-term objectives in
building the team relationship. This is expanded to the team developing trust and
commitment in a long-term customer relationship, rather than focusing on attaining short-
term sales goals (Weitz and Bradford, 1999).

APG has recently experienced difficulty in sales force selection, with one member
circumventing the team to generate sales for their own benefit, including arranging sales
outside of the firm by utilizing firm assets and contacts for personal gain. This internal
sabotage is harmful not only to the firm, but to its efforts to maintain the team sales
approach and especially to its customer relationships. APG needs to rethink its approach
to recruiting sales force members and look beyond the borders of market and product
knowledge for those with sales experience in a team atmosphere. This may require
searching in different geographic areas and relocation for candidates who will pursue the
firm’s interests as concurrent with their own. APG must also repair the relationships with
its remaining team members and reinforce the team atmosphere by examining the
motivational tools and policies in place.

2.5 APG’s Financial Status

The relatively low current ratio in combination with a near-zero D/E ratio in the
fourth quarter of 2006 is concerning as it reflects an inability to increase working capital
though the debt is nearly retired. This could indicate difficulty in convincing potential
customers of the firm’s longevity in Alberta’s oil and gas markets, or scepticism of the
firm’s claims of product differentiation. However, it could also represent the effects of
payment terms, in that charges for generated orders have not been credited to accounts
receivables with the sixteen-week delivery period due to manufacturing after receiving
order (ARO).
APG needs cash influx in order to fully establish an experienced sales force in Calgary, regardless of the lack of available labour. APG needs to accelerate the time schedule for delivery of the ALLINEX line, with many competitors having product in inventory. This forces APG to decrease its price to convince potential customers to wait for the yet unproven product. APG has 75 ALLINEX generators scheduled for delivery in January which is expected to satisfy some waiting demand, but needs to maintain a continuous supply stream. APG needs to provide cash investment to SRC and EP to ensure their own cash flow is adequate to prevent supply problems and bolster confidence in APG’s ability to move product. This may require APG to hold inventory at times, but the alternative of continuing to manufacture ARO severely limits APG’s growth, as customer dissatisfaction increases with continued product wait times. Once the production-delivery cycle is established the need for inventory will cease, assuming logistical consistency. APG should consider alternatives to retiring the Genacqua acquisition debt on the current schedule in order to increase its ongoing working capital, including seeking additional cash investment even if it requires dilution.

2.6 Expected Performance under APG’s Current Strategy

APG has recognized the long-term value of pursuing advantage through differentiation by acquiring the distribution and production agreements with SRC and EP. APG must acknowledge this outsourced component as part of its value chain, and ensure it receives the same attention as internal contributors. There may be difficulty in maintaining stability and consistency of this relationship without making cash available.
APG's decision to open a sales office in Calgary shows proper focus on making sales the key link in its value chain. APG has established outsourced service along the Calgary-Red Deer corridor, to offset large competitors' advantages in service provision.

APG's strategy to operate with minimal working capital will inhibit growth and may affect employee relationships if potential customers are unwilling to wait for product or if difficulties in establishing a loyal and cohesive sales team persist. This will delay the establishment of the ALLINEX brand, possibly denying the opportunity to demonstrate product differentiation and gain competitive advantage over the long-term. This will in turn impede or deny the opportunity for the firm to realize premium rents and reap supernormal profits, which will not increase the value of the firm to potential suitors.

3.0 Solutions for APG

Several plausible recommendations are suggested in the Assessment section. The keys for APG to maximize profits are to:

- properly define their customer segments;
- understand and appreciate sources of potential demand within these segments;
- focus sales efforts on establishing long-term relationships and customer loyalty, acknowledging sales management as their core competency; and
- develop metrics to evaluate progress toward achieving strategic goals.

3.1 Defining Customer Segments

The customer segment analysis performed identifies strong demand in the CBM, heavy oil, and conventional gas industries due to expected increase in well sites in the
coming years. These potential APG's customers are likely to cross industry lines at some point in the customers' growth; even if not, the similar use of APG's products and small differences in feature choice allow APG to aggregate segments and define them more appropriately, perhaps by industry and geography. APG's product line is narrow enough to encourage sales team knowledge of all their products, and more pertinent to their efforts to develop brand awareness through the ALLINEX line. It is ill-suited for APG to separate the "Engine market" from those of generators, when many of the customers will be likely to consider both, especially since the main component of the generators is the cryogenically-treated IH 466 engine.

The "Prime Power" market is differentiated only by the size of generator preferred; within it, the heavy oil industry is also targeted for engines. APG should aggregate the subsegments since many of the customers are also found in other defined customer segments. Irrigation sites are difficult to identify, and unlikely aside from chance. Once APG establishes presence in the CBM plays their influence will extend to irrigation uses of generators and engines when the trend turns to "wet" plays once "dry" production begins to decline.

The "Standby" market is inconsequential to long-term proficiency of APG. These subsegment definitions apply to literally everyone: residential, small- to mid-size commercial, and large commercial. The distribution channels necessary to establish brand presence are unavailable to APG in the first two subsegments, and the latter offers small margins which will detract from their net worth and prospective value to suitors. The standby market is best left as an add-on rather than a focused customer segment. APG should only continue to offer them based upon the analysis of financial PCMs,
particularly the Share Profits PCM, where further product definition can help them decide if carrying a wide variety of new generators and lines is worthwhile. This decision is similar to that already taken regarding their service offerings, in considering the worth of continuing to carry a product while attempting to develop their own differentiated brand versus the efforts needed to properly represent these products and pursue these markets.

3.2 APG's Sales and Marketing

The first step in plotting marketing strategies focusing sales efforts is to identify sources of demand information and exploit them to gain deep understanding of demand derivation. APG can then develop customer relationships with comprehensive team-based sales force management.

3.2.1 Knowing Demand

APG's sales strategies need to identify possible derived demand customers to focus on long-term sustainability rather than short-term cash flow, assuming product and service quality is at a premium. APG can position the firm as demand-responsive; rather than using sales-driven planning, APG can train salespeople to be demand-driven, increasing communication throughout the firm to more accurately understand lead potential. APG can have outside salespeople exploit customer relationships to determine future needs. Meredith (2006) notes that B2B suppliers develop problems in cash flow and investment return when they overlook market effects that evolve past the direct customer markets. The author recommends analyzing derived consumption two or more levels past the firm’s immediate distribution points for both opportunities and plausible
threats. This concurs with Porter’s (1985) contention that market effects upon the firm’s customers and their customers’ customers will additionally impact the firm’s future.

APG needs to incorporate derived demand effects into its forecasting, by developing stronger customer relationship management to incorporate their clients’ forecasts into APG’s forecasts, including consumer sector trends. APG will be able to ascertain unconsidered markets by understanding the derivative use of APG products by their clients. This assists short-term forecasting, relieving stress on cash flow and affects longer-term capital abilities critical to planned expansion, especially in the salesforce and in partnership agreements (Meredith, 2006).

APG should continuously analyze oil and gas industry players, including number of industry entrances and exits, and the total number of plays in operation. Meredith (2006) recommends analyzing changes in user segments to proxy market change. APG’s use of automated control systems to monitor and regulate generators is a current technological advantage over most competitors, but can be easily matched. There are no synergies developed between ACS, whose prime business is designing automated quality control systems, and APG. The opportunity to develop control products for the power generator market can provide competitive advantage through advanced technologies and intellectual properties (Porter, 1979). APG can gain direction and an indication of market dependence on technological change by paying close attention to research content and investment by customer industries and by competitors.
3.2.2 Sales Force Management

APG should recruit team-based sales staff and managers, whether or not they have prior product or market knowledge. The pharmaceutical industry is well-known for extensive team-based sales force management, and in recent years has been reducing in size leaving many experienced team sales professionals available. APG’s core competencies need not be technical abilities, but must be in managing their supply chain and team sales.

APG can position the firm as demand-responsive; rather than using sales-driven planning, APG can train salespeople to be demand-driven, increasing communication throughout the firm to more accurately understand lead potential. The APG sales team will be more responsive to customer needs and better able to develop customer loyalty by acting as one resource, where team members rely upon one another to uphold customer relationships as partnerships in achieving customer goals.

Sales remuneration will need to be focused on attaining and developing customer relationships, encouraging trust and candour to proactively learn of changing needs and to develop the derived demand. Commissions can be redesigned to include reverberating effects of future sales due to past efforts to develop client relationships. A future sale resulting from demand derived from earlier sales should result in fees attributable to the original contact salesperson, the sales team, and the closing salesperson, in addition to loyalty rewards for the referring client. The timelines for commissions may be lengthened to be more inclusive and work toward longer-term goals.
APG may need to increase based pay considerably to attract talent until the
ALLINEX brand is established, and make commissions more team- than individually-
based. Team commissions can be divided into a community pool where each member
receives the same proportion, and a distributed pool whereby peer evaluations are used to
determine share proportions, empowering team members and motivating cooperation.

3.3 Measuring Progress

APG should gauge its performance against viable goals to provide challenge and
direction. APG’s management needs to demonstrate firm strategy to each employee,
encouraging understanding of their place in the value chain, to empower them to evaluate
and contribute. Several tools are available, including benchmarking, the Balanced
Scorecard, and multi-goal analysis.

3.3.1 Benchmarking APG

Benchmarking is adapting the practices of identified leaders in a particular
process to your own. It is not a strict re-enactment of the benchmarked firm’s processes,
since factors discriminate the ability to duplicate processes and results. The key is to
recognize the core activities in the process and to apply these activities to the host firm.
Mann, Samson, and Dow (1998) found that benchmarking activities in sales processes
increased sales performance more than ad hoc goal-setting, either in small (not
challenging) or large increments (perhaps unattainable, thus demotivating). The authors
found that firms must continually seek best practices for activities they perform, set goals
to apply these practices, and evaluate not only progress in sales performance but also
appropriateness of these practices to your objectives (Mann, Samson, and Dow, 1998).
The H.R. Chally Group has identified top-selling companies and dissected their practices (Chally, 1998). A major need described by customers is for vendors to substantiate the value the product adds to the customer’s business (Chally, 1998). Three critical elements to accomplish this are (Chally, 1998):

1. Identify and measure the customer’s business needs;
2. Develop complementary services to guarantee the customer’s business improvement; and
3. Measure improvements to the customer’s business to prove your product adds value after the sale.

APG can differentiate its ALLINEX generator line by benchmarking these elements. First, APG can identify all aspects of their customers’ business that can be affected. APG can then evaluate the tangible benefits its ALLINEX generators can provide for each aspect, such as labour savings from decreased maintenance needs, generator run-time efficiencies from longer high-performance cycles, and decreased replacement unit costs with longer generator lifespans. APG should partner with service providers (as they have done in the Calgary-Red Deer corridor) in all geographic markets to which they sell but cannot provide service internally. APG needs to maintain customer relationships with regular contact to assess real customer savings due to their product advantages, which will build customer loyalty and provide powerful testimonials.

First among critical salesperson’s skills is the ability and desire to personally manage customer satisfaction (Chally, 1998). This confirms the need to seek sales team members who will establish strong customer relationships to develop loyalty, repeat
business, reference, and create derived demand as the value added by APG products enables customers to invest savings in additional opportunities.

3.3.2 Setting a Balanced Scorecard

Kaplan and Norton (1992) introduced the Balanced Scorecard (BSC) as a way to avoid over-reliance on financial indicators as sole performance metrics. The authors describe how relying on these metrics leads managers to make decisions that drive short-term results rather than considering alternatives that pursue the firm's strategy over the long-term (Kaplan and Norton, 1992). The BSC retains select financial indicators as appropriate to strategy pursuit among indicators of shareholder interest. The BSC focuses firm efforts toward achieving strategy by setting a few distinct metrics as indicators along four perspectives.

The four perspectives comprising the BSC (Kaplan and Norton, 1992):

1. Financial perspective: indicators of value to shareholders;
2. Customer perspective: indicators of value to customers;
3. Internal business (or process) perspective: indicators of maximizing competencies; and
4. Innovation and learning (or employee) perspective: indicators of continuous improvement and value creation.

The BSC is used to ensure the firm pursues goals to satisfy the needs of all potential stakeholders, which include the customers and the employees as well as financial shareholders. The firm's strategy needs to go beyond shareholder return, as
ignoring the needs of customers in pursuit of profitability will lead to actions designed to force higher margin products on the market without a demonstrated demand.

The customer perspective of the BSC focuses attention to whether or not the firm’s products and services add value for the customer, which is a key indicator of increasing demand and customer loyalty. Chally (1998) showed that adding value for the customer is imperative to maximizing sales efficiencies and developing trusting customer relationships effective over the long-term. APG can develop indicators of customer added value, in showing that adopting APG products will increase profits for client firms in increased labour and equipment efficiencies, decreased maintenance costs, decreased replacement costs, and improved generator or torque capacity.

The process perspective focuses on ensuring consistent internal policies and practices which lead to efficient operating behaviours. This minimizes waste and improves quality, which will provide return to shareholders as well as value to customers. This serves as a check-and-balance for customer relationship management and sales force management, monitoring goals for the ways they pursue the firm’s objectives. The process perspective certifies the means are as salient as the ends, in that sustainable advantage cannot be maintained without diligent focus on how the ends are attained. APG can monitor processes with indicators of customer loyalty and sales force tenure, logistics in delivering product, product maintenance (via durability), and referrals.

The employee perspective seeks to keep the firm current. Innovation is the key to long-term competitive advantage in any industry where the firm seeks to lead rather than follow. Short-term profitability may be attained by followers in flush markets (as exists
in this industry and its customer segments currently), but long-term success relies on continuous learning and improvement. Growth is obtained by continuing to develop ways to add value for the firm and its customers, which will ward off attempts from competitors to mimic the firm’s methods or steal key clientele. APG needs to improve sales force tenure, and can monitor its attempts to learn and grow into a cohesive sales team where ideas and knowledge are shared. Appropriate indicators would measure sales force tenure, and value team sales as more successful than the sum of individual sales.

The financial perspective maintains the bottom line. The three aforementioned perspectives consider other stakeholders and processes, which if properly minded should contribute to financial success. The firm should continue to watch key financial indicators to warrant investments in pursuing the other perspectives, especially in the face of short cash flows and the need to leverage. APG is vigilant of the financial perspective, at the expense of the others as currently operating.

The firm’s strategy needs to go beyond financial success, and the BSC intends to balance the firm’s goal pursuit across all stakeholders. The point is to converge goal-setting with stated strategy, and evaluate progress in implementing the strategy through the metrics. APG is not currently pursuing a balanced strategy, which has manifested in lack of sales force cohesion and loyalty, delays in distribution, and failure to develop customer loyalty. These inhibit their ability to establish their brand and develop quality services to match their differentiated product. APG needs to set metrics to focus operations to achieve goals in all four areas if their strategy is to be successful.
APG can consider appropriate indicators, such as:

Table 3-1: Sample Balanced Scorecard indicators for APG

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Sample Indicators</th>
</tr>
</thead>
</table>
| Shareholder (Financial)                 | • Return on Investment (ROI): additional contribution due to investment in the ALLINEX line, or in enlarging the sales team  
   | • Return on Equity (ROE): additional contribution due to establishing the Calgary office  
   | • Return on Sales (ROS): additional contribution from increased revenues, to evaluate product contribution |
| Customer                                | • Decreased labour costs of customer due to longer maintenance cycles  
   | • Decreased generator costs per unit of production due to lifespan of generators  
   | • Overall customer ROI                                                                 |
| Process (Internal business operations)  | • Improvement in delivery time ARO  
   | • Repeat customer orders or derived demand as indicator of customer relationship management  
   | • Number of new customers as indicator of ability to establish brand              |
| Employee (Learning and Growth)          | • Increased tenure as indicator of loyalty  
   | • Improved revenues or contribution as indicator of sales team cohesiveness       |

*Developed by the author based upon Kaplan and Norton (1992).*

### 3.3.3 Multi-Goal Analysis

Vining and Meredith (2000) believe the BSC in its basic form is too focused on past behaviours and performance. The authors state that the BSC examines ex-post strategic factors, rather than examining plausible strategic alternatives, and suggest using the BSC as one component of a multiple-goal analysis (Vining and Meredith, 2000). Since most firms prefer to have “hard” (monetized or quantitative) rather than “soft” (subjective) metrics, the authors suggest evaluating indirect profitability factors such as a
percentage growth in sales, improvement in margins, or changes in the experience curve as well as less quantifiable measures such as employee impact (Vining and Meredith, 2000). These measures allow the firm to adapt tactics without waiting for financial reporting periods to end, and can be applied to strategic alternatives prior to implementation. For instance, what is the impact on employees if APG pursues generator and engine sales to the heavy oil producers in the Lloydminster region or southeastern Saskatchewan? How will this impact the firm’s ability to retain skilled sales staff, maintain sales team cohesion, and reporting? APG can utilize the multi-goal approach with the BSC as a foundation to examine opportunities prior to making a heady investment.

In response to criticisms of this sort, Kaplan and Norton (2001a, 2001b) expanded the BSC to evaluating strategic alternatives by including questions such as those posed above by applying it to strategic maps drawn by the firm. Indicators chosen would then include quantitative and qualitative impact variables appropriate to the perspectives, and be dissected prior to choosing any particular alternative.

3.4 Expected Impacts of Solutions

APG will improve sales and supply efficiencies by reorganizing their customer segments. Efforts to determine demand and establish customer contacts will be more effective and result in improved lead generation. APG will be able to decrease variance in demand prediction which will contribute to greater sales team cohesion and company loyalty, once they understand the basis upon which customers are organized. The sales teams will work to develop customer partnerships where success of the firm and its
clients are interdependent. This will increase customer tenure and generate derived
demand which will position APG for long-term profitability. Progress will be measured
against goals congruent with company strategies that are adapted as needed, and
understood by all contributors to the value chain.

3.5 Implementation of Recommended Solutions for APG

Implementation of the recommended solutions requires APG to:

1. Clarify company strategies and identify indicators of progress toward achieving
the strategies;

2. Use the Balanced Scorecard to set metrics for these indicators, and use Multi-
Goal Analysis, including the BSC, to evaluate opportunities as they arise;

3. Redefine and reorganize customer segments, constructing a Customer PCM with
input from all firm members with customer contact;

4. Install demand forecasting measures including derived demand and industry
growth projections;

5. Identify customers with strong growth potential based upon long-term demand
potential, and develop relationships;

6. Increase cash availability immediately, either by restructuring debt or seeking
additional investment, in order to shore up the supply chain with SRC and EP, and
ensure capital to attract experienced team-based salespeople to the Calgary office,
with training in product and market knowledge;

7. Benchmark team sales force management to top sales firms, utilizing motivation
and compensation strategies proven to be successful;

8. Continue to evaluate, adjust, improve, and profit.
4.0 Bibliography


