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Acronyms

ACAP	Atlantic Coastal Action Program
ACOA	Atlantic Canada Opportunities Agency
CAPP	Canadian Association of Petroleum Producers
CF(L) Co	Churchill Falls Labrador Corporation
CNLOPB	Canada – Newfoundland and Labrador Offshore Petroleum Board
DFO	Department of Fisheries and Oceans
GBS	Gravity Based Structure
GIS	Geographical Information Systems
HRSD	Human Resources and Social Development
ICT	Institutional, Commercial and Technological
MI	Marine Institute
NGL	Natural Gas Liquids
NL INTRD	Newfoundland and Labrador Innovation, Trade and Rural Development
NLH	Newfoundland and Labrador Hydro
NOIA	Newfoundland Oil Industry Association
OPEC	Organization of Petroleum Exporting Countries
PEEP	Petroleum Exploration Enhancement Program
SERT Centre	Safety and Emergency Response Training Centre
SWOT	Strengths, Weaknesses, Opportunities and Threats

Chapter 1 Introduction and Approach

1.1 Background and Study Objectives

Oil production from the producing fields at Hibernia, White Rose and Terra Nova, all located in the Jeanne D'Arc Basin, attained a new peak in 2007, i.e., 138 million barrels, which was up from a 2006 production figure of 110 million. This production, the anticipation of new fields coming on line, e.g., Hebron, and substantial further exploration announced by Husky Energy and others has established the Province of Newfoundland and Labrador as the hydrocarbon hub on the east coast of Canada. But future prospects reside not only on the resources of the referenced basin, but on what may be discovered as a result of exploration in other areas including the Orphan Basin, the South Grand Banks/Laurentian Sub-Basin, onshore and offshore Western Newfoundland and over time in the waters off Labrador. The need today is to build on what has been achieved and to plan constructively to ensure that maximum benefits accrue over time, i.e., decades not years, to the province as a whole. Indeed, the benefits accruing to the province are already both substantial and multidimensional.

In Western Newfoundland the Greater Corner Brook Board of Trade has taken an active interest in creating an awareness of and supporting both onshore and offshore exploration initiatives in the region. Because there is considerable exploratory activity currently occurring by some smaller oil and gas interests and optimism for significant discoveries in the region, the Board of Trade in association with the Department of Natural Resources took their interest to the next level through the establishment of the Western Newfoundland Regional Oil and Gas Steering Committee (the Committee). The latter then took the initiative to define the parameters of a three phased study. This report is in response to the Terms of Reference for Phase One. The intent is twofold:

- i) to identify infrastructure needs, and supply and service opportunities, including direct or indirect employment opportunities, arising from exploration and development of oil and gas resources on the west coast of Newfoundland; and
- ii) to enhance the participation of local business, institutions, associations and individuals in commercial and direct and indirect employment opportunities associated with the oil and gas sector and its development.

Although the lead time for the development of offshore oil and gas resources is often several years, there is optimism on the west coast that there are reservoirs onshore and offshore that can be tapped through the use of new technology from onshore sites. Such circumstances may shorten the resultant development lead times. The Committee, however, asked that this study consider the full industrial cycle associated with bringing oil and gas to market, i.e., exploration, development, production, transportation and distribution of product, in Western Newfoundland over the next 10 to 15 years. More specifically, the Committee requested the following:

- an assessment of infrastructure and supply and services needs including direct and indirect employment opportunities for three oil production scenarios, i.e., less than 5,000 bbls/d, 5000 to 20,000 bbls/d, and > 20,000bbls/d from onshore and offshore fields;
- an assessment of infrastructure and supply and service needs including direct and indirect employment opportunities for three gas production scenarios, i.e., less than 20 mmcf/d, 20 to 100 mmcf/d, and > 100 mmcf/d from onshore and offshore fields;

- a commentary on the potential synergies and enhanced opportunities arising from concurrent oil and gas development under the scenarios listed above with an emphasis on:
 - a) fabrication and construction
 - b) transportation and distribution
 - c) exploration, development and production related to supply and services
 - d) induced employment and business opportunities
 - e) applied research and technology development
 - f) local utilization in addition to export
- provide examples of development scenarios and innovative local industrial benefits capture in similar areas of oil and gas development and include lessons learned;
- identify business and direct and indirect employment opportunities associated with environmental challenges related to onshore and offshore oil and gas development; and
- make recommendations for the next steps to facilitate the execution of a constructive strategic development plan.

1.2 Past and Current Activity

There has been hydrocarbon speculation along the western coast of Newfoundland since the early 19th century when Mr. Parsons collected some oil from a seep in the Parsons Pond area. The first well was drilled in 1867; by 1969 some 26 wells had been drilled. At least six of these wells encountered and produced oil and/or natural gas. Indeed, a small refinery operated on the north shore of Parsons Pond from 1920 to 1925, but no wells were drilled deep enough to penetrate the deeper targets now evident on seismic. In the latter part of the 19th century a series of wells were drilled in the vicinity of St. Paul's Inlet and again product was found. The Port au Port area was another location of early speculative activity. In the more recent past Mobil, Talisman and Pan Canadian have all sunk wells in the region.

Western Newfoundland is at the epicentre of several sedimentary basins: to the west the Anticosti and Magdalen basins, to the south the Sydney Basin and to the north the St. Anthony Basin. That there is sufficient evidence to attract speculation is indisputable. Today activity on and adjacent the west coast is being undertaken by a number of relatively new and smaller players, characteristic of a commercially unproven frontier. Present and proposed drilling activity involves near shore projects explored from holes drilled onshore, i.e., through the application of advanced drilling technologies that enable greater depths and distances to be achieved from a specific onshore location. This makes onshore to offshore drilling a significant emerging trend on the west coast. This is a trend that reduces the upfront costs that have previously inhibited substantive seismic work or exploratory drilling in the near shore in the past.

1.2.1 Exploratory Licences and Associated Activity on the West Coast

As detailed on Figure 1.1 and Tables 1.1 and 1.2, there are eight offshore and nine onshore licences operational in Western Newfoundland in mid 2008. The most promising areas in the near term appear to be associated with the drilling and work being done by several parties in the vicinity of St. Georges Bay, East Bay and in the waters to the north of Corner Brook.

Table 1-1: Western Newfoundland - Current Offshore Exploration Licenses

<i>Call for Bids (Year)</i>	<i>Exploration Licence</i>	<i>Current Hectarage</i>	<i>Representative Holder</i>	<i>Effective Date</i>	<i>Expiry Date</i>
2001	1069	140,210	Ptarmigan Resources Ltd.	Jan. 15/02	Jan. 15/11
2001	1070	103,040	ENEGI Inc.	Jan. 15/02	Jan. 15/11
2005	1097	96,100	NWest Energy Inc.	Jan. 15/06	Jan. 15/15
2005	1098	159,872	NWest Energy Inc.	Jan. 15/06	Jan. 15/15
2006	1102	124,320	B.G. Oil & Gas Ltd.	Jan. 15/07	Jan. 15/16
2006	1103	216,164	NWest Energy Inc.	Jan. 15/07	Jan. 15/16
2006	1104	187,744	NWest Energy Inc.	Jan. 15/07	Jan. 15/16
2007	1105	51,780	Corridor Resources	Jan. 15/08	Jan. 15/17
2008	1116	211,985	PDI Production Inc. and Civic Creditor Corp.	Jan. 15/09	Jan. 15/18 Jan. 15/14

Table 1-2: Western Newfoundland - Current Onshore Exploration Interests

<i>Exploration Permit/ Lease No.</i>	<i>Petroleum Rights Holder</i>	<i>Permit/ Lease Area (ha)</i>
2002-01	PDI Production Inc./Gestion Resources Ltd./CIVC Creditor Corporation	15,875
93-103	Deer Lake Oil and Gas Inc.	29,200
96-105	Vulcan Minerals Inc.	33,300
03-101	Contact Exploration Inc.	15,402
03-102	Deer Lake Oil and Gas Inc./Leprechaun Resources Ltd.	14,190
03-103	Contact Exploration Inc.	13,073
03-104	Deer Lake Oil and Gas Inc.	25,818
03-105	Deer Lake Oil and Gas Inc.	35,221
03-106	Vulcan Minerals Inc.	38,800
03-107	Vulcan Minerals Inc.	25,519
TOTAL		244,398

Given the speculative nature of the business, the substantive costs involved and the many externalities that influence and curb investment decisions, this is a dynamic playing field and one in which the players can change over relatively short periods of time. In mid 2008 NWest Energy Inc. and Shoal Point Energy Ltd. were assertively exercising their exploratory rights. NWest Energy Inc. has identified 11 targets within its exploration licence with an anticipated potential of 3.8 billion barrels of oil. Based on the analysis of the 2008 3D seismic program, the company will determine the parameters and timing of an exploratory drilling program in 2009.

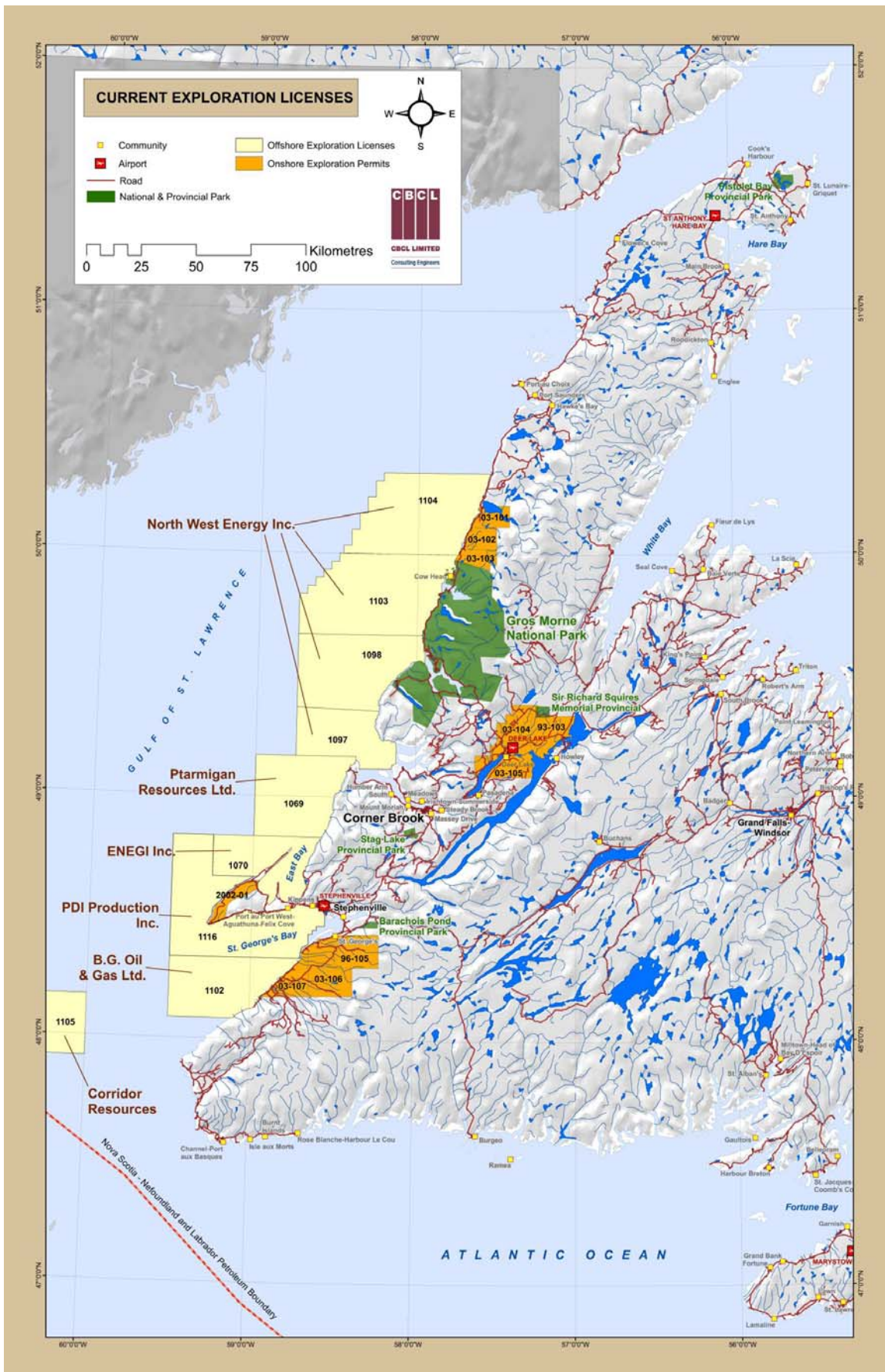


Figure 1.1: Current Exploration Licences

Vulcan Minerals Inc. is the largest owner on the onshore Bay of St. George Basin and has additional interests in two parcels of land in the Parson's Pond area. The company undertook a seismic program on the onshore portion of the Bay St. George Basin in 2007, and has plans to drill a deep well, i.e., up to 3,000 m, in the area in 2008. Other near shore players include B&G Oil and Gas and Corridor Resources Inc; the former has a 100% interest in EL 1102 covering 124,320 hectares in the southeast part of Bay St. George while Corridor successfully attained an interest further offshore in January 2008.

There is exploration in Western Newfoundland. At the time of writing, however, there are no commercially proven reserves of either oil or natural gas. In the absence of a confirmed commercial find, it is well nigh impossible to develop the detailed development scenarios sought by the Committee. Many factors such as the nature of such a find, its size and its location would profoundly influence the requirements for infrastructure, services and labour. In the absence of such project specifics, what the study team has done is to examine the nature of the hydrocarbon sector and how that sector has been accommodated elsewhere. This enables an examination of the exploration, development and production phases associated with the establishment of a hydrocarbon industry and the articulation of strategic recommendations to accommodate the industry in Western Newfoundland to be made.

1.3 Workshops, Meetings and Interviews – Questions Posed

From the outset the study team were aware of the many public and private interests that have a legitimate interest not only in the output of this study, but also have much to contribute to its compilation. Given the scope of the study and the distances involved it was impossible for the study team to meet in person with all identified interests. To address this limitation, the study team with the support of the Committee arranged two multi-stakeholder workshops and a number of meetings with lead agencies in both western Newfoundland and St. John's. Table 1.3 provides a listing of these key meetings and some of the issues raised. These meetings provided insight into the priorities and perspectives of many interests on the west coast and effectively augmented the observations received from members of the Committee both at the "kick-off" meeting and as a result of a number of subsequent meetings that have taken place.

Table 1-3: Record of Workshops and Associated Meetings

<i>Workshop or Meeting</i>	<i>Affiliation</i>	<i>Date</i>	<i>Notes</i>
Cow Head Workshop	20 attendees including representation from Cow Head Town Council, Parsons Pond Town Council, St. Paul's Town Council, Daniel's Harbour Town Council and the Red Ochre Regional Board	12/03/08	<ul style="list-style-type: none"> • Many in this area feel remote not just from St. John's, but from activities in Corner Brook and Stephenville • Feel at times that consultation is window dressing and that decisions will be made regardless of local opinion, i.e., they lack political clout • Feel they need to organize to get local economic benefits • Lobster fishery, forestry and tourism are the economic mainstays

<i>Workshop or Meeting</i>	<i>Affiliation</i>	<i>Date</i>	<i>Notes</i>
			<ul style="list-style-type: none"> Local industries need to be proactive and to learn of the oil and gas industry's procurement policies including required certifications, protocols, and policies on employment equity and safety
Corner Brook Workshop	21 attendees including representation from the City of Corner Brook, the Corner Brook Port Corporation, Atlantic Canada Opportunities Agency (ACOA), Newfoundland and Labrador Innovation, Trade and Rural Development (NL INTRD) and representatives of the private business community	13/03/08	<ul style="list-style-type: none"> Need to accelerate exploration Need to understand the industry's procurement policies Local companies have demonstrated that they can provide specialized labour to Alberta at short notice
Meeting(s)	TEKOil (Corner Brook)	10/03/08	<ul style="list-style-type: none"> Several meetings, but company no longer operating
Meeting	College of the North Atlantic (Corner Brook)	10/03/08	<ul style="list-style-type: none"> 800 full time students Trades programs Advanced GIS program established and respected Able to respond quickly to industry needs
Meeting	Sir Wilfred Grenfell College, Campus of Memorial University (Corner Brook)	10/03/08	<ul style="list-style-type: none"> A liberal arts college New Institute of Environmental Policy – Centre of Environment Excellence
Meeting	Academy Canada (Stephenville)	11/03/08	<ul style="list-style-type: none"> Private post Grade 12 school Can fulfil a niche market, and can respond quickly to industry needs.
Meeting	Stephenville Airport and Chamber of Commerce	11/03/08	<ul style="list-style-type: none"> Concerned about future use of airport facilities Airport currently used as a fire training facility
Meeting	Deer Lake Regional Airport	12/03/08	<ul style="list-style-type: none"> Facility is run on a not-for-profit basis 112% increase in passenger traffic since 2000 and further growth anticipated, i.e., 380,000 by 2015
Meeting	Innovation, Trade & Rural Development	13/03/08	<ul style="list-style-type: none"> Department is supportive of the Oil and Gas sector, but questioning why the bigger companies are not involved Emphasis must be on further exploration

<i>Workshop or Meeting</i>	<i>Affiliation</i>	<i>Date</i>	<i>Notes</i>
Meeting	City of Corner Brook	13/03/08	<ul style="list-style-type: none"> • Priority must be how the port can respond to the needs of the oil and gas sector • Corner Brook can accommodate residential and commercial growth
Meeting	Humber River Basin Project, SWGC Research Office, Atlantic Coastal Action Program (ACAP)	13/03/08	<ul style="list-style-type: none"> • Environmental initiatives with respect to Bay of Islands has been endorsed by Environment Canada and by DFO • Working towards coastal visioning for 20 years • Group working on risk modelling for the Humber River Watershed
Meeting	PDI Production	14/03/08	<ul style="list-style-type: none"> • Optimistic, but must use best appropriate technology • Some concern regarding depth of channel in Corner Brook
Meeting	N. West Energy	14/03/08	<ul style="list-style-type: none"> • Of 155 leads, top 11 have been determined to have a potential of 3.8 billion barrels of oil

In addition to the above referenced workshops and related meetings, the study team circulated a questionnaire and encouraged attendees and others to respond. Some were returned promptly, but overall the response was disappointing. There have in addition been numerous telephone and electronic exchanges with a wide range of parties including contact with a number of people who participated in the Round Tables, parties with exploration licences, representatives of the Canada Newfoundland and Labrador Offshore Petroleum Board (CNLOPB) and the Newfoundland and Labrador Oil and Gas Industries Association, and others in the oil and gas sector both in Canada and in the United Kingdom.

Based on the Terms of Reference and the dialogue that has occurred, the two key research questions that bring focus to this study are:

- i) What are the key determining factors that influence the assessment of need with respect to the supply of infrastructure and services for the oil and gas sector in Western Newfoundland; and
- ii) What are the appropriate response strategies?

Based on the approach adopted to this study, the research that has been done, the discussions that have occurred and the experience of the study team of like situations, a number of potential responses to the above questions were examined. Table 1.4 identifies some of the primary responses that have been articulated.

Table 1-4: Responses to the Research Questions

<i>Question</i>	<i>Factor or Response</i>
What are the key determining	➤ Accurate appreciation of prevailing industry demand levels

<i>Question</i>	<i>Factor or Response</i>
factors that influence the assessment of need with respect to the supply of infrastructure and services	<ul style="list-style-type: none"> ➤ Accuracy of available data on the build up of exploration and production activity ➤ Trusted methodologies for assessing build up and projections ➤ Latest seismic and other data on the onshore and offshore prospects, i.e., independent assessment of oil & gas prospectively and production potential ➤ Regulatory regime that accommodates or inhibits exploration and development ➤ Availability of companies with the experience and competence to provide services to the oil & gas industry or the potential to grow and provide such services ➤ Availability of existing infrastructure to support exploration and development activities including deepwater quaysides, warehouses, RO-RO, fabrication facilities, engineering shops and all of the attendant industry build-up requirements such as construction yards, mud plants, waste treatment, accommodation camps., etc. ➤ Efficient transportation: road, ports, airports, pipelines ➤ Power, water, waste disposal and treatment facilities
What are the appropriate response strategies	<ul style="list-style-type: none"> ➤ Formulation of demand build-up scenarios based on reasonable probabilities from status quo to maximum possible over a defined planning period ➤ Build up of skills for the oil & gas sector ahead of local development , i.e., advance or anticipatory preparedness to provide the skill base, i.e., “you do not need to have oil to be in the oil and gas business syndrome” ➤ Classification of the services needed by the oil & gas industry

Given both the dynamic nature of the industry and the stage of exploration on the west coast, the scenarios that have been explored are a tool for discussion, a tool to facilitate planning and decision making and a tool to be continually subject to review and refinement. It is fully expected that the scenarios as structured will be outdated within six months; local finds, decisions, changes of players, changes in the world price of oil and gas and events that influence where North America sources its supplies will all influence what happens and the timeframe within which it happens on the west coast of Newfoundland. It is a fluid, dynamic and challenging situation.

There is certainly optimism that there is oil both onshore and in the nearshore, and these resources, if proven, will provide the catalyst for what happens over the next 10 to 15 years. Natural gas undoubtedly exists in association with oil and may indeed be found in large quantities at some stage. Today, if major finds of natural gas were to be declared commercial, and a decision made to bring them to market, they would most likely be shipped to market, i.e., to markets on the eastern seaboard and beyond. There is at this juncture no land based infrastructure on the island to handle natural gas.

1.4 Provincial Priorities – Government/Industry Relationship

There is no question that Provincial policy and associated actions will influence all aspects of oil and gas development in Newfoundland and Labrador and in its offshore waters. More specifically the Province's action will influence the rate of exploration and how resources declared commercial are developed and brought to market. Having established themselves as a producing Province, the government of Newfoundland and Labrador has become more assertive as they strive to maximize benefits for the Province and its residents. Priorities that will affect development of the oil and gas sector, including activities, on the province's west coast are contained in a number of plans and sectoral strategies developed by the provincial government over the past five years. Chief among these is the Provincial Energy Plan¹, released in the fall of 2007 that outlines the province's vision, principles, goals and actions for achieving self-reliance, prosperity and sustainable energy solutions for the 21st century.

Addressing both renewable and non-renewable energy resources, the Energy Plan is based on three overriding principles:

1. Sustainability – Energy developments shall be environmentally and economically sustainable;
2. Control – Exercising appropriate control over development of energy resources in the best interest of the people of the province; and
3. Cooperation and Coordination – Adding value to resource development through cooperation and coordination with key stakeholders and partners.

Government's goals include a commitment to re-investment of the value received from the energy sector for long-term economic and social sustainability, while providing a fair return to companies involved in energy developments, particularly in the oil and gas sector. A stated goal of the plan is a clear and streamlined regulatory regime that provides for the needs of the province and certainty and stability for energy sector investors.

1.4.1 Significant Actions

Through the Energy Plan, the provincial government proposed a new organization, the provincial Energy Corporation. This was established in June, 2007 and will take a lead role in the province's participation in the development of energy resources. Wholly owned by the province, the Energy Corporation is now the parent company of Newfoundland and Labrador Hydro (NLH), Churchill Falls Labrador Corporation (CF(L) Co), other subsidiaries currently owned by NLH and new entities created to manage the province's investments in the energy sector.

Specific actions relevant to the province's oil and gas sector set out in the Energy Plan and re-enforced in the 2008 provincial budget include:

- Making an initial investment of \$20 million over three years through the Energy Corporation to purchase existing proprietary seismic data for reevaluation and to acquire new data to fill in gaps;
- An initial investment of \$5 million over the next two years through the Energy Corporation in a Petroleum Exploration Enhancement Program (PEEP) to boost new onshore petroleum exploration in Western Newfoundland;

¹ Focusing our Energy, Energy Plan, 2007. Government of Newfoundland and Labrador.

- Establishing a policy to obtain a 10 per cent equity position in all future oil and gas projects requiring a Development Plan approval, where it fits with the province's strategic long-term objectives. The Energy Corporation will negotiate payment of its share of the historic exploration and pre-development costs incurred by the license co-venturers as well as contribute its share of subsequent development and operations costs;
- Implementing an Offshore Natural Gas Royalty Regime when industry consultations are complete;
- Establishing an internationally competitive Generic Offshore Oil Royalty Regime in line with the principles and structure of the Offshore Natural Gas Royalty Regime;
- Establishing a fund with an initial \$5 million investment to provide financial incentives for export-based petroleum fabrication and manufacturing opportunities (Oil and Gas Manufacturing and Services Export Development Fund)². These financial incentives will be based on clear guidelines, targets and program parameters; and
- Aggressively pursuing refining, petrochemical and other value-added secondary processing opportunities.

Other stated intentions contained in the Energy Plan that will apply to oil and gas development include the following:

- Implementing recommendations of the Skills Task Force³;
- Requiring large-scale energy project proponents within the province to include employment plans for women that address employment equity and work with other governments to accomplish the same goal where resources are jointly managed;
- Invest \$5 million to provide detailed advice and recommendations on planning, implementing and financing energy innovation; and
- Ensuring that energy resources and their development are used as a tool to promote economic development, particularly in rural areas and in Labrador.

1.4.2 2008 Budget

The 2008 provincial budget contained provisions for the implementation of the Energy Plan and other provincial sectoral strategies. Table 1.5 outlines expenditures that could have a direct or indirect impact on a developing oil and gas industry on the west coast of the province.

² www.business.gov.nl.ca

³ All the Skills to Succeed: Report of the Newfoundland and Labrador Skills Task Force, March, 2007.

Table 1-5: 2008 Budget Provisions for Programs, Services and Infrastructure with Potential to Directly or Indirectly Support Oil and Gas Development in Western Newfoundland⁴

<i>Budget Item</i>	<i>Amount</i>
Industrial & Business Development	
Year one of a multi-million dollar three-year Energy Plan commitment	\$13 million
Investment for the Energy Corporation to support financing for major projects	\$215 million
Three year geological mapping program (\$3 million) ⁵	\$1 million
Online Mineral Exploration Approval Management System	\$500,000
Small & Medium-sized Enterprise Fund	\$12 million
Business and Market Development Fund	\$1 million
New Funding – Commercialization Program	\$3 million
Innovation Enhancement Program	\$2 million
Business Attraction Fund	\$ 28 million
Oil and Gas Manufacturing and Services Export Development Fund	\$2 million
Labour Supply	
Upgrading high school fabrication suites in support of the Futures in Skilled Trades and Technology Program	\$750,000 annually in both 2008 and 2009
Apprenticeship programs	\$295,000
Refurbish College of North Atlantic industrial trade shops	\$1 million
Programs to attract workers and retain youth in the province	\$5.3 million
Infrastructure	
Infrastructure investment	\$673 million
Road Improvements	\$182 million
Municipal Infrastructure investment – Federal/Provincial/Municipal cost sharing agreements	\$84.3 million
Research and Development	
Establishment of Newfoundland and Labrador Research and Development Council to develop province-wide Research and Development Strategy	\$1.5 million

⁴ Budget Highlights 08: Securing a Sustainable Future, Government of Newfoundland and Labrador.

⁵ Includes a three-month field program to support exploration for west coast oil and gas by mapping carbonate-hosted base-metal deposits and marble in the area south from Corner Brook to Stephenville, and the Lomond area, northwest of Deer Lake.

1.4.3 Sustainability of Rural Areas of Newfoundland and Labrador

The sustainability of rural areas of the province, particularly those affected by closures or down-sizing of traditional resource industries such as fishing and forestry operations, remains a priority of the provincial government. As a result, public policy initiatives – reflected in the various sectoral strategies recognize the need to invest in those areas of the province where development opportunities exist. Following the closure of the Abitibi Mill in Stephenville, for example, the government established a Task Force to identify economic development opportunities in the region with a commitment to investment in the area through various established programs. Working with NL INTRD, the Task Force was established to:

- work with communities to identify and implement economic opportunities for the short and long term;
- work to attract investment that will help diversify the industrial base of the region;
- look at other options for the use of the mill; and
- identify and implement appropriate responses to the human resource needs of workers directly affected by the closure of the mill.

As a result of the work of the Task Force and the various provincial sectoral strategies, investment has already been directed to this area of the province. Development opportunities have been identified, and further initiatives to diversify the economic base in the Stephenville area and in other parts of Western Newfoundland are being pursued.

1.5 Structure of Report

Chapter 1 sets the stage; it references the requirements of the study, the workshops held and provincial priorities and involvement in the oil and gas sector. Chapter 2 provides a socio-economic profile of the study area; Chapter 3 provides an overview of the physical and social infrastructure that serves the region; Chapter 4 references lessons from selected jurisdictions; and Chapter 5 provides information on the oil and gas sector and how that sector functions. Chapter 6 provides the team's thoughts as to how all parties with interests and responsibilities in Western Newfoundland might look to the future given the many unknowns and uncertainties associated with the oil and gas sector.

Chapter 2 Western Newfoundland: Socio-Economic Characteristics

2.1 The Study Area

The intent of this chapter is to provide a picture of the socio-economic characteristics of the study area, i.e., Western Newfoundland. Statistical analysis is based on the economic development zones as delineated by the Province (see Figure 2.1). More specifically the study area includes the coastal communities on the west coast and on the Northern Peninsula. This area includes the following Economic Zones:

- Zone 06 - Nordic Economic Development Corporation;
- Zone 07 - Red Ochre Regional Board Inc.;
- Zone 08 - Humber Economic Development Board Inc.;
- Zone 09 - Long Range Regional Economic Development Board; and
- Zone 10 - Marine and Mountain Zone Corporation.

Together, these Economic Zones have a combined population of nearly 90,000 people (89,825 based on the 2006 Census and Community Accounts (www.communityaccounts.ca)). The region's population has declined by 4.0% since 2001. These five zones have been defined by Human Resources and Social Development (HRSD) as the Western District of Newfoundland.

2.2 Settlement Pattern and Demographic Trends

Western Newfoundland's economy and therefore the settlement pattern have long been tied to the primary sectors of fishing, and fishing related industries, as well as forestry and forest products. More recently, the area is experiencing increased activity as a result of mineral and hydrocarbon exploration; many expect this trend to continue. As depicted on Figure 2.1, the principle communities on the west coast include:

- Channel-Port aux Basques - Town (Census subdivision);
- Corner Brook - City (Census subdivision);
- Deer Lake - Town (Census subdivision);
- Hawke's Bay - Town (Census subdivision);
- Port Saunders - Town (Census subdivision);
- Rocky Harbour - Town (Census subdivision);
- St. Anthony - Town (Census subdivision); and
- Stephenville - Town (Census subdivision).

Statistics Canada Community Profiles for the City of Corner Brook and the above noted towns were combined to generate the socio-economic database for the study region.

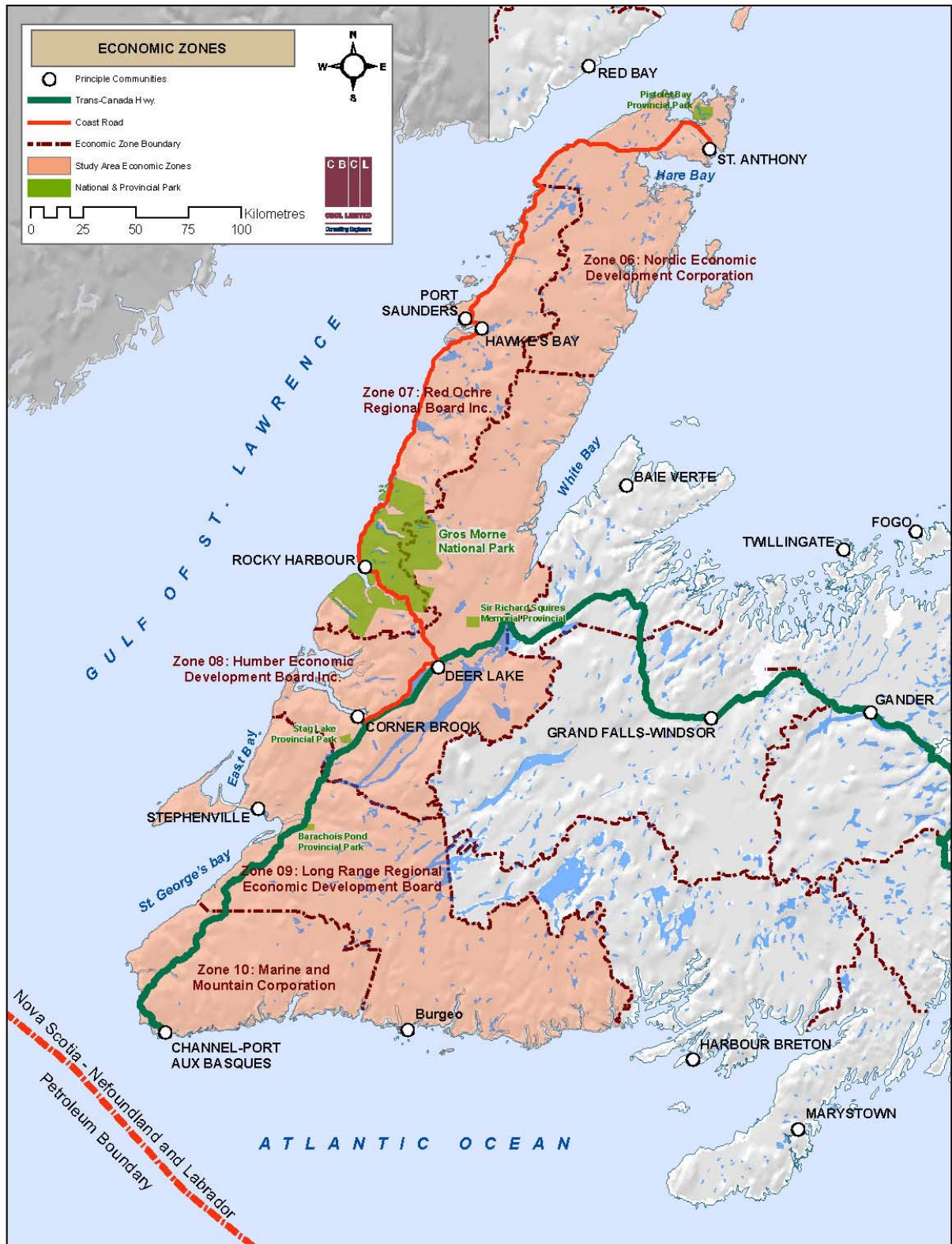


Figure 2.1: Economic Zones

2.2.1 Population

As with many other areas in Newfoundland and Labrador, and indeed Atlantic Canada in general, this region has experienced a declining population. Since 2001, for example, this region has lost 4% of its population according to Statistics Canada's Community Profiles data. This decline is consistent with the average community population decline of 1.5 per cent from 2001 to 2006 for the province as a whole.

Figure 2.2 provides an age cohort/gender pyramid that illustrates that a high proportion of the study area's population is over the age of 40. Based on the 2006 Census, nearly 85% of the study region's population is over the age of 15 years; consistent with the province as a whole where 84.5% of the population is over the age of 15 years. This is also indicative of a trend across Atlantic Canada, particularly in rural areas, where smaller youth cohorts are present and the average population continues to age.

A similar picture of the age cohort and gender share is presented in Figure 2.3 for the entire province of Newfoundland and Labrador.

At a provincial level, two factors seem to be contributing to the lack of population growth:

- i) continued out-migration; and
- ii) the fact that deaths outnumber births.

In-migration is not sufficient to counter balance the population losses, resulting in a net decline (see Table 2.1).

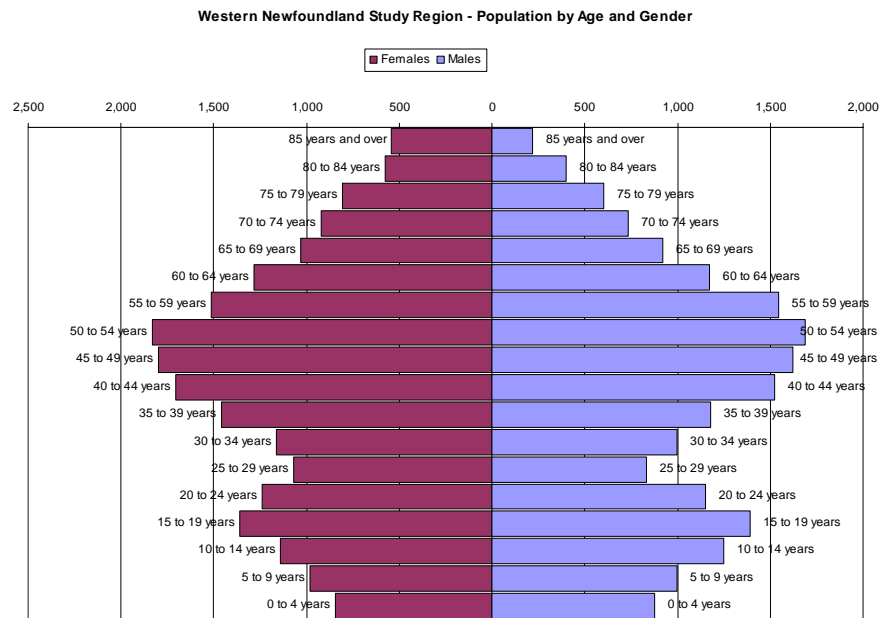


Figure 2.2: Western Newfoundland Study Region – Population by Age and Gender

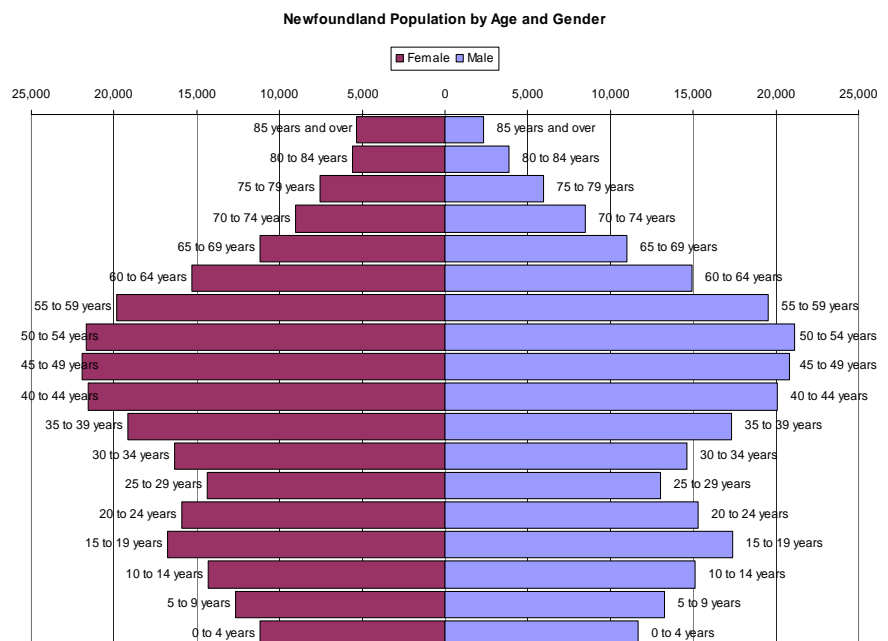


Figure 2.3: Newfoundland Population by Age and Gender

Table 2-1: Components of Population Growth: July 1, 2006/June 30, 2007

<i>Components of Population Growth</i>	<i>Canada</i>	<i>N.L.</i>
Births	352,848	4,326
Deaths	237,931	4,549
Immigration	238,127	506
Emigration	41,349	203
Net temporary emigration	25,567	107
Returning emigrants	22,532	62
Net non-permanent residents	17,884	86
Net interprovincial migration		-3,786
Total Population		

The baby boomers, i.e., those born post war and throughout the 1950s, had fewer children than previous cohort groups.

A growing and stable population would be characterized in these age/gender cohort charts by a wide base that ‘supports’ the population cohorts above. What appears for Western Newfoundland, indeed for the entire province, is that the younger cohorts at the base are far smaller than the cohorts clustered in the ‘middle’ and upper middle, i.e., between 25 and 55 years; this results in a pyramid with a very narrow base relative to the wider cohort bands above.

2.2.2 Components of Population Growth

Unlike Ontario and British Columbia, Newfoundland and Labrador does not tend to retain the foreign migrants who may initially settle in the province. According to Statistics Canada, nearly 300,000 people immigrated to Canada in 2006 (297,530), but of these, less than 1% (approximately 1,225 or 0.4%) came to Newfoundland and Labrador. If this area is typical of other provinces, of those immigrants that came to the region, fewer than a third will tend to remain in the province. It is reasonable to speculate that most foreign born immigrants choose to relocate to other parts of Canada where they are able to connect to a community of immigrants from their country of origin. Not surprisingly, the regions of Canada where there is a greater retention of immigrants are those that have larger immigrant populations.

As depicted in Table 2.1, the Province lost nearly 4,000 people in the period between July 1, 2006, to June 30, 2007.

The socio-economic challenges associated with a shrinking population are being anticipated in the public and private sector, with far reaching implications for businesses as well as government services. The aging of the population will have a profound affect on the province and be felt throughout all aspects of the economic system. This will continue for the foreseeable future and impact housing demand, succession planning for both the public and private sector, as well as continue to put pressure on the labour market for both skilled and unskilled workforces. A declining and aging population will affect the education system, the labour market, health care and a wide range of other programs.

Access to labour will become critically important to all sectors of the economy. Employers and sectors that are able to attract labour will be those that provide a combination of a quality of life and wages that attract workers from what will become a highly competitive labour market. Much discussion in Atlantic Canada focuses on the ‘quality of life’ as a significant draw to the region, but one cannot pay bills with ‘quality of life’. Earnings are important and the new reality is that wages need to be somewhat competitive with wages not only in the same town, but with those offered in other provinces, notably the western provinces. This was a subject that was raised by several participants in the workshops, i.e., wages need to be more competitive with those being offered in the west and the north.

Western Newfoundland needs to pay attention to these trends and to develop the area’s capacity to attract both investment and people through a combination of local services, quality of life and compensation. Additionally, institutional, commercial and technological (ICT) connectivity that supports a variety of employment opportunities will be an important part of the economic infrastructure. The entire package must include quality life-style services including recreational and cultural opportunities; there is, for example, a growing interest among “would be residents” in infrastructure that supports quality of life, i.e., recreation, trails and quality of environment.

2.2.3 Household Formation

The HRSD Western District of Newfoundland had a total of 34,880 households in 2006; of these, the majority were one-family households (27,370), followed by non-family households (6,745) and multiple-family households (780). There are several plausible reasons for the observed trends in household formation. The shift toward more ‘single’ and ‘couples’ only household arrangements reflects:

- The aging population – who tend not to have children living with them;
- Declining birth rates – and the increased probability that a household will have few or any children living with them;
- Lifestyle choices and trends in family arrangements, i.e., more ‘living alone’ and ‘living without children’ household formations; and
- The current affordability/historically lower cost of home ownership in the context of historically low interest rates and higher real incomes, i.e., in cases, the latter is augmented by intergenerational transfer of wealth.

It is anticipated that this trend in household formation will continue into the foreseeable future and that there will be an increasing demand for housing options that are designed for ‘couples without children’, ‘living alone’ and ‘seniors’ household formations. Such trends in household formation have a variety of impacts; these may include:

- Increased demand for lower maintenance housing options including condominium development and apartment units;
- More home renovation activity aimed at ‘barrier free design options’, or senior living needs so that aging residents can increase the length of time that they are able to remain in their homes as independent residents;
- Migration from more rural areas to less rural, or urban areas (cities and towns); and
- Increases in private business services that provide goods and services to support independent living.

2.2.4 Educational Attainment

Community Accounts report that “47.0% of people 20 years of age and older in the HRSD Western District do not have a high school diploma compared to 39.6% of people in the entire province” based on the 2001 Census. Table 2.2 below provides educational attainment for the selected study areas.

Table 2-2: Educational Attainment

<i>Educational Attainment</i>	<i>Newfoundland and Labrador (Province)</i>	<i>Corner Brook - City (Census subdivision)</i>	<i>Stephenville - Town (Census subdivision)</i>	<i>Hawke's Bay - Town (Census subdivision)</i>	<i>St. Anthony - Town (Census subdivision)</i>	<i>Port Saunders - Town (Census subdivision)</i>	<i>Rocky Harbour - Town (Census subdivision)</i>	<i>Deer Lake - Town (Census subdivision)</i>	<i>Channel-Port aux Basques - Town (Census subdivision)</i>	<i>Study Area (Combined)</i>
Total population 15 years and over	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
No certificate; diploma or degree	34%	26%	30%	66%	36%	40%	42%	35%	48%	32%
High school certificate or equivalent	22%	25%	21%	18%	18%	17%	20%	23%	17%	22%
Apprenticeship or trades certificate or diploma	12%	11%	12%	8%	11%	8%	10%	15%	13%	12%
College; CEGEP or other non-university certificate or diploma	18%	19%	22%	3%	20%	15%	16%	17%	15%	19%
University certificate or diploma below the bachelor level	3%	4%	3%	3%	7%	3%	2%	2%	2%	3%
University certificate; diploma or degree	11%	14%	11%	4%	9%	16%	9%	8%	5%	11%

Source: Prepared from 2006 Census Community Profiles

The findings are fairly consistent. Port Saunders - Town (Census subdivision), Corner Brook - City (Census subdivision) and Stephenville - Town (Census subdivision) have the highest proportion of individuals with a “University certificate, diploma or degree” (at 16%, 14% and 11% respectively). Hawke's Bay - Town (Census subdivision) has the highest proportion of individuals with “No certificate, diploma or degree”.

Education attainment across the study area can be summarized as follows:

- 32% - No certificate, diploma or degree;
- 22% - High school certificate or equivalent;
- 12% - Apprenticeship or trades certificate or diploma;
- 19% - College, CEGEP or other non-university certificate or diploma;
- 3% - University certificate or diploma below the bachelor level; and
- 11% - University certificate, diploma or degree.

2.3 The Area's Economy

Table 2.3 provides the 2006 Census labour market data for all of Newfoundland and Labrador, the selected communities in the study area, as well as the study area combined.

Table 2-3: Economic Profile

<i>Selected Summary Statistics</i>	<i>Newfoundland and Labrador (Province)</i>	<i>Corner Brook - City (Census subdivision)</i>	<i>Stephenville - Town (Census subdivision)</i>	<i>Hawke's Bay - Town (Census subdivision)</i>	<i>St. Anthony - Town (Census subdivision)</i>	<i>Port Saunders - Town (Census subdivision)</i>	<i>Rocky Harbour - Town (Census subdivision)</i>	<i>Deer Lake - Town (Census subdivision)</i>	<i>Channel-Port aux Basques - Town (Census subdivision)</i>	<i>Study Area (Combined)</i>
Total population 15 years and over	422385	16810	5485	360	1990	595	820	3995	3645	33700
In the labour force	248685	9565	2750	165	1140	385	550	2330	1980	18865
Employed	202525	8245	2255	95	955	320	385	1765	1445	15465
Unemployed	46150	1315	495	70	190	70	160	570	535	3405
Not in the labour force	173705	7250	2735	195	845	205	275	1660	1660	14825
Participation rate	58.9%	56.9%	50.1%	45.8%	57.3%	64.7%	67.1%	58.3%	54.3%	56.0%
Employment rate	47.9%	49.0%	41.1%	26.4%	48.0%	53.8%	47.0%	44.2%	39.6%	45.9%
Unemployment rate	18.6%	13.7%	18.0%	42.4%	16.7%	18.2%	29.1%	24.5%	27.0%	18.0%

Source: Prepared from 2006 Census Community Profiles

Of the communities in the study area, Hawke's Bay had the highest unemployment rate (42.4%) in 2006, followed by Rocky Harbour (29.1%); Corner Brook had the lowest rate (13.7%).

Figure 2.4 presents the share of employment, by industry, for each of the selected communities in the study area, as well as for the entire province.

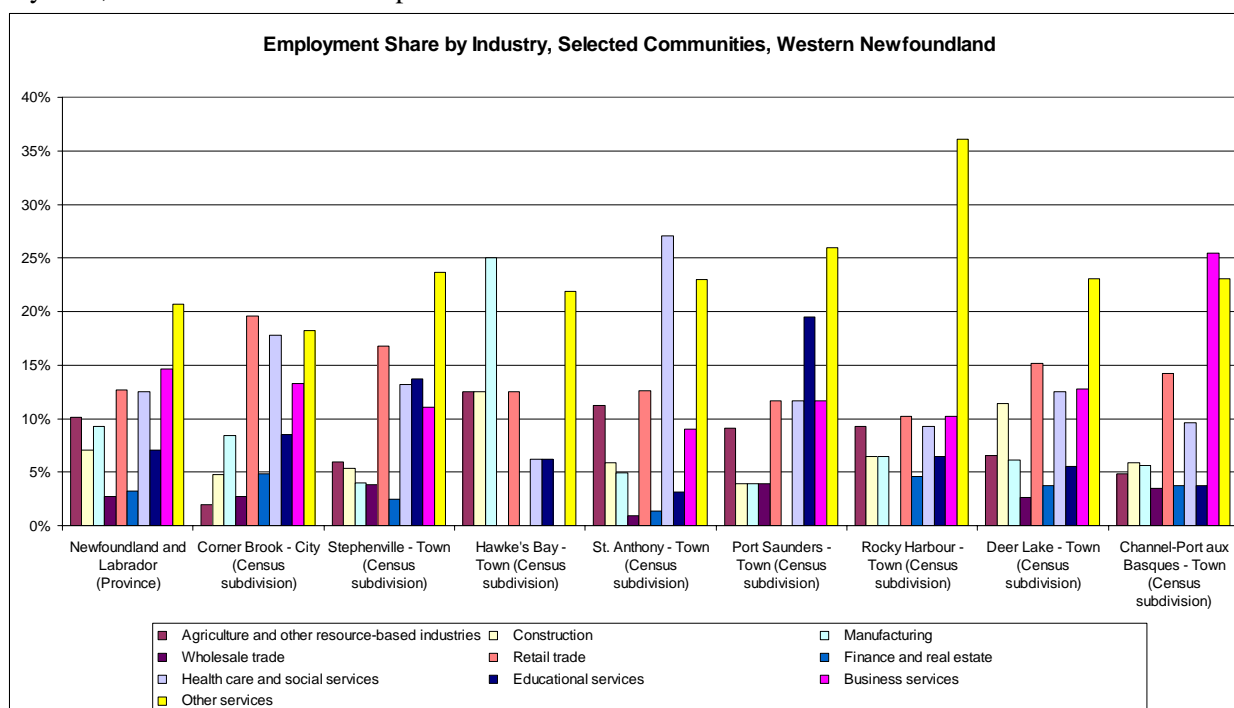


Figure 2.4: Employment Share by Industry, Selected Communities, Western Newfoundland

Throughout the study area, ‘service’ related occupations represent the largest share of occupations (31% - Sales and service occupations), with other industry employers as follows:

- 17% - Trades: transport and equipment operators and related occupations;
- 14% - Business: finance and administration occupations;
- 9% - Occupations in social science: education, government service & religion;
- 8% - Management occupations;
- 8% - Health occupations;
- 4% - Natural and applied sciences and related occupations;
- 4% - Occupations unique to processing manufacturing and utilities;
- 3% - Occupations unique to primary industries; and
- 2% - Occupations in art culture, recreation and sport.

For the province as a whole, a similar picture emerges with the largest single share of employment in “Sales and service occupations” (25%), followed by “Trades; transport and equipment operators and related occupations” (17% for both the province and the study area). “Business; finance and administration occupations” is the third largest industry for both the province and the industry (15% and 14% of all employment, respectively).

Employment by occupation (see Figure 2.5) reflects a similar service dominated economy.

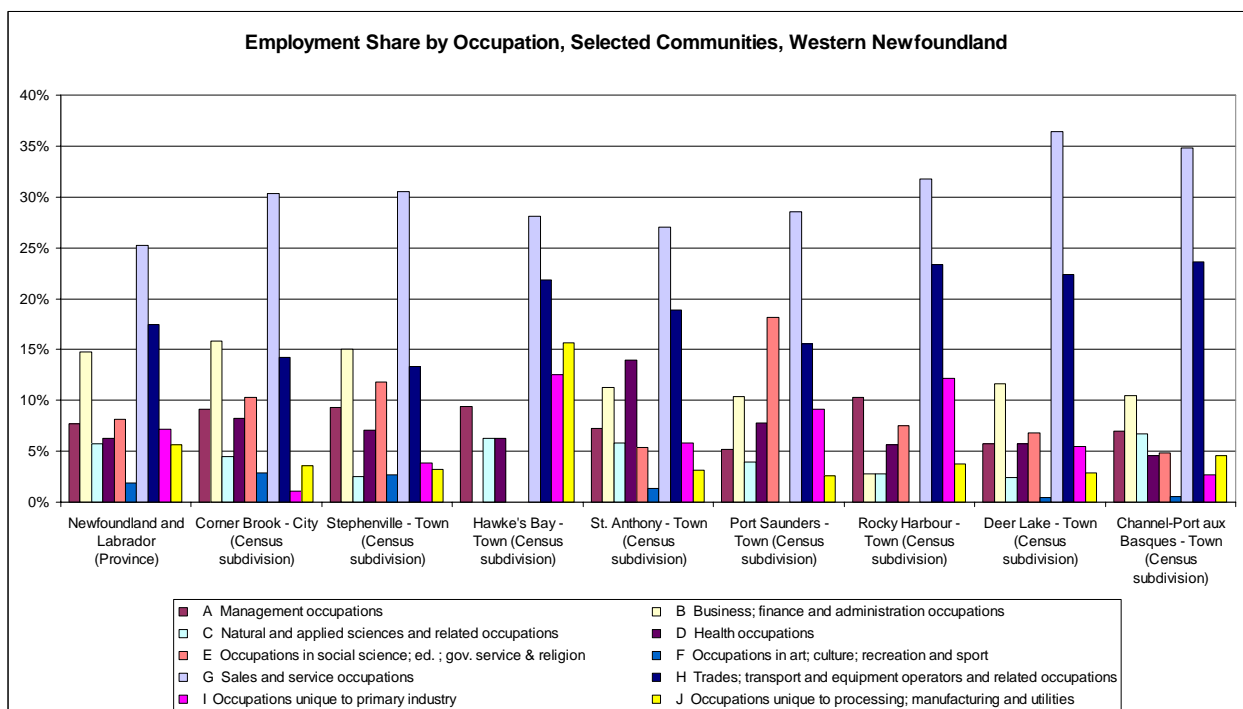


Figure 2.5: Employment Share by Occupation, Selected Communities, Western Newfoundland

Based on the total experienced labour force 15 years and over, occupations in “Other services” was the largest occupation grouping in 2006 (at 21% for both the study area and the province). In 2006 the distribution of other occupational groupings was as follows:

- 17% - Retail trade;
- 16% - Health care and social services;
- 14% - Business services;
- 8% - Educational services;
- 7% - Manufacturing;
- 6% - Construction;
- 4% - Agriculture and other resource-based industries;
- 4% - Finance and real estate; and
- 3% - Wholesale trade.

Chapter 3 Physical and Social Infrastructure

3.1 Context

Although there are many historic reasons for the locations of settlements, their economic self sufficiency at the beginning of the 21st century relies in large measure on the infrastructure that services them. That same infrastructure will make it easier or difficult to attract new investment and accommodate change. People want educational, health and recreational services; they want to be able to travel to neighbouring communities, across the province and beyond safely; and they want access to retail services and entertainment. The minimum standards of service are rising as people become more familiar through travel and exchange of information with other places. All levels of government and the private sector must be cognizant of the need to improve physical and socio-economic services in order to limit out migration, to attract new immigrants to Western Newfoundland and to accommodate the requirements of new and expanding economic sectors, not just the oil and gas sector.

This is not to imply that Western Newfoundland is poorly serviced, but that the area is large, sparsely settled and providing enhanced infrastructure and services, e.g., investing in improved roads, is expensive. The oil and gas sector at the initial exploratory stages does not place an insurmountable burden on infrastructure, but as it evolves, it will be more efficiently accommodated if there is good road infrastructure in place, if the wharves can handle the shipping that is required, if there is serviceable flat land available for the development of support services and if the personnel involved have access to quality schools, higher education facilities, good housing and airport facilities. For example, in Aberdeen in the 1970s, two facets of the infrastructure that were under pressure as a result of offshore oil and gas exploration and associated development were the airport and the hospital. The airport had to accommodate swift growth, and the hospital was put under pressure to provide new services, e.g., the provision of decompression units and the provision of enhanced emergency services. The hospital related to the need to have the requisite emergency response teams in place to address accidents at sea and on rigs. Some of these questions will have been addressed in St. John's in response to demands associated with the development and operations of Hibernia and other fields off the east coast; these requirements need to be addressed on the west coast. The foundations of the necessary infrastructural requirements are in place in Western Newfoundland; selective and timely investment would enhance their capacity and facilitate further private sector investment.

The following sections provide data on the roads, port and wharf facilities, airport facilities, education and training facilities, hospital and health care facilities and the environmental infrastructure that serve the population of Western Newfoundland. Figure 2.1 depicts key locations graphically.

3.2 Road Infrastructure

In the absence of rail transportation in Newfoundland, heavy equipment and goods that have to be moved from Place A to Place B are transported either by ship or by road. Wharf capacity and shipping will certainly be central to the development of the oil and gas sector in the area, but an efficient, safe and well maintained road network will be equally important. In the first instance this involves the Trans Canada Highway from Port-aux-Basques to St. John's; secondly, it will necessitate access to key ports, e.g.,

Stephenville and Corner Brook, and to areas that may accommodate specific developments, e.g., Route 460 to the Port au Port peninsula and Route 430 along the northern peninsula. As the oil and gas sector evolves, there will be increasing traffic on these routes, including the transportation of heavy loads. Ideally the Trans Canada Highway should be twinned throughout its length. It is recognized, however, that this would be an enormous undertaking, and one that can only be realized over time. An important objective nevertheless should be to give priority to those portions of the route where development is being encouraged, that accommodate higher traffic counts and/or that are characterized by dangerous vertical or horizontal curves. This is information that the pertinent departments already have. Prioritization of investment, however, involves many dimensions including the technical, and there is a need to examine the road improvement program that serves the population of Western Newfoundland and will increasingly service the development of the oil and gas sector in this area.

Other priorities include the upgrading of the identified rural routes, the rationalization and better signage of urban routes, particularly those in Corner Brook, to facilitate movements from the Trans Canada Highway to the city and between specific destinations in the city. This is of relevance not only to the oil and gas sector, but to the tourist sector and to the population at large. One workshop participant stated very clearly that “I feel that many roads need to be upgraded to accommodate exploration and development”.

3.3 Port and Wharf Facilities

Port and wharf facilities are of substantive importance to the successful development of the oil and gas sector in an area like Western Newfoundland irrespective of whether oil and gas development ultimately takes place onshore or offshore. There is no rail service, and any large equipment, e.g., drilling derricks or support services and suppliers, such as drilling muds and fluids, are likely to be delivered by sea. This has already been the case, and both the Corner Brook and Stephenville ports are positioned to provide such services. As the industry expands, there will be progressive demands for land for storage of equipment and drill pipe, fuels and drilling fluids, etc., and for the reception, processing and storage of product. Given the respective attributes of the two ports, Stephenville has in place available storage for product, a considerable acreage of land suitable for support services and proximity to largely unused airport facilities. Corner Brook Port, on the other hand, has both an established industrial profile which the Port Corporation intends to expand upon and also the potential to further market the port and surrounding area as a cruise destination. At this time it is important that Corner Brook and Stephenville be recognized as contributing complementary facilities in the servicing of the oil and gas sector. This includes the strategic need to support those responsible for the planning, maintenance and development of the under used port and airport infrastructure in Stephenville in order to maximize their full industrial and commercial potential. Certainly the future use of the port and airport at Stephenville should be examined together and in relation to both the capacity of the surrounding road network and the community's priorities for growth.

Further information is provided below on the wharf facilities at Corner Brook, Stephenville and Port Saunders. These are certainly not the only wharves on the west coast. There are significant commercial facilities in Port aux Basques, including the ferry terminal facilities, and at St. Anthony. Many smaller wharves serve the needs of the fishing industry on the west coast, and some of these could serve the

interim needs of support and supply vessels for the oil and gas sector providing there is not less than 6 m quayside draft. Given the constraints of this contract, however, it was not feasible to compile an inventory of this infrastructure, but such an inventory would be a valuable tool.

3.3.1 Corner Brook

The wharf at the Port of Corner Brook was until 2001 administered as a public wharf by Transport Canada. In 2001 the Corner Brook Port Corporation was instigated and took over its operation. There is one dock constructed of reinforced concrete and steel tube pile bents with a modern Arch Fendering System. The deck elevation is 4.1 m, providing berthage of 362 m; the minimum dockside depth is 10.1 m. Approximately 28,000 square meters of storage space is available in proximity to the wharf. Additional land acquired in 2007 could be utilized for storage or other uses related to oil and gas exploration and development.

The Port is 35 km inland from the Gulf of St. Lawrence and is accessible year round. The Humber Arm through the Bay of Islands, which provides marine access to the Port of Corner Brook, is 1.6 km wide with a depth of 46 m. The diameter of the turning basin is approximately 1,530 m; the tidal range in the bay is 2 m. The Humber Arm is a compulsory pilotage area with the service being provided by the Atlantic Pilotage Authority.

Land access to the port facilities is gained via a four-lane arterial road from the Trans Canada Highway through the City of Corner Brook, or via a newer two-lane road that connects with the Trans Canada Highway.



Port of Corner Brook

A fixed high capacity crane, costing approximately \$2.7 million, has recently been installed and will begin operations shortly. The crane has a lift capacity of 53 tonnes and a reach of 33 m. It replaced smaller mobile crane, and its installation will enable a greater number and range of ships to be serviced thereby increasing the number of ships the port can handle.

The Corner Brook Port is a designated site for Canada Customs clearing and is fully certified under the International Ship and Port Facility Security Code regulations. A number of services are available including: fresh water; supplies; bunker and diesel fuels; gas and lubricants; minor repairs; hospital; port operations personnel; security; stevedoring; Canada Customs (through Canada Border Services); international garbage disposal; and gray/black water and sludge removal.

Currently there is one shipping agent servicing the port, i.e., Oceanex Inc. The commodities handled include consumer goods such as dry goods, construction materials, and furniture; automobiles; road salt; containers for large retail stores; supplies for the pulp and paper industry; and oil and gas industry

equipment. Oceanex offers weekly service year round to Halifax via St. Johns and an additional route to Montreal seasonally.

3.3.2 Stephenville

The Port of Stephenville, which is privately owned and operated by the Port Harmon Authority Ltd., is located on the north shore of St. George's Bay about 50 km east of Cape St. George. The port is accessible year round though occasional support may be required from an ice breaker during the winter months. Pilotage into the port is compulsory. The available wharf age is 293 m in length and 19 m deep; the depth at the wharf face ranges from 7.8 to 9.1 m. Pilotage into the port is compulsory. There is 6,500 m² of open storage associated with the wharf space. Access to the harbour and turning basin is through a 72 m wide by 2,100 m long dredged channel that has a limiting depth of 10 m. The channel was dredged for the first time in approximately 20 years in 2007 at a cost of \$2.5 million. The tidal range in the estuary is 1.7 m. At present the predominant use of the port is by the fishing industry. Commodities other than fish coming into the port include asphalt, salt, grain and calcium chloride.

There are seven storage tanks available; three (one @ 120,000 barrels and two @ 80,000 barrels) were used by Abitibi Inc. to store Bunker C, the other four, all 80,000 barrels, are owned by Newfoundland and Labrador Housing.

3.3.3 Port Saunders

Port Saunders is a safe harbour in the centre of the northern peninsula offering a variety of services to the fishing industry, but services that could also be of value to the offshore oil and gas sector. The marine service centre was constructed to service the long liner fleet as a consequence of a federal/provincial agreement in 1975 and was privatized in 1999. The channel, which is protected, is 45-80 ft deep. There is a paved storage area adjacent the wharf and there is a multi-purpose building 100 ft x 150 ft x 40 ft in height available for lease plus lots of available office space. The Northern Boat Repair facility at the wharf has two marine travelifts of 70 and 200 ton capacity respectively and two haul out basins. There is equipment available for rental, including forklifts and over head cranes, and there are welding and fabrication facilities in situ.



Port Saunders from the air



Port Saunders

It is apparent from his participation at the Cow Head workshop, and from materials forwarded subsequent to the workshop, that the owner of the Northern Repair facility at port Saunders is proactively seeking business. He has invested in the facilities and is looking at all avenues to diversify his revenue stream. It is unlikely in the short term that this harbour would be used by the oil and gas sector given its location, but as exploration extends northwards over a wider geographical area, the facilities and safe anchorage in the centre of the northern peninsula could have a role to play.

3.4 Airport Facilities

The oil and gas industry is a global industry. Its management serves in many parts of the world and even in the context of the junior players, the personnel involved and the crews they engage travel. The airlinks from Western Newfoundland to St. John's, Houston, London and beyond are therefore critical to the accommodation of the sector in Western Newfoundland.

3.4.1 Deer Lake Regional Airport

The airport at Deer Lake has undergone substantial growth over the past decade. Privatized in 1998, the airport is run by a regional Board of Directors as a not-for-profit, autonomous and independent organization. It has full ownership of its lands and assets. Through the 1970s to mid-1980s the airport handled approximately 100,000 passengers per year; through the late 1980s to 2000, this had risen to a little over 150,000. Since 2000, the numbers handled have increased dramatically, and in 2007 over 275,000 passengers passed through the terminal which is greater than the passenger traffic handled at comparable sized airports in Saint John, Charlottetown or Fredericton. Further growth is anticipated though at a slower rate; by 2015, it is predicted that the airport will be handling approximately 380,000 passengers.

Between 2004 and 2007, over \$15 million had been spent on expansion at the airport; this included improvements to the terminal, parking, runways and lighting. Another \$9 million will be spent over the next three years on further improvements to the taxiway, the runway and to upgrade water supply. Improvements to date have included a new 250 seat departure lounge, new domestic and international arrival halls and new customs facilities. Customer services now include a provincial visitor's information centre, a shuttle service into Corner Brook, five on-site car rental agencies, 500 long-term parking spaces, a full service restaurant and wireless internet service.

Operational services include 24 hour Nav. Canada flight services, ground handling services, refueling services, and an AFF Emergency Response Service.

The key economic drivers that the airport authorities have capitalized upon include:

- local and regional tourism including the development in the Humber Valley of



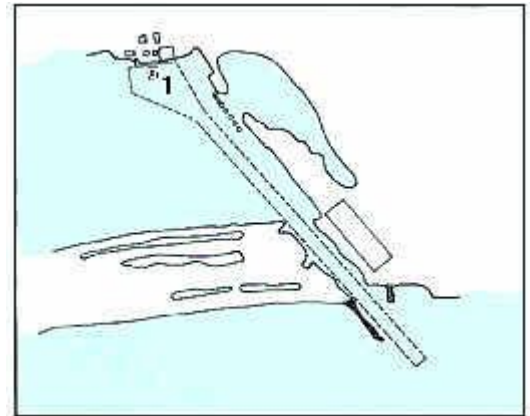
Deer Lake Airport

- international destination resorts;
- increased airline capacity and an improved flight schedule;
- a more competitive fare structure;
- special events and conventions;
- developing key communication links, e.g., with Labrador; and
- accommodating the needs of the mobile local work force, i.e., those who travel in rotation to Alberta and the north.

The intent over the next decade is to further expand the services offered at the airport to the traveling and commercial public, to develop partnerships with the public and private sectors to attract new air service business opportunities and to market the lands associated with the airport for commercial development. The airport has seen remarkable growth in a short period of time and is obviously seeking and is prepared to accommodate further growth irrespective of what happens to the oil and gas sector in the region.

3.4.2 Stephenville Airport

The airport facilities at Stephenville are owned and operated by the Stephenville Airport Corporation; built by the American military these facilities are substantial and underused. The land area amounts to approximately 889 hectares, and there are five associated buildings including the terminal and freight building. The terminal building can hold up to 700 people, 400 to 500 comfortably. The main runway is 11,000, x 200 ft with 1,000 ft of over-run at each end while the cross runway is 5,000 ft x 150 ft; there are also four substantial taxiways. Although providing schedule passenger services by Sunwing Airlines and Provincial Airlines and providing refueling and ground handling services to corporate, military, general aviation customers, the facilities are not used to capacity.



Stephenville Airport

The Airport Corporation is also a partner with the Marine Institute of Memorial University in the Safety and Emergency Response Training Centre (SERT Centre). The SERT Centre provides safety and emergency response training including crash fire fighting training and recertification for the aviation sector. This centre is one of the premiere fire fighting facilities in Canada and has the capability and capacity to design customized programs at the airport.

3.4.3 Other Air Support

There are two 50 ft diameter helipads at the south end of Deer Lake airport. Guardian Helicopters has recently leased the NALAIR hanger at the Deer Lake Airport and are operating three helicopters from that location. It is understood that NALAIR has located at the airport to support the mineral exploration programs that are being executed in western, central and northern Newfoundland and in Labrador. The facilities and land at Deer Lake airport are such that additional helicopter services could be accommodated should the oil and gas sector expand and the need is identified.

There is a heliport located at Burgeo on the south coast of Newfoundland that is operated by the Calder Health Care Corporation, and two helicopter companies, Universal and Canadian, provide services out of Pasadena. Small air strips serve community requirements at St. Andrew and Port au Choix, and a small airport serves the needs of St. Anthony and the northern peninsula providing services with two carriers, i.e., Air Labrador and Provincial Airlines, to Labrador and to St. John's. The runway is paved and is 4,000 ft in length. Services provided include a café, ground transportation, vehicle rental and aircraft refueling.

3.5 Education and Training

As stated in the opening paragraphs of Part 1, the oil and gas sector is confronting a shortage of educated and experienced skilled workers. It is not alone in having to address this challenge; most economic sectors are confronting the same issue.

Higher education can also in its many forms play a role in instigating knowledge based economic development, but the latter cannot take place without a substantive change in approach. On the one hand, as indicated in Section 2.2.1, the demographic profile is such that institutes of higher learning must turn to new student markets to maintain enrollment; on the other hand the students graduating must look to attain experience in their chosen field and this may not be in Western Newfoundland. This would suggest the need for innovative approaches to both enrollment and to equipping students for a world, as opposed to local, a labour market. There may, for example, be opportunities for the expansion of exchange and co-operative programs with industry and for students to spend a stipulated period of study or work abroad. With institutions in place such as the College of the North Atlantic in Qatar, the establishment of co-operative programs with the oil and gas sector in a range of disciplines would seem possible.

The 2005 White Paper on post secondary education entitled "Foundation for Success" advocated "enhancing collaboration between the higher education institutes and local communities and industries"; it is suggested that the next step must be taken, i.e., institutes of higher education must establish that collaboration on a global playing field to bring economic development back to Newfoundland and more specifically to Western Newfoundland. If the oil and gas sector needs educated people, which it does, then the education institutions have to establish relationships with the industry wherever it is located, i.e., it cannot be restricted to educating students for local jobs.

3.5.1 Memorial University of Newfoundland

Memorial University, founded in 1925, has two campuses in St. John's (the main campus and the Marine Institute), one in Corner Brook and a fourth in Harlow in England. With a student population of over 17,000 students and a little over 6,000 full, part and semester positions, it is the largest university in Atlantic Canada. Undergraduate and graduate degrees, as well as diploma and certificate programs are offered through the faculties (Arts, Business, Education, Engineering, Medicine and Science) and schools (Graduate Studies, Music, Nursing, Pharmacy, Human Kinetics and Recreation and Social Work). Memorial's research accomplishments, to a large degree, take advantage of the mid-Atlantic location of the university that has shaped the Province's culture and priorities.

The Marine Institute (MI) is Canada's leading centre of fisheries and marine training, and one of the largest marine educational facilities in the world. The institute has a number of centers and units, including the Offshore Safety and Survival Centre, the Centre of Marine Simulation, the Centre for Aquaculture and Seafood Development, MI International and the Centre for Sustainable and Aquatic Resources. These lead the institute in applied research and technology transfer and also provide training to a variety of industry clients. The MI is one of only five public educational facilities in Canada to be ISO certified.

In 2002 the Bonne Bay Marine Station at Norris Point was opened. This facility which is operated by the Gros Morne Co-operating Association and Memorial University serves the following junctions:

- teaching and field centre for university students in marine biology and environmental studies;
- marine research complex; and
- marine interpretation centre.

It is a unique and valued education and research resource on the west coast and is one that could contribute substantially to the understanding of the waters of Western Newfoundland.

3.5.1.1 SIR WILFRED GRENFELL COLLEGE

The Sir Wilfred Grenfell College was established in 1975 as a feeder college to Memorial University; the college currently has approximately 1,400 full time and 50 part time students. At present the college offers 14 degree programs in the Liberal Arts, Environmental Science and Nursing; the governing body is also working on new programs including one in Sustainable Resource Management. Prospective engineering graduates can complete the first year of their program at this campus before transferring to the main campus in St. John's. The college has formed partnerships with the Centre of Environmental Excellence and the Institute of Biodiversity and Ecosystem Science; these partnerships are allowing the creation of new networks, the transfer of information and combined work on research projects. The college is currently working towards a governance change that would allow it to be more proactive to the requirements of industry with respect to specific programs including those that could address the needs of the oil and gas sector. The college is also one of the largest employers in Western Newfoundland and is of substantial importance to the local and regional economy.

3.5.2 *College of the North Atlantic*

The College of the North Atlantic is Newfoundland and Labrador's public college. It is one of the largest post-secondary educational and skills training centers in Atlantic Canada, offering over 90 full-time diploma and certificate programs. Headquartered in Stephenville, the college not only operates 17 campuses across the Province but the College of the North Atlantic in Qatar. The focus of the college goes beyond the more traditional approaches to education and training, serving students of all ages and interests; it also proactively seeks to provide courses and training required by specific industrial sectors and has already established a working relationship with the oil and gas industry in the Province. The college has four campuses on the west coast:

- St. Anthony Campus;
- Corner Brook Campus;
- Bay St. George Campus in Stephenville; and
- Port aux Basques Campus.

In the discussions that were held with representatives of the college in both Corner Brook and Stephenville, the willingness and ability of the college to respond both to student and prospective employer needs was impressive. The college graduates students today with national credentials as civil engineering technicians, electronic engineering technicians and has instigated several innovative programs including the Geospatial Research Project supported by the Canadian Foundation for Innovation. They have instigated at the Corner Brook campus programs an advanced program in GIS and an increasingly valuable program for environmental technologists.

3.6 Hospitals and Health Care

As has been described the study area is large and some of the population is located at a considerable distance from hospital facilities. This forces not only a degree of self reliance, but also encourages the adoption of remote diagnostic and treatment programs using the latest technologies. Three hospitals and four health centers service the health requirements of the population of Western Newfoundland. Additional specialist services are provided in St. John's.

The following are the hospitals and clinics in the area; they are located on Figure B in Part I.

- i) The Western Memorial Regional Hospital in Corner Brook is a 192 bed facility providing secondary services to the people of the Western Region, i.e., a population of approximately 82,000 people;
- ii) The Charles S. Curtis Memorial Hospital in St. Anthony, which is run by the Labrador Grenfell Regional Health Authority, is a 50 bed facility providing services to the Northern Peninsula and the south coast of Labrador;
- iii) The Sir Thomas Roddick Hospital in Stephenville is a 44 bed acute care centre with a comprehensive range of inpatient and outpatient services for the people of the Bay St. George catchments area which extends from the Port au Port Peninsula east to Gallants and south to the Jeffrey's – St. Fintan's area. This area has a population of approximately 24,000;
- iv) The Bonne Bay Health Centre, located in the town of Norris Point, has 22 beds and provides primary health care services and long term care services to the communities of Cow Head, Parsons Pond, Daniel's Harbour, Woody Point and Trout River. The catchments area has a population of approximately 5,000. The centre also operates five satellite medical clinics at each of the above referenced communities;
- v) The Rufus Guinchard Health Centre, located in the town of Port Saunders, has 29 beds and provides primary health care services and long term health care services to the communities of Port Saunders, Port au Choix. Hawkes Bay, River of Ponds, Eddies Cove West, Castors River North and South and Bartletts Harbour. The catchments area serves approximately 4,000 people;
- vi) The Dr. Charles L Legrow Health Centre is located in Port aux Basques. This facility, which has 44 beds, provides primary, secondary and long term care to the 9,000 people who stay on the south west coast. It has been recognized both provincially and nationally as a Primary Health Care Centre that provides services through an interdisciplinary team approach. The Centre also provides health services at three satellite clinics, i.e., at Doyles in the Codroy Valley, at Rose Blanche on the southwest coast and at Lapoile, which is accessible only by boat or helicopter and

- vii) The Calder Health Centre, located in Burgeo, has 21 beds and provides primary and long term care services to a population of approximately 2,000 in the communities of Burgeo, Grand Bruit, Grey River, Francois and Ramea.

These hospitals and clinics provide the service points for health care in the region. It is not the intent of this report to comment on the sufficiency of this network to meet current needs, but as a new industrial sector evolves, particularly one that is conducted in remote locations, including offshore locations, there is a need to address emergency response procedures and to ensure that both training and equipment is available to First Responders. This was an issue that was articulated forcefully at the workshop in Cow Head by both attending First Responders and other participants, i.e., the need to ensure adequate and regular training for selected local personnel.

3.7 Landscape, Environmental Attributes and Recreational Opportunities

The environment and the availability of open space and dramatic scenery were identified by many participants at the workshops and others as having both intrinsic and economic value, and although there were few, if any, voices opposed to facilitating further exploration for oil and gas, there were concerns raised that no development should be permitted that impacted adversely on either marine or terrestrial resources. On the one hand, the fishery and tourism are central to the economy of the region and, on the other, the environmental attributes of the area are increasingly recognized as contributing to the quality of life.

Although the environment is not strictly infrastructure, the existence of the Gros Morne National Park; the Marble Mountain Ski Resort and its associated residential complexes; the nearshore lobster spawning areas; the Bay of Islands and other scenic resources and recreational destinations; and the many fishing rivers that drain to the west coast do provide a valued natural landscape and habitat that contribute to the distinctive character of the region. This in and of itself has value and must not only be taken into account in strategic planning to accommodate new development, but must also be proactively protected and managed. To this extent, the environment and all that is associated with it can be characterized as infrastructure; it provides the context within which all else takes place. To this end those interest groups and stakeholders, such as ACAP and those involved with the Humber River Basin Project, must be supported in their research and in the execution of adequate protection measures. In this context responsibility is spread across all sectors of the community:

- the private sector, including the oil and gas sector, to engage with those who depend on the natural environment for their livelihood and to utilize to the extent possible local expertise and knowledge to address and execute best environmental management practices in meeting provincial and federal environmental regulatory requirements;
- the municipalities and local development agencies to ensure through their land use planning and other initiatives that due regard is placed on environmental and related matters; and
- the senior levels of government to ensure that the spirit and intent of all pertinent legislation is met and to proactively support, both financially and through research, expertise and pertinent field programs, the designation and management of protected areas and waters.

Some might consider that the oil and gas sector has a mixed reputation when it comes to environmental issues, and there are instances in different parts of the globe where their actions are less than exemplary. On the other hand, the industry has been held accountable by governments to a very high standard, and the industry, especially the major players, are leaders at the cutting edge of environmental protection. In the North Sea, for example, the industry has developed a collaborative working relationship with the fishing sector that provides a model that could be employed elsewhere; the two industries not only coexist, but work with and benefit from each other's presence. The natural environment has value, not always readily quantified, but the loss of any pristine area is difficult to replicate. Western Newfoundland has a rich natural environment that must be considered an asset to be proactively managed for the benefit of the all who live and work in the area. It is an asset that can also be promoted to attract investment to the region and to encourage people to stay in the area, and that asset, if managed, will accrue in value over time.

Chapter 4 Lessons from Elsewhere

As exploration boundaries are pushed both geographically and technically, countries around the world have accommodated the development of oil and gas resources both on and offshore. A requirement of this study was to look at lessons that may be learnt from other jurisdictions. Of particular relevance to Western Newfoundland perhaps is the history of such activity in Scotland and Norway. Section 4.1 provides data on the Scottish experience with particular reference to locations from which meaningful parallels can be drawn. Section 4.2 provides a brief introduction to the circumstances that shaped hydrocarbon related development in Norway and Section 4.3 draws some general conclusions from the material presented. The team have also drawn on the work they have done in Kazakhstan, a country where there are enormous proven reserves of oil and gas and all parties involved, government and the private sector, are determined to develop these resources in the best interests of the country. Given the size of the proven resources and the geography and socio-economic characteristics of Kazakhstan, the parallels with Western Newfoundland may be less relevant than those that can be drawn from the Scottish experience, but there are lessons that may be drawn from how that country has approached strategic infrastructural planning.

4.1 The Scottish Offshore Experience

This section provides a review of the impacts of North Sea oil and gas development on some of the smaller rural communities in Scotland. The case studies were carefully selected so as to be more comparable to the circumstances of the study area. The strengths, weaknesses, opportunities and problems posed by the development and operation of the oil and gas industry are described, and strategies that were used to facilitate community preparedness are identified. Two areas, in particular, are examined: the Shetlands and the Orkney's, both island communities.

There are four oil pipeline landings in Scotland: Sullom Voe (Shetlands), Flotta (Orkneys), Cruden Bay (Aberdeenshire) and Nigg Bay (Highlands). Of these, all except Cruden Bay, have terminal facilities where the oil undergoes primary processing and storage prior to being tankered out to refineries elsewhere. The Cruden Bay installation is limited to a pumping station which propels the oil onward to Grangemouth on the shores of the Forth. There, the oil is processed and used as the feedstock for the BP refinery and associated petrochemical industries. Primary processed crude which is not used at Grangemouth is transported by pipeline to Hound Point, further eastwards along the Forth Coast, for onward shipping.

The only gas pipeline landfall in Scotland is at St. Fergus (Aberdeenshire). Here gas from a number of fields, including the SAGE, FLAGS and Frigg systems, is brought in via offshore pipelines. At the seaward end, the gas field operators separate water and hydrocarbon liquids from the gas, which is then cleaned and adjusted to the required thermal values for general consumption. Apart from the pipelines that take gas south to the English market, there are two additional export pipelines: the UK-Irish Gas Interconnector from Brighouse Bay in Galloway to the Republic of Ireland, completed in 1993/94, and the Scotland-Northern Ireland Pipeline from Portnaughan Bay to Castle Robin which was completed in 1997.

As noted above, the principal area of downstream petrochemical activity is at Grangemouth. Despite the scale of the oil and gas resources brought ashore from the North Sea, no downstream petrochemical development has taken place in proximity to the landfall sites; this is discussed further in Section 4.1.2. The principal onshore developments have included platform fabrication yards (at Methil, Ardesier and Nigg) and marine support and supply bases; the latter have been located in many parts of Scotland, but are largely concentrated in the northeastern part of the country.

4.1.1 Location Specific Profiles

4.1.1.1 SHETLAND

The Shetland Islands are located between 59° and 60° latitude, approximately the same latitude as Bergen, Anchorage or Leningrad; Western Newfoundland on the other hand is located between 47° and 51°, considerably further to the south. Shetland is a large, sparsely populated and peripheral area, although its population density has always been greater than that of Western Newfoundland. Its island nature and geographical distance from the UK mainland exacerbates its peripherality. The main town, Lerwick, has approximately 7,000 people. Pre-oil, the Shetlands had limited freight and passenger services, and air services were generally restricted to one flight per day. Aberdeen, the mainland contact point, is as distant to the islands as Bergen in Norway. Basic socio-economic statistics on the Shetland Islands are shown in Table 4.1.

Table 4-1: Shetland: Socio-Economic Statistics Before, During and After Oil-Related Development

	1971	1981	1991	2001
Population	17,327	22,768	22,522	21,988
Area	1,438 square km			
Population Density (pers/sq km)	12.05	15.83	15.66	15.29
Employment Statistics	Percentage of Workforce'			
Unemployment Rate	4%	5%	4%	2.4%
Primary (Fishing/Agriculture)	15%	15%	18%	10.71%
Secondary (Manufacturing)	22%	10%	11%	9.59%
Tertiary (Construction)	9%	10%	10%	9.57%
Tertiary (Service Sector)	50%	59%	58%	70.11%
Total Employed	6,433	10,425	10,704	11,110

Note:' These figures do not include the workforce that was involved in the construction of the Sullom Voe Oil Terminal. 1980 was a peak year with 7,052 temporary construction and service workers. The figures include the self employed, the largest proportion (approximately 50%) of which are fisherman and the remainder (approximately 33%) tradesmen. The 1971 and 1991 figures were sourced with these sector adjustments already made; the 1981 figures have been adjusted and are therefore approximations. The 2001 figure was sourced from the 2001 census which can be found on the SCROL (Scottish Census OnLine) website.

The landscape is characterized by undulating to moderately rolling upland with blanket peat bog over much of its surface; there are very few areas that are suitable for agriculture, but in contrast to Western Newfoundland, there is little remaining woodland or forestry. Fishing remains the cornerstone of the Islands' economy and has been since the 14th century or earlier. While the attendant fish processing industry is the largest component of the manufacturing sector, aquaculture has been something of a success story in recent years, with over 50 salmon farms contributing substantially to the growth of this component of the local economy. In addition, craft-based textiles (knitwear) and tourism are long-established (traditional) industries. In 2006, the value of oil production operations in Shetland was 70 million pounds compared to nearly 226 million pounds with respect to the fisheries; it is an island economy totally dependent on its marine resources. Out-migration in search of work has always been an issue and was the major cause of depopulation until the late 1960s. With the establishment of the oil and gas sector through the eighties and nineties, the population largely stabilized; this, however, may again be changing.

Table 4-2: Shetland: Production in the Traditional Industries

	<i>1982/83</i>	<i>1985/86</i>	<i>1992</i>	<i>1998</i>	<i>2000</i>	<i>2001</i>
Fish Catching	£11.2 mil.	£17.0 mil.	£20.0 mil.	£156.3 mil.	£202.8 mil.	£223.9 mil.
Fish Processing	£12.7 mil.	£15.0 mil.	£25.0 mil.			
Salmon Farming	£0.0 mil.	£3.3 mil.	£33.3 mil.			
Agriculture	£5.8 mil.	£7.8 mil.	£11.0 mil.	£12.0 mil.	£11.7 mil.	£12.4 mil.
Knitwear	£4.2 mil.	£6.4 mil.	£4.0 mil.	£5.4 mil.	£5.0 mil.	£2.5 mil.
Tourism	£3.5 mil.	£5.9 mil.	£10.0 mil.	£12.8 mil.	£12.0 mil.	£12.8 mil.
Traditional sector total	£37.4 mil.	£55.4 mil.	£103.3 mil.	£186.5 mil.	£231.5 mil.	£251.6 mil.
	<i>1982/83</i>	<i>1987/88</i>	<i>1996</i>	<i>1998</i>	<i>2000</i>	<i>2001</i>
Oil Production Operations	£37.4 mil.	£55.4 mil.	£50.4 mil.	£57.8 mil.	£53.0 mil.	£116.1 mil.

Note: Operations significantly increased in 2001 due to the Gas Plant Overhaul and Oil Recovery programme which took place at the Sullom Voe Oil Terminal. Statistics courtesy of Shetland in Statistics published by Shetland Islands Council Economic Development Unit.

The percentage of those over 18 with higher/further education qualifications on the islands is relatively high; it was 20.25% in 2001. The comparative figure in Scotland was 19.47%. It is important to note, however, that there is still in the Shetlands a high degree of multi-skilled pluriactivity, i.e., people with more than one income source (for example, someone may run a small farm part-time in combination with working in a fish-processing facility and an on-farm bed and breakfast business). Pluriactivity is a common strategy in many peripheral rural areas where it is economically safer to have a broad base of skills. It is also common in Western Newfoundland where many people are involved in more than one economic activity on a daily, weekly, or seasonal basis.

Because of these geographical and socio-economic similarities, Shetland serves as a useful comparison. In one important aspect, however, the Shetland case is different. Immediately before the discovery of oil, Shetland was enjoying an economic revival in fish processing and in the knitwear industries, thereby reversing population decline and reducing unemployment. This, in combination with its locational

strengths, meant that Shetland was in a comparatively strong negotiating position vis-a-vis the oil industry.

The major oil-related development in Shetland is the Sullom Voe Oil Terminal, constructed between 1975 and 1982. The Terminal is one of Europe's largest oil and liquefied gas terminals with a capacity to handle over half the UK's potential offshore oil production. The Terminal throughput peaked in 1984, with an average of over 1.2 million barrels of crude oil per day; it now averages about 0.9 million barrels per day. There are also a number of supply bases on the Islands. It is estimated that the Terminal supports some 380 to 445 employees and the supply bases 210 to 330 employees. Oil-related construction is estimated to have supported an average of 1,200 employees up to 1981; most were temporary workers from outside of the islands.

Impacts from the hydrocarbon related activity in the Shetlands included escalating prices, housing shortages, social disruption and distortion of services. The three most important socio-economic criteria to consider, however, are:

- sector related employment;
- local income levels, and by implication, the standard of living; and
- inter-industry linkages, particularly with the Shetland Island Council.

The total labour force, excluding the temporary construction workforce of 9,000, rose by 80% in a decade. Most of this increase occurred in the service sector. The most serious negative impact of oil development was on local industries through competition for labour, particularly skilled labour, and the bidding up of wage rates. The fishery was not seriously adversely affected due to strong traditional and family connections, the "share system" of ownership, and generally high fishing incomes.

By 1981, over 1000 residents were employed in short term construction and catering jobs and around 2000 in longer term jobs, including oil terminal, marine and air services. These jobs were all relatively highly paid. Including indirect employment, this meant that by 1982/83 oil activities generated £29 million in household incomes increasing Shetland's per capita income above the UK average. Increased job opportunities and higher incomes are the key factors that kept people on the islands thereby providing the basis for population growth. These are also the factors that were raised repeatedly at the workshops as being central to keeping people in Western Newfoundland as opposed to rotating to positions in the west.



Sullom Voe Development [© Cairns-ICL]

The dominance of the oil industry in the local economy should be interpreted carefully since the oil industry spends a much smaller proportion of its receipts locally than the traditional sectors. In addition, Sullom Voe Terminal's purchases are concentrated in only a few sectors. In spite of accounting for 26.4% of all

Shetland inter-industry sales, there are only five sectors for which sales to the Sullom Voe Terminal represented more than 10%; these were manufacturing (14%), professional services (14%), hotels and catering (31 %), and, by far the greatest beneficiary, the Shetland Island Council for tax rates (83%) and port services (81 %). The total oil industry contributions to municipal finances for 1993/94 and 2007/08, is shown in Table 4.3; the contribution has substantially fallen over the past decade, but nevertheless remains an important contribution to the local economy.

Table 4-3: Oil Industry Contribution to Shetland Islands Council Finances

	<i>Sullom Voe Terminal</i>	<i>1993/94</i>	<i>07/08</i>
i)	Rent (paid to General Fund but lost via RSG mechanism in 93/94 but now paid to the Shetland Charitable Trust and so no longer lost)	£8.9 mil.	£1.6 mil.
ii)	Rates (paid to General Fund, but set by Scottish office and pooled nationally for redistribution to Councils on population basis using RSG mechanism)	£12.0 mil.	£0.18 mil.
iii)	Water Meter Charges	£0.4 mil.	£0.01 mil.
iv)	Disturbance Agreement (paid to charitable trust)	£3.5 mil.	£0.0 mil.
v)	Harbour Agreement Payments:		
	a) 2% on capital employed (paid to Reserve Fund)	£1.6 mil.	£0.0 mil.
	b) 1 p per long ton (paid to Reserve Fund)	£0.5 mil.	£0.7 mil.
	Tanker Owners		£4.5 mil.*
i)	Harbour Charges (15% return on capital employed; transferred to Reserve	£9.4 mil.	
ii)	Boarding and Landing Charges (15% return on capital employed; transferred to Reserve Fund)	£0.5 mil.	
iii)	Pilotage Charges (15% return on capital employed; transferred to Reserve Fund)	£0.7 mil.	
iv)	Mooring Charges (15% return on capital employed; transferred to Reserve	£0.5 mil.	
	Total	£38.0 mil.	£7.01 mil.

(*) no split of income from tanker owners available for 07/08

In early 1972, the Zetland County Council assumed that major oil developments in the Shetland Islands were inevitable. They instigated two important initiatives:

- i) instructed the Development Officer to prepare a Land Use Development Plan to:
 - establish a planning control framework to guide development proposals; and
 - identify proprietary areas for detailed survey work.
- ii) acquired by Compulsory Order, where necessary, land required by the oil and gas industry.

The underlying premise was that these actions would prevent speculators monopolizing the land and thereby inhibiting its best use for the overall benefit of the community. In parallel they commissioned a study of deep water anchorages and established the Reserve Fund. These were important powers made possible by the passage of the *Zetland County Council Act* in 1974; other powers conferred to the Council by the Act included:

- powers of compulsory purchase and powers to obtain revenues from land lease arrangements;

- powers to take on the duties of the port and harbour authority and to obtain ensuing revenues;
- powers to engage in commercial enterprises on behalf of the community and to obtain revenues from commercial interests; and
- powers to establish a reserve fund out of revenues accruing from oil developments for use in social and community aid.

The Council also persuaded the oil companies to contribute towards the cost of some infrastructure and to reimburse expenditure on the port facilities at Sullom Voe through a "Disturbance Fund". In addition to the direct financial benefits to Shetlanders, the improvements in transport and communications infrastructure attendant on the oil development (improved road quality and increased air service) are an important long term benefit. The Council is also directly involved in the planning and management of the Terminal via a management company on which the Council and the oil companies both have two directors. This early determination of the Council to substantially influence the location, pace and operation of oil-related development to minimize disruption and to gain economic returns for the community has proven to be extremely effective.

4.1.1.2 ORKNEY

The Orkney Islands lie 100 km to the south of the Shetlands, some 30 km off the northern coast of the Scottish Mainland. It has been said that "whereas a Shetlander is basically a fisherman with a small holding, the Orcadian is a farmer who occasionally fishes". This is because the geological structure of Orkney has given rise to a considerable area of soils of high agricultural value; approximately 82% of the land area is in agricultural use, in comparison with 45% for Shetland. Apart from this difference, pre-oil Orkney, like Shetland, satisfies the main criteria of rural peripherality - a small, dispersed population with a restricted industrial base, distant from markets, with poor infrastructure, and a tendency towards rural depopulation. Tables 5.4 and 5.5 provide statistics on the area.

Table 4-4: Orkney: Socio-Economic Statistics Before, During and After Oil-Related Development

	<i>1971</i>	<i>1981</i>	<i>1993²</i>	<i>2001³</i>
Population	17,077	18,862	19,760	19,245
Area	991 square km			
Population Density (pers/km2)	17.23	19.03	19.93	19.42
Employment Statistics	Percentage of Workforce'			
Unemployment Rate	4%	6%	6%	3.02%
Primary (Fishing/Agriculture)	18%	12%	7%	15.71%
Secondary (Manufacturing)	10%	9%	9%	7.8%
Tertiary (Construction)	10%	6%	11%	10.25%
Tertiary (Service Sector)	58%	67%	67%	66.24%
Total Employed	4,800	6,100	7,000	9,183

Notes:

- 1 These figures do not include the construction workforce at the Flotta Oil Terminal. 1976 was a peak year with 1,245 temporary construction workers.

- 2 1991 unemployment figures were unavailable. The nearest dates were 1988 (11.5%) and 1994 (5%). 6% was taken as a working figure to enable comparative calculation of the sector employment with 1981.
- 3 2001 data from the 2001 census which can be found on the SCROL (Scottish Census OnLine) website.

Table 4-5: Orkney: Production in the Traditional Industries

	<i>1971</i>	<i>1981</i>	<i>1991</i>	<i>1995</i>
Agriculture	N/A	N/A	£ 20.2 million	£ 23.9 million
Fish catch output	N/A	N/A	£ 8.0 million	£ 11.3 million
Craft industries	N/A	N/A	N/A	£ 4.3 million
Tourism	N/A	N/A	£ 24.0 million	£ 27.0 million
Gross Regional Product (not Including oil-related outputs)	£ 6.3 million	£ 20 million	> £ 52 million	>£ 66 million



Flotta – Predevelopment [© Cairns-ICL]



Flotta – Post development [© Cairns-ICL]

The major oil-related development in Orkney is the Flotta Oil Terminal constructed between 1974-1977. This terminal performs a similar function to Sullom Voe, but is considerably smaller; Sullom Voe handled 37.5 million tonnes of crude oil in 1994, whereas Flotta handled 12.0 million tonnes. Nevertheless, the terminal was handling about 10% of the UK's total oil production, making it a very important terminal. Unlike the situation in Shetland, there are few oil-related supply bases located within the Orkneys. Given the more limited oil development and the location of the Flotta Terminal on a small island, it would be reasonable to assume the terminal's economic impact would not be as far reaching. The available statistical evidence would support this assumption.

One of the major impacts, however, has been the reversal of depopulation. Approximately 300 permanent jobs were created, of which 230 were filled by Orcadians, many of whom returned to Orkney as a consequence of the terminal development. Competition for construction labour increased building costs, but insofar as permanent staff was concerned, there was no drastic enticement of labour away from the indigenous industries. As a proportion of total employment, Orkney's manufacturing sector is unusually small. A study of the impact of oil on manufacturing in 1981 showed that engineering and distilling were

the two most adversely affected sectors, as skilled men left to work on Flotta thereby causing wage rate inflation. Both sectors, however, are quite small in employment terms, and the total number of men involved was also small. The drop that was seen in primary sector employment was not so much related to the impact of oil sector as to increasing agricultural mechanization. The increase in service sector employment reflects a trend similar to the Shetland example.

The *Orkney County Council Act*, 1974 gave the Council powers comparable to those of Shetland's as regards control over Harbour affairs and the establishment of a Reserve Fund. The extent of direct involvement sought by this Council, however, was more limited. In part, the more limited scale of development at Flotta made existing regulations, particularly land use planning controls, appear adequate. In addition, the existence of only one consortium of four oil companies, with a single operator, made negotiation simpler than in Shetland, where the multiplicity of oil companies forced the Council to become more deeply involved. As in Shetland, Orkney negotiated the establishment of a Disturbance Fund.

It should be noted that for both Shetland and Orkney, the Reserve and Disturbance Funds are the only sources of investment dedicated to rejuvenating their economies post oil. Council incomes that have been derived from the rent and tax rates have been largely vitiated by compensating reductions in central government grant.

4.1.2 Petro Chemical and Downstream Options

Throughout the mid to late seventies there was much talk in Scotland about the development of new petrochemical complexes on greenfield sites, i.e., downstream development. There was after all an abundance of feed stocks from both oil and natural gas coming ashore. Sites were identified in several areas, but new downstream development in the more rural areas did not happen. A lasting difficulty in the Peterhead area, for example, was the fluctuating uncertainty about the prospects for further gas treatment and petrochemical processing in the area. For methane gas, options that had been discussed included:

- a Natural Gas Liquids (NGL) separation plant and associated transmission pipeline;
- a NGL separation plant, plus an ammonia/methanol plant;
- NGLs, once separated from the methane, could have had their natural gas removed and piped to the south;
- NGLs could have, alternatively, been converted into Substitute Natural Gas and fed into the distribution grid as fuel;
- NGLs could have been separated into ethane, propane, butane and naphtha, whereupon they could have been transported by tanker; and
- NGLs could have been broken into propylene, benzene, toluene, butadiene, butylenes and ethylene by an ethylene cracker.

Each additional level of treatment would have required greater infrastructure and a related increase in capital investment. The employment implications of specific downstream activities had been estimated by the Scottish Office to be:

- 50 jobs at an NGL plant;
- 120 jobs at an ammonia/methanol plant;

- 300 jobs related to downstream ammonia/methanol developments; and
- 400 to 1,000 jobs, with perhaps a further 900 spin-off jobs associated with the development of an ethylene cracker.

In the absence of an NGL plant, however, there was no opportunity for self-sustained growth in any area based on petro-chemicals. An ammonia/methanol plant, however, was a finite development that was considered for some time perhaps more in scale with the employment needs of a predominantly rural area. Plans for ammonia/methanol and NGL processing in the 1970s, however, did not materialize, and there is no downstream hydrocarbon processing on either the northern islands or northeast Scotland in proximity to the land-fall locations. Investment has taken place to the south around the Firth of Forth, particularly in the Grangemouth area, i.e., in the traditional industrially oriented “central belt” of Scotland.

4.2 Norway

Offshore hydrocarbon activity became a factor in the Norwegian economy in the mid 1960s. The national economy at that time, however, was fairly healthy, and there was no pressing need for additional revenue. As a consequence, the central government's approach was to advance exploration slowly and to exercise strong control over where and when development would occur. A fundamental aspect of Norwegian policy, for example, was a decision that oil and gas from the Norwegian offshore fields was, where ever technically feasible, to be landed in Norway to generate new industrial opportunities. The execution of this policy resulted in new installations including a petro-chemical complex at Bamble in Southern Norway and an oil refinery at Monstad to the north of Bergen.

Priorities at the local level were often more pressing. In the Stavanger area, for example, people, particularly young people, were moving away; indigenous industry was stagnating; and the municipal economic situation was not healthy.

Stavanger was desperately in need of an infusion of investment, and the oil and gas industry meant new possibilities for both economic activity and the labour market. The municipalities in the area, town and county, worked together to deliberately attain a leading role in the country's offshore industry. They marshalled their arguments and took the steps necessary to ensure that land and training was in place. More specifically, they "sold" the following factors to key players in the new industry:

- the availability of a good harbour;
- the proximity of the area to the potential oil and gas fields of the southern North Sea;
- the availability of serviced land and buildings for offices and related activities;
- the availability of land for new housing; and
- the availability of training programs at the regional college.

Partly as the result of local initiatives Stavanger, rather than Oslo, became the centre of the Norwegian hydrocarbon industry. The key factors to note include the important role played by regional cooperation and the fact that the various municipal players put there own "house" in order by thinking and planning with the future in mind, i.e., they were pro-active rather than re-active. The municipalities took stock of their strengths, ensured that training for local people was in place, and were confident that they could work as an equal partner with the new industry.

4.3 Overview

The oil and gas industry is large; it mobilizes and draws upon large sums of money and is staffed by skilled people who typically move from one region or county to another as circumstances dictate. The paragraphs that follow highlight some of the resultant strengths and weaknesses, opportunities and disbenefits commonly attributed to the industry.

i) Strengths

The main strength of the oil and gas industry is its "international" scale, i.e., it can provide large-scale capital investment to a rural area in addition to providing a substantial increase in Gross Regional Output. In addition to acting as a catalyst for economic regeneration, the industry can also act as a magnet for other inward investment. This has happened both in Scotland and Norway.

ii) Weaknesses

Paradoxically, the international scale is also the industry's main weakness. It is governed by factors outside of the local area, and thus does not identify with the local economy to the extent that local activities do. As noted in the Shetland profile, oil industry money is recirculated through the local economy to a lesser degree than other monetary injections.

The industry's international profile can also lead to a disparity of scale between the existing economy and that of the oil industry. For example, there is a contrast in business structure: small local enterprises tend to live from hand-to-mouth using cash payments from one job to subsidize the next; in contrast big national and international firms maintain accounts centrally and pay at specified intervals. This can be a logistical obstacle to smaller companies successfully competing for a portion of a large job.

In summary, the key opportunities associated with hydrocarbon related development include the following:

- higher income;
- local population increase;
- improved infrastructure;
- improved communications;
- lower unemployment;
- increased job opportunities;
- potential for oil industry jobs to be included within a pluriactive economy;
- increased government revenues;
- increased access to financing for other non-hydrocarbon capital investment;
- increased social infrastructure investment;
- increased opportunities for the provision of services; and
- improved skills base and skills transfer.

The more significant disadvantages associated with hydrocarbon related development include:

- tendency for wages to increase in non-hydrocarbon sectors;
- decline of traditional industries;
- environmental impacts;
- shortage of labour;

- escalating prices for goods and services;
- speculation in land;
- shortages of housing and accommodation; and
- post-hydrocarbon unemployment and economic decline, leading to renewed depopulation and reduced pool of skilled labour.

The exploration, development and operation of an oil or natural gas field are things that neither occur quickly nor disappear overnight. Work on the Hebron field, for example, has been ongoing for several years, and production is not scheduled to start before 2012. The industry will be in Newfoundland for decades not years. Hydrocarbon development, like other extractive industries, is also cyclic. Three general phases, in terms of the type and level of activity generated, can be identified: exploration and appraisal (the ascent), development (the peak), and production (the plateau and decline). Each has a different profile, involves different types of activities and generates different levels of expenditure and impacts on local communities. In both the exploration and production phases, expenditure is relatively low, but is concentrated on services which can be provided locally, if they exist, or could be brought in from, in the case of Western Newfoundland, St. John's. In these phases a relatively high proportion of any given level of expenditure would accrue as income either locally or provincially. There is a related demand for equipment such as oil tools, oil rigs and, for offshore work, for supply boats; such demands can often be met from local sources.

Expenditure on manufactured equipment is very much higher during the development phase, and such expenditure can have a high import content with the result that there is a relatively low proportion of expenditure accruing as income locally. The sheer scale of the development phase expenditures, relative to exploration and production expenditures, however, makes the capture of benefits during this phase very important to the total benefits that may accrue locally and provincially. This is a reality that the Province of Newfoundland and Labrador have been working on for sometime, and reflects the importance of the investment that has been made, for example, at Bull Arm.

In preparing policies in response to oil and gas related proposals, regional agencies in concert with provincial departments have to take into account the type of development that may occur and the implications of the cyclic nature of the industry; they must also grapple with the interplay of three factors: speed, scale and uncertainty.

Uncertainty was one of the dominant characteristics of oil-related development in Scotland and it leads to worry and stress. Many local authorities, in an attempt to clarify the pre-oil situation, requested the preparation of an oil and gas strategy for Scotland⁶. Formulation of this took time. As a result, there was little control over the early developments and the attendant socio-economic impacts. A comprehensive survey of coast, however, was undertaken and land use planning guidelines were published suggesting preferred development and conservation zones on the Scottish coast which developers and local authorities had to take into account in formulating their plans and decisions. This was a substantive and influential piece of work which, in today's terms, served as a critical reference point in the establishment

⁶ Scottish Development Department. 1974. North Sea Oil and Gas: Coastal Planning Guidelines. Edinburgh.

of sustainable coastal management. The need to coordinate activities and to communicate knowledge also led to the setting up of four bodies:

- i) an Oil Development Council chaired by a Minister with representatives of all walks of life;
- ii) a standing conference of local authorities and oil companies again chaired by a Minister;
- iii) a task force of civil servants;
- iv) an Environmental Forum on which representatives of all voluntary bodies concerned with the environment considered the changing events and prospects.

These bodies took responsibility for Scotland as a whole and worked with regional parties as the industry placed demands on different parts of the coastline. Communication, the sharing of data and the definition of priorities meant that much was accomplished and no irreversible environmental damage was incurred. There was at times local worry and disruption, but also local opportunity and enterprise (Lyddon, 1982). It was a period which local interests gained confidence in their ability to manage their own affairs. Since the development of the Flotta and Sullum Voe terminals, the Orkneys and Shetlands have learnt to deal with and accommodate the oil and gas sector. The circumstances have been summed up elsewhere as follows:

“Not everything tried was successful and not everyone benefitted. There were some costs in environmental, social and economic terms. Compromises were reached and it may be that better solutions could be tried in other areas with the hindsight of the experience in the Northern Isles. However, the substantial beneficial results of the early efforts in Shetland and Orkney are there for all to see. The final message must be, that it is possible for remote rural areas to work with large multi-national companies to derive lasting benefits from both temporary construction activity and large scale resource exploitation projects, particularly, where they have a reasonable lifespan. Indeed it is imperative for their long term survival that they do”. (Blackadder, G.A. and J. Baster, in North Sea Oil and the Environment edited by William J. Cairns, 1992, Elsevier Applied Science, p. 190).

An essential ingredient that resulted in specific local benefits accruing to the Shetlands and Orkneys was the local legislation, which empowered both Councils with extensive negotiating powers. A key conclusion is the necessity to start negotiations early and get an agreement signed before any large project is instigated. The attitude of both Councils, accepting that the oil industry on the islands would not be permanent, and therefore setting up agreements for the Reserve Funds and Disturbance Funds, has paid dividends. The Disturbance funds in particular have provided both Orkney and Shetland with an invaluable source of revenue to assist their traditional industries to survive and grow, leaving them in a better position to sustain the economic life of the two communities when the inevitable down-turn of the oil industry occurs.

5.1 Needs of the Oil and Gas Sector

The oil and gas sector is dynamic, is driven by global factors, and has, as referenced in Section 4.3, distinct phases when operating in a local area. How this is described can vary, but what follows is a description of the development of hydrocarbon reserves over three phases, plus reference to a downstream phase, or what is often referenced as the valued added phase. At each phase of development there are a range of economic opportunities for local and regionally based suppliers, as well as the oil and gas companies including, for big finds, the large national and multi-national industry participants that dominate the sector. In summary, the following are referenced in the sections that follow:

- exploration phase;
- pre-production development phase;
- production and transmission; and
- the downstream or value added phase.

5.1.1 Exploration Phase (*Upstream Phase*)

Exploration activity is the initial step in the upstream phase and includes:

- **Seismic and geophysical survey work** – this involves preliminary surveys in an area of interest to collect data regarding the geological characteristics of the hydrocarbon reserve. This is done both onshore and offshore and is typically accomplished through sonar arrays (towed by highlight specialized seismic vessels offshore and land based soundings). The data is collected and interpreted by highly specialized petroleum geologists who work (usually remotely from the area being explored) to further specify the areas of greatest hydrocarbon potential for subsequent exploratory drilling; and
- **Exploration drilling** – assuming that a particular company has secured a license/lease from the Department of Natural Resources and/or the CNLOPB, and that prior seismic work reveals an area of interest, the leaseholder may commission specialized drill ships and/or rigs to conduct exploratory drilling. This is done to delineate the size of the potential hydrocarbon reserve, the type of hydrocarbons that are present, and other characteristics including depth, pressure, quality and quantity. Exploratory drilling can last from one to three months per well and a much discussed rule of thumb is that 45 or so exploratory wells are necessary to arrive at one commercially viable find.

Services associated with the exploration phases include geological and geophysical expertise, drilling material and services and delineation drilling.

5.1.2 Pre-Production Development Phase (*also part of the Upstream Phase*)

Pre-production, or well development activity, follows the identification of a commercially viable find. This is the step after there has been a determination to proceed with the development of a production well which will act as the conduit through which the hydrocarbon is extracted. Pre-production work may include the construction of a specialized platform from which to drill, e.g. Hibernia, and may take several months or years before production begins. Once in production, the work to extract the hydrocarbons will often span several years.

Services associated with development activity include engineering design, construction, fabrication and assembly and procurement.

5.1.3 Production and Transmission

The methods employed for production and transmission will depend on, among other things, the environment in which the resource is located and the characteristics of the hydrocarbons that are to be extracted. Impurities, e.g., sea water content, liquid hydrocarbons or undesirable components such as hydrogen sulphide, will impact the production method, the transmission method, as well as the upstream production technology to be applied to refine the product. It may, however, be necessary to remove some of the undesirable materials prior to the product's transmission to market. It is these questions around how much treatment the hydrocarbon product requires prior to its transportation that influences both the nature of that transportation and the location of downstream activities.

Production and transportation related services and activities include:

- Engineering oversight;
- Procurement management;
- Additional construction, fabrication and assembly;
- Oil and gas extraction/production and processing;
- Transportation, i.e., pipelines, shuttle tankers, etc.;
- Construction of collecting lines, transmission lines/operation of shuttle;
- Inspection, maintenance and repair;
- Supply services;
- Material and supplies support services;
- Drilling material and services; and
- Geological and geophysical expertise.

There may also be further delineation well drilling associated with wells already in production.

Once the hydrocarbon product has been accessed, there are a number of transmission methods, depending on the product and its destination. Transmission methods include tanker truck, tanker rail car, boat, or undersea and/or land based pipelines; it may be shipped as a compressed or liquefied gas or as a liquid. As referenced, there is no rail service in Newfoundland and to date there are no pipelines that bring product to shore or to market. While the current strategy is to utilize shipping to handle offshore product, there are serious initiatives being taken to encourage more treatment of product onshore.

5.1.4 Value Adding Phase (Downstream Phase)

As referenced, value adding includes the refining of petroleum into a variety of consumables. It includes natural gas (methane), crude oil and condensate (sulphur NGLs, ethane, propane, butane, etc.). Moving into this phase requires the development and operation of special plant for refining. Related value added opportunities include the potential for power generation and the availability of what may be a cheaper and/or more stable local power supply for a region, or for the province. Given the demographics and power circumstances prevailing in Newfoundland and Labrador, however, the opportunities and benefits associated with downstream hydrocarbon activity are closely aligned to the market demands of third parties, especially the US northeast. Although there has at different times been discussion of the feasibility of a natural gas pipeline taking product from the producing wells off the east coast to shore or to market, this has not transpired and as technologies evolve with respect to the transportation of liquefied

and compressed natural gas by ship, the likelihood of a pipeline network perhaps becomes less likely. Increasingly it appears probable that both oil and natural gas will continue to be handled by ship; the outstanding question is whether these products are transported to a provincial shore based facility for refining and treatment for subsequent transportation to market, or directly shipped to treatment facilities nearer the end market.

The range of downstream facilities that could potentially be developed is extensive, but will be dependent on both the specifics of each project (objectives, target market, etc.), and the specifics of the type of product that is discovered. Potential activities include:

- Hydrocarbon processing facilities;
- Operation of transmission pipelines;
- Operation of distribution pipelines; and
- Compression and metering facilities.

The development of such facilities on the west coast in the next 10 to 15 years is highly unlikely given current exploration and pragmatic development scenarios.

5.2 Industrial Context

Each service area or opportunity is different depending on the region of the development and whether it occurs onshore or offshore, in deep water or shallow water. The extent to which local, regional or provincially based companies can participate in such activities is dependent on many factors, not the least of which is the very structure of the industry itself. Over its more than 100 years of history, the oil and gas sector has become one of the world's largest industries, employing hundreds of thousands of people in every aspect of the industry from exploration to retail sales. In part, because of its size and the high financial stakes involved for the participants, oil and gas development today involves some of the world's largest firms in the most capital intensive industrial functions associated with any sector.

It is not uncommon for oil and gas development to involve multiple phases of activity over several years and to involve several partnering firms. In fact, the trend in offshore oil and gas development, including the developments that have occurred off the east coast of Newfoundland, seems to be towards the multi-phased project that involves multiple corporate partners. The latter as development proceeds will also involve the Province in selected plays as a contributing partner. This is perhaps industry's response to the high risks associated with exploration and development in what are perceived by the industry as high risk and remote locations; this includes northern offshore locations which are typically among the most costly venues in which oil and gas sector participants operate.

It is perhaps for this reason that oil and gas development is also extremely sensitive to market conditions. The oil and gas exploration that occurred on the East Coast of Canada in the early 1970s was attractive to the industry because of the Organization of Petroleum Exporting Countries' (OPEC) crisis, and the offshore represented an instantly cost effective alternative to hydrocarbon product from the Middle East. The subsequent easing of OPEC pressure and the gas crisis rendered the continuation of East coast development a relatively high cost alternative to oil and gas supplies that once again became available.

Time and technology have since combined. The oil and gas sector on Canada's East coast is developing; this is particularly true of Newfoundland and Labrador, which is enjoying its position as a petroleum rich province. A 2005 study indicated that there were 47 firms in Newfoundland and Labrador that were involved in oceans related technology, including the oil and gas sector. These firms had a combined revenue of over \$150 million, a total employment of over 990 and contributed nearly \$27 million in fiscal impacts. Nevertheless, the market sensitive oil and gas industry is one that operates at a global scale, is characterized by a group of major industry participants that are highly specialized and are actively reviewing the potential of all potential producing areas. Newfoundland and Labrador are competing for investment dollars in a market that involves, but is not limited to, the Middle East, Africa, Kazakhstan and South America. It is a highly competitive international arena. The Province's advantages include political stability, proximity to the US market and the expanding and proven capacity both of its labour pool and its related research capacity particularly as it relates with respect to operations in severe marine conditions and the transportation of compressed natural gas.

5.3 Service Needs and Opportunities

Throughout each stage of 'development' there are opportunities for employment, the supply of equipment and services. Some of these opportunities are discussed below.

5.3.1 Support for Land Based Exploration and Development

The support needed for activities associated with exploration and production are significantly less than the equivalent support required for offshore development. In most respects, it is a question of scale, i.e., smaller. Transportation lay down areas and storage facilities, accommodation and related services would all be required, but given the current understanding of what might happen on shore over the next 10 to 15 years, the demands could be absorbed by the existing service infrastructure with minimal upgrading. The challenge arises when there is parallel hydrocarbon development occurring in several locations, including production from one or more locations in the nearshore, or, indeed, in deeper water offshore. The logistics of servicing several locations puts pressure on resources and on infrastructure and requires strategic decisions as to how best to service those demands in the best interests of the region and in an environmentally sustainable manner.

5.3.2 Onshore Support for Offshore Exploration

Although much offshore drilling could take place off the west coast and be largely serviced from St. John's, such operations would more likely require a local supply base from which to stage the work for the period of the drilling, i.e., weeks or months for exploration wells, longer for consecutive exploration wells, and longer still for production wells. The base would be the point from which supplies, materials and possibly personnel, would be transported to drill ships and/or platforms. Such bases are used throughout exploration, development and production activities. The basic services associated with a supply base remain fairly consistent throughout all phases, but vary based on the scale of the activity that is being supported. The basic supply base features include:

- Good ground transportation linkages, i.e., road/rail
- Capacity to accommodate bulk deliveries, or tanks, for the interim storage of drilling muds and fuels
- Cranes, forklifts and other support vehicles
- Security
- Storage space, inside and outside, on-site and off-site
- Suitable structure for loadings

- Shore power
- Sufficient depth of water and berthage face
- Lighting
- Proximity to the off-shore work
- Water and fuel

Water, fuel and drilling fluids can be delivered by sea or road on a regular basis to a supply base if the drilling program is of short duration, or of such a small scale that it does not warrant onsite bulk fluid storage, but as the scale of the operation increases so do the requirements for storage. Over time there will also be a requirement for on-site, or near site, office space for the supply base manager and associated staff. That in turn requires accommodation and associated facilities.

5.3.3 Fabrication

Depending on the nature and scale of commercial finds, how the product may be produced and the needs of the production, there may be need for the shore based fabrication of development and production facilities. Fabrication yards accommodate the construction of larger and bulky custom facilities that are required by a specific drilling and/or development program. These may include drilling platforms, topside facilities, living quarters, production platforms, helicopter decks, etc. The facilities at Bull Arm, for example, accommodated the assembly of the Gravity Based Structure (GBS) Hibernia platform. Fabrication yards require storage, inside and outside, laydown and assembly areas, inside fabrication space, high capacity cranes, facilities for painting and coating, etc. In the context of Province of Newfoundland and Labrador, and given the present distribution of exploration and development, it is unlikely that major fabrication facilities, comparable to Bull Arm, would be developed on the west coast. Given that such facilities must compete in a global market, it is more important to the economy of the Province as a whole that the investment in Bull Arm is fully capitalized and its competitive advantage strengthened.

5.3.4 Land Lease and Development

Depending on the need for associated servicing facilities, e.g., supply bases, laydown areas, etc., there can be circumstances when a third party needs to identify and secure land in the appropriate locations to facilitate efficient servicing. This in broad strategic terms is what was achieved by the Scottish Planning

Guidelines and what was achieved on a more local level by the Shetland and Orkney Island Councils. Give the distribution of key facilities, i.e., wharves and related infrastructure, described in Chapter 3, this may necessitate that key areas, e.g., the wharf and airport facilities in Stephenville, be subject to further study with respect to their capacity to service the oil and gas sector and that specific site specific development controls be prepared to facilitate their future use.

A couple of huge problems facing the industry are a worker shortage and an aging workforce (average almost 50!). One petroleum industry consulting group estimates that it'll take between 7,000 and 8,000 new workers to staff all the new oil rigs coming online in the next two years.

The vast majority of entry-level oil and gas jobs exist in the drilling sector, whether it be onshore or offshore. The best people for the jobs are those who are mechanically inclined, physically fit, able to work well as part of team -- and drug free. In addition to more physically demanding, hands-on positions there are plenty of technical jobs that require at least an undergraduate degree. The industry is actively seeking people with Master's Degrees in geosciences.

Source:

http://www.jobmonkey.com/oilindustry/html/oil_drilling_overview.html

5.3.5 Institutional, Commercial and Technological Capacity

As commercial finds are proven and product is being handled, there are opportunities for initiatives between the educational institutions, the operators in the hydrocarbon sector and other parties to be explored, encouraged and supported. This could include the delivery of location specific training programs; the expansion of the emergency training facilities at Stephenville Airport to address needs particular to the west coast; or the employment of the expertise in advanced GIS systems and environmental research at the Sir Wilfred Grenfell College to enable oil and gas development to be undertaken in an environmental sustainable manner. The engagement of local expertise from the academic institutions, research affiliates and volunteer organizations at the outset of exploration and as plans for development proceed will go a long way to create trust and to defray local worry and unnecessary concern. To ensure that local institutions have the capacity to respond effectively as the hydrocarbon sector evolves, necessitates that all involved parties recognize the importance of the existing programs and provide adequate funding to enable them to grow and market their capacities to other potential users; key among these are those programs involving the physical and environmental sciences.

5.4 Labour

To many, employment opportunities are perhaps the main benefit that can be anticipated as a result of oil and gas development. There is an expectation that those jobs that will be created will be filled largely by members of the local labour force. Yet the availability of labour, especially trained labour such as experienced petroleum engineers, is becoming the one of the most critical factors not only for the oil and gas sector, but for government and other industrial sectors. It is, in part, a consequence of the aging population, but also in part a consequence of a lack of hiring in the late 1980s and 1990s. It is a problem that is recognized by the Province.

At the same time, many companies that do the seismic work or drilling, especially for offshore activities, are usually working under contract for the developer, and, if a large multi-national oil company is involved, there may be limited opportunities for local participation unless this is negotiated as part of the agreement to the licence. The bigger contractors, for example, own the rigs and employ their own staff who travel with the equipment from location to location.

The requirement for labour in a specific location is dependent on the scale of the work to be undertaken. To date in Western Newfoundland, the demands have been small and to the extent possible local labour has been contracted. Indeed, this is the most cost effective option for industry. Most positions in a new location are typically at an entry level, i.e., \$15 to \$20 per hour. Although more highly skilled trades people and professionals are also required, these positions are

Petroleum Engineer

- conduct studies related to the exploration, development and extraction of oil and gas deposits;
- plan, design, develop and supervise projects for the drilling, completion, testing and reworking of oil and gas wells; and
- conduct analyses of oil and gas reserves and production potential.

Petroleum engineers may specialize in drilling, production, reservoir analysis or operations.

Requirements

- Bachelor's degree in petroleum engineering or equivalent;
- Registration as a Professional Engineer;
- Supervisory and senior positions require experience.

more likely to be already associated with the firm involved and may or may not be held by a “local” person. Positions may include a mix of union (onshore fabrication and supply support) jobs as well as non-union (usually production and rig based jobs).⁷

By comparison, the average hourly wage for oil and gas well drilling workers and service operators in Alberta in 2005 started at \$19.81 per hour, went up to \$21.08 after three years and was \$33.02 for the top earners. The average annual income was \$61,623 (Source: 2005 Alberta Wage and Salary Survey). These numbers have unquestionably increased over the past two to three years as demand has grown, and as these figures increase the demand for equivalency in Newfoundland increases.

An illustrative list of supply base, offshore drilling and production platform employment opportunities include:

- | | | |
|--|--|---|
| ➤ Boilermaker | ➤ Floorman/roustabout | ➤ Medical support |
| ➤ Carpenter | ➤ Geologists/ Geological engineer | ➤ Millwright |
| ➤ Catering staff | ➤ Heavy equipment operator | ➤ Petroleum engineer |
| ➤ Civil engineer | ➤ Helicopter Pilots | ➤ Pipefitter |
| ➤ Construction supervisor | ➤ Instrument fitter | ➤ Process operator |
| ➤ Corrosion/structural engineer | ➤ Instrument technician | ➤ Project Management and administrative support |
| ➤ Crane operator | ➤ Insulator | ➤ QA&QC / Testing |
| ➤ Deck hands | ➤ Ironworker | ➤ Safety Supervision |
| ➤ Driller/tester | ➤ IT and communications support | ➤ Safety/environment management |
| ➤ Drilling equipment operator | ➤ Maintenance trades | ➤ Ship’s engineer |
| ➤ Drilling superintendent | ➤ Management and administrative personnel | ➤ Ship’s master |
| ➤ Electrical engineer / Electrician | ➤ Materials management and logistics coordinator | ➤ Stevedores |
| ➤ Engineering and engineering technologist | ➤ Mechanic | ➤ Truckers |
| ➤ Equipment mechanic | ➤ Mechanical/electrical engineer | ➤ Welder |
| ➤ Fabrication | | ➤ Wellhead technician |

⁷ In 2003, workers in the Mining and Oil and Gas Field Machinery Manufacturing industry were paid \$49,488 on average. This compares to the average of \$43,186 for the Manufacturing Sector as a whole. (www.ic.gc.ca/canadian_industry_statistics/cis.nsf/idE/cis33313wage.html)

These positions demand a broad range of skills and experience. For key ones, such as a petroleum engineer, a university degree in a technical field, combined with several years of progressive offshore experience, are required. For others, education at the community college level is sufficient, though in most cases, a minimum level of oil and gas industry experience is sought. This raises several questions for decision makers and institutions with responsibility for bridging the gap between labour demand and supply, but the key question is: “What skills are likely to be in greatest demand over the next several years”. The Canadian Association of Petroleum Producers (CAPP) have posed and tried to answer this question, but it is a challenging exercise.

5.4.1 Specialty Services

Many of the activities associated with oil and gas developments involve a network of highly specialized service providers that work around the globe. These service companies include seismic survey vessels and survey equipment manufactures, drilling materials suppliers (drill bits, drill stems, drilling fluids) and producers of specialized software and monitoring equipment used in, for example, rig positioning. Local opportunities within this segment of the sector are extremely limited if left to market forces.

5.4.2 Other Supplies and Services

In addition to the direct requirement of labour and materials, there will also be a requirement for extensive supplies and services to support these activities. The following is a list of potential supplies and services that may be required depending on the type of work:

- Accommodations (room/house rentals and temporary lodging);
- Automobile rentals (auto, truck and bus rental);
- Construction supplies (steel, sheet metal, etc.);
- Construction trailer rentals;
- Consulting services, e.g., engineering and environmental;
- Food provision services;
- Oils and fuelling supplies;
- Ground transportation (buses, taxis, car rentals);
- Heavy equipment rentals;
- Laundering facilities;
- Legal services (contract agreements, property rights, etc.);
- Mechanical services;
- Security services;
- Waste disposal services; and
- Welding services and supplies.

Oil and Gas Drilling, Servicing and Related Labourers

- *manipulate sections of pipe or drill stem at rig floor*
- *maintain drilling equipment*
- *handle, sort and move drill tools, pipe, cement and other materials*
- *assist in setting up, taking down and transporting drilling and service rigs and service equipment*

Requirements

- *completion of high school may be necessary*
- *completion of introductory college or Petroleum Industry Training Service*
- *certificates in hydrogen sulphide awareness, Workplace Hazardous Materials Information System (WHMIS) and/or Transportation of Dangerous Goods*

In short, there are a wide variety of consumables and services required by the oil and gas industry as they proceed from exploration into production. Likewise, and depending on the organization of the work, oil and gas workers will consume a variety of goods and services from the local economy during their time in the area.

5.5 Petroleum Related Servicing Opportunities

Based on the work undertaken, i.e., the review of the existing infrastructure, reference to what happened elsewhere and consideration of the available literature a number of petroleum related servicing opportunities have been identified. These are referenced below.

5.5.1 Drill Rig/Vessel Servicing

Drilling operations in Western Newfoundland will necessitate the use in the first instance of shallow water drilling rigs, and, at a later stage, deeper water drill rigs. Although there are several rigs that have been winterized and certified for use in Canadian waters, many will require adaptation to operate in these waters. The opportunity to conduct this rig/vessel outfitting/refitting service may emerge as an opportunity in Western Newfoundland, particularly for rigs or vessels designed to operate in shallow waters. The refitting of equipment for deeper water is more likely to be provided not in Western Newfoundland, but either at Marystown on the south coast or at Bull Arm. These facilities compete with comparable sites globally for work unless the government, through the powers vested in the Energy Corporation, intervene to specify that such work if associated with an exploratory development licence off the coasts of Newfoundland and Labrador must be certified in the Province.

5.5.1.1 SUPPLY BASE STAGING

Oil and gas related activities require the support of on-shore supply bases. Throughout all phases, i.e., exploration, development and production, there is the need for supply base support – logistical yarding, storage, assembly and, for offshore activities mustering points for the marine based transportation of the consumables used on rigs and drill vessels. Consumables include items from drilling fluids, to pipe, to provisioning of food, laundry and housekeeping items. Depending on the type of and intensity of the oil and gas related activity, support can range from the berthage of the seismic vessels to facilities for refuelling and ship provisions, to dockside repairs. There are several ports along the west coast from which to stage supply base operations, including Stephenville, Corner Brook and Port Aux Basque. Ultimately, the location of the supply base is influenced by those developing the hydrocarbon reserve, but, as was the case in Scotland, the government can take pro-active steps to influence siting decisions. The base locations will be influenced by their proximity to the reserve(s) under development, their location relative to other transportation linkages, the availability of shore based services, but there are other strategic considerations that can, and should, influence decisions.

5.5.1.2 CANADIAN CERTIFICATION

Information from secondary sources suggests that there are few rigs that have the design features that would allow them to be certified to operate in the conditions found off Atlantic Canada – few rigs in operation meet Canadian Certification requirements (in 2005 only 11 of 650 rigs were certified). Canadian Certification is also necessary for rig workers. Rig certification can be very expensive and may

cover everything from the standard of insulation to electrical upgrades to complete renovation of topside facilities. Rig refitting and larger vessel service needs for the offshore oil and gas industry along the west and south coasts of Newfoundland would probably be fulfilled from existing facilities such as the Peter Kiewit facility at Cow Head, Mortier Bay, and other facilities outside of the region, but the certification of rig workers could be accommodated at the campuses of the college of the North Atlantic locally.

5.6 Considerations

Capturing and distributing local economic benefits from oil and gas development in an emerging region is challenging. In a study conducted by Kelly Vodden, Simon Fraser University, Dr. John Pierce, Simon Fraser University and Dr. Doug House, Memorial University, the authors caution that *the benefits of offshore oil and gas are generally distributed in a manner that is “uneven and unequal” to the disadvantage of rural regions*. The challenges to local economic development are related to the scale of the industry and associated barriers to entry, including laws and agreements respecting/upholding international competition. As House, Pierce, and Vodden noted offshore development “is unlikely to guarantee local benefits.” They argue for a number of conditions to increase local benefits including:

- Proactive measures on behalf of communities, senior governments and industry collectively, including the articulation and execution of a human resource development strategy, associated training and education programs aimed at the sector;
- Support for spin-off opportunities such as local access to natural gas supply, the development of processing facilities and encouragement to local businesses that service the industry; and
- Capturing and reinvesting oil and gas royalties which they consider the most significant opportunity for both provincial and community economic benefit.

They also caution about the possible impacts, both positive and negative, on existing industries, e.g., the fisheries and tourism; both are important on the west coast. Finally, the authors note not only the importance of the industry and of government to instigate local engagement, but also the responsibility of local interests to cooperate in the best interests of the region, to find out about the industry, e.g., by joining the Newfoundland Oil Industry Association (NOIA) with the oil and gas companies and government.

5.6.1 Challenges to West Coast Oil and Gas Benefits

As stated, there is optimism that oil and gas will be found in commercial quantities in Western Newfoundland. There will be opportunities and benefits, but there are also challenges. The following sections identify some of those challenges.

5.6.1.1 TRAINED AND EXPERIENCED WORKFORCE

The oil and gas sector is highly specialized and has an existing and highly mobile workforce. Coupled with the specialization of the industry, the limited, although growing, history of the industry in Western Newfoundland and the tendency for many of the existing workforce to head toward opportunities in western Canada, the oil and gas sector may be constrained by the limited availability of an experienced workforce.

5.6.1.2 PROXIMITY TO OTHER SERVICE AREAS

Marystown and, in particular, the KOS facility at Cow Head, will be an asset to the development of oil and gas opportunities along the South Coast and the Laurentian Sub-basin. With this existing infrastructure in place, it will be difficult to establish competing or duplicate facilities on the west coast.

5.6.1.3 WHARF UPGRADES

To service offshore oil and gas development, there will be a requirement for dedicated wharf areas for fuelling and the loading and offloading of materials, well components, equipment and supplies. The nature of these materials is such that it requires the use of heavy cranes and lifts and significant wharf space for temporary storage. While there are a number of existing wharfs along the coast that are currently being used by fishing and light transport vessels, there is limited capacity for the type of dedicated facilities with appropriate backup land and access that are required by a large offshore development project in the absence of significant upgrades.

5.6.1.4 LACK OF SPECIALTY SUPPLY AND SERVICES

Many of the services demanded by the oil and gas industry are provided by a limited number of specialized and international companies that come into a region of oil and gas development as demand dictates. It may be difficult for west coast companies to break into this oil and gas supply chain in a meaningful way. Provincially, however, several Newfoundland companies have an established history in the oil and gas sector, and these companies are well positioned to bring specific services to the industry on the west coast and to employ local people.

5.6.1.5 CONFLICT WITH EXISTING MARINE INDUSTRIES

Where two or more industries are operating, there is always the potential for conflict – the offshore oil and gas industry has co-existed alongside fishing in other regions of Newfoundland, and there is no reason to believe that there would be any significant local opposition to oil and gas development as long as key spawning areas were protected and the requisite environmental controls were implemented.

5.6.1.6 FINANCIAL SUPPORT

Western Newfoundland is rural and businesses are for the most part small both in size and in turnover. To move to the next level often requires investment, and it can be difficult to attain small loans, i.e., \$5,000 to \$500,000 from a traditional financial institution. It was suggested in discussions that the government should examine the possibility of providing guarantees for certain types of loans for small businesses striving to become established in the oil and gas sector.

5.7 Recommendations

The following sections bring together both some of the observations and recommendations suggested to the team by others and also recommendations made as a result of the work undertaken and the experience the team brought to the study. These are presented under three headings: strategic planning, infrastructure and dialogue and engagement.

5.7.1 Strategic Planning

It is recognized that some of the important strategic initiatives to support and facilitate oil and gas exploration and subsequent development on the west coast have already been taken by the provincial government and for that they are to be commended. The following are among those initiatives:

- the investment of \$20 million over three years to purchase existing proprietary seismic data for reevaluation and to acquire new data to fill gaps in the physical coverage – this pertains to the entire province, but some portion should be directed to the examination of the west coast;
- the investment of \$5 million in a PEEP to boost onshore petroleum exploration in Western Newfoundland;
- the implementation of the recommendations of the Skills Task Force; and
- the commitment to ensure that energy resources and their development are used as a tool to promote economic development, particularly in rural areas of the Province.

The following are initiatives recommended in support of further strategic planning:

- the establishment of a system of labour market monitoring in Western Newfoundland based on the recommendations of the Skills Task Force;
- the promotion of programs that would enable small business on the west coast to attain the necessary financial guarantees to qualify for loans to retool or otherwise expand to meet the needs of an oil and gas sector in the area;
- the establishment of a two year program in concert with ACAP, the Centre of Environmental Excellence and other stakeholders to compile all available environmental and socio-economic data and to survey the entire coastline of Western Newfoundland. The latter would involve the registration of ecological conditions and the preparation of an inventory of all infrastructure, including its condition and capacity. The intent in the short term would be to conduct a SWOT analysis and to prepare a strategic statement identifying “go” and “no go” locations for development based in part on the model undertaken in Scotland. This would establish a framework to be used in the subsequent development of more detailed sustainable management criteria and implementation policies and guidelines to facilitate efficient state of the environment reporting; and
- the preparation of land use and servicing plans for both Stephenville and Corner Brook that address different growth scenarios over the next 15 to 20 years, i.e., stabilization of the population, accommodation of 5% growth and accommodation of 10% growth.

5.7.2 Infrastructure

As stated elsewhere in this report, the state and capacity of all facets of the infrastructure in Western Newfoundland indicates two things:

- i) how committed the region is to address the needs of its residents; and
- ii) how committed and willing the region is to accommodate new development.

To accommodate economic growth and the requirements of the oil and gas sector over the next 10 to 15 years, it is recommended that consideration be given to the following:

- continual twinning of selected portions of the Trans Canada Highway from Port au Basque to St. John's in response to defined traffic and safety requirements;
- study and determination of improvements necessary to key routes to the coast particularly those serving hydrocarbon plays;

- structural appraisals of all facilities associated with the port and airport at Stephenville and the undertaking of a use study and development of a business plan to determine alternative and optimum uses for the associated lands and waters; and
- further investment not only on the research capacity of specific university and college programs, but support to the development of outreach and affiliated cooperative programs that will enable graduates to attain both the basic qualifications and the experience necessary to work directly or indirectly for the hydrocarbon sector.

5.7.3 Dialogue and Engagement

Through the workshops and meetings, it became apparent that many parties felt peripheral to the “mainstream” and that consultation was seen as little more than window dressing. All who have a role to play in supporting exploration for oil and gas and its subsequent development in Western Newfoundland have much to gain from regular engagement in different forums. This means that all parties must assume a certain level of responsibility for becoming informed. More specifically:

- interested local businesses should be encouraged to join NOIA, to attend oil and gas forums and find out how the industry works and is serviced;
- NOIA and the provincial government should continue to support events in Western Newfoundland including the Oil and Gas Forum;
- Industry should be encouraged to engage and use the expertise of local stakeholders, including academic resources; and
- Local communities and towns should engage their residents and businesses in dialogue to determine their priorities for alternative futures.

Looking back on how many of the smaller Scottish communities responded to the oil and gas sector, one of the enduring consequences of the years of uncertainty and change, was a growth in local self determination and confidence, i.e., being confronted with the necessity to respond and work with a global industry provided the catalyst necessary for many local entities to assume responsibility and define priorities for their own community’s well being and growth. This has brought about positive results. It is now a time of change and of opportunity in Western Newfoundland. Much needs to be done to ensure that development and new economic activities can be accommodated in a manner that serves the best interests of the region.

Chapter 6 Strategic Directions and Recommendations

6.1 Context

The Province of Newfoundland and Labrador has undergone substantive economic change over the past 10 to 20 years and that change continues in the wake of a number of major projects including several associated with exploration for and development of oil and gas. There are three producing offshore oil fields in the Province and another approved; exploration continues and several other significant discoveries are known. In 2007, the Province produced almost 45% of Canada's conventional light crude oil making it a key contributor to national self sufficiency. The Province is also a stable political regime with a good environmental record in proximity to one of the world's primary markets for hydrocarbon product, i.e., the US. This factor is important. While Western Newfoundland is geographically distant from the direct consequences of the major fields currently producing off the east coast, local leaders and entrepreneurs are cognisant that they have a role to play in what takes place elsewhere in the Province as well as prepare for the hydrocarbon activity that will likely occur within and adjacent to the west coast.

The objective of this report is to recognise the inherent locational advantages of Western Newfoundland, to appreciate the dynamics of the hydrocarbon industry globally and to ensure that investment is made in physical and social infrastructure to support both the potential needs of the oil and gas sector and the traditional and potential economic drivers in the region. The latter include the forestry, mining and tourist sectors. Strength in each of these areas and their support by all levels of government will also support exploration and the subsequent development of the oil and gas sector. Improved infrastructure and enhanced services, including strong, supportive and innovative educational institutions, serve all dimensions of the economy, support immigration and investment and enable the responsible nurturing of the environment, a dimension of critical importance to both the tourist and fishing sectors in Western Newfoundland.

There is some consensus that the world is approaching a practical limit to the number of barrels of crude oil that can be pumped every day. While production in the latter part of 2007 was about 85 million barrels of oil per day, demand is forecast to rise to 120 million barrels per day by 2030. Whether or not such demands can be met is dependent upon a range of factors, but the most important may not be the availability of the resource. Many experts and observers are now of the opinion that a global production ceiling will be a reality for other reasons:

- restricted access to oil fields, i.e., resource nationalization⁸ whereby national oil companies are going to ensure security of supply to their local market;
- labour and construction bottlenecks – the industry through the 1990s did not invest sufficiently in personnel, e.g., geologists and other skilled workers;
- changing costs particularly with respect to the prices of the raw materials and the equipment used in exploration and drilling;
- increasingly complex field geology as exploration and development confront frontier challenges; and
- political instability within several major oil regimes.

⁸ Resource nationalization refers to tightening controls over the development of oil fields to achieve political aims, often by restricting outsiders', i.e., the multinational oil and gas companies', ability to develop hydrocarbon product for world markets.

The challenges are increasingly being acknowledged. In October 2007, for example, a former head of exploration and production at Saudi Arabia's national oil company, Sadad Ibrahim Al Hussein, said in London that he did not believe that there were enough engineers or equipment to ramp up production fast enough to keep up with the thirsty global economy.

These are substantial obstacles which pose both challenges and opportunities for the Province and for Western Newfoundland.

6.2 Exploration and Production

To prepare for the establishment of an oil and gas industry in any area, it is important to know what may be involved. The hydrocarbon industry is commonly described in two parts:

- i) upstream activities, i.e., the exploration and production sector of the industry; and
- ii) downstream activities, i.e., the sector that deals with refining and processing of crude oil and gas products, their distribution and marketing.

The Province, based on the hydrocarbon product currently being produced from the Grand Banks and anticipated from east coast fields, is striving to increase its participation in downstream activities. In Western Newfoundland for the conceivable future, i.e., the 15 to 20 year time horizon, the focus must be upon upstream activities. Table 6.1 identifies some of the activities associated with exploration and production and the anticipated in place servicing requirements.

Table 6-1: Activities Associated with Exploration and Production

<i>Activity</i>	<i>Associated Requirements in Place</i>
Desk Studies: review of geological information from previous work in the field, core samples, if available, etc.	Minimal
Aerial & Field Studies – onshore only	Access to helicopters, field vehicles and support for a minimal number of personnel, largely geological and geotechnical specialists, for limited periods of time
Seismic Surveys (2D & 3D) – by using the different reflective properties of sound waves on rock strata, seismic surveys, both onshore and offshore, can facilitate both the identification of different geological structures and the latter's hydrocarbon potential	Transportation: boats offshore and field vehicles onshore. Support for a minimal number of personnel for specified periods of time, i.e., weeks as opposed to months
Exploratory Drilling – the only way to confirm the presence of hydrocarbons and the thickness and internal pressure of a reservoir is to drill	<i>Onshore:</i> access for the drilling unit, associated materials, e.g., fluids and muds, and the drill team; means of handling and transporting wastes; accommodation, either in trailers or in local facilities <i>Offshore:</i> boats – may or may not use local wharves as a base

<i>Activity</i>	<i>Associated Requirements in Place</i>
Appraisal Drilling – additional drilling to determine if the reservoir is economically feasible to develop. Several wells may be drilled from a single site, e.g., directional drilling at an angle from a site adjacent to the original discovery borehole to appraise other parts of the reservoir	As above, but there may be a tendency to utilize more local facilities if these are readily available
Development and Production – a small reservoir may be developed using one or more of the appraisal wells; a larger reservoir would more likely require the drilling of specific production wells. The number of wells required varies with the size of the field involved	<p><i>Onshore:</i> this is the most intensive phase and the phase that places most pressure on local resources, transportation equipment and infrastructure, including local roads. There is also a need for storage facilities and to determine the most efficient means of getting product to market.</p> <p><i>Offshore:</i> local demand for wharf and storage space onshore, but such production, particularly if a large field is involved, would just as likely be efficiently serviced by sea</p>
Decommissioning and Rehabilitation – necessary for each of the above activities	Equipment to plug wells, demolish and remove installations and to restore sites

6.3 Uncertainty and Optimism

A recent report commissioned by Enegi Oil indicates that Western Newfoundland, both onshore and offshore, holds much promise with known finds onshore and excellent resource potential offshore; the company plans new seismic and drilling programs over the next two to five years. The report commissioned by NWest Energy Inc. references hydrocarbon potential in 11 offshore locations. This is certainly encouraging, but it is also true that the scale of the potential resource is unknown and that it may be technically difficult both to quantify and to access. The geology of the area is fractured and is characterized by numerous disconnected pools and faulting. Current work is progressing on the basis of the reanalysis of earlier 2D seismic work and a limited amount of new 2D seismic runs. There has not been substantive 3D seismic work undertaken either onshore or offshore, and there are at this time no commercially proven resources.

The hydrocarbon players operating in the area are small by industry standards, a phenomenon which is not unexpected in a commercially unproven zone. If this frontier is proven to hold commercial quantities of gas and oil over the next five years, the industry will grow. The extent of growth will depend on the size of the proven reserve. There is also a legitimate expectation, particularly if large commercial deposits are confirmed, that the number of junior to intermediate-sized exploration and production companies would decrease through asset transactions to larger players. This is necessary in light of the continuing strength of commodity prices and the resulting increase in the costs associated with drilling and subsequent development, particularly if development involves the recovery of offshore oil and gas.

The build up to 20,000 bbls/d of oil and 100 mmcf/d of gas quantities, which indeed could be found, represents a junior industry. This is the scenario being presented by some in the industry as the top end

of the likely scale of production in Western Newfoundland over the next 10 years. In this scenario, the build up of related oil and gas infrastructure and associated investment would be slow, and it would be irresponsible of the study team to create an atmosphere of expectation beyond the reality of the situation. Should, however, the build up be pitched at 200,000 bbls/d, i.e., 10 times the referenced amounts, then there is the basis of a viable oil and gas industry generating USD 7.3 bn in total revenue at USD 100 per barrel. This is not to say that the build up to 20,000 bbls/d, perhaps in three small concessions, is insignificant, but it should be placed in context. All of the companies involved in the search and development of oil and gas resources will seek minimal cost exposure. There will not be a significant build up of a local industry until production expectations based on solid evidence of a commercially recoverable resource are proven and can indicate a level of production in the order of at least 100,000 – 200,000 bbls/d.

6.4 Infrastructure

An evolving oil and gas sector requires infrastructure specific to the needs of the involved parties, as well as the full spectrum of community infrastructure. If exploration progresses into development and operational phases, infrastructure specific to the needs of the oil and gas sector would include marine supply bases, treatment facilities for drill cuttings, tanker terminals and pipelines. Community infrastructure is necessary to support the overall economic and social well being of the community and includes power generation and distribution, water supply and its treatment, roads, airports, communication systems, schools, higher education, hospitals and housing. Although the oil and gas sector may contribute to the development or enhancement of the former, the latter is normally provided by the public and private sectors operating in the local area. The maintenance and improvement to community infrastructure is essential not only to the hydrocarbon players, but to all who want to live and work in the region. Although the foundations of the necessary infrastructural requirements are in place in Western Newfoundland, further investment in infrastructure is essential both to the retention of the existing population base and to create an atmosphere conducive to investment by local and incoming entrepreneurs.

Figure 6.1 identifies the principle settlements in Western Newfoundland, illustrates the highway infrastructure, the location of the airports, the principal wharfs, the location of hospitals and the key institutions of higher education. Education is of particular significance. There is a need regionally, provincially, nationally and globally for “job ready” graduates. The industry is seeking people; depending on positions, this means candidates with a mix of university, college and high school education coupled with practical training leading to professional and occupational certifications. This is the framework of community investment that will support further growth. It is this framework that must be supported through investment to accommodate growth in both the short and longer timeframes.

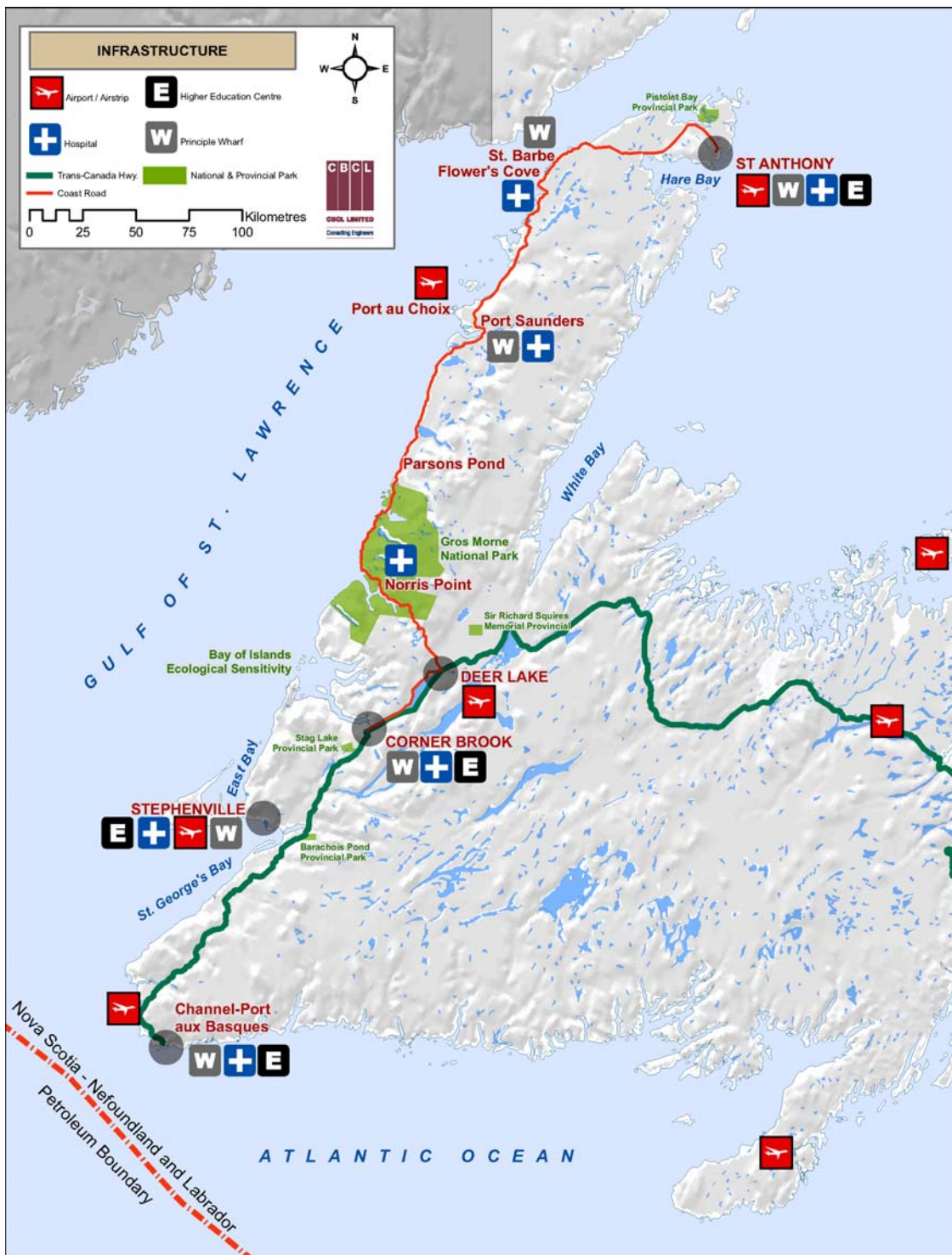


Figure 6.1: Infrastructure

6.5 Anticipated Growth and Development Scenarios

Figure 6.2 sets out in diagrammatic form a summary of how the study team attempted to address the many challenges associated with this assignment and the process adopted to establish priorities for action. This draws upon the various concepts involved and provides a context for their practical application.

In undertaking this work, there have been two fundamental challenges that had to be acknowledged:

- the lack of certainty regarding the amount of oil and gas which may be found and handled; and
- the lack of certainty regarding the rate of extraction that may then be involved.

Circumstances have changed even during the execution of this work, and the team has spent considerable time trying to define and articulate a pragmatic approach to what is unknown. Figure 6.3 captures the resultant thought process. While there is confidence within the oil and gas sector and in government departments that there is commercial hydrocarbon product in Western Newfoundland, there is no timeline associated with its development and subsequent transportation to market. If during 2008/9,

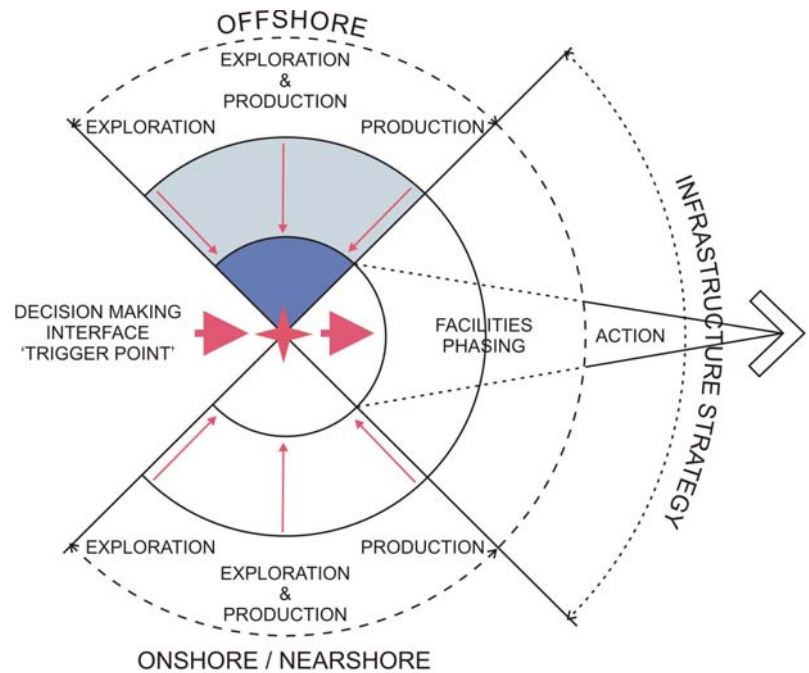


Figure 6.2: Synopsis of Analytical Process

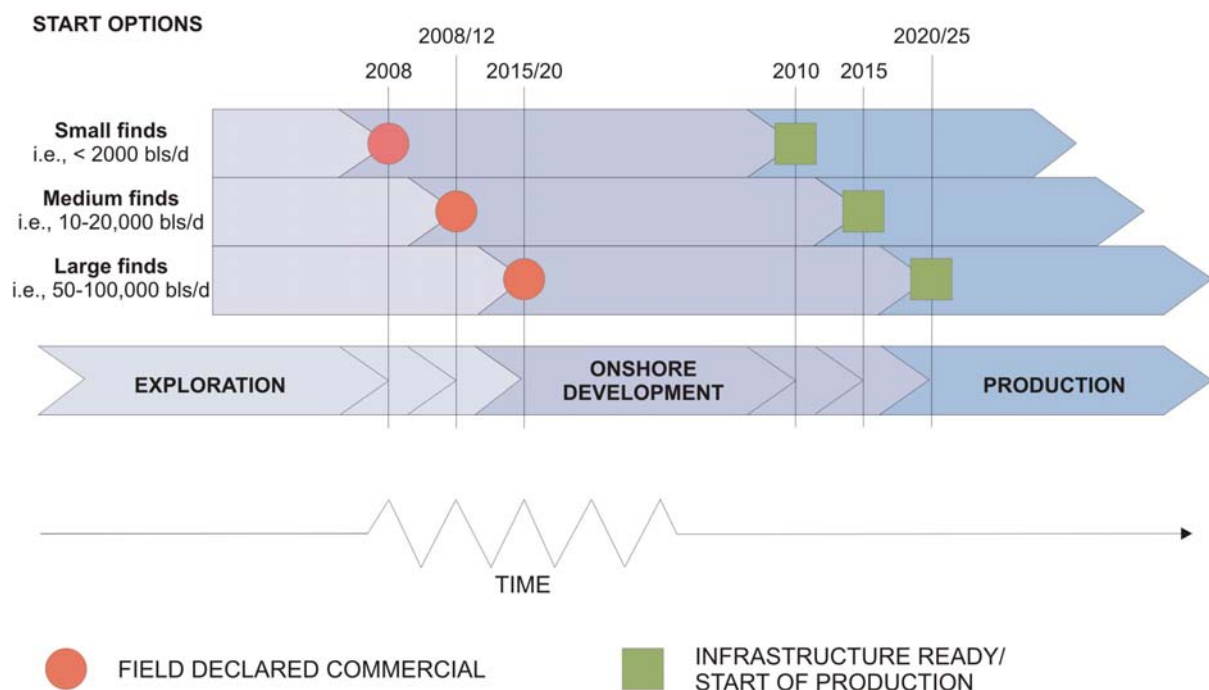


Figure 6.3: Field Programming Options

there is a discovery of <2,000 barrels a day from an onshore well, this could be produced and brought to market relatively quickly and certainly by 2010.

A somewhat larger find, i.e., >10-20,000 barrels of oil a day is unlikely to be declared in the immediate term, but it is realistic within a five year time horizon. The declaration of a larger commercial find, i.e., greater than 50,000 bbls/d, in the next 10 to 15 years, is feasible given what is known, but would substantially change the investment context. If such finds involved proven offshore resources, it would also likely herald the involvement of larger players.

The underlying theme is the relationship between the timing and scale of the exploration, the timing of field development and the concomitant needs for infrastructure, both offshore and onshore. It is vital to recognise that plans for the provision of these elements have more incremental benefit if decisions are proactive as opposed to reactive. Indeed, the essential elements of the recommended action plan address needs not only for the hydrocarbon players on the west coast, but the community at large. The underlying premise, given the uncertainty both with respect to the availability of global resources to support the further delineation and development of resources on the west coast, is that Western Newfoundland can capitalise on its geographical locational advantages, invest in its people and provide expertise and services to the oil and gas sector operating both in the province and elsewhere. As stated at the workshop in Corner Brook: “You do not need an oil and gas industry to participate in the industry”. The area is currently providing manpower and services to the industry in Alberta. This can continue and could expand to oil and gas regions elsewhere. It is after all a global industry that is short of resources.

Bearing in mind the many unknowns, consideration has been given in a hypothetical manner to the referenced six scenarios, namely:

- three oil production scenarios, i.e., less than 5,000 bbls/d, 5,000 to 20,000 bbls/d and >20,000 bbls/d from onshore and offshore fields; and
- three gas production scenarios, i.e., less than 20 mmcf/d, 20-100 mmcf/d and >100 mmcf/d from onshore and offshore fields.

The aim has been to recognize the range of possible outcomes that have a higher degree of probability, recognize the inherent infrastructural strengths of Western Newfoundland and enable investment decisions to be made in the short and medium terms that will benefit the region and provide support to the emerging hydrocarbon sector. Within that framework the recommendations are sufficiently robust to accommodate new demands whether from the traditional economic drivers in the region or from the oil and gas sector. Whatever hydrocarbon finds are ultimately declared commercial in Western Newfoundland, they will generate specific demands on the supplier community and pressures on infrastructure and services depending on the nature of the find, its location and the selected means of production. Such finds will be developed within the infrastructural framework that exists and in the context of the present and emerging configuration of economic activity and transportation links in the province. As each new hydrocarbon project comes forward in Western Newfoundland, it will be more readily and efficiently accommodated if a strategic approach has been adopted and implemented with respect to the enhancement of both transportation infrastructure and services in the region. Such commitments are proactive, serve present needs and provide the enhanced context that will accommodate future growth. Figure 6.4 captures this strategic approach.

Any specific discovery, regardless of its size, needs to be accessed, produced, stored and transported to market. Onshore discoveries of oil at this junction can be produced commercially in relatively small quantities, e.g., < than 2,000 barrels a day as long as the producer has economical access to storage facilities and could readily transport the product for processing and markets. Transportation, given the existing infrastructure in Western Newfoundland, would be by tanker. Existing storage facilities, including tanks that could be rehabilitated, such as the aboveground oil tanks at Stephenville, have particular strategic value in these circumstances; they could facilitate the storage of product and the associated wharfs could support the economic shipping out of product. Larger quantities of oil, or oil produced in wells to the north, would require consideration of storage and transportation options though the latter would most likely always involve shipping. As represented in Figure 6.4, operators and public agencies need to address the needs associated with each find, address the constraints, e.g., lack of storage, and to work collaboratively in the context of the existing infrastructural framework to maximize the

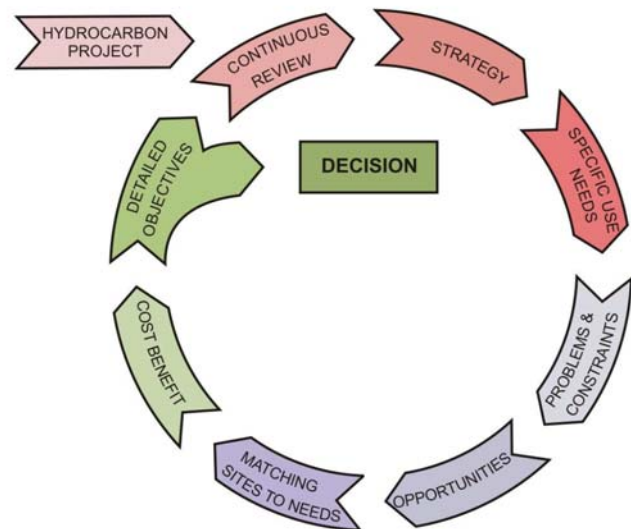
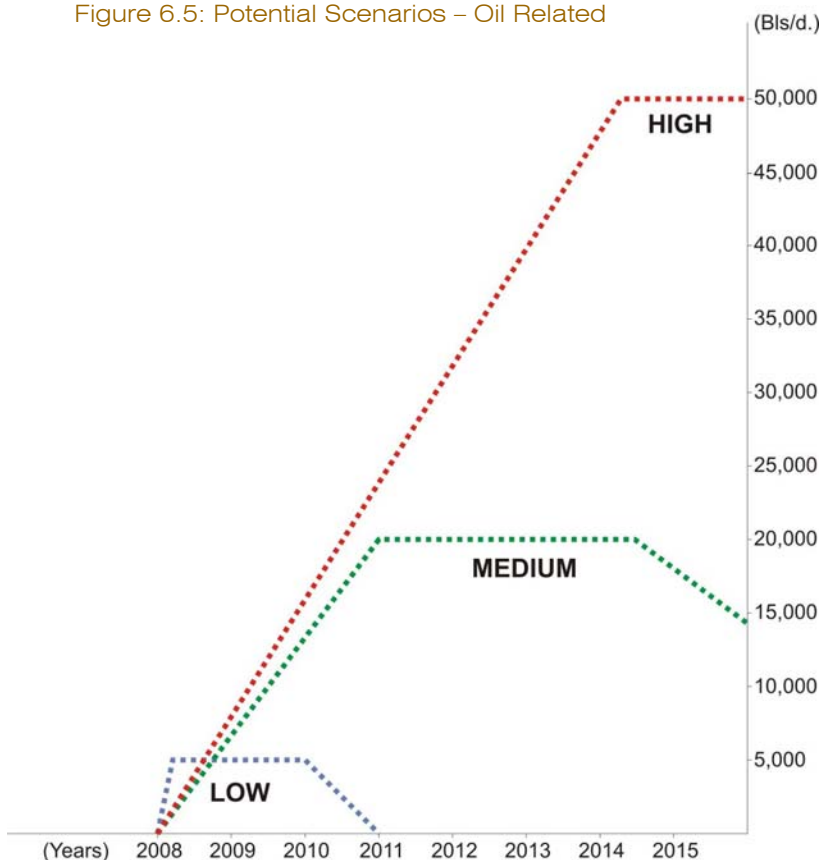


Figure 6.4: Response of Western Newfoundland to Projects

Figure 6.5: Potential Scenarios – Oil Related



opportunities. The private sector will invest in all facets of exploration; the public sector for its part must identify and safeguard for appropriate use key infrastructure and invest selectively.

Figure 6.5 provides a schematic of three potential oil driven development scenarios for Western Newfoundland:

- i) low – up to 5,000 bls/d;
- ii) medium – up to 20,000 bls/d; and
- iii) high – up to 50,000 bls/d.

Based on the information solicited, these scenarios, all of which relate to oil, are pragmatic and represent a realistic, but not overly optimistic prediction of what may transpire between now and 2020. To achieve production of 50,000 bls/d, the target would be to find between 300 to 500 million barrels in place. Based on the interpretation of existing seismic data, NWest Energy have estimated a

total undiscovered potential of 3.8 billion barrels of oil in their licence areas. They need not one, but several wells to confirm such numbers, but multiple finds could result in a production rate of more than 50,000 bls/d. It is, however, still a high risk, frontier region.

Although natural gas unquestionably exists in Western Newfoundland, it is not presently at the forefront of exploratory initiatives. What transpires if or when gas is discovered will be determined by the size of the reserves, the profitability interplay between supply and demand and transportation options. Based on the information compiled and the many unknowns it appears premature to the study team to articulate prescriptive hypothesis. Parallels, however, have been drawn from other jurisdictions and observations made with respect to the infrastructural and supply and service needs that might be associated with gas production in the context of a developing mixed hydrocarbon regime. Given the total lack of available infrastructure to handle natural gas in Western Newfoundland, the timeline to production and transportation to market is likely to be significantly longer than that associated with the production and transportation of the anticipated quantities of oil. Whereas small quantities of oil could be produced and transported relatively quickly, gas is unlikely to be forwarded to market in the next five to 10 years in the absence of either pipelines or appropriate shipping facilities. This pushes the development scenario for any substantial amounts of gas out beyond 2020.

As referenced in Sections 4.3 and 5.1, many commentators have observed a general cyclic phasing associated with the establishment of a hydrocarbon industry. These phases, depicted on Figure 6.6, are:

- exploration and appraisal – the rise;
- development – the peak; and
- production – the plateau and decline.

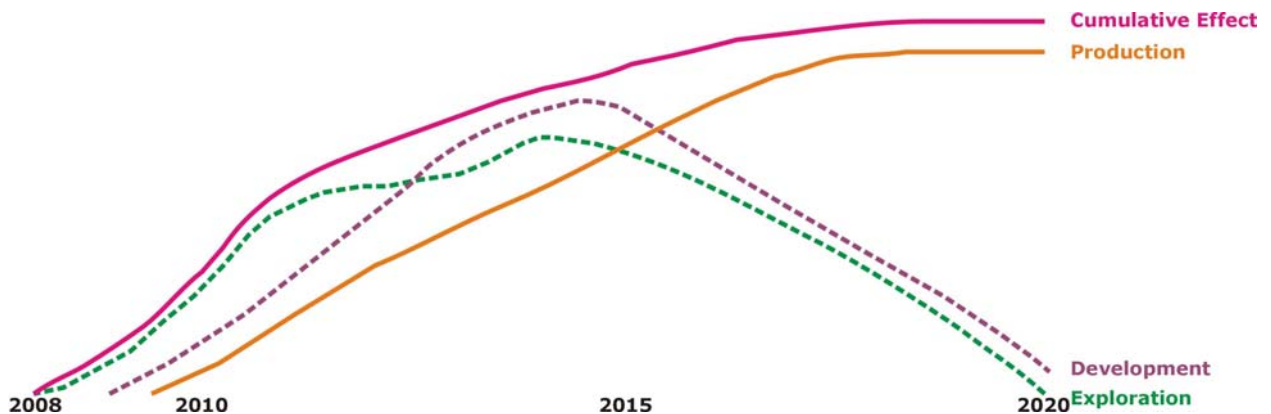


Figure 6.6: Hypothetical Cycles: Exploration, Development and Production

Such a categorization is generally valid, but there are many factors that influence how the patterns play out. Each field, for example, goes through the cycle, but the length of the phases will depend on the geological complexity of the field, the size of recoverable reserves in relation to field development costs, the commitment of the field operator and other licensees and the implementation of regulatory powers. Super imposed on such individual field variations are others that affect the timing of phases in any oil and gas province; these include the speed and thoroughness of early exploration, the scale and extent of early licensing, advances in exploration and development technologies, etc. In a maturing area, as Newfoundland and Labrador may be considered, all phases are occurring simultaneously; in a new area,

such as Western Newfoundland if considered on its own, the industry is in its infancy. How the hydrocarbon industry evolves in Western Newfoundland, however, will be influenced by and capitalize upon, the sector's existing presence and impact, i.e., the facilities and skills, that currently exist in the Province. It is prudent to point out that despite the unquestionable benefits that were derived in several rural Scottish municipalities, especially the Orkneys and Shetlands, and the servicing advantages that accrued to Aberdeen, the industrial or downstream related investment in Scotland occurred in the existing central urban area, particularly in the vicinity of Grangemouth.

Taking the locational circumstances into account, the anticipated consequences of the development scenarios referenced in Western Newfoundland would likely include:

- an increase in Gross Domestic Product reflected by strength in the construction and other service sectors;
- demand over time for additional new services;
- stabilization in employment at the outset as participation rates increase and unemployment falls, leading over time, to an increased demand for labour;
- population stabilization;
- moderate growth in housing starts and property values; and
- overtime, an increase in disposable income.

Activity in the hydrocarbon sector in conjunction with the further diversification of the economy, i.e., growth in tourism, in mineral activity, etc., will unquestionably bring benefits to Western Newfoundland. Such change and economic diversification needs to be planned and selective investment made to ensure capacity in both labour and infrastructure.

6.6 Strategic Direction and Action Plan

Based on the above analysis, consideration of the materials presented in the preceding chapters together with the feedback received from participants in the workshops and meetings, the following objectives underlie the recommended strategic direction and associated actions that should be put in place in both the short and longer terms:

- provide the regulatory and administrative context to maximize investment in onshore and offshore exploration for hydrocarbons, i.e., both oil and gas, in Western Newfoundland while minimizing financial risk – this is a provincial responsibility and an integral and recognized part of the Energy Plan (see Section 1.4);
- establish a clear environmental regulatory regime – this is a joint federal/provincial responsibility;
- continue to improve the infrastructural base in Western Newfoundland through selective investment in good transportation facilities, education, hospitals and ensure access to land for commercial and industrial purposes, particularly the land needs of the oil and gas sector;
- ensure the protection of key natural resource areas, including Gros Morne National Park, the Humber Valley and the Bay of Islands, i.e., the environmental resource spine of Western Newfoundland;
- encourage the planning, regeneration and use of existing infrastructure including that in Port aux Basques, Stephenville, Corner Brook, Deer Lake, Port Saunders and St. Anthony;

- identify and promote areas to accommodate the specific needs of hydrocarbon projects, e.g., maintain and upgrade wharves, airport and related facilities at key locations including those at Stephenville and Corner Brook;
- continue to invest in public education and health care, cultural and recreational opportunities to serve the needs of both the region and the Province;
- facilitate training of local people to meet the demand for skills in the oil and gas sector not only in Western Newfoundland, but in the Province as a whole, in Canada and elsewhere; and
- promote Western Newfoundland as a place of opportunity for both families and businesses.

It is recommended that the following action priorities should be addressed in provincial and regional budgets over the next five to 10 years:

- continual twinning of selected portions of the Trans Canada Highway from Port au Basque to St. John's in response to defined traffic and safety requirements;
- upgrading of key routes to the coast as necessary to meet the needs of confirmed hydrocarbon developments;
- review, planning and selected investment for the use of airport and associated infrastructure at Stephenville;
- structural appraisals of the facilities associated with the port at Stephenville and a use study to determine alternative and optimum uses for the associated lands and waters;
- maintenance of the Deer Lake Airport facilities to support local economic investment and including developments taking place in the Humber Valley and vicinity;
- support for active collaboration between the senior levels of government, the universities and key stakeholders to conduct the necessary research and field programs to protect the environment, i.e., the Gros Morne National Park, the Bay of Islands, the Humber Valley, and other identified areas;
- continued investment in further education, particularly in technical and scientific programs, with an emphasis on innovation, flexibility and the development of a highly skilled workforce ready to contribute not only to the regional economy, but beyond.

With reference to the scenarios referenced above for the hydrocarbon industry in Western Newfoundland, the following are perhaps the key factors that will influence policy decisions moving forward:

- the timing, location and size of proven fields and the means by which they will be developed; and
- the location of key onshore infrastructure to support development and to receive and store product.

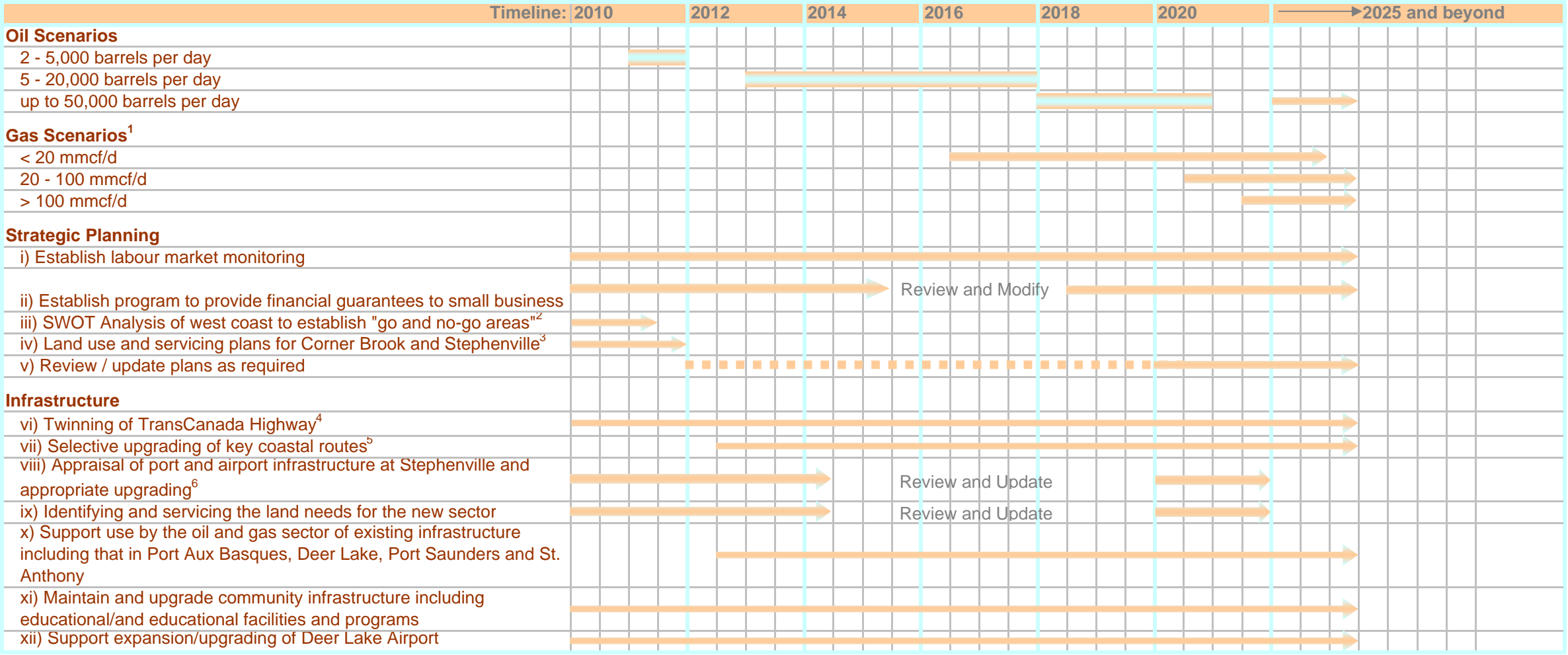
In the interests of economy, it is essential both to maximize the use of existing infrastructure and also to ensure that such infrastructure continues to support existing economic sectors. In this context Corner Brook and Stephenville must be seen as potentially playing complementary roles. The former has a substantial working port with capacity to serve several sectors including the mining sector; the city is an administrative service community with strong educational and health facilities served by Deer Lake airport. The planning of these facilities and the designation of lands for further residential and commercial development is imperative; this is particularly important in relation to the proximity of Corner Brook to the Humber Valley, to the Bay of Islands and to the commercial and light industrial capacity that exists in Deer Lake. Stephenville is in the throes of economic change, has substantial infrastructural capacity that warrants further study and its future use carefully defined. The City of

Corner Brook and the Town of Stephenville should work collaboratively to ensure that resources are not unnecessarily duplicated while building on their respective strengths.

The overall objective must be to:

“Maximize the potential economic benefit of hydrocarbon exploration and development while supporting other sectors of the economy, taking into account and protecting the environmental attributes of Western Newfoundland”.

Figure 6.7 captures the primary recommendations made in this report against a 10 to 15 year timeline. Progress can be achieved and new investment in hydrocarbon exploration and development accommodated if all involved parties, i.e., the oil and gas companies, the Province, the Municipalities, the development agencies and local communities, work together. Further planning is essential. Investment in infrastructure and in education is also essential. It would seem prudent if the findings and recommendations contained in this report were taken back to those consulted in Western Newfoundland to solicit their opinions and ideas as to how best to optimize anticipated oil and gas activities as part of full and open dialogue. This report is a minor, but strategic part, of the planning process. The annual conferences on the subject are another important catalyst for dialogue and the exchange of information. That there are hydrocarbons is not seriously in question, but their identification and development does necessitate prudent investment of both public and private monies to support and accommodate the evolution of a new industrial sector in the region.



Notes:

1 Based on the information compiled and the many unknowns, it is premature to be prescriptive in the short term with respect to the requirements of gas production. Given the total lack of available infrastructure to handle natural gas in Western Newfoundland, the timeline to production is likely to extend out 10 to 15 years.

2 Support should be provided to CAP, the Centre of Environmental Excellence and other stakeholders to conduct a SWOT analysis in the preparation of a strategic statement identifying "go" and "no-go" locations for development in Western Newfoundland. This would include the detailing of ecological conditions and the condition and capacity of all infrastructure.

3 These plans should detail the consequences of different growth scenarios looking 15 to 20 years out.

4 Determined by traffic volumes, physical road characteristics and the findings of 2) above.

5 Determined by findings of 2) above and status of exploration results.

6 Determined by findings of 3) above and demand, including demand from oil and gas sector.

Figure 6.7: Scenario Development Timeline and Recommendations

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