Olds Area Labour Force Profile: By Selected Industry

Prepared for the Olds Institute for Community and Regional Development

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Contents

Site Location

The main factors that companies take into account when deciding where to locate are access to key inputs, suppliers, and customers. Companies need a location that has plenty of workers who know how to make their product or who have comparable skills and can be readily trained. They also need a location with plenty of access to the main ingredients of their product. And they don't want to be far from their customers or from transportation systems to reach them.

The table below sets out typical cost factors for two types of companies[1].

Factor	Manufacturing project	Office project
Labor	36%	72%
Transportation	35%	0%
Utilities	17%	8%
Occupancy	8%	15%
Taxes	4%	5%

Food processing companies locate facilities close to the farms and ranches that supply them and close to main highways and rail to get product to market. Emerging high-technology companies need engineering schools and venture capital. Many locations will be eliminated right off the bat if, for example, the company needs to be close to a university laboratory with a life sciences specialty, a labor market with a lot of web-software code writers, a major airport hub serving national markets because its sales representatives travel a lot, or a place with a lot of fresh water to make steel or paper.

Increasingly, the supply of skilled labor is a key issue, and the work of site location consultants often involves detailed analyses of labor markets. This document describes the labour force profile, within selected industries, in the Olds Area. The Olds Area is defined as 1 hour driving distance from the Town of Olds, Alberta. This includes the City of Calgary.

The Olds Area's Workforce

Key Messages

- *We can supply labour. 1.43 million people live with a 1 hour drive of the Town of Olds.*
- *People have and will move here for jobs. The Olds Area has seen its population increase by 361,700 in a decade (34%).*
- *People in the Olds Area work hard. The labour force participation rate is around 75%.*
- *Looking for people with hands-on skills? Over 15% of people between the ages of 25 and 64 in Central Alberta have a trades certificate.*
- *Want to locate in a region with a proven ability to create jobs? Full-time employment in the Olds Area increased 30% in a decade - from 638,500 in June 2005 to 830,200 in June 2015.*

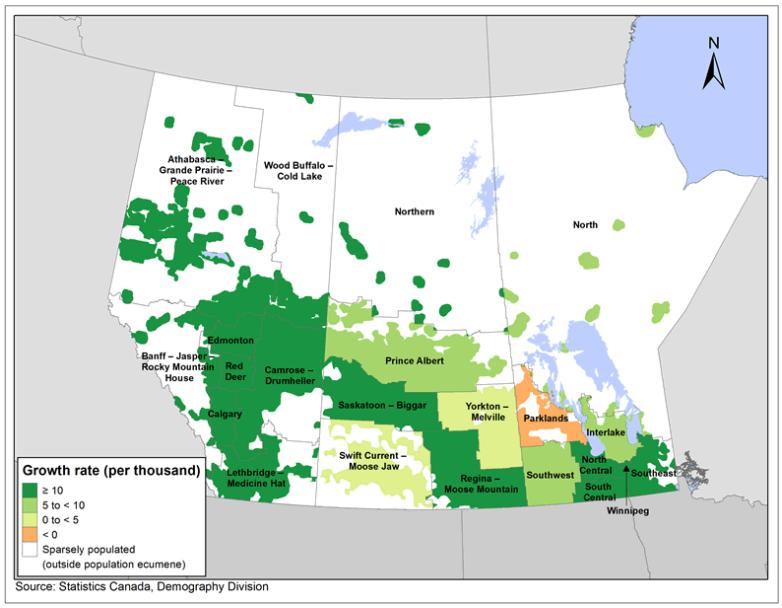
[1] *Source: http://www.greatamericanjobsscam.com/chapter-2.pdf*

- *Alberta has a highly educated work force. Almost 65% of people (25-64) have some post-secondary education or a trades certificate. Over 25% have a university degree or a post-graduate degree.*

Population growth

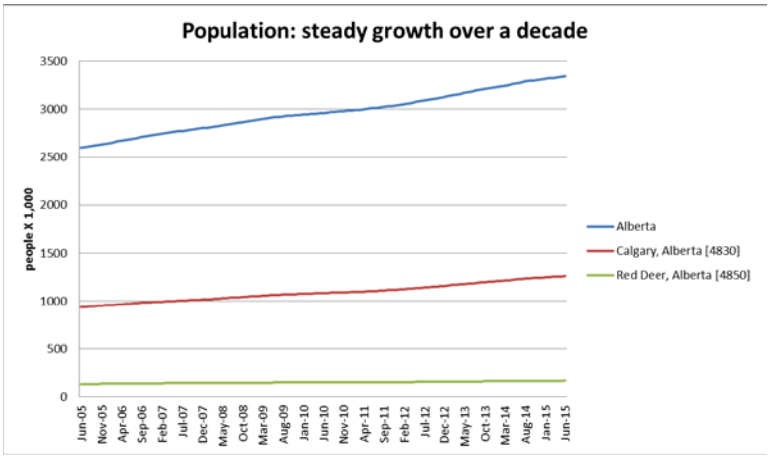
The Olds Area has a population of 1.43 million people. This Area, which includes the Economic Regions of Calgary and Red Deer, is located in the southern part of the Edmonton/Calgary corridor – an area of the province that has seen tremendous population growth over the past decade.

Map 2.4
Population growth rates between July 1, 2013 and June 30, 2014 by economic region (ER), Prairies



Source: Statistics Canada, Demography Division

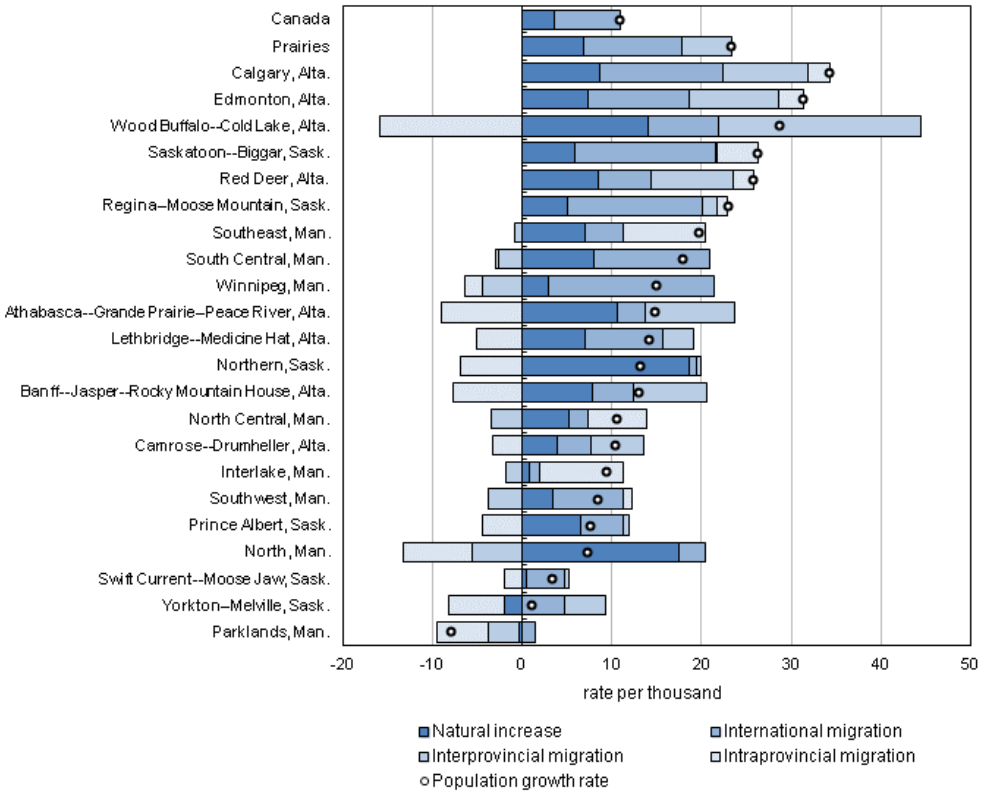
As shown in the Chart below, the Area has seen its population increase by 361,700 in a decade (34%).



Source: Statistics Canada. Table 282-0122 - Labour force survey estimates (LFS), by provinces and economic regions based on 2011 Census boundaries, 3-month moving average, unadjusted for seasonality, annual (persons unless otherwise noted)

Most of this growth has been due to international and interprovincial migration as people move to the Area for jobs, particularly in the oil and gas industry.

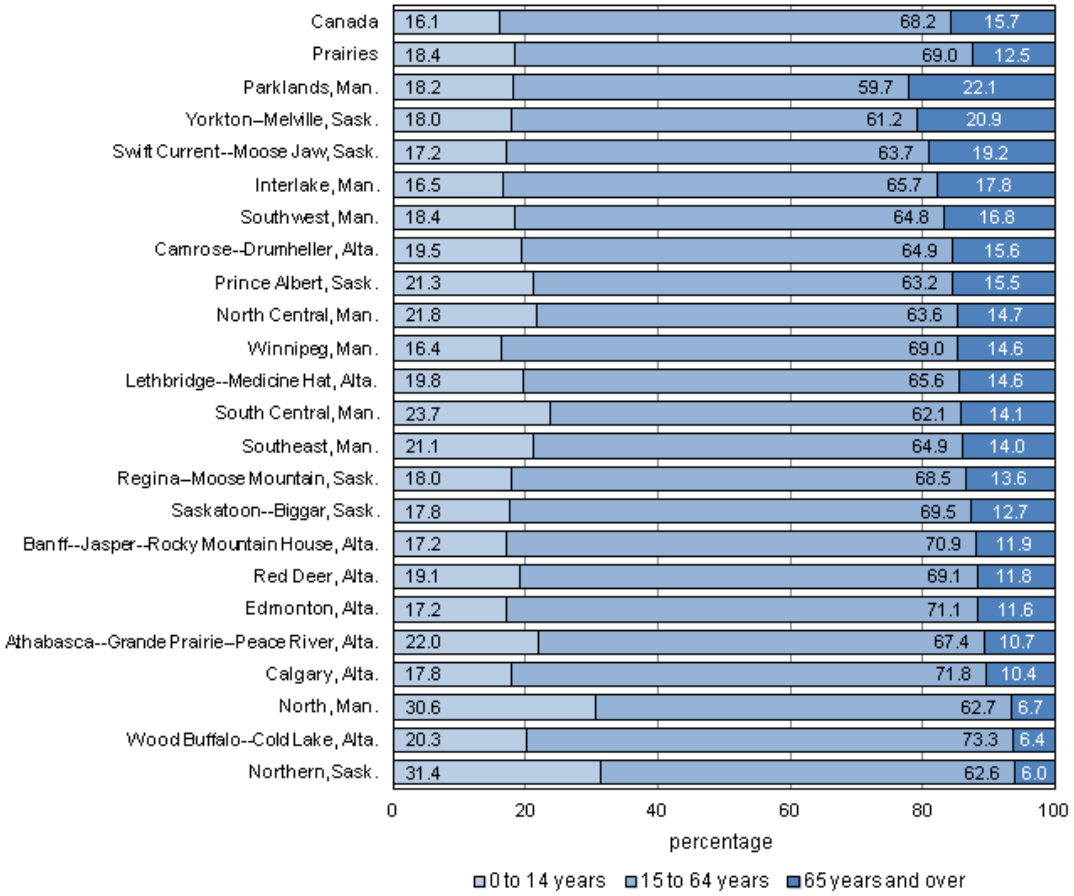
Chart 2.7
Factors of population growth by economic region, Prairies, 2013/2014



Note: Economic regions are sorted in descending order of the population growth rate.
Source: Statistics Canada, Demography Division.

The Area also has a larger proportion of young people than the rest of Canada. In Canada as a whole, 15.7% of people are 65 years and over while this number drops to around 11% for the Olds Area. The working age population in the Olds Area is just over 70% compared to 68% in Canada as a whole.

Chart 2.8
Distribution of population by age group and economic region, Prairies, July 1, 2014

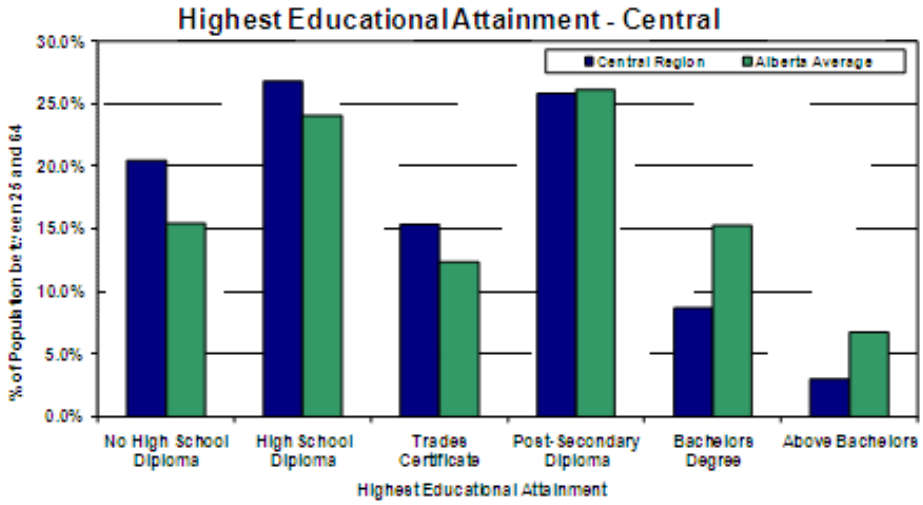


Note: Economic regions are ranked in descending order of the proportion of the population aged 65 and over. Figures in percent may not add up to 100% as a result of rounding.
Source: Statistics Canada, Demography Division.

Educational attainment varies

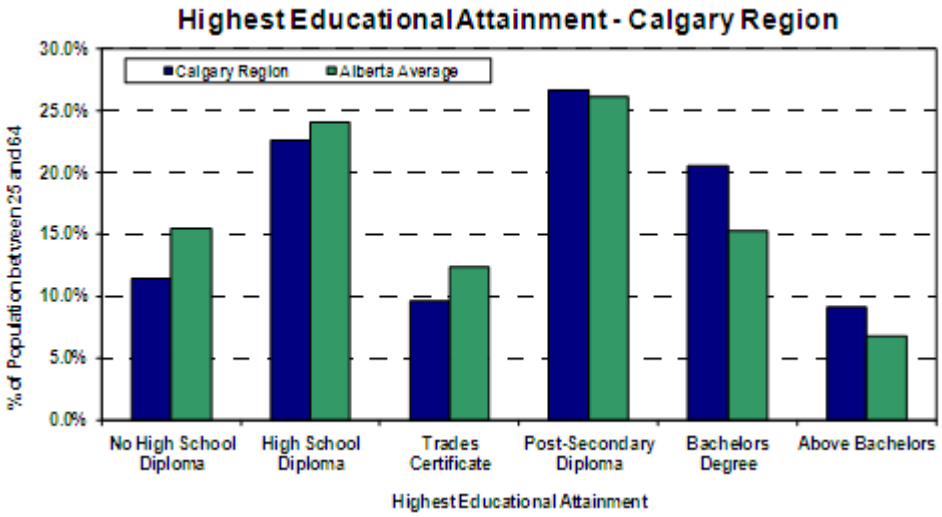
Educational attainment in the Olds area shows a different pattern in the area north of Calgary (including the city of Red Deer) as compared to the City of Calgary. Educational attainment in the Central Region (north of Calgary) is lower than the average for Alberta (except for trades certificates) while in Calgary, it is higher than the average.

For the working aged population of between 25 and 64 years in the Central Region, 37.4% had a post-secondary degree or diploma, compared with 48.1% for all of Alberta. However, the region does have a larger share holding a trades certificate: 15.3% in the region vs. 12.4% in Alberta. 20.4% of the region's working age population did not finish high school, higher than the Alberta average of 15.4%.



Source: Statistics Canada 2006 census data quoted at http://www.albertacanada.com/business/statistics/central-labour.aspx

However, according to the 2006 census, the level of educational attainment for the Calgary Region is higher than for Alberta. For the working age population of between 25 and 64 years, 56.1% had a post-secondary degree or diploma, higher than the 48.1% for all of Alberta. However, the region does have a smaller share holding a trades certificate: 9.7% in the region vs. 12.4% in Alberta. 11.5% of the region's working age population did not finish high school, lower than the Alberta average of 15.4%.



Source: Statistics Canada 2006 census quoted at http://www.albertacanada.com/business/statistics/calgary-labour.aspx

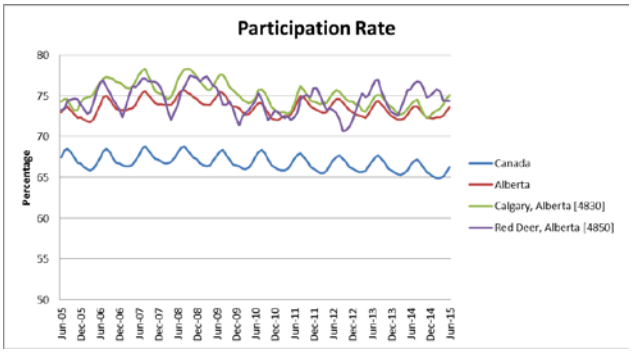
Within the Town of Olds, 59% of people ages 25-64 have at least some post-secondary education or a trades certificate[2]. This compares to 64% of Albertans of the same age range.

[2] http://www12.statcan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=48&Data=Count&SearchText=Alberta&SearchType=Begins&SearchPR=01&A1=All&B1=All&Custom=&TABID=1

Educational Attainment (people ages 25-64)	Town of Olds (4,165 people)	Alberta (2,035,330 people)
No High School	13.5%	12.3%
High School or Equivalent	26.8%	23.8%
Apprenticeship/Trade Certificate	15%	12.2%
College Certificate/Diploma	24.6%	21.4%
Some University	3%	4.7%
Undergraduate Degree	10.7%	17.7%
Post Graduate Degree	5.7%	7.9%

Very high labour force participation rates

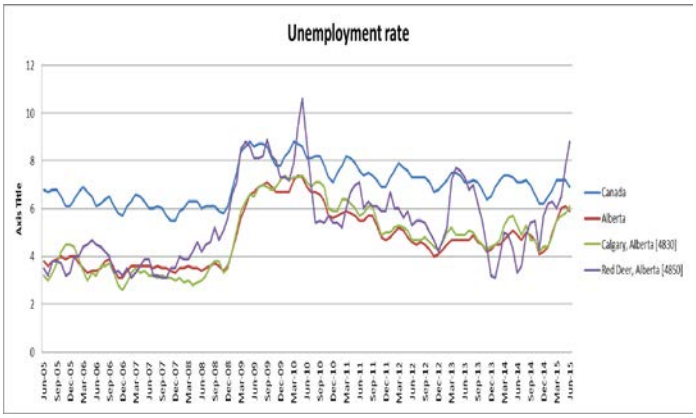
Labour force participation rates in the Olds Area are very high – hovering around 75%. The Chart below shows labour force participation rates over the past decade. Note that participation in Canada is seasonal because more people work in the summer (July and August) and fewer people work in the winter (February and March).



Source: Statistics Canada. Table 282-0122 - Labour force survey estimates (LFS), by provinces and economic regions based on 2011 Census boundaries, 3-month moving average, unadjusted for seasonality, annual (persons unless otherwise noted)

Low unemployment rates

Unemployment rates in Alberta are very low. The unemployment rates in the Olds Region were extremely low (4%) until the recession of 2009. Since 2009, the rates have hovered between 7% and 5%. The drop in oil prices and the resulting loss of jobs over the winter of 2015 have recently shown up as a spike in unemployment in both the Red Deer and Calgary Regions.

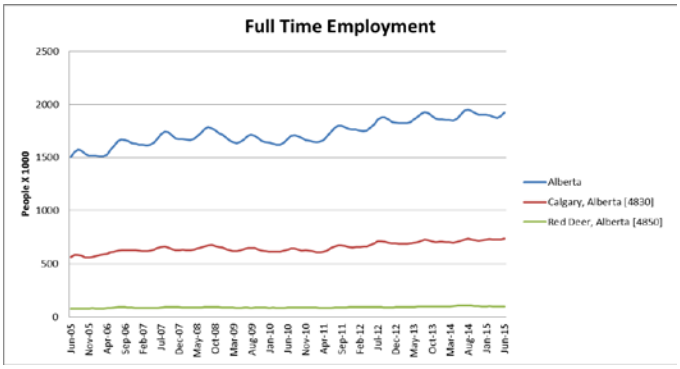


Source: Statistics Canada. Table 282-0122 - Labour force survey estimates (LFS), by provinces and economic regions based on 2011 Census boundaries, 3-month moving average, unadjusted for seasonality, annual (persons unless otherwise noted)

Still creating jobs

Alberta has been a job generator in Canada for more than a decade and has had by far the highest employment growth of all provinces in Canada over the past 10 years.

The Olds Area continues to create jobs. Full-time employment in the Area increased from 638,500 in June 2005 to 830,200 in June 2015 – an increase of 30%



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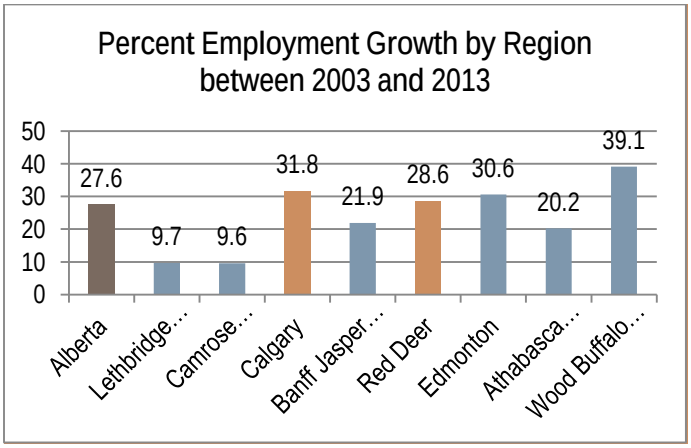


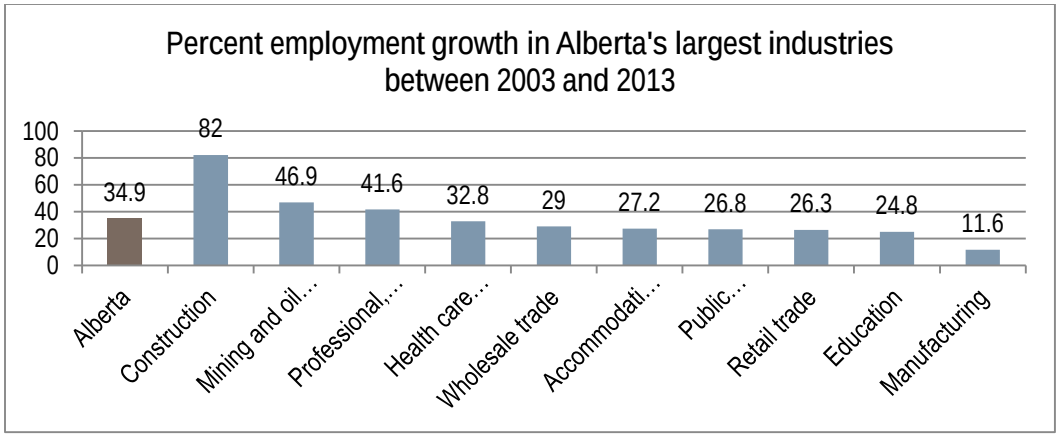
Source: Alberta Government "Economic Commentary" April 9, 2014 page 3

Selected Industries

Industries in Alberta that showed job growth over the past 10 years included[3]:

- Construction - increase of 90,280 jobs (82% increase). This rise can be explained by a tripling of construction spending over that period: from $29 billion in 2003 to $87 billion in 2013. Heavy and civil engineering construction was the fastest growing construction sub-industry over that period with a 94% gain, as oil sands construction spending rose from $1.4 billion in 2003 to just over $27 billion by 2013. About one in every five new jobs that were created in Alberta over the past decade was a construction job.
- Mining and oil and gas – up 40,485 or 46.9% (large gains for oil and gas extraction and for oil and gas services)
- Professional, scientific and technical services – up 36,843 or 41.6% (especially engineering and architectural services)
- Health care and social assistance – up 42,615 or 32.8% (large gain for nursing and residential care facilities)

The rapid growth in the oil sands in northeastern Alberta translated into strong growth for the mining and oil and gas sector and for associated industries, such as professional, scientific and technical services (especially engineering services), employment services, and waste management and remediation.



Source: Alberta Government "Economic Commentary" April 9, 2014 page 4

As the Table below shows, the main growth industries in the Olds Area are similar to those in the province as a whole: oil and gas, health care, professional and technical services (linked to oil and gas), and construction (linked to oil and gas and population growth in towns and cities).

	OLDS AREA (within 1 hour of the Town of Olds)	
	Central Region	Calgary Region
Location	The area from Wetaskiwin south to Carstairs, including the City of Red Deer	The area from Crossfield south to High River, including the City of Calgary
Largest industries (by	Retail trade, oil and gas, agriculture, healthcare and social assistance and construction, each employing more than	Retail trade; professional, scientific and technical services; health care and social assistance; and

[3] *Source: Alberta Government "Economic Commentary" April 9, 2014*

employment)	15,000 workers	construction
Average individual income (tax filer)	$34,500 in 2007, a large 42% increase from 2003	$49,200 in 2007, a 41% increase from 2003
Average family income (tax filer)	Average income for couples was $104,000 in 2007, a 46% rise from 2003.	Average income for couples was $147,600 in 2007, a large 47% rise from 2003.
Fastest growing industry	Oil and Gas is the fastest growing industry. This region is the province's second largest natural gas producer, the number four region for drilling activity, and the number three region for employment in the oil and gas industry, accounting for 13% of Alberta's oil and gas employment.	Health Care and Social Assistance was the fastest growing industry between 2006 and 2010, which increased its employment level by more than 10,000. Other growth areas were professional/technical and construction.
Agriculture	Employment in the agricultural industry, which has been on a long and steady decline in the province, fell by 13% between the two Census years (2001 and 2006). Central Alberta is one of Alberta's top two agricultural regions, accounting for more than 15% of the province's farm cash receipts, cropland and livestock in Census year 2006, and is the top-ranked region for employment in this industry, accounting for 19% of Alberta employment in the agricultural industry.	N/A
Manufacturing	Concentrated in the chemicals industry, and the region accounts for about 10% of Alberta's manufacturing shipments.	Many of the region's large industries, such as manufacturing, construction, professional, scientific and technical services (for instance engineering), and finance, insurance and real estate, are heavily dependent on Alberta's large oil and gas industry. The region's top manufacturing sub-industries are food processing and machinery and metal fabrication.

Source: http://www.albertacanada.com/business/statistics/central-region.aspx

The Olds Institute has selected several industries that could be further developed in the Olds Area:

- Oil and Gas: services, equipment and devices
- Environmental Remediation: oil and gas clean-up and remediation, brownfield clean-up, recycling and waste, equipment and devices, environmental sciences
- Agriculture: resource efficiency, food processing, plant sciences, food sciences, equipment and devices
- Biofuels and Bioproducts: clean green energy, biofuels and biochemicals
- Life Sciences: medical devices, nutraceuticals
- Manufacturing: associated with the other 5 industries
- Information and Communications Technology: associated with the other 5 industries
- Clean Energy: electricity from solar and wind

Oil and Gas

Oil and gas is a highly important industry in Alberta and in the Olds Area, as 73% of all oil and gas companies in Canada are located in this province. This industry is made up of a variety of sizes of companies which tends to give it resilience. It pays high wages compared to other industries and, even though oil is a commodity and Alberta has little control over oil prices, businesses are more profitable in this industry than in most other industries.

Environmental Remediation

Waste Management and Remediation is a relatively small but important industry in Alberta as almost 20% of companies in this industry in Canada are located here. The demand for this service is linked to oil and gas extraction and mining. It is dominated by micro and small businesses and is more profitable than other industries.

Agriculture and Food

Agriculture is another important industry in Alberta as just over 20% of both crop producers and livestock producers in Canada are located here. Agriculture is dominated by micro-businesses and agricultural businesses are among the least profitable of all industries. The average age of farmers has been steadily increasing as has the average size of farms. The price of farmland in Central Alberta has increased by approximately 10%/year over the past decade so even though farming enterprises may not be as profitable as other types of businesses, farmers' assets continue to increase in value.

Food and beverage processing is a small but growing industry in Alberta. Less than 10% of food processors in Canada are located here and less than 5% of beverage manufacturers are located here. Food and beverage processing is dominated by small and medium enterprises rather than micro-businesses. Processing food tends to be more profitable than producing food.

Life Sciences

The Life Sciences industry in Canada is driven by health care. The Olds Area has one pharmaceutical packager (Olds Soft Gel located in the Town of Olds – formerly Banner Pharmacaps). Pharmaceutical and Medicine Manufacturing is a very small industry in Alberta with fewer than 20 companies in total – mostly located in Edmonton. In Alberta, this industry is made up of small, innovative start-up companies along with a few offices of multi-nationals.

Biofuels and Bioproducts

10 years ago, biofuels was a growth area and governments, especially in the US, were offering subsidies to grow the industry. Since that time, most of the government subsidies have ended and the industry has collapsed. There are now only 26 renewable fuel plants in the entire country. Industry Canada does not collect much information on this industry because it is very small.

Information and Communications Technology

Industry Canada combines ICT and Cultural Industries when it collects industry statistics. This industry is small in Alberta (with about 1500 companies) but it pays well and tends to be extremely profitable.

Clean Energy

Clean Energy is a very small but growing sector in Alberta. The government does not keep statistics on this sector.

The Table below summarizes these selected industries.

Industry (2013)	Number of Establishments in Alberta	% of all Establishments in this industry Canada	Size of Establishment	Employment	%	Average Hourly Wage	Profitability of Establishments in this industry
Oil and Gas Extraction	1516	73%	Micro (1-4 employees)	944	62%	$48/hour	75% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	506	33%		
			Medium (100 –	46	3%		

			499 employees)				
			Large (500+ employees)	20	1%		
Support Activities for Oil and Gas and Mining	4499	59%	Micro (1-4 employees)	3029	67%	$39/hour	80% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	1316	29%		
			Medium (100 – 499 employees)	138	3%		
			Large (500+ employees)	16	0+%		
Agriculture – Crop Production	3165	20.1%	Micro (1-4 employees)	2526	80%		44% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	637	20%		
			Medium (100 – 499 employees)	2	0+%		
			Large (500+ employees)	0	0%		
Agriculture – Animal and Aquaculture Production	2419	22.9%	Micro (1-4 employees)	1879	78%		33% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	539	22%		
			Medium (100 – 499 employees)	1	0+%		
			Large (500+ employees)	0	0%		
Manufacturing – Food Processing	467	8.3%	Micro (1-4 employees)	122	26%	$17/hour	67% of establishments were profitable in 2013
			Small (5-99 employees)	307	66%		
			Medium (100 – 499 employees)	33	7%		
			Large (500+ employees)	5	1%		
Manufacturing – Beverage and Tobacco	40	4.8%	Micro (1-4 employees)	12	30%	$23/hour	61% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	22	55%		
			Medium (100 – 499 employees)	6	15%		
			Large (500+ employees)	0	0%		
Manufacturing - Pharmaceutical and Medicine Manufacturing (Sub-set of chemical manufacturing)	14	6.4%	Micro (1-4 employees)	7	50%	$25/hour	70% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	6	43%		
			Medium (100 – 499 employees)	1	7%		
			Large (500+ employees)	0	0%		
Waste Management and Remediation	641	19.1%	Micro (1-4 employees)	273	43%	N/A	78% of establishments in Canada were profitable in 2013
			Small (5-99 employees)	358	56%		
			Medium (100 – 499 employees)	10	2%		
			Large (500+ employees)	0	0%		
Information and Cultural Industries	1,410	7.9%	Micro (1-4 employees)	688	49%	$23/hour	88% of establishments in

			Small (5-99 employees)	677	48%		data processing and hosting were profitable in 2013
			Medium (100 – 499 employees)	38	3%		
			Large (500+ employees)	7	0.5%		

Source: Canadian Industry Statistics, Industry Canada, www.ic.gc.ca

Note: Industry Canada uses "establishment" as the unit of measure in the Canadian Industry Statistics. Establishment usually corresponds to a plant, mill or factory. The Industry Canada financial performance and profitability information comes from Canada Customs and Revenue Agency (CCRA) tax returns. Total employment does not include contract workers – just those on the regular payroll.

Oil and Gas Industry

Key Messages

Workers

- *Oil and gas is a large, important industry in Alberta, generating $133 billion/year in revenue. Alberta's energy sector is a key economic driver and has been for decades.*
- *This industry directly employs 119,000 people in Alberta and drives employment in other key industries like construction and professional/technical services. One out of every 13 jobs in Alberta is related to energy.*
- *Every major oil and gas company in Canada has its head office within one hour of the Town of Olds as do the industry's major trade associations.*
- *There are several hundred exploration and drilling companies, oil and gas field services companies, and metal manufacturers in the Olds Area.*
- *This industry has a skilled and experienced workforce in all aspects of the value chain.*
- *15% of the working-age population has trades certificates.*
- *Red Deer College and Olds College offer apprenticeship training in many trades areas including safety training, heavy equipment operator, welding, and rig technician.*
- *Olds College and Red Deer College graduate more than 500 tradespeople who can work in the oil and gas industry every year*

Inputs and Supplies

- *Alberta's energy industry includes conventional oil and gas drilling, unconventional gas (coal bed methane and shale gas), oil sands mining, and oil sands in-situ drilling.*
- *The rich resources available in the province account for the third largest reserves of crude in the world and the largest deposits of oil sands in the world.*
- *The hydrocarbon value chain in Alberta stretches from upstream oil and gas exploration and development through distribution and pipelines to downstream refining, manufacturing, and retailing*
- *Innovations in technology, such as the Steam Assisted Gravity Drainage (SAGD) system and directional drilling have enabled additional development of resources.*
- *Areas for additional innovation include more efficient operations (hydraulic fracturing), environmental concerns (remediation, CO2, settling ponds, water use, pipeline leaks) and effective distribution.*
- *The government is highly supportive of the oil and gas industry and provides favourable tax regimes and subsidies*

Markets and Transportation

- *Olds is strategically located along Alberta's primary highway, between the head offices in Calgary, the oil services companies in Red Deer, the oil refining plants in Edmonton, and the oil sands projects in northern Alberta.*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

In 1947 a major oil field was discovered just south of Edmonton, Alberta. This discovery was large enough to significantly alter the economy of the province and, for the past 70 years, oil and gas has been the main driver of the province's economy. The province of Alberta has jurisdictional responsibility for the resources that lie within its boundary and is responsible for oversight of the industry. It licenses companies to gain access to oil and gas on crown land and charges royalties on production of oil and gas.

Conventional oil development occurred throughout Alberta with the largest oil fields located north of Edmonton. Now, oil development has shifted to the Athabasca Oil Sands, in Northeastern Alberta, which contain the 3rd largest crude oil resource in the world. Alberta currently produces 2.5 million barrels per day of crude oil of which about 78% is raw bitumen from oil sands. A large portion of the bitumen produced is upgraded to a lighter, more valuable synthetic crude oil that is provided to domestic and international refineries for further processing.

Natural gas fields are located throughout Alberta with higher concentrations on the eastern side of the province. There has been a renaissance in natural gas drilling with the discovery of shale gas and coal bed methane.

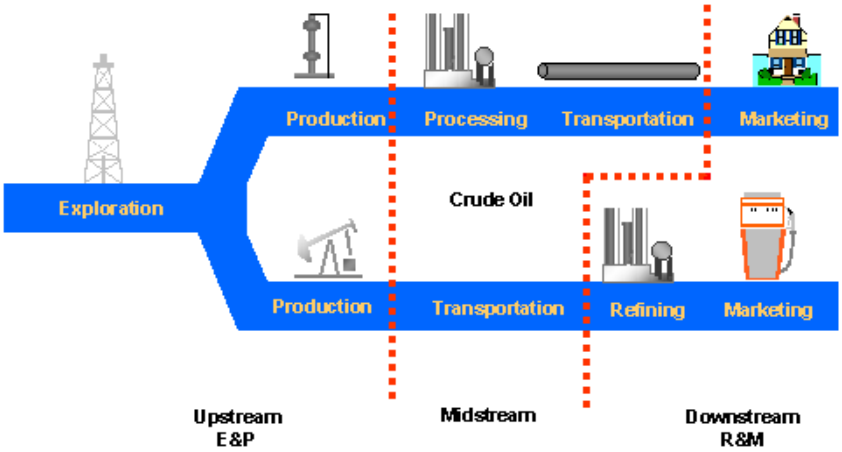
Most oil and gas processing and refining occurs near Edmonton but most oil company head offices are located in Calgary. Canada's largest concentration of petroleum, petrochemical, and chemical processors are located just northeast of Edmonton. Alberta has 4 major ethylene plants – two of which (Joffre and Fort Saskatchewan) are among the largest in the world

The oil and gas industry in Alberta nearly tripled in size between 2003 and 2013. Alberta's customers for oil and gas are the rest of Canada and the United States

The oil and gas industry in Alberta is dominated by multibillion-dollar companies like Suncor Energy, Enbridge, Husky Energy and Cenovus Energy but there are also thousands of smaller oil and gas technology and services companies in the industry. The Olds Area has a strong oil and gas technology and services industry.

<u>Oil and Gas Value Chain</u>

The upstream oil and gas industry in Canada is highly competitive, with hundreds of exploration and production firms. The natural gas gathering and transmission pipeline network is owned and operated by several private companies.



Source: http://www.petrostrategies.org/Learning_Center/oil_and_gas_value_chains.htm

Oil and gas technology and services is focused on upstream-related oil and gas equipment and services. Upstream-related products and services include exploration, seismic and geological services, drilling and completions, and advanced production techniques. This industry focuses on such areas as: multilateral drilling technologies, non-invasive drilling fluids, swell packer stimulation technologies, coiled tubing expertise and benefits, innovative pumping technologies, non-traditional well configurations, and geo-steering of horizontal wells in real time.

Oil and gas equipment is another important product area for companies in Alberta as they work to improve extraction technologies such as advanced seismic and horizontal drilling for conventional oil and gas and Steam Assisted Gravity Drainage (SAGD) to recover heavy crude.

Areas for R&D include reservoir characterization from drill cuttings, fracture design and fluid selection, fracture and produced fluid recovery, drilling and fracture stimulation of under-pressured and water sensitive reservoirs, stratified reservoirs, fracturing sand supply and use, use of non-potable water for drilling and fracturing operations, and remediation of settling ponds in the oil sands.

Oil and Gas Cluster

Alberta has a strong economic cluster in oil and gas and can be a world leader in innovative technologies for exploration, and development and production of oil and gas. Calgary, in particular, has a local investment community that is very savvy about innovative applications for the energy sector. Innovate Calgary's strategic focus is, in fact, on energy technology because it is seen as an area that Alberta can excel in.

Alberta	Revenues	# of firms	Employment
Oil and Gas	$111 billion (2014)	8,600 (AB gov 2014) or 6015 (Industry Canada, 2013)	110,000 (2014)
Refined and upgraded petroleum	$22.6 billion (2014)	9	8,000 (estimated)

Source: http://www.albertacanada.com/business/industries/og-about-the-industry.aspx and http://www.albertacanada.com/business/industries/rpb-about-the-industry.aspx

Beginning in 2014, there has been a global over-supply of oil that has caused oil prices to decline. The reasons for the over-supply include:

- Supply is up. New technologies have allowed US companies to extract oil from shale deposits and Canadian companies to use Steam Assisted Gravity Drainage to extract oil sands, adding more oil to the global supply. Geopolitical conflicts (civil war in Libya, ISIS in Iraq, sanctions in Iran) have calmed somewhat and more oil is back on the market from these oil producing regions.
- Demand is down. Demand for oil in places like Europe, Asia, and the US began tapering off due to weakening economies, new efficiency measures, more fuel efficient cars, and cut-backs on gasoline subsidies for fuel users.

Some oil companies have cut production and laid off employees with the drop in oil prices. There was an estimated loss of 17,000 oil and gas jobs in Alberta in 2014/15 as conventional oil companies cut production.

The Olds Area

Conventional light oil in Alberta is a mature industry with most of the recoverable oil reserves already produced and production declining by three to four percent per year. Conventional heavy oil is also past its production peak with a future of long-term decline. Alberta expects its light-medium crude oil production to decline by 42% from 2006 to 2016, while it expects heavy crude production to decrease by 35% over the same period. However, it also expects bitumen and synthetic crude oil from oil sands will considerably more than offset the decline in conventional crude oil and account for 87% of Alberta oil production by 2016[4].

Oil and gas production in the Olds Area has fallen – with gas production declining 3.5% between 2004 and 2009 while oil production fell almost 24% during the same period. The region's total gas potential represents 13.2% of Alberta's overall reserves, and oil potential is 17.2% of Alberta's conventional reserves[5].

Every major oil and gas company in Canada has its head office within one hour of the Town of Olds as do the industry's major trade associations. All the players in the oil and gas industry from exploration and seismic companies, pipeline companies, manufacturers, oil field service companies, drilling companies, trucking companies, and engineering and consulting firms can all be found in this Area.

The National Energy Board (Canada's national energy regulator), the Alberta Energy Resources Board, the Alberta Utilities Commission, the Natural Gas Exchange, the Canadian Association of Petroleum Producers, and the TSX Venture Exchange are all located in Calgary. Red Deer hosts the annual Red Deer Oil and Gas Expo and is home to Red Deer College's Centre for Innovation and Manufacturing.

There are several hundred oil and gas field services companies, drilling companies, and metal manufacturers in the Olds Area. Many are focused on conventional oil or conventional/unconventional gas (including coal bed methane and shale gas) but some have transitioned to doing work in the oil sands. Many work internationally.

The largest oil and gas companies working in the Area include:

- Suncor Energy – petroleum refining (12,000 employees)
- Imperial Oil – petroleum refining (+/- 9000 employees)
- Flint Energy Services – oil and gas field services (+/- 8800 employees)
- ATCO Ltd. – power and electricity (+/- 7700 employees)
- Ensign Energy – drilling (7355 employees)
- Shell Canada – crude and natural gas (6600 employees)
- Precision Drilling – drilling (6800 employees)
- Canadian Utilities Ltd – natural gas distribution (5700 employees)
- Canadian Natural Resources – crude and natural gas (+/-4700 employees)
- Husky Energy – oil and gas exploration (4380 employees)
- CITIC Canada Energy Ltd – crude and natural gas (4300 employees)
- TransCanada Corp – natural gas transmission (4165 employees)
- Trican Well Service – oil and gas field services (4100 employees)
- Nexen Inc – oil and gas exploration (3900 employees)

[4] *Source: https://en.wikipedia.org/wiki/Western_Canadian_Sedimentary_Basin*

[5] *Source: http://www.albertacanada.com/business/statistics/central-energy.aspx*

Smaller companies working in and around the Red Deer region include:

- Taqa North
- Advantage Oil and Gas Ltd.
- Parkland Fuel Corporation
- Schlumberger Coil Tubing Services
- Abacus Datagraphics Ltd
- Quinn's Energy Services
- Weatherford Canada Partnership
- High Arctic Energy
- Enhanced Petroleum
- Crater Lake Drilling
- Cathedral Energy
- Calfrac Well Services
- Iroc Energy Services
- Lonkar Well Testing
- Ok Drilling Services
- Predator Drilling
- Rezone Well Servicing
- Roll'n Oilfield Industries
- Terracco Drilling
- Trinidad Drilling
- Western Vacuum Service
- Amoco Canada Petroleum Company Ltd
- Apache Canada Ltd
- Canetic Resources Inc
- Caroline Petroleums (1985) Ltd
- Conoco Phillips Canada
- Devon Canada Corporation
- Enerplus Group of Companies
- Fodor Drilling Ltd
- Ineos Canada Partnership
- N A L Resources Joffre Field OFC

The oil and gas industry is supported by a variety of associations including: C-FER Technologies, Canadian Association of Geophysical Contractors, Canadian Association of Mining Equipment and Services for Export, Canadian Association of Oilwell Drilling Contractors, Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association, Canadian Energy Research Institute, Canadian Heavy Oil Association, Canadian Society of Exploration Geophysicists, Canadian Society of Petroleum Geologists, Canadian Association of Oilwell Drilling Contractors, Canadian Society for Unconventional Resources, Canadian Oilfield Services and Supply Directory, Chemistry Industry Association of Canada, Enform (safety certification), Gas Processing Association Canada, Oil Sands Developers Group, Petrinex, Petroleum Services Association of Canada, and the Petroleum Technology Association of Canada.

Funding and Financing

Oil and gas companies have access to a wide-range of private-sector options for financing including bank loans, the bond market, project partners, venture capital, private equity and export credit agencies. Governments also provide subsidies and favourable tax programs for oil and gas exploration and development companies. There are 3 main programs:

- The Canadian Development Expenses program, estimated at $478 million in 2009. These are expenses incurred in the drilling, converting and completing of oil wells or mine shafts in Canada that can be accumulated by an operating company in a Cumulative Canadian Development Expenses pool.
- The Canadian Exploration Expenses program, estimated at $233 million in 2009. This program allows oil, gas and mining companies to deduct the entire amount of exploration expenses in the year that they are incurred.
- The Flow-through Share program, estimated at $157 million in 2011. Corporations that have incurred exploration and development expenses can issue what are called flow-through shares in order to transfer to investors the tax deductions related to these expenses, up to the value of the shares.

The International Monetary Fund estimates that governments in Canada provide $840 million in producer support to oil companies and an additional $440 million in producer support to natural gas. Canada does not tax externalities like traffic accidents, carbon emissions, air pollution and road congestion.

In addition, although the province of Alberta charges oil, gas, and mining companies royalties when they develop a resource, the royalty rates in Alberta are lower than in the US. The government of Alberta is the owner of 81% of the mineral rights in the province and sets the terms and conditions for development and the royalty rates. In the case of conventional oil and natural gas, the amount of royalties depends primarily on how much oil and gas is produced, and on the price received for those resources. In the case of oil sands, the amount of royalties depends on a formula that involves the price received for the resources and the allowable costs involved in producing and selling the resources.

Wages and Education

Overall, the Canadian oil and gas industry has not had historically high labour productivity levels. However, this is almost entirely due to the high manpower requirements for conventional oil and gas. Unconventional oil production (i.e. oil sands), particularly new methods of injecting steam deep underground to extract oil from sand, are allowing producers to boost output with fewer workers thereby increasing labour productivity. Conventional oil production in Canada declined nearly 15 per cent between 2007 and 2012, but the workforce grew from 34,600 to 49,200. Meanwhile, unconventional producers are getting more oil and gas with fewer workers. Output grew 53 per cent from 2007 to 2012, but employment dropped to 16,300 from 18,2006.

In the oil sands, companies that operate open-pit mines employ between 800 and 4,000 workers while “in-situ” plants (those using SAGD technology) employ between 30 and 65 workers. There are more in-situ operations in development than surface mines7.

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[6] *Source: “The Impact of the Oil Boom on Canada’s Productivity Performance, 2000-2012.”Andrew Sharpe and Bert Waslander of the Ottawa-based Centre for the Study of Living Standards. Fall 2014 issue of the International Productivity Monitor.*

[7] *Source: http://www.woodbuffalo.net/LMIResources/LabourMarketNews/labourmarketnews.html#oilsandsjobs*

Jobs

Some of the best and brightest people in the world have been attracted to this area because of Alberta's economic growth and opportunity. Calgary, for example, is said to have the highest concentration of engineers and engineering technologists in Canada. Many occupations in the oil and gas industry are skilled and require training including petroleum engineer, geologist, geophysicist, engineers, land surveyors, technicians, technologists, lawyers, and business administrators.

Journeyman Trades required in the oil and gas industry include crane operators, heavy-duty equipment mechanics or technicians, industrial electricians, industrial instrument mechanics, industrial mechanics and millwrights, insulators, machinists, rig technicians, steamfitters and pipefitters, and welders.

In the oil sands, in particular, workers do not start as labourers and work their way up; instead, skills are acquired by completing certificate, diploma, or degree programs. Key jobs include power engineers, process operators, heavy equipment operators (at open pit oil sands mining sites), heavy equipment mechanics and technicians, and engineering technologists.

There are, however, many jobs in oil and gas that do not require training or certification (other than a valid driver's license and safety training). These include pipeline labourer, helper (perforator loader, tubing, well pulling, wireline), oilfield labourer, shop hand, swamper, seismic helper and lease hand, survey crew worker, construction labourer, truck driver (Class 1 and 3), and heavy equipment operator .

Wages

Salaries in oil and gas are much higher than in other industries in Alberta. For example, the average wage is between $26 and $31/hour for oil and gas well drilling, services, testing, and labourer jobs with average annual salaries between $73,000 to $90,000/year. Professional, engineering, technical, and managerial jobs pay even higher wages[8].

Education

In the past, it was often possible for people to start working in the oil patch as a labourer or "rig pig" (for very good wages) and work their way up into supervisory and managerial jobs. However, increasingly, due to technological changes and safety concerns, formal education has become a job requirement. Post-secondary institutions, including the University of Calgary's Schulich School of Engineering and Institute for Sustainable Energy, Environment & Economy, and SAIT Polytechnic's MacPhail School of Energy offer education and training in all major areas of the energy industry including (but not limited to): petroleum, electrical, chemical, mechanical, geomatics and oil and gas engineering.

Closer to the Town of Olds, Olds College and Red Deer College train students in several oil and gas related occupations.

Educational Programs	College	# of graduates/year	Average wage	Jobs
Land Analyst and Land Agent diplomas	Olds College	60	$37.95/hour	Surface Land Agent Land and records administrator

[8] *Source: http://occinfo.alis.alberta.ca/occinfopreview/info/browse-wages.html*

				Surface land coordinator Project analyst Community relations representative Lease records analyst
Agricultural and Heavy Equipment technicians (certificate 30, diploma 30)	Olds College and Red Deer College	84 plus 12 Pre-employment Heavy equipment technicians at Olds College (2015)	$31.79/hour	Heavy Equipment Technicians, Mechanics
Heavy equipment operators	Olds College	32 (2015)	$31.92/hour $77,543/year	Heavy equipment operators
Welders	Olds College and Red Deer College	165 Apprentice students from Olds College plus 12 pre-employment welders (2015)	$33.79/hour $74,839/year	Welders
Rig Technician Apprenticeship	Red Deer College		$31.11/hour $76,496/year	Oil and Gas Rig Worker
Upstream Oil and Gas Safety Training certificate	Red Deer College – Continuing Education			
Power Engineering Certificate	Red Deer College – Continuing Education			Operate power, heat, refrigeration and utilities for industrial and commercial facilities
Electrical Engineering Technologist diploma	Red Deer College		$36.95/hour	
Instrument Technician	Red Deer College			
Millwright	Red Deer College			
Steamfitter/Pipefitter	Red Deer College			

Agriculture Industry

Key Messages

Workers

- *Agriculture is a large, important industry in Alberta worth more than $20 billion/year in revenues.*
- *Directly employs 80,000 people in Alberta.*
- *Many people in the area grew up on farms and have a strong farm work ethic and a respect for food production that is prized by employers. 19% of Albertans (700,000 people) live in a rural area.*
- *People in the area are hard workers. The labour force participation rate is 75%*
- *Average wage for an agricultural worker is $18 to $20/hour.*
- *Employers may access the Seasonal Agricultural Workers program if local employees are unavailable.*
- *The largest agricultural college in western Canada, Olds College, is located in the Town of Olds. The college offers certificates, diplomas, and applied degrees as well as custom-designed corporate training.*
- *Olds College graduates more than 600 students per year from agriculture or food-processing related programs*

Inputs and Supplies

- *Abundant land and water, a widely dispersed rural population, easy access to the large US market, and emerging global demand for food make agriculture attractive in Alberta.*
- *Alberta's agricultural producers are some of the best in the world.*
- *Central Alberta is one of Alberta's top two agricultural regions, accounting for more than 15% of the province's farm cash receipts, cropland and livestock, and is the top-ranked region for employment in this industry, accounting for 19% of Alberta employment in the agricultural industry.*
- *The area is a main producer of hogs, poultry, cattle, barley, canola, hay, and spring wheat.*
- *Food processing is growing. We are home to hundreds of agricultural processors and feed manufacturers.*
- *There are dozens of meat processing facilities in the Olds Area - including the largest pork processing facility in the province and Alberta's only federally inspected processing facility for lamb*
- *There is strong government support for primary agricultural production in Alberta*
- *Three major agri-food research centres are located in the Area.*
- *The province expects a large turnover in farm ownership over next 10 years as farmers retire. This will create an opportunity to buy farmland.*

Markets and Transportation

- *The infrastructure for agriculture in Alberta is excellent. Over the past 15 years, Western Canada began seeing significant consolidation and upgrading of elevator and rail infrastructure.*
- *Alberta offers easy access to the large US market via the primary highway in Alberta as well as rail lines*
- *The area is close to locally large markets in Edmonton and Calgary with excellent rail and HW access*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

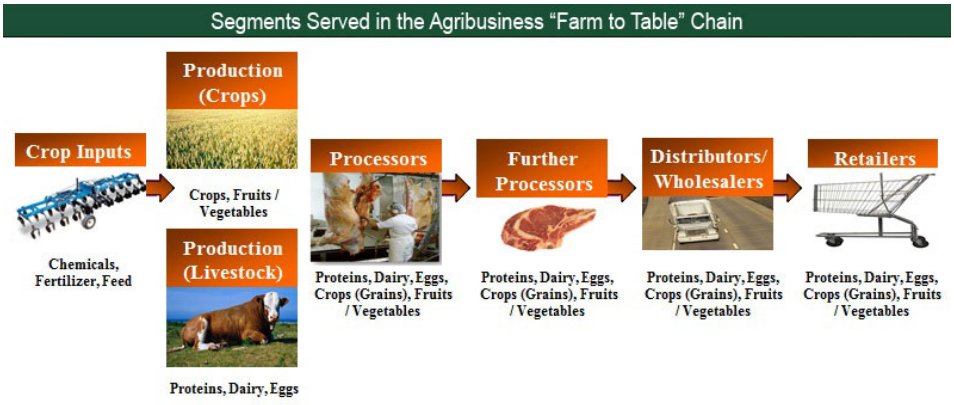
Agriculture has been a key industry in Alberta since the 1870s. The climate in Alberta is dry and temperate with extreme variations between seasons. Productive soils are found in most of the southern half of the province and in certain parts of the north. Agriculture includes both livestock and crops.

Currently Alberta produces almost half of all cattle in Canada, as well as other livestock (dairy, hogs, poultry and eggs) in lesser quantities. The cattle industry is highly efficient and globally competitive in Alberta; however, the Canadian cattle industry has seen declining production for a decade due to the BSE crisis in the mid 2000's, droughts, US protectionism (i.e. country of origin labelling), and less demand because the general public is eating less meat.

Crops are canola, along with spring wheat, barley, oats, rye, peas, and sugar beets. The 2011 Census of Agriculture showed that canola surpassed spring wheat for the top spot among field crops in Alberta. Production is very efficient and export-oriented. Grains are trucked to high-throughput grain elevators located on rail lines for shipping to markets.

Although the value of agricultural production continues to grow, the number of farmers is steadily declining and the size of farms is steadily increasing. The demographics of Canadian agriculture are changing quite rapidly as many farm operators are approaching retirement age. The 2011 Census of Agriculture found that farms where the oldest operator was 55 years or older represented more than half of all farms in 2011, compared to 37.7% in 1991. This trend was found in farms of different types and sizes in all provinces. The trends - fewer operators, fewer young operators, and fewer farms - show no signs of reversing and may indicate more consolidation and significant turnover in farm assets in the future[9].

The Canadian agriculture and agri-food system is a complex and integrated supply chain which includes input and service suppliers, primary producers, food and beverage processors, food retailers and wholesalers, and foodservice providers. The activities along this supply chain generate significant economic benefits at both the federal and provincial levels.



Source: http://www.tritoncap.com/focus.html

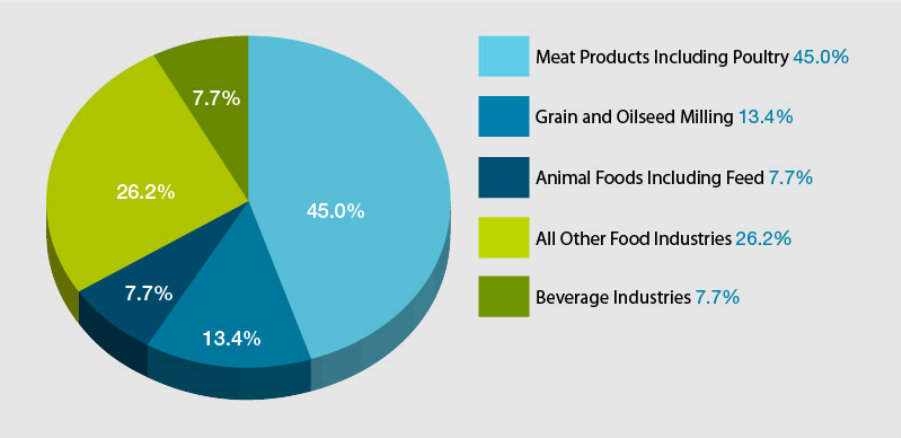
Agri-food Processing

[9] *Source: http://www.statcan.gc.ca/pub/96-325-x/2014001/article/11905-eng.htm*

As of 2013, almost 60% of Alberta's food and beverage manufacturing industry was concentrated in two segments: meat products and grain and oilseed milling. In 2013, nearly 45% of food manufacturing sales were concentrated in the meat products segment. Although meat products dominate the agri-foods business in the province, companies produce everything from staples like bread, dairy and margarine to specialty items such as pierogi, baby food, gluten-free products, and elk velvet capsules.

Alberta Food and Beverage Sales by Type

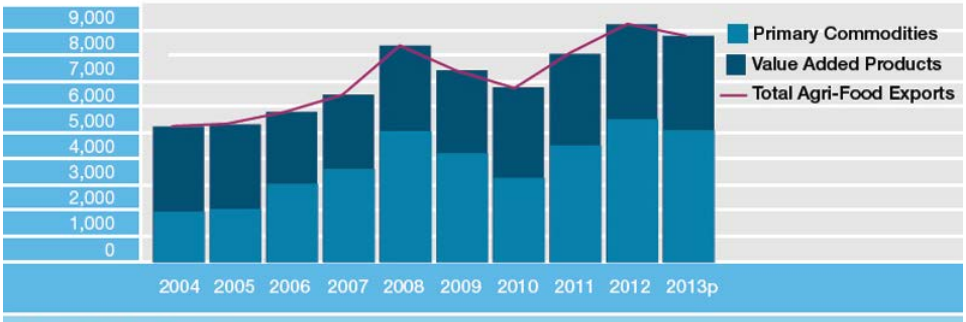
2013 Preliminary (1)



(1) The data shown in this table are preliminary estimates and are subject to revision.
Final 2013 annual estimates will be available in June, 2014
Other Foods (Including Snack Foods) and Miscellaneous Foods data is not available due to confidentiality
Source: Statistics Canada
Prepared by: Statistics and Data Development Branch, Alberta Agriculture and Rural Development

Alberta is Canada's second largest exporter of agri-food products with 20.7% of Canada's total agri-food exports headed to the U.S., Australia, Japan and China. In general, exports of agri-food have grown over the past decade. About 40 processing companies in the province are responsible for the majority of those exports, and most deal in meat.

Alberta Agri-Food Exports, 2004-2013, Value $ Millions



Source: Statistics Canada
Prepared by: Statistics and Data Development Branch, Alberta Agriculture and Rural Development

There has been ongoing consolidation in the food processing industry in Alberta. The industry is a mix of micro, small and medium, and large companies. Plenty of big companies source product and/or sell into the Alberta market including Cargill, Olymel, Maple Leaf Foods, Lucerne, Agropur, McCain, and JBS Foods.

Alberta	Revenues	# of firms	Employment
Farming (primary production)	$12.9 billion (2014) farm cash receipts	43,234 farms (Statistics Canada, 2011) 4,454 of these larger farms (over $500,000 in revenues) accounted for 70.6% of total provincial gross farm receipts reported for the year 2010. or 17,300 agricultural businesses (AB gov , 2014) or 5584 crop and livestock establishments (Industry Canada 2013)	63,300 (AB gov, 2014) or 62,050 farm operators (Statistics Canada, 2011) In Alberta 29.6% of all farms in the province reported paid labour for the year 2010. The census counted 37,852 paid employees, of whom 41.2% worked year-round in a full or part-time capacity while 58.8% were seasonal or temporary employees.
Food and beverage processing	$8.8 billion or $12.6 billion	Estimated 507-578 firms	Estimated 22,700 (2014). Various sources indicate somewhere between 22,900 and 26,400 employees. .

Source: http://www.albertacanada.com/business/industries/agrifood-about-the-industry.aspx and http://work.alberta.ca/documents/industry-profile-agriculture.pdf and http://www.statcan.gc.ca/pub/95-640-x/2011001/p1/prov/prov-48-eng.htm and http://economicdashboard.albertacanada.com/FarmCashReceipt

Machinery Manufacturing and Fertilizer Production

Machinery manufacturing and fertilizer production are the upstream components of the agricultural value chain. In 2010, machinery manufacturing firms in Alberta generated $5.6 billion in revenue (an increase of 31 per cent from 2004)[10]. The industry employs 20,000 and is the third-largest employer in the manufacturing sector. Within this industry, agriculture-related manufacturing generates $210 million in revenue (four per cent of total machinery manufacturing revenue) and employs 690 workers. While this group is small, it is growing. Revenue doubled from 2005, and the group added 100 workers. The same industry in Saskatchewan is much larger with revenue in 2010 of $844 million, employing 4,400. Saskatchewan's implement and farm machinery industry exported $361 million in 2011. Manitoba did $534 million. In Alberta, the figure was $72 million. This is partly because metal and machinery manufacturing in Alberta is highly concentrated on the oil and gas industry.

Fertilizer manufacturing in the prairie provinces is very strong. Alberta is strong in ammonia and urea production because of our cheap natural gas.

The Olds Area

The Olds Area is a primary agricultural area in the province. The area is a main producer of hogs, poultry, cattle, barley, canola, hay, and spring wheat[11].

[10] Source: Sift Everything Alberta's Agriculture Advantage AN EVIDENCE-BASED GUIDE TO THE SECTOR'S STRENGTHS AND INNOVATION OPTIONS http://bio.albertainnovates.ca/media/56485/130604_aibio_agriculture_final_report.pdf

[11] *Source: http://www.albertacanada.com/business/statistics/central-agriculture.aspx*

The Area's agri-business industry includes livestock, plant, food processing, natural health products and biofuels. Red Deer is home to Western Canada's largest indoor/outdoor agriculture exhibition, Agri-Trade. The Calgary Stampede is the largest Agricultural Society in Alberta.

The Olds Area is home to hundreds of agricultural processors and almost one-third of the province's feed manufacturers. There are dozens of meat processing facilities - including the largest pork processing facility in the province and Alberta's only federally inspected processing facility for lamb – and three major agri-food research centres in the region.

Major employers in agri-business in the Area include:

- Olymel S.E.C. – pork slaughter and packing plant
- Permolex – flour, gluten, and ethanol plant
- SunGold Meats – lamb slaughter and packing plant
- RAHR Malting – malt plant
- Nossack's Fine Meats Ltd – meat plant
- Canadian Premium Meats – meat plant
- Nestle Purina Pet Care – pet food
- Transfeeder Inc. – compressed hay
- Barr-Ag Ltd. – compressed hay
- XL Foods – meat slaughter and packing plant. > 500 employees
- Centennial Food Service - meat packaging and food distribution. > 500 employees
- Vantage Foods – meat packaging. +/- 300 employees
- VAP Holdings – meat slaughterhouses +/- 300 employees
- Mrs. Willman's Baking Ltd – bread, cakes, etc. +/- 200 employees
- Canada Malting Co. – malt plant +/- 200 employees
- Bouvry Exports – meat slaughterhouse and packing +/- 150 employees
- Whistler Brewing Company – beer +/- 150 employees
- Big Rock Brewery – beer +/- 100 employees
- Alberta Distillers Ltd – liquor +/- 100 employees

Agriculture is an area of interest to the Olds College Centre for Innovation (OCCI). OCCI offers specialized facilities and expertise in the area of agri-food production, processing, analysis, certification and waste management. Our Olds College farm is home to field trials for agricultural companies including varietal testing, novel fertilizers and pesticide trials. Olds College hosts the Bayer Crop Science regional research facility. OCCI also manages a sophisticated handling and Growsafe TM system for the evaluation of feed efficiency in livestock, including cattle and sheep. OCCI continues to provide feed efficiency testing on bulls in order to identify efficient sires at a younger age, and improve the profit margin and competitiveness for many Canadian beef cattle producers. The recent renovation and re-branding of the National Meat Training Centre and the acquisition of specialized equipment will renew and reinforce our ability to serve the Canadian meat industry's needs for product and process innovation and enhanced quality assurance. We offer services, expertise and access to facilities for crop processing, fermentation, pilot incubation, quality analysis and certification through our Bioindustry Resource Centre and Analytical Laboratories. Research greenhouses allow for phytotoxicity trials and testing of biocontrol agents in agri-food production.

OCCI is home to four distinct laboratories with specialized and unique expertise and equipment. The wet chemistry analytical laboratory is equipped with gas chromatography, high pressure liquid chromatography, mass spectrometry, inductively coupled plasma spectrometry, and microwave digestion. Other laboratories are dedicated to bioprocessing, plant physiology, and environmental microbiology.

List of Laboratories:
Bioactive Ingredients and Quality Control - Lab 358 / 359
Applied Microbiology - Lab 370 / 370A / 370B / 370C
Plant Stress Physiology - Lab 363
Micro-processing - Lab 360 / 361

Government is the dominant funder of research in agriculture in Canada[12]. Research facilities, in addition to the Olds College Centre for Innovation, include:

- Lacombe Research Centre – food safety, red meat quality, carcass grading, cereal breeding, forage/beef production, and honey bee production
- Field Crop Development Centre in Lacombe – cereal crops, barley, malt
- Food Processing Development Centre in Leduc
- Crop Diversification Centre South in Brooks – horticulture, Saskatoon berry and other fruit releases, post-harvest handling, storage of fruits and vegetables
- University of Alberta Department of Agricultural, Food, and Nutrition Science

There are over 250 business associations and government programs supporting agriculture in Alberta making it the most institutionally supported industry in the province[13]. The agricultural industry is supported by dozens of associations and agricultural commissions as well as the provincial department of Agriculture, Food, and Rural Development and the federal department of Agriculture and Agri-Food Canada.

Funding and Financing

The federal government aggressively supports agriculture and provides about 59% of all support to the sector[14]. Direct program payments, typically amounting to around $700 million/year in Alberta, are triggered when pre-program, on-farm revenue falls below a rolling historical average. Support payments level out the total market cash receipts. The payments keep farmers in business when volatility might otherwise drive them out.

There are also a variety of support and insurance programs for agricultural producers. Growing Forward is a joint federal/provincial government initiative to provide funding to help the agricultural industry in the areas of:

- research and innovation
- environmental stewardship
- food safety
- biosecurity
- business management
- market development

[12] http://bio.albertainnovates.ca/media/56485/130604_aibio_agriculture_final_report.pdf
[13] http://bio.albertainnovates.ca/media/56485/130604_aibio_agriculture_final_report.pdf
[14] http://bio.albertainnovates.ca/media/56485/130604_aibio_agriculture_final_report.pdf

- traceability
- livestock welfare
- energy efficiency and
- water management.

The main agricultural lenders in the province are Alberta Financial Services Corporation (AFSC) and Farm Credit Canada (FCS). The Agriculture Value Added Corporation (AVAC) invests venture capital in ag-tech companies.

Wages and Education

Farming employment in Canada peaked in 1920 and then fell due to increased productivity, automation, innovation in farming practices such as improved fertilizers and pesticides, higher yield varieties of plants and breeds of animals, improved irrigation practices, more efficient farm management, and farm consolidation. Between 2009 and 2013, labour productivity for the Agriculture, Forestry, Fishing and Hunting sector increased 4.6% per year on average. In comparison, labour productivity for the Canadian economy as a whole only increased 0.9% per year[15]. Agriculture in Alberta is a very efficient industry with excellent supply chains and transportation and distribution systems.

The Seasonal Agricultural Worker Program allows employers to hire temporary foreign workers when Canadians and permanent residents are not available. The workers must be citizens from Mexico or participating Caribbean countries, production must be in specific commodity sectors, and the activity must be related to on farm primary agriculture.

Jobs

Alberta's agriculture sector doesn't employ many people and doesn't attract many graduates (about 2.0%)[16].

Most occupations in agriculture do not require specialized training or certifications. Typical jobs in agriculture include: farm operator/supervisor, farm worker, dairy or swine herdsperson, agricultural equipment operator, pen checker/feedlot attendant, truck driver, cattle herd health position, horse trainer, agricultural equipment salesperson/manager, agronomic advisor/specialist, agricultural lenders/bankers, agricultural industry association positions, grain buyer, crop specialists, chemical sales person, feed mill personnel, food processing worker, etc.

Wages

Wages for agricultural workers tend to be lower than in other industries. For example, an agricultural worker makes about $15.50/hour while a general labourer on an oil and gas rig makes about $31.11.

Education

Olds College and Red Deer College train students in several agricultural-related occupations.

Educational Programs	College	# of graduates/year	Average wage	Jobs
Meat Processing certificate	Olds College	24	$19.03/hour $37,532/year	• Professional retail or industry meat cutter • Value added meat processor • Slaughter man • Own and operate a business

[15] *Source: Statistics Canada, CANSIM table 383-0012, 2009 to 2013.*

[16] Alberta's agriculture sector doesn't employ many people and doesn't attract many graduates (about 2.0%).

				venture
Horticulture – Technician, Technologist, Applied Degree	Olds College	55	Landscape gardener $22.93/hour $49,630/year Greenhouse or nursery operator $27.11/hour Turfgrass management $22.93/hour Market gardener $23.72/hour	• Nursery production • Greenhouse production • Field vegetable production • Urban tree care • Pest control • Parks and recreation departments • Landscape contractors • Landscape architects • Environmental remediation firms • Horticultural equipment and material suppliers/manufacturers • Tree Nurseries • Garden Centres • Agri-tourism Operations • Urban Agriculture Operations • Golf course horticultural operations
BrewMaster and Brewery Operations diploma	Olds College	24	Agricultural products machine operator $19.10/hour	• Beer maker • Brewery operations • Brew pubs • Malting plants
Agricultural Management diploma and Agribusiness applied degree	Olds College	90	Agrologist $41.93/hour Livestock and poultry producer $23.72/hour Farm worker $18.23/hour Dairy producer $23.72/hour	• Managing farms and agricultural operations • Livestock, poultry, crops, dairy producers • Agricultural suppliers (equipment, chemicals, etc.) • Agricultural lenders • Lab technicians • Agronomist
Equine diplomas (50) Farriers certificate (16) Exercise Rider and Jockey training certificate (15) Race Horse Groom certificate (15)	Olds College	96	Farrier $19.51/hour Groom $14.43/hour	• Farrier • Groom • Exercise rider • Riding coach • Horse production and breeding • Equine event management
Animal Health Technology diplomas, Vet Medical Receptionist, and Vet Technical Assistant certificates	Olds College	120	Vet receptionist $18.36/hour Animal health technologist $22.28/hour	• Vet clinic assistants and receptionists • Research facilities • Feedlots • Wildlife rehabilitation • Pharmaceutical companies • Animal shelters
Cattle Artificial Insemination course	Olds College – Continuing Education	38		
Agronomy certificate	Olds College – Continuing	10		Trained crop scouts

	Education			
Fibre Week	Olds College – Continuing Education	200		Weavers; llama, alpaca, sheep producers, milling
Hort Week	Olds College – Continuing Education	125		Landscape gardeners, market gardeners, greenhouse production
Landscape Gardener apprenticeship	Olds College	99		Landscape gardener
Agriculture Food Business Management degree	Red Deer College plus university transfer		Agrologist $41.93/hour	
Agriculture Bachelor of Science	Red Deer College plus university transfer		Agrologist $41.93/hour Food Scientist $40.98/hour Food Science Technologist $30.72/hour	
Veterinary Medicine	Red Deer College plus university transfer		$49.21/hour	

Information Communication Technology

Key Messages

Workers

- *Growing industry in Alberta with $11 billion in revenues.*
- *Key areas of expertise are: Information Technology, Digital Media, Electronics, Wireless and Telecommunications, and Geomatics*
- *Employs 50,000 people.*
- *Originally driven by oil and gas, now diversified into health, education, government, and other areas.*
- *Well-paying, profitable industry*
- *Alberta's third largest value-added sector*
- *Although local colleges don't provide specific training in this area, workers may be attracted to Central Alberta because of our high quality schools, safe neighbourhoods, clean air, sparse traffic and free parking, and proximity to Calgary and the Rocky Mountains*

Inputs and Supplies

- *Alberta has a large, sophisticated and growing ICT industry with an international reputation for innovation.*
- *The province has advanced infrastructure and exceptional centres of research*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

Markets and Transportation

- *The area is close to Edmonton and Calgary with excellent HW access*
- *The Calgary International Airport is less than 1 hour away*

Alberta's Information and Communication Technologies (ICT) sub-industry, with its origins in oil and gas related applications, consists of companies with expertise in diverse business areas including: bioinformatics, digital content, e-learning, global positioning systems, health management systems, nanotechnology, software development, systems integration, telecommunications, and wireless communications17. Over half of Alberta's fastest growing companies are in the Information and Communications Technology (ICT) sector[18].

Key institutions include the Banff New Media Institute, Alberta College of Art and Design in Calgary, and TR Labs in Calgary.

Alberta Industry	Revenues	# of firms	Employment
Information and Communications Technology	$11.4 billion	4,500 companies in ITC (AB gov, 2012) or 1,410 info and cultural	50,000 employees

[17] *Source: http://www.albertacanada.com/files/albertacanada/GOV_4A_Aberta_ICT_Industry_Profile.pdf*
[18] *Source: http://www.calgaryeconomicdevelopment.com/industries/technology*

		industry establishments (Industry Canada, 2013)	

Source: http://www.albertacanada.com/business/industries/ict-about-the-industry.aspx

The Olds Area

Employees in ICT work in all industry sectors and many companies have significant IT divisions that focus on software development and support services integral to their business operations. ITC companies in Alberta tend to be located in Edmonton and Calgary. Major employers in information and communication technologies in the Olds Area (mostly in Calgary) include[19]:

- Shaw Communications Inc
- CGI Systems Management Consultants Inc
- GE Power Systems Canada Inc
- Hemisphere GPS
- Nexen Inc
- Allstream Flextronics
- Colt Engineering Corp
- IBM Canada Limited
- Schlumberger Canada Ltd
- QC Data
- VIP International Corporation
- Bell West Inc
- Divestco Inc
- General Dynamics Canada Ltd
- Metafore Corp
- Amec Inc
- Spartan Controls Ltd
- Electromec Manufacturing Solutions Inc
- Raytheon Systems Canada Ltd
- RIS Resource Information Systems Inc
- Guest-Tek Interactive Entertainment Ltd
- Emerson Process Management
- BW Technologies Ltd
- TELUS
- Novatel Inc
- Veritas DGC Inc
- Hewlett-Packard
- Smart Technologies Inc
- Bell Canada
- Aspen Technologies

[19] *Source: http://www.calgaryeconomicdevelopment.com/sites/default/files/pdf/sector_profiles/info_communication_tech.pdf. Note: some of these companies are in industries other than ICT but they employ a large percentage of ICT workers.*

- Telvent
- Xerox
- Critical Mass Productions Inc
- Vantis
- Golder Associates Ltd
- IHS Energy
- Axia Netmedia Corp
- Cybersurf Corp

Olds' O-Net offers Canada's first community-owned and operated Fibre-to-the-Premises network. O-NET delivers unique broadcasting, phone and Internet services to residential and business customers, creating advantages such as the fastest Internet speeds in the country, the latest high-definition television features, fully customizable telephone systems, mass storage and virtual private networks. O-Net has allowed Olds College to implement a mobile learning initiative by taking advantage the full gigabit (1,000 megabits per second) of bandwidth.

Funding and Financing

The federal government supports information and communications technology through two main grant programs:

- Federal Scientific Research and Experimental Development (SRED) tax credits
- National Research Council/Industrial Research Assistance Program (NRC/IRAP) - advisory services as well as financial assistance for R&D activities in two core areas: youth employment strategies, and research and technology development activities.

Within Alberta, ITC companies can access capital through the Alberta Enterprise Corporation Fund and the Alberta Value-Added Corporation.

Wages and Education

Jobs

Most ICT companies in the Olds Area (almost ¾) are either in Information Technology or in Digital Media. Electronics, Wireless and Telecommunications, and Geomatics make up the rest of the ICT Industry.

ICT has 12 different occupational classifications. The most common jobs are information systems analysts and consultants, computer programmers, interactive media developers, and graphic designers and illustrators.

Wages

Typical wages in information and communication technologies are as follows[20]:

- Graphic Designer $26.81/hour
- Information Technology Specialist $43.06/hour
- Information Systems Consultant $43.06/hour
- Systems Auditor $43.06/hour

[20] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*

- Computer programmer $43.71
- Interactive Media Programmer $43.71
- Software Engineer $38.61
- Telecommunications Technologist $36.59
- Broadcast Maintenance Technologist $28.08/hour
- Computer and Information Systems Managers $49.42/hour
- Database Analysts and Administrators $40.06/hour
- Web Designer $28.80/hour
- Web Technician $37.93/hour
- Web Master $28.80/hour
- Creative Writer $37.47/hour

Education

The information and communication technology industry in Alberta is supported by a number of industry associations including the Alberta ITC Council, Digital Alberta, Alberta Geomatics Group, Calgary Council for Advanced Technologies, The Alberta Council of Technologies, INFOTECH Alberta, Calgary Technologies Inc, and TEC Edmonton.

Innovate Calgary is a partnership between Calgary Technologies Inc. and University Technologies International, to provide a variety of services to ITC companies, from business incubation and investment opportunities to office and lab space.

TRTech is Canada's largest not-for-profit information and communications technology research consortium, internationally recognized as a leading model for industry-university-government collaboration. TR-Labs also offers technology development services, including pre-certification testing and validation, and access to a demonstration environment.

The Banff New Media Institute (BNMI) has become a centre for digital media research and development in Alberta, across Canada, and around the world.

The School of ICT at SAIT offers a unique applied degree program, 16 diplomas, seven fast-track certificates as well as over 200 continuing education, distance education, professional training courses, and business and industry courses.

The University of Alberta in Edmonton is home to the iCORE-NSERC Multimedia Research Centre.

Other resources at post-secondary institutions in Alberta include[21]:

- Athabasca University - AU Research Centre
- University of Alberta - Alberta Ingenuity Centre for Machine Learning, Centre for Intelligent Mining Systems, Multimedia Advanced Computational Infrastructure
- University of Calgary - Advanced Database Systems and Applications, Centre for Information Security and Cryptography, Software Engineering Research Network (SERN is a joint venture of the Departments of

[21] https://www.albertacanada.com/files/albertacanada/GOV_4A_Aberta_ICT_Industry_Profile.pdf

Computer Science and Electrical & Computer Engineering), Centre of Excellence for Integrated Resource Management

Red Deer College trains students in a few ITC related occupations.

Educational Programs	College	# of graduates/year	Jobs
Motion Picture Arts, Applied Bachelor	Red Deer College		Cinematographers, Film directors, producers
Visual Art Diploma	Red Deer College		Illustrator, painter, sculptor
Data Analysis Certificate	Red Deer College, Continuing Education		

Life Sciences Industry

Key Messages

Workers

- *Very small but growing industry in Alberta, driven by health care needs and demographics.*
- *Generates $1 billion in revenues and directly employs 3500 people.*
- *Although local colleges don't provide direct training in this sector, workers may be attracted to Central Alberta because of our high quality schools, safe neighbourhoods, clean air, sparse traffic and free parking, and proximity to Calgary and the Rocky Mountains*

Inputs and Supplies

- *The Town of Olds is home to a capsule production facility that can do softgel and hard case capsule filling and packaging*

Markets and Transportation

- *Alberta offers easy access to the large US market via the primary highway in Alberta as well as rail lines*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

Life Sciences includes pharmaceutical, biotechnology, and medical technology and its growth is closely tied to changes in the broader health care industry such as an aging population, increasing population, rising wealth, increasing chronic diseases (cancer, diabetes, cardiovascular issues), increasing obesity, and access to health insurance and benefits plans.

Globally, the pharmaceutical segment was expected to generate all-time-high total revenues of $1.23 trillion in 2014, up from $1.15 trillion in 2013 and $1.13 trillion in 2012. This segment is affected by the rising demand for generic drugs, product safety issues and recalls, intellectual property disputes, corruption, and inappropriate marketing. The loss of revenue as huge patents expire is driving mergers and acquisitions. Life sciences companies are competing globally for increasingly scarce technical and professional skills[22].

Canada has 17 medical schools and over 100 teaching hospitals. Canadian universities tend to work closely with life sciences industry and many of the start-up companies in this industry spin out of university research or conferences. Canada has the 2nd largest number of biotech companies in the world, with the majority focused on human health. The National Microbiology Laboratory in Manitoba has been in the news recently because scientists there developed the newest, effective Ebola vaccination.

<u>Pharmaceuticals</u>

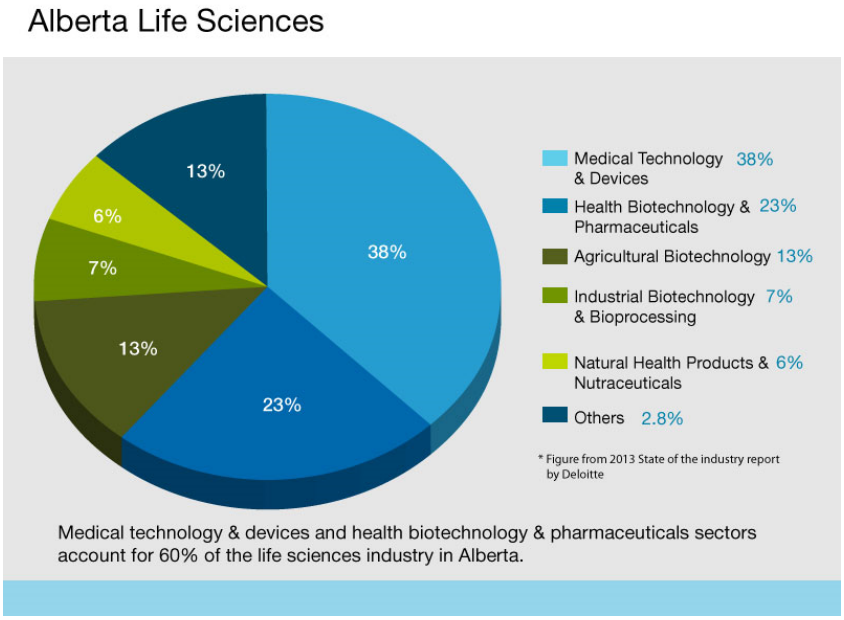
[22] *Source: http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-2015-life-sciences-report.pdf*

The largest pharmaceutical companies in the world have operations in Canada – often in R&D as well as manufacturing – because of the Canadian infrastructure, talent and access to key markets. The pharmaceutical industry is composed of companies developing and manufacturing medicines and generic pharmaceuticals, as well as over the counter drug products. Pharmaceutical companies are clustered mainly in Vancouver, Montreal and Toronto.

Medical Devices

Canada has particular strengths in medical devices including x-ray and radiation equipment, electronic diagnostic systems, and electro-medical devices. This segment of the industry is primarily based in the three largest provinces—Ontario, Quebec and British Columbia—with over 80 percent of the medical device industry located in the provinces of Ontario and Quebec.

Alberta has a small Life Sciences industry and slightly more than half of the industry is made up companies involved in medical technology and devices and in health biotechnology and pharmaceuticals. Key components in Alberta's medical devices and technology industry include: assistive & diagnostic devices, hospital equipment, medical imaging and medical/surgical supplies. Alberta has developed significant expertise in many areas of biotech including: bone and joint research, cancer research and treatment (especially reovirus, vaccines, diagnostics, and epidemiology), cardiovascular research, diabetes and islet transplantation research, and vaccines and infectious diseases.



Source: http://www.albertacanada.com/business/industries/ls-about-the-industry.aspx

Alberta has had significant success in the commercialization of nanotechnology and advanced materials with leading companies in the areas of design and manufacturing of nano/micro scale devices and MEMS and in the fields of circuits/chips, calibration systems and bio-detection and in films/coatings (including medical coatings). Alberta has internationally renowned expertise, infrastructure and resources in genomics, transcriptomics, proteomics and metabolomics.

One of the main issues for life sciences companies in Alberta is the lack of private venture capital. The exemptions are Avrio Ventures, located in Calgary (which invests in agricultural biotech on a national scale) and the provincial - government-backed venture program, called AVAC, which makes investments of between $500,000 and $1 million for companies in early development phases.

Alberta	Revenues	# of firms	Employment
Biotech	$1 billion	200	3500

The Olds Area

There are two initiatives at Red Deer College that could potentially support the Life Sciences industry. The first is the Centre for Innovation in Manufacturing (CIM). It houses $4.2 M in cutting-edge, industry-leading prototype and advanced manufacturing equipment. The CIM's primary focus is to engage with industry to provide design, 3D CAD (Computer Aided Design) modelling, design engineering, proof-of-concept and prototype fabrication services, among others.

The second initiative at Red Deer College is the Health Research Collaborative (HRC) - an applied research initiative developed between Red Deer College and Alberta Health Services. Its goal is collaborative applied research that effectively addresses health issues, improves health outcomes, and builds capacity for evidence-informed planning and decision making.

At Olds College, the Centre for Innovation (OCCI) is home to four distinct laboratories with specialized and unique expertise and equipment. The wet chemistry analytical laboratory is equipped with gas chromatography, high pressure liquid chromatography, mass spectrometry, inductively coupled plasma spectrometry, and microwave digestion. Other laboratories are dedicated to bioprocessing, plant physiology, and environmental microbiology.

The Area's life sciences industry includes the facility formerly operated by Banner Pharmacaps. Banner was bought out by US-based Patheon in 2013 which in turn sold the facility to Advanced Orthomolecular Research (AOR), headquartered in Calgary. The facility now operates under the name Olds SoftGels and manufacturers product for AOR. The Olds facility includes two GMP facilities capable of producing over 2.5 billion softgel capsules per year. The Main facility is 50,000 sq. ft. with the ability to produce softgel capsules, two piece hard shell capsule, and packaging. It has approvals from Health Canada, FDA, WHO GMP, USP, IFANCA and HALAL certification. The Containment facility is 14,000 square feet and has the capacity to do Softgel capsule production, liquid fill and packaging. It offers containment for cytotoxic, potent pharmaceuticals and new chemical entities with unknown toxicology. It has approvals from Health Canada, FDA, WHO GMP, USP & IFANCA .

- Calgary's Advanced Orthomolecular Research (AOR) produces nutrition-based pharmaceuticals.
- BioRefinex uses high pressure and saturated steam to denature organic material and destroy all pathogens while retaining the valuable nutrients. The end product is used for organic fertilizer and nutrient feedstock for biogas production.
- Apotex is the largest Canadian-owned pharmaceutical company. Its main business is manufacturing generic drugs. There is an Apotex office in Calgary.
- Covidien is focused on the development and commercialization of clinical and home healthcare products. It has merged with Meditron (a giant multinational that does medical supplies respiratory monitoring solutions,

surgical solutions, and vascular therapies). Calgary is the only Canadian location and has a distribution centre.

- Idexx Laboratories is a multi-national world leader in providing diagnostic, detection, and information products to the animal health industry as well as quality assurance products and services to the dairy and water industries. They do dairy testing and water microbiology testing. They have offices in both Edmonton and Calgary.
- Oncolytics Biotech is involved primarily in the development of the reovirus for the treatment of cancer. This company formed out of research done at the University of Calgary.
- Resverlogix is focused on the research and development of treatments for patients with cardiovascular disorders using an epigenetic technology that modulates protein production. Head office is in Calgary.
- Mylan Canada manufactures pharmaceuticals in Calgary. Employs over 600 people.

Wages and Education

The life sciences industry (as of 2013) was mostly comprised of small companies with nearly half of respondents employing seven (7) or fewer employees and 86% having thirty (30) or fewer employees. Just 3.5% of companies have between 51 and 100 employees and 4.4% have more than 100 employees. A recent study by Deloitte, estimated that the Life Sciences industry contributed 14,100 jobs to Alberta in 2012 and directly employed 3,525 people[23]. Although this is a very small industry in Alberta, it delivers economic diversification, attracts and retains highly educated people, and promotes intellectual property development in the province.

Jobs

According to the Deloitte survey, 77% of the jobs in life sciences require at least a university degree and, in fact, 30% require a PhD. Jobs in Life Sciences include scientific, research and lab tech jobs in microbiology, biochemistry, molecular biology, and medicine. There are also jobs in manufacturing and sales for medical devices, drugs, and equipment.

Wages

This is a small but emerging industry in Alberta. The average wage for a biotechnologist or microbiologist is $40.98/hour[24].

Education

BioAlberta is the central voice for the life sciences industry in Alberta. It is a private, not-for-profit industry association that focuses on advocacy, promotion, and industry development.

Red Deer College trains students in several life sciences related occupations.

Educational Programs	College	# of graduates/year	Average wage	Jobs
Biological Sciences Degree	Red Deer College with university transfer		$40.98/hour	Lab tech, health care lab, conservation officer, ecologist, entomologist, fish and wildlife officer, interpretive naturalist,

[23] *Source: http://www.bioalberta.com/uploads/files/Documents/SOI%20Reports/BioAlberta%20SOI%202013.pdf Life Sciences in Alberta: State of the Industry 2013, Deloitte*

[24] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*

				reclamation specialist, park warden
BSc in Nursing	RDC collaborative degree		$42.60/hour	Health care, home care, occupational health, community health nurse
Kinesiology and Sport Study	RDC diploma or university transfer		$29.27	Kinesiologist, recreation coordinator, athletic therapist
Medical Lab Assistant	RDC certificate		$24.36/hour	Assist in a medical lab, doctor's office
Occupational Therapist	RDC diploma		Occupational Therapist assistants make $20.32/hour. Occupational Therapists require 6 years of education and make $43.58/hour	Health care
Pharmacy Technician	RDC diploma		$20.32/hour	Assist in a pharmacy
Licensed Practical Nurse	RDC diploma		$28.43/hour	Health care, home care

Bio-Products Sub-Industry

Key Messages

Workers

- *Very small sub-industry in Alberta, driven by the demand for renewable fuel sources*
- *Although local colleges don't provide direct training in this sector, workers may be attracted to Central Alberta because of our high quality schools, safe neighbourhoods, clean air, sparse traffic and free parking, and proximity to Calgary and the Rocky Mountains*

Inputs and Supplies

- *Central Alberta offers feedstock for biofuels such as crop residue.*
- *The Centre for Innovation at Olds College has expertise in biofuel production*

Markets and Transportation

- *Olds is strategically located along Alberta's primary highway, between the main cities of Edmonton and Calgary*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

The Bioproducts Sub-industry includes all firms that use biomass and other renewable or sustainable feedstocks/materials to develop or produce bioproducts. Alberta has a small biochemicals sub-industry that uses biomass as an alternative feedstock to petrochemicals in the production energy products and industrial chemicals. Companies are exploring the use of crop and forestry residues, municipal solid waste, sludge, and industrial organic matter.

Governments in North America and Europe became very interested in biofuels about 15 years ago as a way to reduce greenhouse gasses and reduce reliance on imported oil. Many governments offered subsidies for companies to develop biofuels and biofuel technologies. However, there have been a number of changes over the past 15 years and, as a result, the biofuels industry is struggling and many companies have shut down. Issues include:

- Other renewable energies have become much cheaper. The costs for solar and wind have plummeted over the past decade making biofuels even more uneconomical.
- In the US, the discovery of shale oil has increased the domestic oil supply, reducing the impetus for biofuels as a way to reduce oil imports
- First generation biofuels (made from food stocks like corn and sugar) have not lived up to the expected environmental benefits and they have had a negative impact on the food system
- Turning plant matter into liquid fuel or electricity is very inefficient. However, second and third generation biofuels from wastes like saw dust and corn stocks may still have a place for airplane fuel (because there is no alternative power source for planes that could reduce emissions).

Alberta companies are exploring opportunities to make the biochemicals sub-industry more competitive, including:

- Utilizing lower valued feedstocks
- Improving existing conversion processes (i.e. glycerol)
- Increasing production capacity
- Developing new specialized products for the marketplace

Calgary hosted the 2013 Agricultural Biotechnology International Conference (ABIC) partly because western Canadian research facilities and universities, like the University of Saskatchewan, are developing a reputation as a global centre for agro-biotech, especially in the crop biosciences. Alberta is home to company head offices for companies such as Bayer CropScience and Dow AgroSciences. Key areas include the role of agro biotechnology in preventative health (both human and animal), meeting the growing demand for food and green products, the development of sustainable biofuels, and biological remediation of the oil sands.

The Olds Area

The Olds College Centre for Innovation (OCCI) was involved in a 7 year Biodiesel Production, Alternative Feedstock and Commercial Adoption that just wrapped up in 2014. This project focused on increasing biodiesel production for research purposes, agronomic and processing trials of alternative feedstock, process optimization and enhanced byproduct use. The College has recently expanded research scope to include renewable and waste-to-energy projects.

The BioFuel Technology Centre opened on the Olds College campus in 2007 and is leading research into the production and use of renewable fuel. The facilities and equipment make it possible to store and blend biodiesel with petro-diesel year-round for use in industry trials involving past and present fleet vehicles (Mountain View County and For Trees Company Ltd) and school buses (Chinook's Edge) in the local community.

The Bio-Industry Resource Centre facility offers a large biotechnology incubator space, as well as office and boardroom facilities to house industry partners. A wide range of services available in this facility include seed cleaning and processing, chromatography based analysis, fermentation, and ASTM biodiesel analysis.

- The Biofuel Quality Laboratory is also located in this facility. It offers the equipment and expertise to perform ASTM D6751 and CGSB-3.524 biodiesel analysis including moisture (D6304), flash point (D93), acid number (D664), water and sediment (D2709), cloud point (D2500), free and total glycerin (D6584), kinematic viscosity (D445), sulfated ash (D874), oxidative stability (EN14112) and cold soak filtration (ASTM D7501). Additionally, OCCI has a FOSS Near Infrared analyzer (NIR) for rapid analysis of Fatty acid methyl esters (FAME %), Water, Free fatty acids (FFA), Total Acid Number, Triglyceride, Diglyceride, Monoglyceride, Methanol, Total Glycerin, and Total Glyceride.
- The Bioprocessing technology incubator offers over 1,000 square feet of research space, which may be divided into four independent sections to serve our client's needs. Each of the four areas provides access to RO water, hot and cold water, compressed air, steam, electricity, and vacuum. Fermenters with the volumes of 750 L, 150 L, and 75 L are available in the incubator area.

OCCI also has four distinct laboratories with specialized and unique expertise and equipment. The wet chemistry analytical laboratory is equipped with gas chromatography, high pressure liquid chromatography, mass spectrometry,

inductively coupled plasma spectrometry, and microwave digestion. Other laboratories are dedicated to bioprocessing, plant physiology, and environmental microbiology.

Olds Area employers in bioproducts include:

- Permolex operates a unique value-added grain fractionation facility located in Red Deer. The facility integrates a flour mill, a gluten plant and an ethanol plant. In addition, the facility has incorporated a co-generation power plant to produce the electricity and steam required in the various processes.
- BioRefinex, located in Ponoka and Lacombe, uses high pressure and saturated steam to denature organic material and destroy all pathogens while retaining the valuable nutrients. The end product is used for organic fertilizer and nutrient feedstock for biogas production.
- Milligan Biofuels uses damaged canola seed in its operations. The company manufactures and sells biodiesel, diesel fuel conditioner, penetrating oil, road dust suppressants, asphalt release agents, and rust inhibitor, for industrial and agricultural requirements. Milligan also provides high quality canola meal and feed oil to the animal feed sub-industry. The main plant is in Foam Lake, Saskatchewan but there is a Regional Sales Office in Red Deer.
- Fiberwerx in Sylvan Lake, a custom fiberglass manufacturer, was making hemp fibre panels for trucks
- Durham Energy in Calgary is looking at a demo plastic- to-oil plant in the area

Wages and Education

Bioproducts is a small subset of the Life Sciences Industry which is itself very small, employing only 3,525 people in Alberta. Most of the companies in Bioproducts are very small. Although this is a very small industry in Alberta, it delivers economic diversification, attracts and retains highly educated people, and promotes intellectual property development in the province.

Jobs

According to the Deloitte survey on the Life Sciences industry in Alberta, 77% of the jobs in this industry require at least a university degree and 30% require a PhD.

Wages

The average wage for a biotechnologist or microbiologist is $40.98/hour[25].

Education

Red Deer College provides 2 years of a university transfer course in Biological Sciences.

Educational Programs	College	# of graduates/year	Jobs
Biological Sciences Degree	Red Deer College with university transfer		Lab tech, health care lab, conservation officer, ecologist, entomologist, fish and wildlife officer, interpretive naturalist, reclamation specialist, park warden

[25] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*

Environmental Remediation Industry

Key Messages

Workers

- *Small but growing and profitable industry in Alberta. Generates almost $3 billion in revenues in Alberta.*
- *Driven by government regulation of the oil and gas industry.*
- *There are approximately 50 remediation companies within 1 hour of the Town of Olds*
- *Olds College graduates 68 Land Reclamation and Remediation students each year. In addition, Red Deer College and Olds College train more than 100 students/year in various environmental programs.*
- *15% of the working-age population in the area has trades certificates.*
- *Many workers are familiar with the oil and gas industry and many of the skills required in that industry are transferrable to reclamation and remediation.*

Inputs and Supplies

- *There has been almost 100 years of oil and gas production in Alberta and there are hundreds of thousands of leak sites in the province. The backlog in remediation, combined with new environmental rules, will allow the industry to continue to grow rapidly.*
- *The government is committed to environmental regulation as it will be necessary in order to continue to access foreign markets for the oil and gas industry*
- *All of the head offices of oil and gas companies are located within an hour of the Town of Olds*

Markets and Transportation

- *Olds is strategically located along Alberta's primary highway, between the main cities of Edmonton and Calgary*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

The environmental remediation industry is made up of companies engaged in the remediation and clean-up of contaminated buildings, mine sites, pipelines, and oil drilling operations; soil or ground water remediation; waste water treatment; hazardous material removal; and contouring of land and re-vegetation. Environmental remediation is expected to continue to be a growth industry for 3 reasons[26]:

- Government environmental policy and regulation
- Consumer demand for environmentally-friendly products and practices
- Environmental management practices in corporations and businesses such as lifecycle assessment, green purchasing policy and other environmental business practices

[26] *Source: http://www.eco.ca/pdf/Canadian-Environmental-Sector-Trends-2010.pdf*

Although there has been almost 100 years of oil and gas production in Alberta, it wasn't until 1994 that the province of Alberta began enforcing reclamation and remediation guidelines for oil and gas sites. There are hundreds of thousands of leak sites in the province. The backlog in remediation, combined with the new rules, has allowed the industry to grow rapidly.

Alberta is home to the largest remediation conference in Canada, the Remediation Technologies Symposium, and hosts a number of water treatment conferences including the highly successful WaterTech Conference.

Environmental companies in Alberta have expertise in:

- Remediation of land. High levels of drilling and production in the oil and gas industry need a range of environmental products and services.
- Water treatment. Municipal infrastructure is expanding rapidly to meet the surging economic and population growth in the province; large investment in oil sands mining will require increased water treatment.
- Climate change solutions. There is a focus on increased funding for the development and implementation of greenhouse gas related technologies.
- Waste management. Alberta is home to world-class waste management centres, established to meet solid waste and wastewater challenges. Edmonton's Gold Bar wastewater treatment plant is one of the most innovative facilities in North America and a leader in wastewater technology.

Alberta Industry	Revenues	# of firms	Employment
Environmental Products and Services	$2.8 billion	1,330	DK

Source: http://www.albertacanada.com/business/industries/eps-about-the-industry.aspx

The Olds Area

Olds College has a long history of research work on bioremediation of contaminated soil and water, reclamation of previously disturbed sites, and the use of native plants and organic amendments including biochar and compost. This work has been conducted both locally and internationally. The recently completed Olds College Botanic Gardens III and Treatment Wetlands will, in addition to treating the College's storm and waste water, be a site to conduct research to determine the best and most effective wetlands plant species, indigenous to Alberta, that can be used for bioremediation of various contaminants.

The Treatment Wetlands at Olds College comprise an area that is about 87 000-plus square meters (approximately 22 acres). The treatment wetlands are equipped with real-time data monitoring and collection systems that provide this facility with a capability that is unmatched anywhere in the country. The treatment wetlands are composed of three series of "polishing wetlands" that are mainly used to treat the College's storm and waste water and one series of triple-lined research ponds/wetlands that are used to research the effectiveness of wetlands to treat and remove various types of contaminants from waste water without the risk of contaminating ground water. Both the polishing and triple-lined research wetlands are used for research purposes. The main difference is the type of contaminants that each one of them can accommodate. The overall purpose of the treatment wetlands is to treat and decontaminate waste and produced water – thus achieving Alberta's Water for Life strategy by producing high-quality recycled water through the removal of sediments, contaminants and undesirable nutrients.

The Olds College Composting Technology Centre uses a variety of composting and food waste management strategies. A partnership with the Mountain View Regional Waste Commission allows for the collection of compost

from the towns of Olds, Didsbury, and Sundre. The compost is distributed back to the community, so that area gardeners and homeowners can return the valuable organic matter and nutrients to the earth as part of a healthy food cycle.

According to the Environmental Services Association of Alberta, there are approximately 50 remediation companies in the Olds Area (within 100 km of Olds). The industry has been undergoing consolidation as international companies move into Alberta and buy up some of the original, smaller home-grown companies. Some of the major employers in environmental remediation include:

- WorleyParsons
- SNC-Lavalin
- Tervita
- Genivar
- Stantec Consulting
- Golder Associates

Wages and Education

No one collects good data on employment in the industry because it is complex and in flux and the definition keeps changing. For the same reasons, it is hard for post-secondary institutions to provide the kind of training needed by industry. The skills required in the industry are constantly changing in response to new innovation and the evolution of emerging environmental markets.

Jobs

Within the remediation industry, jobs include:

- hydrogeologists and soil scientists who assess contaminated sites
- remediation consultants and engineers who decide how to deal with a site. This can include using natural bacteria to break down lighter oils in soil into CO2 and water or using heat to increase the volatility of contaminants so they can be more easily drawn from soil, and either collected or thermally destroyed.
- Construction workers and heavy equipment operators who move contaminated dirt and contour sites

Wages

The average wage for an environmental engineer is $46.11/hour.[27] Other wages are as follows:

- Environmental auditor $38.91
- Hazardous waste management technologist $38.91
- Natural & applied science policy consultants $37.34
- Biologist $38.98
- Soil scientist $41.91
- Environmental engineer $43.45
- Chemical engineer $49.68

Education

Olds College and Red Deer College train students in several environmental remediation related occupations.

[27] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*

Educational Programs	College	# of graduates/year	Jobs
Land Reclamation and Remediation	Olds College	68	• Renewable energy administrator • Surface land administrator • Land reclamation and remediation • Land Steward and Rural Planning
Environmental stewardship	Olds College	23	
Environmental and Conservation Sciences degree	Red Deer College plus university transfer		
Environmental Management degree	Red Deer College plus university transfer		
Environmental Science degree	Red Deer College plus university transfer		

Industrial Manufacturing Industry

Key Messages

Workers

- *Relatively large industry in Alberta with almost $16 billion in revenues.*
- *Employs over 50,000 people.*
- *In Alberta, it is driven by value of the Canadian dollar, reliance on the US economy, and the state of oil and gas.*
- *Central Alberta is home to a cluster of industrial manufacturing firms including large firms like Agrium (fertilizer), Dow (chemicals), and Nova (plastic resins).*
- *Many smaller firms in the area are involved in metal manufacturing for the oil and gas and agricultural industries*
- *The Centre for Innovation in Manufacturing (CIM) is located on the campus of Red Deer College. It houses $4.2 M in cutting-edge, industry-leading prototype and advanced manufacturing equipment*
- *Red Deer College trains more than 50 mechanical engineering and electrical engineering technologists each year*
- *People in the area are hard workers. The labour force participation rate is 75%*
- *Average wage for labourers in manufacturing is about $20/hour. Technologists make about $38/hour.*

Inputs and Supplies

- *The province's oil and gas sector provides many of the feedstocks for industrial manufacturing in Central Alberta*
- *Electricity costs for large power customers in Alberta are among the lowest in Canada (around 5-7 cents per kilowatt hour in 2015) and far lower than in the US*[28]
- *The Canadian dollar is currently at $0.75 cents to the US dollar, making exports to the US much more attractive*

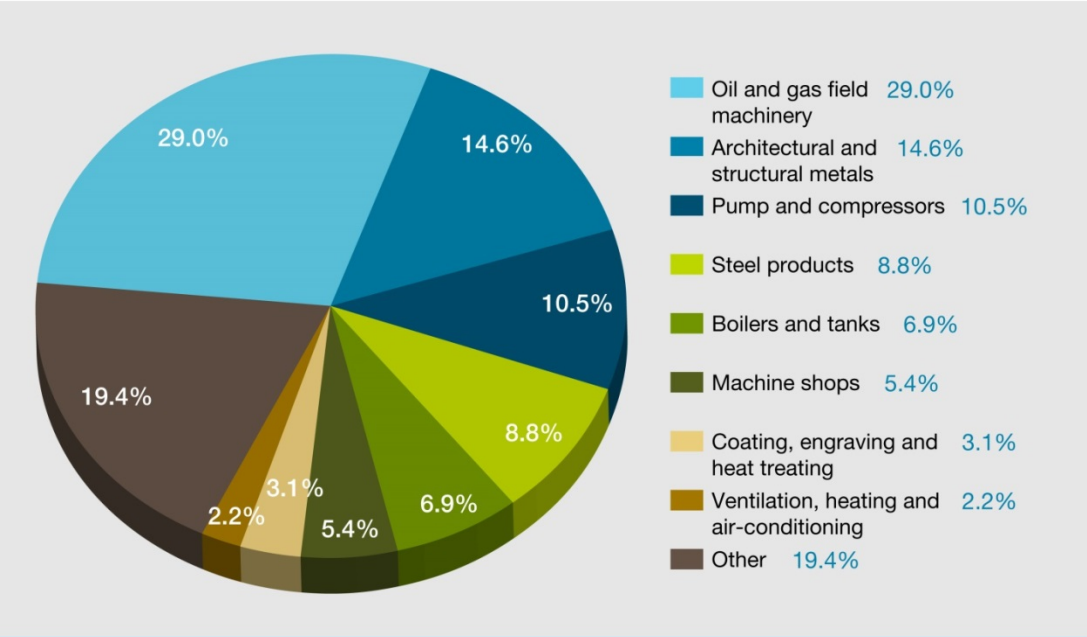
Markets and Transportation

- *Transportation infrastructure in Alberta is excellent. Over the past 15 years, Western Canada began seeing significant consolidation and upgrading of rail infrastructure.*
- *Alberta offers easy access to the large US market via the primary highway in Alberta as well as rail lines*
- *The Calgary International Airport is less than 1 hour away*
- *Olds offers one gigabyte fibre broadband connection to all businesses and residents*

Industrial manufacturing is a foundational industry which allows for infrastructure development as well as energy and natural resource production in Alberta. Much of the industrial manufacturing in Alberta is related to the oil and gas industry.

[28] *Comparison of Electricity Prices in Major North American Cities http://issuu.com/hydroquebec/docs/comp_2015_en*

Revenue Shares in 2014 for Major Sub-Sectors



Sources: Statistics Canada and Alberta Innovation and Advanced Education

Alberta Industry	Revenues	# of firms	Employment
Industrial Manufacturing	$15.6 Billion (2014)	1,930	51,100

Source: http://www.albertacanada.com/business/industries/im-about-the-industry.aspx

The Olds Area

The Centre for Innovation in Manufacturing (CIM) is located on the campus of Red Deer College. It houses $4.2 M in cutting-edge, industry-leading prototype and advanced manufacturing equipment. The CIM's primary focus is to engage with industry to provide design, 3D CAD (Computer Aided Design) modelling, design engineering, proof-of-concept and prototype fabrication services, among others.

The Central Alberta Rural Manufacturers Association is located in Blackfalds with the goal of helping manufacturing businesses work together to explore new ways of enhancing productivity and improving bottom lines (such as group purchases of supplies, insurance, and utilities). There are currently about 10 -15 manufacturing businesses that are members of CARMA.

The Central Alberta Rural Innovation Network (CARIN) is located at Red Deer College. One of 6 RIN's in the province, CARIN gives businesses commercialization expertise, technology and concept development; funding programs; market and customer development; financing and investment attraction; and training.

Major employers in manufacturing in the Olds Area include:

- Agrium Inc – fertilizer (14,000 employees)
- NOVA Chemicals – plastics and resins (3,000 employees)

- Dow Chemical – chemicals (2,000 employees)
- IKO Industries – asphalt felts and coatings (2,000 employees)
- SMART Technologies - semiconductors (2,000 employees)
- Haworth Ltd – partitions and fixtures (1300 employees)
- Harris Canada Systems – electronic components (>500 employees)
- BURNCO Rock Products – cement (>500 employees)
- FYi Eye care Services – pressed and blown glass ((>500 employees)
- Weatherford Canada Partnership – oil and gas machinery (>500 employees)
- Geinow Windows and Doors – (>500 people)
- Airtex Manufacturing Partnership – heating equipment (>500 employees)
- Shaw Pipe Protection Ltd – metal coating (>500 employees)
- Mylan Canada – pharmaceutical preparations (>500 employees)
- Badger Income Fund – oil and gas (>500 employees)
- Standen's Ltd – steel springs (>500 employees)
- Regency Furniture Corp – (>500 employees)

Wages and Education

The recent drop in the Canadian dollar and the improvement in the US economy have helped the manufacturing sector in Canada. In addition, rising energy costs, added pressure on lead times, and increased inflation in China has made Canada more competitive as a sourcing nation. Issues with quality and consistency of product have also driven Canadian manufacturers to look to on-shoring for their sourcing strategies[29].

In general, manufacturing has become more sophisticated, with logistics and supply chains, and automation on the shop floor. Still, many manufacturing plants remain labour-intensive with many of the jobs low-skill.

Jobs

As manufacturing firms become more automated, there is a growing need for technicians, technologists, skilled trades people (toolmakers and electricians), mechanical engineers, electrical engineers, mechatronics engineers, logistics specialists, supply chain specialists, and other highly qualified workers within this diverse industry.

Wages

Typical wages in manufacturing are as follows[30]:

- Labourers in metal fabrication $20.46/hour
- Manufacturing manager $46.61/hour
- Automated systems technologist $38.29/hour
- Mechanical engineering technologist $38.29/hour
- Manufacturing engineer $40.92/hour

[29] *Source: Canadian Manufacturing Outlook 2014, KPMG*

[30] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*

- Mechanical engineer $46.45/hour

Education

Alberta Innovates - Technology Futures provides technical services for Alberta's manufacturing and resource industry. Their Welding Engineering Program aims to improve the productivity and quality of the fabrication, construction and energy industries by evaluating and facilitating the adoption of modern welding and automation technologies. The program includes: Welding Quality and Productivity in the Oil Sands Energy Industry, The Alberta Metal Fab Innovation (AMFI) Program, and Welding Testing and Services.

Red Deer College trains students in several manufacturing related occupations.

Educational Programs	College	# of graduates/year	Jobs
Mechanical engineering technology	RDC diploma		Certified engineering technologist, professional technologist in engineering, technical sales rep,
Electrical engineering technology	RDC diploma		Certified engineering technologist, professional technologist in engineering, technical sales rep

Clean Energy Sub-Industry

Key Messages

Workers

- *Direct employment in the clean energy sector in Canada – which encompasses hydro power, as well as wind, solar and biomass – is small but growing and as of 2013 almost 27,000 people were employed in this sector.*
- *In Alberta, it is driven by utility and consumer demand for alternative energy, access to capital, geo-political agreements (i.e. Climate Change, and government policy).*
- *Red Deer College trains more than 50 mechanical engineering and electrical engineering technologists each year.*
- *Current jobs in construction and oil and gas are transferrable to alternative energy sector.*
- *Some oil and gas and utility companies are already investing in renewable energy.*

Inputs and Supplies

- *There is a strong desire to phase out coal-fired electrical generation in the province and to increase the use of alternative and renewable energy that emit no (or less) CO2 and other pollutants. ("Alternative" energy includes electricity generated by natural gas).*
- *Alberta has high quality wind resources, the best solar resources in Canada, looming coal plant retirements and a growing demand for electricity.*
- *Investment (both foreign and domestic) in alternative energy is growing.*
- *The federal government has promised to invest in clean technology, unlock venture capital, develop green power sources, support energy efficiency, electric vehicles, and to lead trade missions to promote growth in this sub-sector.*
- *The deregulated market for electricity in Alberta has been a barrier to development of large scale renewables. Renewable companies are hoping that the provincial government will create a mechanism for long-term price stability in the electrical market such as a clean energy standard.*
- *Renewable electricity companies have two revenue options: selling electricity as well as selling Renewable Energy Credits. Long-term contracts for RECs can provide some revenue stability.*
- *The province has also promised to provide subsidies for green retro-fits for houses and businesses. This may create an opportunity for solar photovoltaics installation and energy efficiency measures.*

Markets and Transportation

- *The infrastructure for electricity distribution in Alberta is good. There are two new 500 KW lines connecting the main population centers of Edmonton and Calgary*
- *The western transmission line is located 8 kilometers west of Olds*
- *Alberta's electrical grid ties into neighbouring provinces and the US*

In 2015, renewable sources provided more than 65% of Canada's electricity —the highest such proportion amongst G7 nations. According to the International Renewable Energy Agency[31], Canada ranks fourth in the world in installed hydro capacity (77 GW) and seventh in wind (9.7GW). And while we have lagged other nations in deploying solar (1.9 GW), investment is increasing. In 2014, domestic solar investment climbed 47% over 2013. When it comes to marine energy, Canada ranks third for the number of in-stream tidal and wave technology developers.

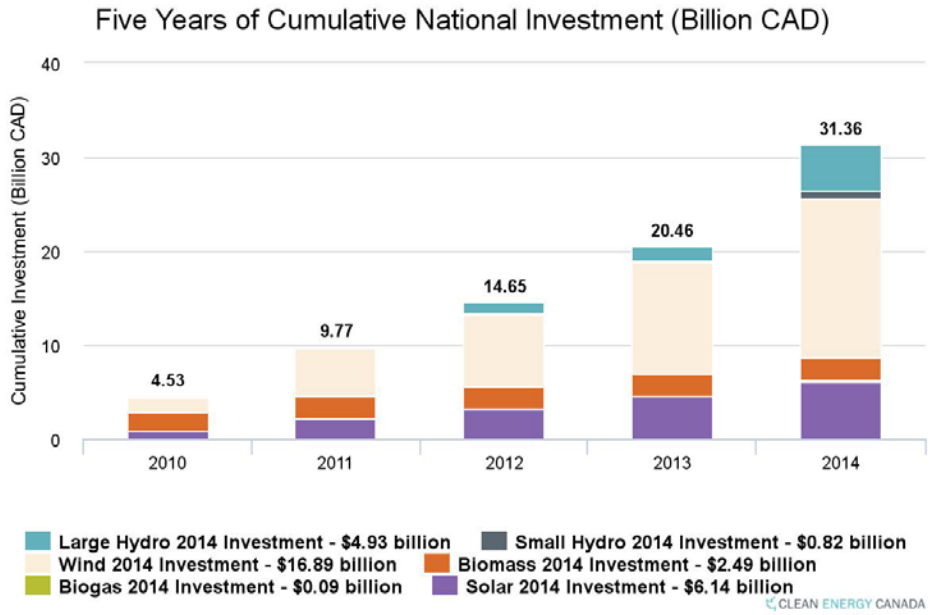
The Table below shows the types and amounts of renewable energy produced in Canada as of 2013.

Renewable Energy Source	Electric (kW)	Thermal (kW)	Liquid Fuel (kW)	Total
Large Hydro	71,794,067	0	0	71,794,067
Small Hydro	3,657,698	0	0	3,657,698
Wind	7,899,916	0	0	7,899,916
Biomass	2,416,123	10,598,769	1,408,808	14,423,700
Biogas	81,148	111,642	118,865	311,655
Solar Photovoltaic	931,258	0	0	931,258
Other	64,300	49,158	0	113,458
Total	86,844,510	10, 759,568	1,527,673	99,131,751

Source: CIEEDAC Renewable Energy database 2013

Large hydroelectric is by far the largest source of renewable energy. Biomass tends to be used in the lumber, pulp and paper industry. Solar includes both utility-scale solar farms as well as micro-solar on the roofs of houses and businesses. (About ½ the recent growth in solar photovoltaics has been due to residential installations in Ontario).

As the table below shows, investment in renewable energy in Canada has continued to increase over the past 5 years [32]

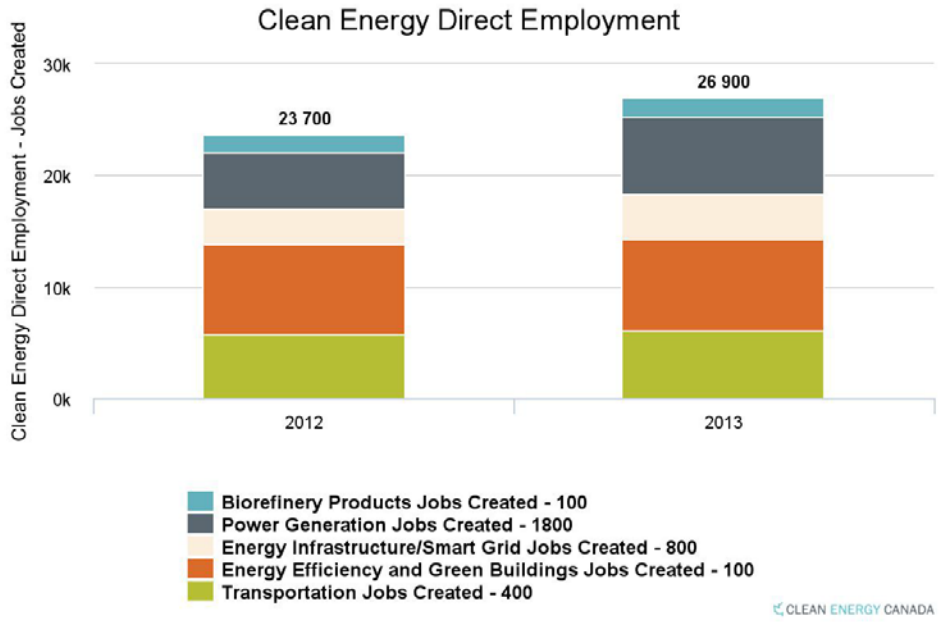


[31] *International Renewable Energy Agency*

[32] *Clean Energy Canada, http://cleanenergycanada.org/trackingtherevolution-canada/2015/*

As of 2013, Canada had 90 manufacturing plants that produce key components of biofuel, biomass and waste to energy plants, as well as marine, solar, and wind turbines that are either announced, under construction, or fully commissioned. Six plants manufacture towers, blades, or whole turbines, in Quebec, Ontario, Nova Scotia, and British Columbia. An additional 28 companies project-manage wind farm construction. Twenty six plants manufacture solar panels for the Ontario market. [33]

Direct employment in the clean energy sector in Canada was up 37% in 2012 to 23,700 people.[34] And up again to 26,900 in 2013.



A number of developments indicate a promising future for clean energy.

- The prices of leading technologies such as wind and solar have dropped steadily for decades. In some jurisdictions, solar and wind are now more price competitive than coal for power generation.
- Clean energy manufacturers are moving forward and have effectively weathered withering competitive pressures, consolidations, and policy changes.
- Markets in fast-growing, developing countries are prospering. Some of these economies see distributed electrical generation as an opportunity to avoid investments in costly transmission systems.

Renewable sources account for more than 90% of the installed electric capacity in British Columbia, Manitoba, Newfoundland & Labrador and Québec. The percent installed electrical capacity from renewables in Alberta is only 18.7% (the lowest percentage in Canada next to Nunavut).

Alberta has traditionally relied on oil, natural gas, and coal as its main sources of energy. As of August 2015, about 38 per cent of Alberta's installed electricity generation capacity was from coal and almost 44 per cent from natural gas. When the oil sands were first developed in northeast Alberta, the region did not have electrical infrastructure. Consequently, oil sands companies invested heavily in power cogeneration and on-site transmission facilities to run

[33] http://cleanenergycanada.org/trackingtherevolution-canada/2015/
[34] *Global Cleantech Innovation Index 2014* http://www.cleantech.com/wp-content/uploads/2014/08/Global_Cleantech_Innov_Index_2014.pdf

their own operations. Natural gas is burned in oil sands power plants, with equipment converting unused heat to steam, supplying upgraders and extraction operations. Oil sands companies actually generate excess electricity which is then sold into the grid. Natural gas is a cleaner option than coal.

There is a strong desire to phase out coal-fired electrical generation in the province and to increase the use of alternative and renewable energy that emit less (or no) CO2 and other pollutants. There has been an on-going retirement of coal-fired generation plants.

The provincial government released a plan in November 2015 to increase carbon pricing and re-invest the proceeds into clean energy research, green infrastructure and residential energy reduction programs. The plan would also limit oil sands emissions to 100 megatonnes (the current annual amount is 70 megatonnes) and to reduce methane emissions by 45%. The province would like to see 33% of power generated by renewables by 2030. Currently, just over 17% of Alberta's electricity comes from renewables (hydro, wind, and biomass).[35] Alberta does not yet have a commercial solar generation plant although that may change soon.

Technology[36]	Installed Capacity in Alberta (MW)	% of Total Installed Capacity (MW)
Wind	1459	9%
Hydroelectric	900	6%
Biogas and biomass	438	3%
Solar	0	0%
Total Renewable Electricity	2815	18%

As of August 2015, Alberta has 16,242 megawatts (MW) of installed electricity generation capacity as well as of 26,000 kilometers of transmission lines. Together, this system continuously delivers electricity to homes, farms and businesses in every corner of the province.

Alberta sees a need for 7GW of additional electricity supply by 2022, mostly because of retiring old coal plants, and that challenge intensifies in the broader picture: generation must double (to 26GW) within the next 40 years to match rising demand. Since 1996, peak demand has increased by over 4,000 megawatts (MW), and the population has increased by 1.3 million. Both are expected to rise even more in the years to come. As of 2014, Alberta has been a net importer of electricity for 16 of the last 17 years.

Alberta Industry	Revenues	# of firms	Employment
Wind farms (22 farms)		11	1500 jobs (140 FTE in construction plus 10 permanent jobs in operations and maintenance per 150 MW)[37]
Hydroelectric (23 hydro plants)		4 (TransAlta owns most of the hydro plants in Alberta)	
Biogas and Biomass (11 plants)		10 (large pulp mills often have biomass plants)	
Solar photo voltaic		1	

[35] *Alberta Utility Commission 2014 and Alberta Electric System Operator 2015)*

[36] *www.energy-alberta.ca/pdfs/FSAlterRenew.pdf, Alberta Government, June 2015*

[37] CanWEA, windfacts.ca

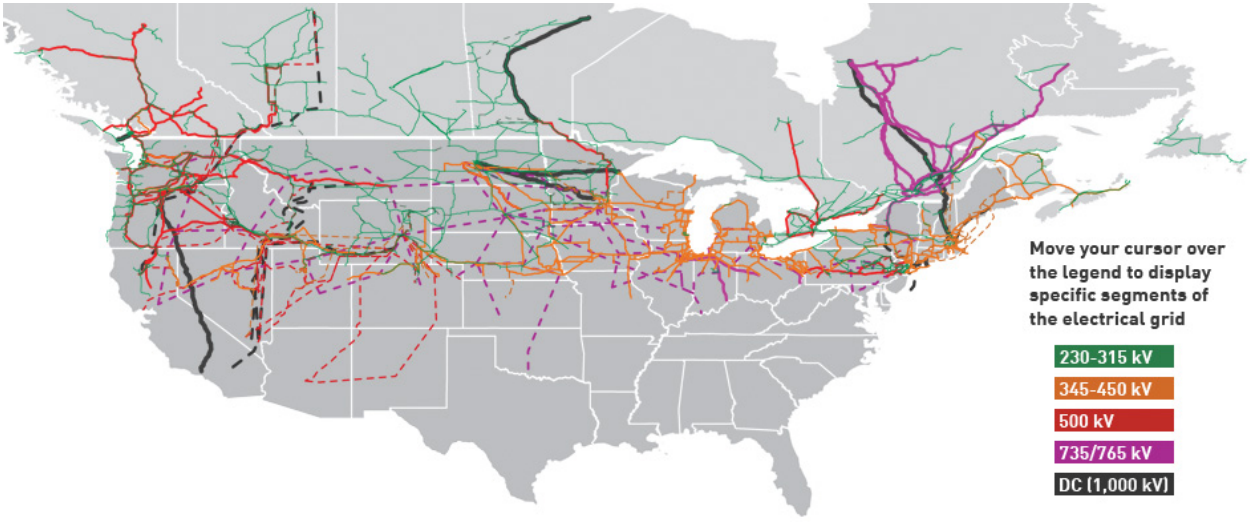
farms (2 farms planned)			

Alberta has high quality wind resources, the best solar resource in Canada, looming coal plant retirements and growing demand for electricity.

Transmission System

Alberta is connected to BC and Saskatchewan and the western states in the US through an electrical grid. 82.2 million people share this grid. The transmission system between Edmonton and Calgary was recently reinforced through the construction of two new 500 kilovolt (kV) direct current transmission lines -the largest lines in Alberta. One line connects the eastern Edmonton area to Brooks (485 kilometers) and the other line connects the western Edmonton area to the Calgary area (350 kilometers).

The western line is located 8 kilometers west of Olds.



The province of Alberta deregulated its electricity system in 2001. Alberta's electricity system is owned and operated by a mix of investor-owned and municipally-owned companies, overseen by 2 organizations that plan and regulate the electrical grid and the rate of return. The deregulated system is seen as a barrier to renewable energy development because the price of electricity fluctuates and developers would like a mechanism for long-term contracts at stable pricing. This could include a clean energy standard which would require a certain percentage of renewable energy in the grid.

Generating facilities, like wind farms and coal-fired generating plants and oil sands co-gen facilities (owned by investors or in some cases municipalities), generate electricity. This electricity is carried on large transmission lines owned by power companies. The electricity then flows through smaller distribution lines owned and maintained by power companies and rural electrical associations. A variety of retailers purchase power from the electrical grid and consumers can then choose which electricity retailer they would like to use.

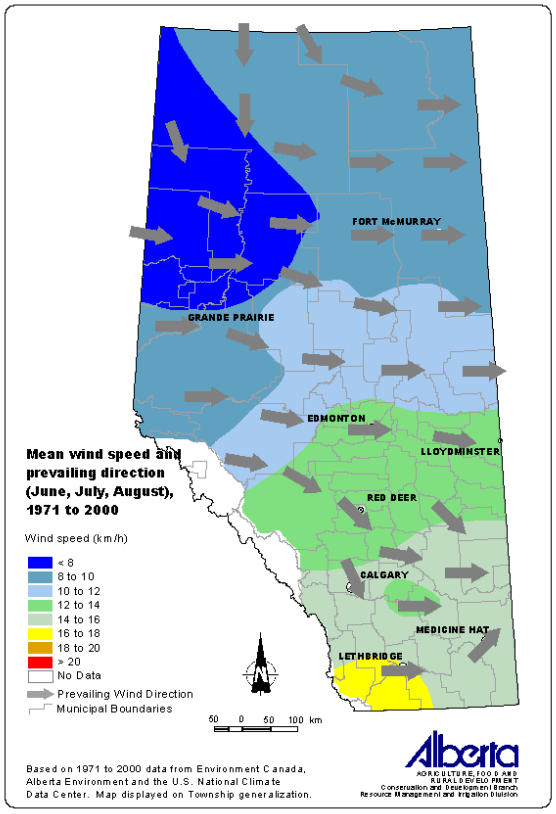
Some power companies in Alberta are completely vertically integrated and not only generate electricity but also manage transmission, distribution, and retail. ENMAX, owned by the City of Calgary, is an example. Other companies simply generate electricity and sell it to the grid. Still others just own transmission lines.

17 companies currently supply electricity into the grid in Alberta. 5 of these companies – ATCO Power, Enmax, Capital Power Corporation, TransAlta, and TransCanada – supply about 80% of the province's generation capacity. There are about 160 wholesale electricity purchasers many of whom re-sell to end users.

The province of Alberta authorizes Renewable Energy Credits for green electricity. Some large-scale renewable energy companies are selling RECs to American buyers as a way to generate additional long-term stable revenue. Regulation also requires free hook-up to the grid for Albertans who generate their own electricity through micro-generation plants (1 MW or less). There are currently about 1,000 micro-gen sites in Alberta.

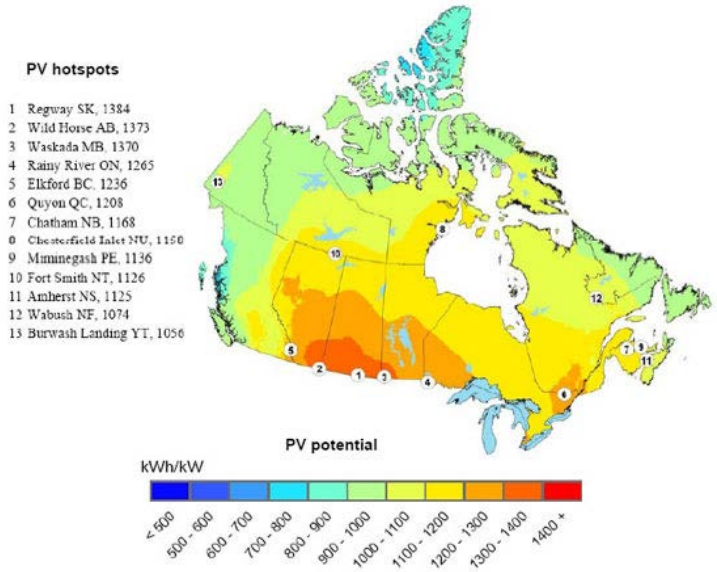
Wind

Alberta has excellent wind resources. Most of the wind farms in Alberta are located in the central and south regions of the province where wind is more consistent. Large-scale battery storage projects are currently under development in Alberta. They will mainly be used to store electricity generated at wind farms and have the potential to stabilize and make the electricity produced by wind and solar much more reliable.



Solar

The province has begun to embrace wind energy, but solar remains under-developed. Alberta boasts some of the nation's best solar resources, far better than that of Ontario (currently the hub of solar photovoltaics in Canada) or even Germany.



While there are currently no installed large solar projects in Alberta, there are two (20 MW) projects in the planning stages in southeastern Alberta near Burdett. Small scale projects on residential, commercial, and municipal buildings are also growing. Since 2009, after a massive solar panel manufacturing boom, and an unexpected global recession, the cost to install solar photovoltaics has dropped by half, more in some cases.

The Olds Area

The Olds Area is very close to existing electrical transmission lines and has relatively good resources in both solar and wind as well as some expertise and ability in biogas and biomass.

Almost half of the installed wind capacity across Canada has been developed by Calgary-based companies. Many oil and gas companies and utility companies are also involved in renewable energy. For example, TransAlta is one of the largest wind producers in Canada. Employers in alternative and renewable energy in the Olds Area include:

- TransAlta's Bearspaw Hydro dam near Calgary
- Algonquin Power's Dickson Hydro dam in Red Deer county
- Capital Power's wind farm near Halkirk
- Greengate Power – developed the Halkirk wind farm
- Boyd Solar (Didsbury) – residential and business solar installations
- BluEarth Renewables – wind, solar, and hydro
- Sustainable Energy – designs and manufactures power inverter platforms for solar
- Conergy Inc – solar
- New Energy Corporation – Calgary-based but builds tidal turbines

Organizations and associations that can assist renewable energy companies include Alberta Innovates, Canadian Bioenergy Association, Canadian GeoExchange Coalition, Canadian Renewable Energy Alliance, Canadian Solar Industries Association, Canadian Wind Energy Association, Clean Energy Canada, CanmetENERGY, and Natural Resources Canada.

Wages and Education

Jobs

Many of the jobs in construction and some in the oil and gas industry are easily transferable to the alternative energy sector.

Jobs for solar photovoltaic systems include roofers, architects, contractors and electricians.

Jobs in wind include turbine and components manufacturing: engineers (product design and R&D), semi-skilled workers in production, technical staff for repair and O&M of turbines, and sales and marketing. Developers of wind farms hire project managers (for permits, planning, construction, negotiating land access, logistics, site management), construction and trades, lawyers, engineers, programmers, and sales and marketing. Wind energy promoters and utilities selling wind energy require electrical, environmental and civil engineers, as well as sales and marketing and office staff. R&D, engineering and specialized services for wind energy require programmers, engineers, economists, and lawyers. Wind farm construction, installation, repair and O&M requires electrical and civil

engineers, transportation, installers (cranes, fitters, etc.), and construction workers. Smart grids and smart meters require product specialists, electrical engineers, design engineers, cyber security, and technicians for installation.

Renewable energy companies have reported a shortage of workers across Canada. They have suggested the inclusion of solar studies in engineering and technical curricula at post-secondary institutions, a nation-wide certification program for both photovoltaic and solar thermal installers, as well as the introduction of an apprenticeship program for project management.

Wages

Typical wages in alternative energy are as follows[38]:

- Labourers $20.46/hour
- Power system electrician $40.81/hour
- Land agent $37.95/hour
- Solar installer $29.86/hour
- Wind turbine technician $29.86/hour
- Construction estimators/project managers $34.77/hour
- Mechanical engineering technologist $38.29/hour
- Manufacturing engineer $40.92/hour
- Mechanical engineer $46.45/hour

Education

NAIT offers a diploma in Alternative Energy Technology, Lakeland College offers a diploma in Renewable Energy and Conservation, and Lethbridge College offers a one-year Wind Turbine Technician certificate. The Canadian Solar Institute offers industry certification. Two companies in Calgary offer short workshops on wind projects – Solas Energy Consulting (Power Courses) and Oak Leaf Energy. Closer to home, Red Deer College and Olds College offer the following programs:

Educational Programs	College	# of graduates/year	Average wage	Jobs
Mechanical engineering technology	RDC diploma			Certified engineering technologist, professional technologist in engineering, technical sales rep,
Electrical engineering technology	RDC diploma			Certified engineering technologist, professional technologist in engineering, technical sales rep
Heavy equipment operators	Olds College	32 (2015)	$31.92/hour $77,543/year	Heavy equipment operators
Electrical Engineering Technologist diploma	Red Deer College		$36.95/hour	
Land Analyst and Land Agent diplomas	Olds College	60	$37.95/hour	Surface Land Agent Land and records administrator Surface land coordinator Project analyst Community relations representative Lease records analyst

[38] *Source: http://occinfo.alis.alberta.ca/occinfopreview/search-results.html*