

Canadian Energy Research Institute

The Contributions of the Canadian Oil and Gas Service Sector
to the Canadian National Economy

Prepared for
Petroleum Services Association of Canada

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Relevant • Independent • Objective

**THE CONTRIBUTIONS OF THE CANADIAN OIL AND GAS SERVICE SECTOR TO THE
CANADIAN NATIONAL ECONOMY**

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Introduction

The oil and gas component of the Canadian economy is historically focused on hydrocarbon production, pricing, royalties and taxation. Success or failure is usually measured by levels of production, the profitability of hydrocarbon exploration and production companies (E&P), and royalty and taxation levels of various levels of government.

Often absent from this debate is the myriad of companies and tens of thousands of workers that support the efforts of the E&P sector, the oil and gas service sector (OGS). Products and services employed in direct support of the E&P activities include exploration, drilling, completion, production, construction, processing, transportation, logistics, manufacturing, maintenance and fabrication.

Wells drilled, production rates, revenues, royalties and taxes are replaced by words like casing, production strings, tubing strings, bits, wellheads, rig move, rig days, rig release, packers, plugs, fracing, cementing, coring, testing, and abandonment. Engineers, landmen, geologists and geophysicists are replaced by surveyors, rig crew, drilling supervisor, trucker, loader operator, jug hound, mud man, snubber, well tester, tool push, well site geologist, and safety supervisor. Numerous other words and jobs describe the manufacturing and fabrication industries that develop products used by the OGS sector in the construction of the thousands of field facilities that dot the western Canada landscape. At the end of economic life for a field facility the final word is "abandonment". The OGS sector includes the companies responsible for sealing, removing and reclaiming the land foot print back to its original condition.

The Petroleum Services Association of Canada (PSAC) approached the Canadian Energy Research Institute (CERI) and asked the institute to attempt to quantify the extent of the contribution that the oil and gas service sector makes on the Canadian economy.

The purpose of this report is to detail the results of CERI's challenge to determine the true contribution of the OGS sector to the Canadian economy through economic metrics of GDP, employment and taxation. In order to accomplish this task, CERI made use of the Statistics Canada 2006P Input, modified basic price set of Input-Output tables at the "W" level of aggregation. At the "W" level of aggregation the Input-Output table details 285 industries and 705 commodities.

Executive Summary

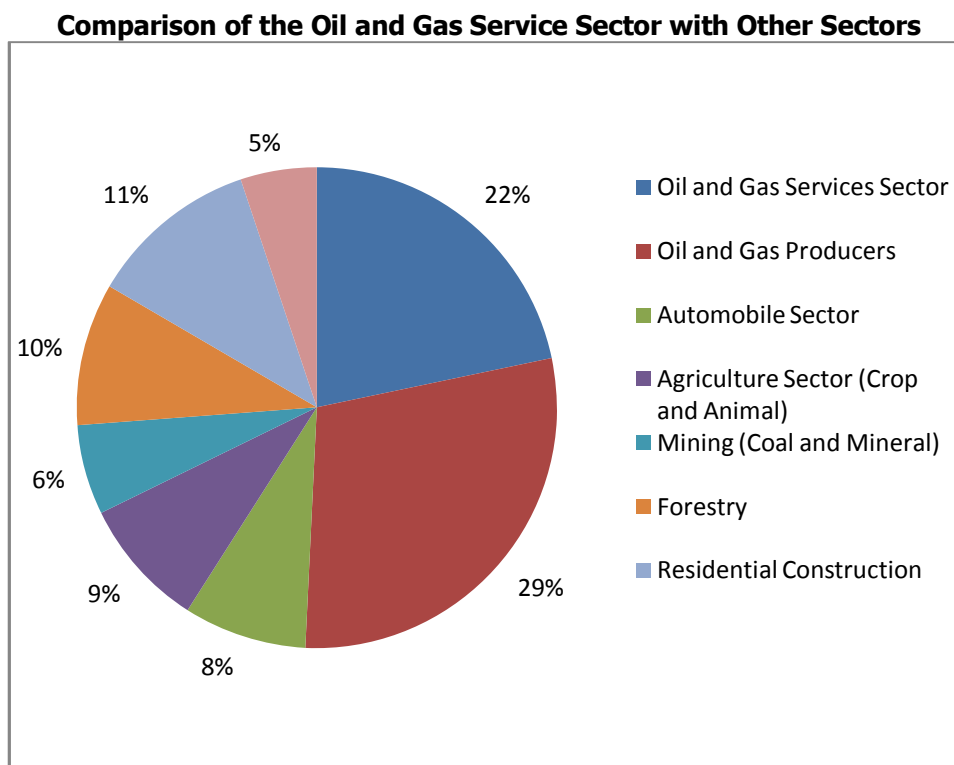
The oil and gas component of the Canadian economy is historically focused on hydrocarbon production, pricing, royalties and taxation. Success or failure is usually measured by levels of production, the profitability of hydrocarbon exploration and production companies (E&P), and royalty and taxation levels of various levels of government. Often absent from this debate is the myriad of companies and tens of thousands of workers that support the efforts of the E&P sector, the oil and gas service sector (OGS). Products and services employed in direct support of the E&P activities include exploration, drilling, completion, production, construction, processing, transportation, logistics, manufacturing, maintenance and fabrication. In order to estimate the economic contribution of the OGS sector the Statistics Canada 2006P Input, modified basic price set of Input-Output tables at the "W" level of aggregation were examined. The following are the results of that examination:

1. Based on these tables, it was determined that Canada's gross domestic product (GDP), as specified at basic prices, for the year 2006 was **\$1.35 trillion dollars**.
2. The oil and gas service sector of the Canadian economy generated **\$65 billion dollars** of GDP or 4.8 percent of the Canadian GDP.
3. In 2006, the Provincial and Federal governments took in \$80 billion and \$144 billion, respectively, in the form of income taxes. This totals **\$225 billion** in government revenues over and above oil and gas royalties.
4. In 2006 the oil and gas producers paid **\$12 billion in royalties**.
5. The oil and gas service sector of the Canadian economy paid **\$9 billion dollars of taxes** or 4.1 percent of all the taxes paid to the provincial and federal governments.
6. In 2006, the Canadian economy employed **16,500,000 workers**.
7. The oil and gas service sector of the Canadian economy employed **800,000 workers** or 4.8 percent of the labour force.

Canada's GDP, as specified at basic prices, for the year 2006 was \$1.35 trillion dollars. Figure 1 compares the oil and gas service sector against other Canadian industries on a GDP contribution basis. In total, these industries contributed \$298 billion of GDP value, or 22 percent of the Canadian economy. The GDP values associated with each comparative industrial sector is listed below. The OGS sector at \$65 billion generates almost a quarter of the contribution of the eight industries and is almost on par with the oil and gas producers and ahead of the other industries.

- oil and gas service sector¹: GDP = \$65 billion
- oil and gas producers²: GDP = \$87 billion
- Automobile sector³: GDP = \$25 billion
- Agriculture sector⁴: GDP = \$26 billion
- Mining sector⁵: GDP = \$18 billion
- Forestry sector⁶: GDP = \$29 billion
- Residential construction⁷: GDP = \$34 billion
- Non-residential construction⁸: GDP = \$15 billion

Figure 1



The codes listed in the following footnotes are from the North American Industry Classification System (NAICS) with each code describing a particular industry with respect to the nature of business, input commodities and produced products. Each footnote lists the industry codes that were assumed to contribute to a particular sector that was identified in figure 1.

¹ Refer to Table 2 for industry codes that define the Oil and Gas service sector.

² NAICS code 211100.

³ NAICS codes 336100, 336200, 336300, 326193, 335910, 333600, 326210, 326220, 811100

⁴ NAICS codes 111A00, 112A00, 115100, 115200, 311100, 311210, 311220, 311230, 311300, 311410, 311420, 311500, 311611, 311614, 311615, 311810, 311821, 311822, 31182A, 311910

⁵ NAICS codes 212210, 212220, 212230, 212290, 212392, 212396

⁶ NAICS codes 113000, 115300, 321100, 321215, 32121A, 32121B, 321911, 321919, 321920, 321990, 322110, 322121, 322122, 322130, 322210, 322220, 322230, 322290

⁷ NAICS code 2300A0, 337110, 33712A, 314110, 314120

⁸ NAICS code 2300B0

Methodology

What is the total contribution to the Canadian economy of OGS? When measured at all, it is a macro-economic perspective when the activity of OGS is included as an input cost of the value of domestic E&P capital spending or production. To fully understand the economic benefits of OGS in Canada and the macro-economic contribution to the Canadian economy, the authors started with the Statistics Canada 2006P Input, modified basic price set of Input-Output tables at the "W" level of aggregation. At the "W" level of aggregation the Input-Output table details 285 industries and 705 commodities.

Generally speaking, the gross domestic product or value-added is a measure of the unduplicated production of an industry and does not include the intermediate costs of goods and services purchased from other industries. The "use" matrix displays all the intermediate costs incurred in production by an industry plus the indirect taxes and subsidies, and returns to the factors of production, namely: wages and salaries, supplementary labour income, mixed income and operating surplus. Calculating an industry's GDP at basic prices is the sum of its factor incomes (wages and salaries, supplementary labour income, mixed income and other operating surplus) plus taxes less subsidies on production.

In order to determine the contribution of the OGS sector, it was first necessary to identify the industries that contribute either partially or fully to the efforts of supporting the E&P sector. PSAC and CERI estimated that the OGS sector consisted of 38 industries that either partially or totally generate goods and services that are employed in the effort of finding and developing oil and gas resources. In addition, it was also estimated that 225 commodities were used in carrying out various services employed by the OGS sector.

The many contributors to the OGS sector included industries that supply gravel for well site road access to the sands used for fracing, to the engineers, designers, welders, carpenters and electricians that manufacture modular components for field installations, to the drill pipe, concrete, chemicals, boilers, tanks, heaters, and compressors and to the truckers, and mail service that support the OGS activities. Also included were the local machine shops, portable welding trucks, warehousing, transportation facilities, communication systems, nuts, bolts and wire that indirectly support the OGS sector. From the Alberta fabrication facilities in Leduc, Alberta to the pipe manufacturing facilities in Regina, Saskatchewan to the manufacturing industries of southern Ontario and Quebec, the OGS sector covers thousands of companies employing hundreds of thousands of employees located in virtually every province and territory of Canada

Since some industries generate goods and services used by other industries and final products not used by the OGS sector, the GDP contribution of a given industry was reduced to reflect these situations. First, it was necessary to account for the situation where an industry generates goods and services which may not totally be OGS related, the OGS related GDP for a given industry was reduced based on the ratio of input costs incurred in production by an industry of OGS related commodities, divided by the input costs incurred in production by an industry in total. This factor was then applied to the GDP value for the industry, and reflects that portion which can be attributed to an OGS industry. Additionally, some industries produce products that are used both by the OGS sector and other non-OGS sectors. In these

situations, a simple estimation of the percentage of goods and services that each industry generates that is taken up by the OGS sector was applied.

- Industries with no contribution to oil and gas services were given a zero percent GDP contribution.
- Industries with only a minor contribution to oil and gas services were given a 25 percent GDP contribution.
- Industries with only a partial contribution to oil and gas services were given a 50 percent GDP contribution.
- Industries with only a major contribution to oil and gas services were given a 75 percent GDP contribution.
- Industries that are totally dedicated to the oil and gas services were given a 100 percent GDP contribution.

The Input-Output tables do not explicitly identify the level of employment associated with each industry. However, by utilizing the “wages and salaries” coupled with the “supplementary labour income” and “mixed income” values, then dividing by the average wage (from Revenue Canada) for a given industry, an estimate of the employment per industry is determined. The sum of all industry employment is compared against the total Canadian level of employment (Stats Can 2006: 16,500,000 employees) and a calibration factor is applied to each of the industries.

Income taxes and corporate taxes are calculated based on Revenue Canada’s average wage (and the various tax brackets) and the published corporate tax rates. In a similar fashion as the employment data, a calibration factor (based on Revenue Canada published numbers) is determined and applied to each contributing industry.

Oil and Gas Service Contribution to GDP

In 2006, the oil and gas service sector contributed \$65 billion dollars to the Canadian economy. This represents a 4.8 percent of the total Canadian GDP. Figure 2 subdivides this contribution to sub sector groupings of "OGS direct industries", "OGS indirect manufacturing", "OGS other manufacturing" and "OGS other industries". The oil and gas service "direct industries" includes all aspects of drilling, completion, gathering, processing, and construction, accounts for 48 percent of the total GDP contribution of the OGS sector. The "manufacturing industries" (indirect manufacturing and other manufacturing) includes all the industries that manufacture commodities used by the oil and gas service sector accounts for 25 percent of the total GDP contribution of the OGS sector. "Other industries" account for the remaining 27 percent, which is made of elements like truck transportation, communication engineering, warehousing, machine shops, repair shops etc. While the "direct industries" are specifically related to the locations where oil and gas field activities take place, which Western Canada accounts for the majority, the other oil and gas service industries, which includes manufacturing, transportation and services are located throughout the country. These industries account for more than 52 percent of the GDP contribution. Table 1 lists the Canadian industries, and GDP contribution, that make up the OGS sector.

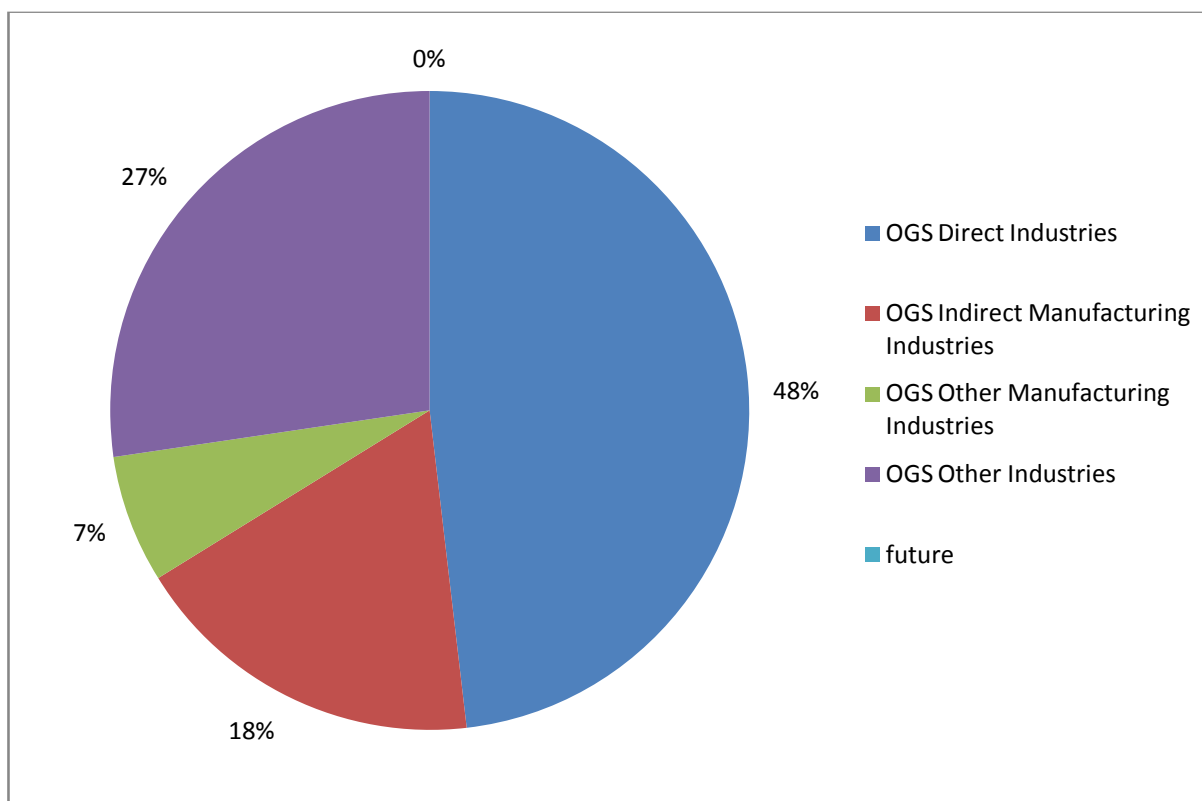
Figure 2**Oil and Gas Service Sub Sector GDP Contributions**

Table 1

**Oil and Gas Service and Energy Related Services Industries
Industry Accounts: Aggregation Level W, 2006 Tables**

ID	Industry Code	Industry Identification (W level)	GDP (Market Price) Million \$
17	212320	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying	175
22	213100	Support Activities for Mining and Oil and Gas Extraction	8457
27	2300B0	Non-residential Building Construction	4665
28	2300C0	Transportation Engineering Construction	1637
29	2300D0	Oil and Gas Engineering Construction	12811
31	2300F0	Communication Engineering Construction	74
32	2300G0	Other Engineering Construction	1088
33	2300H0	Repair Construction	3660
83	321990	All Other Wood Product Manufacturing	159
109	326120	Plastic Pipe, Pipe Fitting and Unsupported Profile Shape Manufacturing	377
120	327310	Cement Manufacturing	400
121	327320	Ready-Mix Concrete Manufacturing	540
126	331210	Iron and Steel Pipes and Tubes Manufacturing from Purchased Steel	834
127	331220	Rolling and Drawing of Purchased Steel	223
134	332100	Forging and Stamping	283
136	332311	Prefabricated Metal Building and Component Manufacturing	257
137	33231A	All Other Plate Work and Fabricated Structural Product Manufacturing	730
139	332410	Power Boiler and Heat Exchanger Manufacturing	282
140	332420	Metal Tank (Heavy Gauge) Manufacturing	395
141	332430	Metal Can, Box and Other Metal Container (Light Gauge) Manufacturing	149
143	332600	Spring and Wire Product Manufacturing	200
144	332710	Machine Shops	697
145	332720	Turned Product and Screw, Nut and Bolt Manufacturing	62
146	332800	Coating, Engraving, Heat Treating and Allied Activities	494
147	332900	Other Fabricated Metal Product Manufacturing	665
150	333130	Mining and Oil and Gas Field Machinery Manufacturing	1447
151	333X00	Industrial, Commercial and Service Industry Machinery Manufacturing	841
154	333600	Engine, Turbine and Power Transmission Equipment Manufacturing	247
155	333910	Pump and Compressor Manufacturing	609
168	335312	Motor and Generator Manufacturing	143
169	335315	Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	140
170	335910	Battery Manufacturing	6
171	335920	Communication and Energy Wire and Cable Manufacturing	76
197	484000	Truck Transportation	7228
205	488000	Support Activities for Transportation	3048
206	49X000	Postal Service and Couriers and Messengers	1215
208	4931A0	All Other Warehousing and Storage	499
239	541B00	Other Professional, Scientific and Technical Services	9876
		TOTAL	64691

Oil and Gas Service Contribution to Taxation

In 2006, the oil and gas service sector contributed \$9 billion dollars in the form of taxes paid to the federal and provincial governments. This represents a 4.1 percent of the total government tax revenue. Figure 3 subdivides this contribution to sub sector groupings of "OGS direct industries", "OGS indirect manufacturing", "OGS other manufacturing" and "OGS other industries". The oil and gas service "direct industries" which includes all aspects of drilling, completion, gathering, processing, and construction, accounts for 51 percent of the total tax contribution of the OGS sector. The "manufacturing industries" (indirect manufacturing and other manufacturing) which includes all the industries that manufacture commodities used by the oil and gas service sector accounts for 26 percent of the total tax contribution of the OGS sector. "Other industries" account for the remaining 23 percent, which is made of elements like truck transportation, communication engineering, warehousing, machine shops, repair shops etc. While the "direct industries" are specifically related to the locations where oil and gas field activities take place, which Western Canada accounts for the majority, the other oil and gas service industries, which includes manufacturing, transportation and services are located throughout the country. These industries account for approximately 49 percent of the oil and gas service corporate and personal tax contribution. Table 2 lists the Canadian industries, and Taxation contributions, that make up the OGS sector.

Figure 3

Oil and Gas Service Sub Sector Tax Contributions

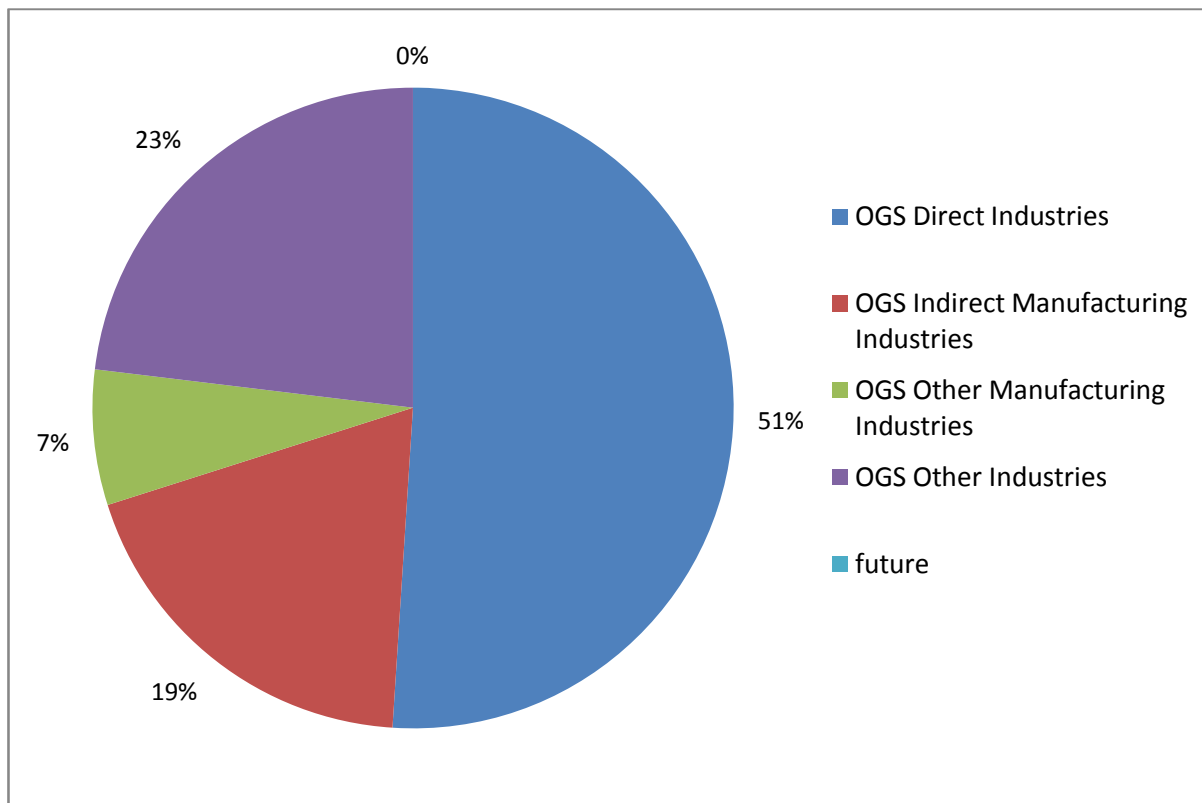


Table 2

**Oil and Gas Service and Energy Related Services Industries
Industry Accounts: Aggregation Level W, 2006 Tables**

ID	Industry Code	Industry Identification (W level)	Federal Tax (income) Million \$	Provincial Tax (income) Million \$	Corporate Tax Million \$
17	212320	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying	7	3	23
22	213100	Support Activities for Mining and Oil and Gas Extraction	667	279	487
27	2300B0	Non-residential Building Construction	316	132	147
28	2300C0	Transportation Engineering Construction	110	46	58
29	2300D0	Oil and Gas Engineering Construction	916	384	454
31	2300F0	Communication Engineering Construction	4	2	2
32	2300G0	Other Engineering Construction	70	29	68
33	2300H0	Repair Construction	222	93	115
83	321990	All Other Wood Product Manufacturing	7	3	15
109	326120	Plastic Pipe, Pipe Fitting and Unsupported Profile Shape Manufacturing	15	6	39
120	327310	Cement Manufacturing	7	3	72
121	327320	Ready-Mix Concrete Manufacturing	32	13	26
126	331210	Iron and Steel Pipes and Tubes Manufacturing from Purchased Steel	44	19	85
127	331220	Rolling and Drawing of Purchased Steel	13	5	20
134	332100	Forging and Stamping	17	7	16
136	332311	Prefabricated Metal Building and Component Manufacturing	12	5	25
137	33231A	All Other Plate Work and Fabricated Structural Product Manufacturing	44	19	38
139	332410	Power Boiler and Heat Exchanger Manufacturing	14	6	26
140	332420	Metal Tank (Heavy Gauge) Manufacturing	22	9	25
141	332430	Metal Can, Box and Other Metal Container (Light Gauge) Manufacturing	9	4	6
143	332600	Spring and Wire Product Manufacturing	14	6	4
144	332710	Machine Shops	45	19	28
145	332720	Turned Product and Screw, Nut and Bolt Manufacturing	3	1	5
146	332800	Coating, Engraving, Heat Treating and Allied Activities	28	12	30
147	332900	Other Fabricated Metal Product Manufacturing	37	15	58
150	333130	Mining and Oil and Gas Field Machinery Manufacturing	74	31	164
151	333X00	Industrial, Commercial and Service Industry Machinery Manufacturing	52	22	66
154	333600	Engine, Turbine and Power Transmission Equipment Manufacturing	14	6	22
155	333910	Pump and Compressor Manufacturing	40	17	46
168	335312	Motor and Generator Manufacturing	14	6	-5
169	335315	Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	10	4	7
170	335910	Battery Manufacturing	0	0	0
171	335920	Communication and Energy Wire and Cable Manufacturing	8	3	-4
197	484000	Truck Transportation	309	130	312
205	488000	Support Activities for Transportation	161	68	203
206	49X000	Postal Service and Couriers and Messengers	72	30	27
208	4931A0	All Other Warehousing and Storage	30	13	9
239	541B00	Other Professional, Scientific and Technical Services	755	316	375
		Total	4217	1766	3098

Oil and Gas Service Contribution to Employment

In 2006, the oil and gas service sector employed an estimated 800,000 workers. This represents a 4.8 percent of the total Canadian work-force of 16,500,000. Figure 4 subdivides this contribution to sub sector groupings of "OGS direct industries", "OGS indirect manufacturing", "OGS other manufacturing" and "OGS other industries". The oil and gas service "direct industries" which includes all aspects of drilling, completion, gathering, processing, and construction, accounts for 46 percent of the total employment contribution of the OGS sector. The "manufacturing industries" (indirect manufacturing and other manufacturing) which includes all the industries that manufacture commodities used by the oil and gas service sector accounts for 23 percent of the total employment contribution of the OGS sector. "Other industries" account for the remaining 31, percent which is made of elements like truck transportation, communication engineering, warehousing, machine shops, repair shops etc. While the "direct industries" are specifically related to the locations where oil and gas field activities take place, which Western Canada accounts for the majority, the other oil and gas service industries, which includes manufacturing, transportation and services are located throughout the country. These industries account for approximately 54 percent of the oil and gas service employment contribution. Table 3 lists the Canadian industries, and employment contribution, that make up the OGS sector.

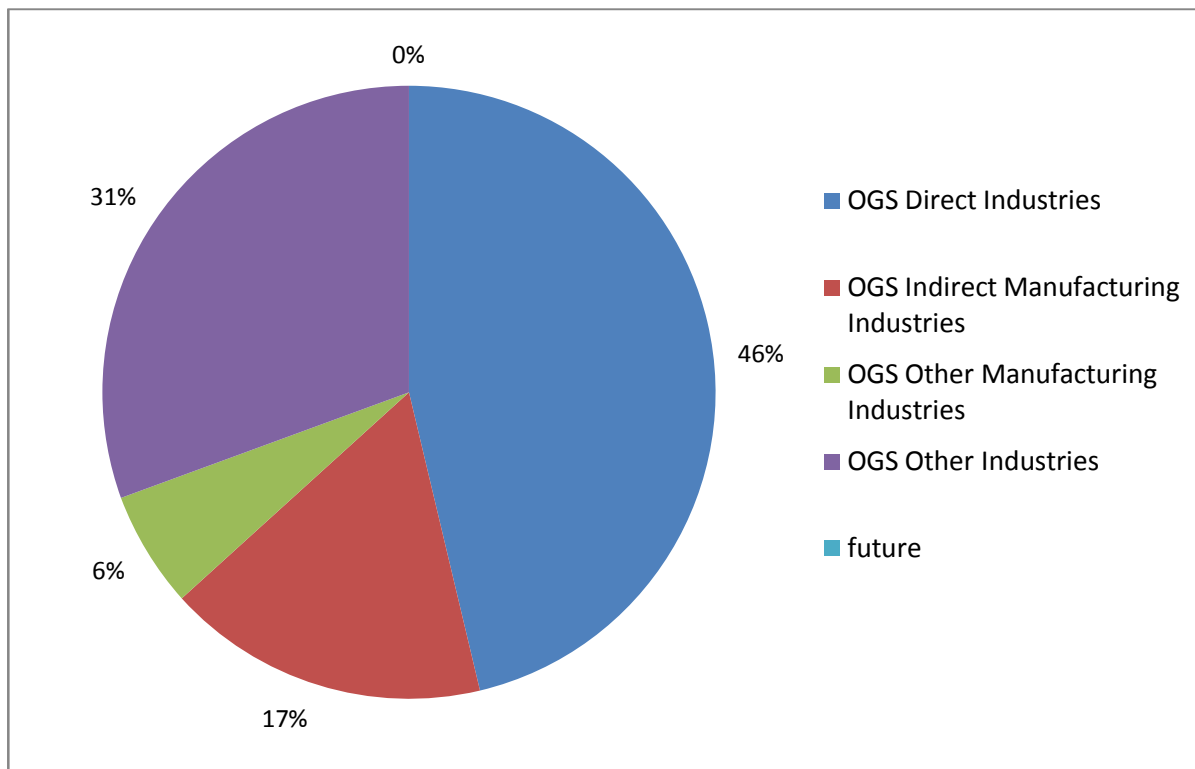
Figure 4**Oil and Gas Service Sub Sector Employment Contributions**

Table 3

**Oil and Gas Service and Energy Related Services Industries
Industry Accounts: Aggregation Level W, 2006 Tables**

ID	Industry Code	Industry Identification (W level)	Employment Jobs
17	212320	Sand, Gravel, Clay, and Ceramic and Refractory Minerals Mining and Quarrying	1204
22	213100	Support Activities for Mining and Oil and Gas Extraction	79744
27	2300B0	Non-residential Building Construction	54492
28	2300C0	Transportation Engineering Construction	19322
29	2300D0	Oil and Gas Engineering Construction	155697
31	2300F0	Communication Engineering Construction	1054
32	2300G0	Other Engineering Construction	11580
33	2300H0	Repair Construction	46287
83	321990	All Other Wood Product Manufacturing	2154
109	326120	Plastic Pipe, Pipe Fitting and Unsupported Profile Shape Manufacturing	4632
120	327310	Cement Manufacturing	1993
121	327320	Ready-Mix Concrete Manufacturing	8569
126	331210	Iron and Steel Pipes and Tubes Manufacturing from Purchased Steel	7313
127	331220	Rolling and Drawing of Purchased Steel	2141
134	332100	Forging and Stamping	4080
136	332311	Prefabricated Metal Building and Component Manufacturing	2953
137	33231A	All Other Plate Work and Fabricated Structural Product Manufacturing	10926
139	332410	Power Boiler and Heat Exchanger Manufacturing	3384
140	332420	Metal Tank (Heavy Gauge) Manufacturing	5551
141	332430	Metal Can, Box and Other Metal Container (Light Gauge) Manufacturing	2346
143	332600	Spring and Wire Product Manufacturing	3511
144	332710	Machine Shops	11119
145	332720	Turned Product and Screw, Nut and Bolt Manufacturing	807
146	332800	Coating, Engraving, Heat Treating and Allied Activities	6970
147	332900	Other Fabricated Metal Product Manufacturing	7960
150	333130	Mining and Oil and Gas Field Machinery Manufacturing	12545
151	333X00	Industrial, Commercial and Service Industry Machinery Manufacturing	8169
154	333600	Engine, Turbine and Power Transmission Equipment Manufacturing	2183
155	333910	Pump and Compressor Manufacturing	6224
168	335312	Motor and Generator Manufacturing	2886
169	335315	Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing	1944
170	335910	Battery Manufacturing	81
171	335920	Communication and Energy Wire and Cable Manufacturing	1529
197	484000	Truck Transportation	97944
205	488000	Support Activities for Transportation	40205
206	49X000	Postal Service and Couriers and Messengers	24945
208	4931A0	All Other Warehousing and Storage	9962
239	541B00	Other Professional, Scientific and Technical Services	133930
		Total	798333

About CERI

The Canadian Energy Research Institute (CERI) is a co-operative research organization established through an initiative of government, academia, and industry in 1975. The Institute's mission is to provide relevant, independent, objective economic research and education in energy and related environmental issues. Related objectives include reviewing emerging energy issues and policies as well as developing expertise in the analysis of questions related to energy and the environment.

For further information, see our web site: www.ceri.ca