

Government of Alberta's Research Investments Report 2011/2012

Enterprise and Advanced Education

January 2013



Alberta  Government

Contents

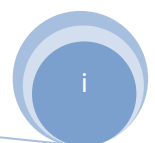
Significant Changes for the 2011/2012 Reporting Year.....	i
Introduction	1
Highlights	1
Overall Results	2
Research Activities Expenditure of the GoA 2011/2012.....	5
Total Expenditures by Objectives	8
Total Expenditures by Performer.....	9
Alberta Research and Innovation Plan Desired Outcomes.....	11
Final Remarks.....	12
Table 1. Government of Alberta expenditures on reserach activities.....	3
Table 2. Total expenditures by department, ministry or agency on science, 2009/10, 2011/12, and 2011/12.....	6
Table 3. Total expenditures 2006/2007 to 2011/2012 by science type	8
Table 4. Total expenditures by performing sector, 2006/2007 to 2011/2012 preliminary	10
Table 5. ARIP Outcomes by the Ministries.....	12
Figure 1. Government of Alberta’s research expenditure as a percentage of total government expenditure, 1999-2012.....	2
Figure 2. Total expenditures by activity, Government of Alberta, 2006/2007 to 2011/2012 (in thousands of dollars)	3
Figure 3. Inforgraphic for GoA's research investments	4
Figure 4. Total expenditures by department, ministry or agency, 2011/2012.....	7
Figure 5. Objectives of total research expenditures, 2011/2012	8
Figure 6. Total expenditure by performing sector, 2011/2012	9
Figure 7. Research Investments by Alberta Research and Innovation Plan Outcomes.....	11

Significant Changes for the 2011/2012 Reporting Year

A number of changes occurred on September 2012 which affected the way this report is being delivered. In previous years, research investment data was captured within the Government of Alberta's Scientific Activities Survey Report. That survey was conducted as a joint project of Enterprise and Advanced Education (EAE) and Statistics Canada. Due to federal budget constraints, Statistics Canada decided not to sign a cost-sharing agreement with EAE to conduct the survey for this reporting year. Therefore, EAE will retain this document for internal GoA purposes.

Collecting and analyzing this information is essential in aligning research investments and outcomes within the provincial research and innovation system. The continuity of the data was maintained by redistributing the 2010/2011 Scientific Activities Worksheet, which also contains 2011/2012 preliminary figures, to the original respondents. The respondents were asked to validate the 2011/2012 figures and requested to incorporate all the changes that occurred within the time period. In addition, they were also instructed to categorize the outcomes of their research investments according to the Alberta Research and Innovation Plan identified categories. The final figures for 2011/2012 are considered actual and used for the Government of Alberta's Research Investments Report.

The fiscal year included in this report discusses the 2011/2012 fiscal which ran from April 1, 2011 and ended on March 31, 2012. The report captures the research spending of any merged or new ministries reflecting its 2011/2012 fiscal year.



Introduction

The statistical data presented provide a broad perspective of the Government of Alberta's involvement in research activities. These activities consist of research and experimental development (R&D) and a number of activities closely related to R&D and referred to as related scientific activities (RSA). The report contains indicators of research expenditures for various aspects such as: department or agency, type of activity, science type, and sector of performance.

Research surveys, like many other surveys, are based on respondents' interpretations of definitions and methods of calculation. Recognizing the fact that the data are estimates, they are expected to be representative of the current research expenditures for the province of Alberta. This document summarizes the findings of Enterprise and Advanced Education's (EAE) initiative to request for validation of research investment information from Government of Alberta ministries, departments, and agencies. Twelve ministries participated in the survey as well as seven entities reporting under EAE. The results are reported by ministry, by type of research (natural sciences or social science), by type of activity (research and development or related scientific activity), and by objective of the research activity.

Highlights

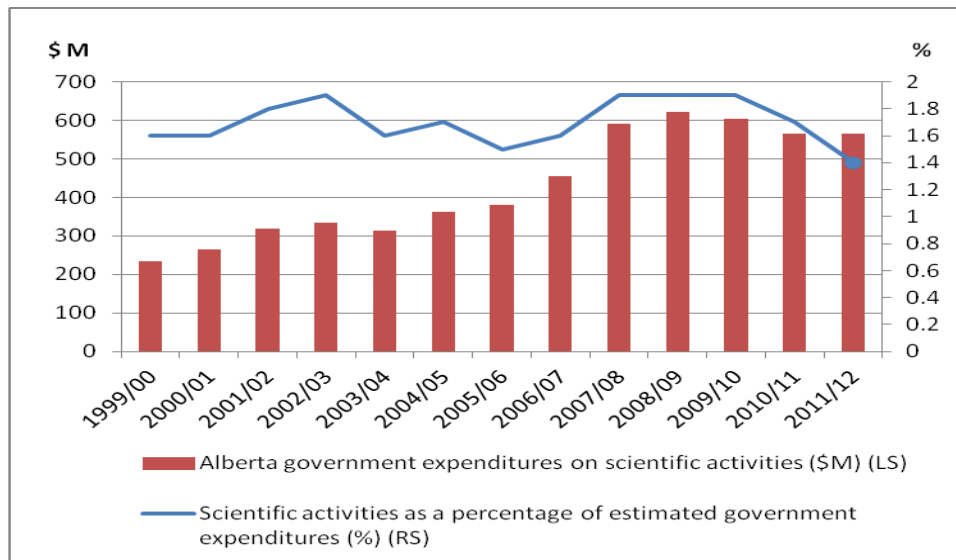
- The Government of Alberta invested a total of \$566.3 million on research for fiscal year 2011/2012. This year is marked by the ministries' intention of maintaining previous year's research investments which is reflected by the slight increase of 0.1% from \$565.8 million in 2010-11.
- In 2011/2012, 93.0% or \$526.6 million of the total research expenditure was spent for natural sciences research and 7.0% or \$39.6 million for social sciences. Research expenditure in natural sciences is historically greater than expenditure in social sciences.
- Compared to previous year's figures, research investments increased very slightly. However, there is a 5% increase in natural science and a 38.3% decline in social science.
- About 70.6% (\$399.7 million) of the total research expenditure was dedicated to research and development while 31.4% (\$166.6 million) was dedicated to related scientific activities. Historically, provincial R&D expenditures are greater than RSA. The gap between the two has grown larger in the last five reporting years (from 2007/2008 to 2011/2012) as R&D has shown an increasing trend and RSA expenditure has been declining.
- The objective of protection and improvement of human health drew the largest percentage of research expenditures capturing 22.5% (\$127.4 million) of the total. This was followed by objectives relating to control and care of the environment (18.7%; \$105.8 million), basic research (12.9%; \$72.8 million) and production, distribution and rational utilization of energy (12.1%; \$68.3 million). This distribution did not change significantly from the previous year.

- The Government of Alberta invested 45.7% of its research spending to effective resource and environmental management, 28.7% is dedicated to broadened economic base, and 25.6% leads to the outcome of resilient, healthy communities.

Overall Results

The Government of Alberta (GoA) invested a total of \$566.2 million on research activities during the fiscal year 2011/2012. This represents a 0.1% increase from the previous year's \$565.8 million. The increase is partly due to the ministries' ability to maintain the previous year's investments on research. The Ministry of Energy and Alberta Innovates - Technology Futures had large projects which drove the investments upwards but a significant decline in social sciences held the investments lower. Collectively, there was a slight increase in the total.

Figure 1. Government of Alberta's research expenditure as a percentage of total government expenditure, 1999-2012



Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education. LS: Left side; RS: Right side

Table 1 presents the historical amounts allotted for Alberta expenditures on research activities and how they relate as a percentage of estimated government expenditures. Alberta government expenditures continue to increase every year but the share dedicated to research activities remain in the range of 1.4% to 1.9% (Figure 1) with the 2011/2012 fiscal year having the least research investments as a percentage of GoA expenditures.

Table 1. Government of Alberta expenditures on reserach activities

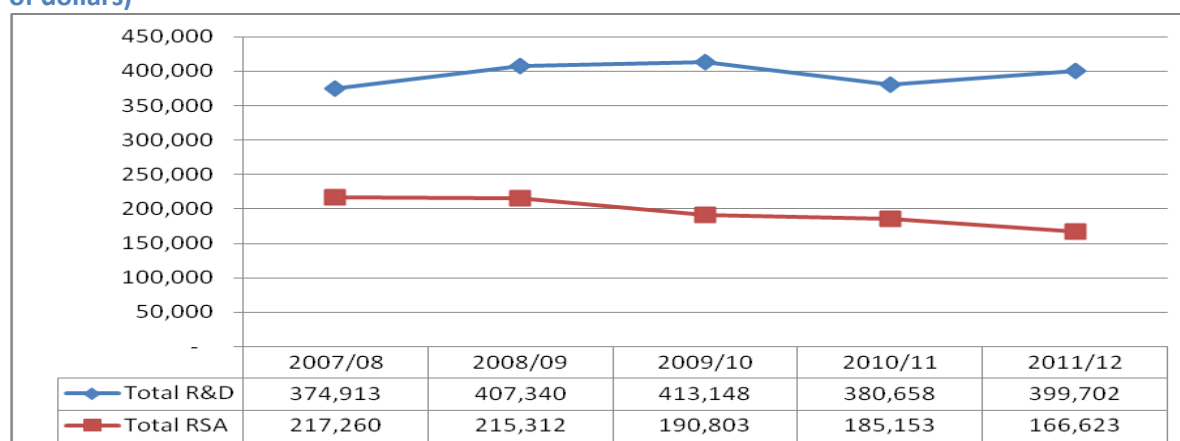
Year	Alberta government expenditures on research activities (Million \$)	Alberta government expenditures (Million \$)*	Research activities as a percentage of estimated government expenditures (%)
2000/01	263.7	16,174.5	1.6
2001/02	317.7	17,982.8	1.8
2002/03	333.4	17,146.8	1.9
2003/04	313.5	19,200.1	1.6
2004/05	362.6	21,423.2	1.7
2005/06	381.7	25,547.7	1.5
2006/07	455.9	28,170.1	1.6
2007/08	592.1	31,749.6	1.9
2008/09	622.6	32,994.1	1.9
2009/10	603.9	31,694.3	1.9
2011/12	565.8	33,406.3	1.7

Source: Government and Legislative Assembly Estimates documents from Budget 2001 to Budget 2012. <http://www.finance.alberta.ca/publications/budget/index.html>.

The trend of the total research investments by the Government of Alberta’s ministries, departments and agencies are broken down by R&D and RSA. The total investments on science started to decline in 2009/10 and slightly recovered in 2011/2012. The trend is not the same for both R&D and RSA which can be seen in Figure 2. Latest figures show that R&D and RSA are trending towards opposite directions. R&D increased by 5.0% while RSA decline by 10.0%. While R&D has a generally upward trend, RSA has been declining since 2007/08 from \$217.3 million to the present level of \$166.6 million.

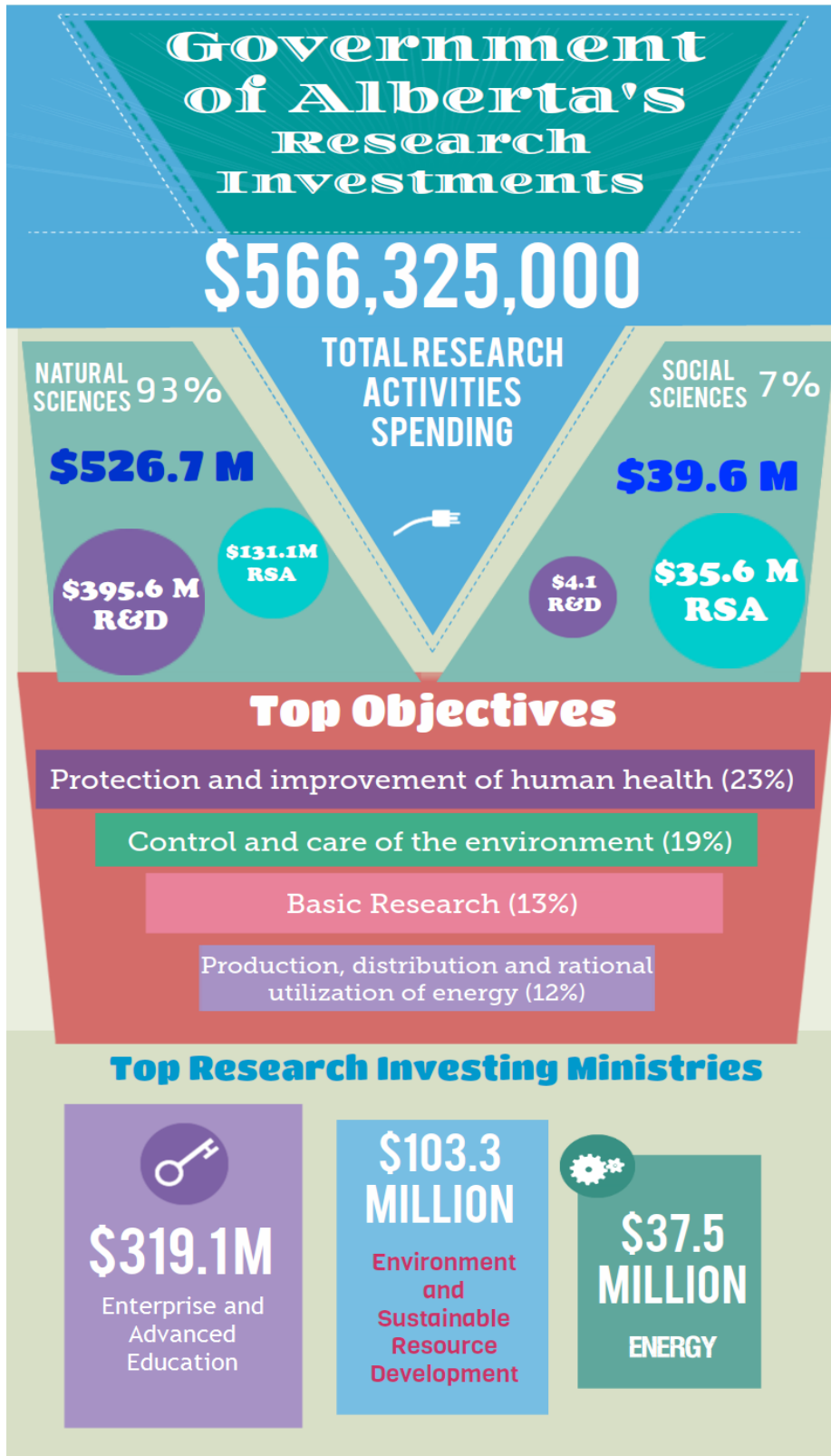
Historically, research and development expenditure has remained about double the related scientific activities amounts (see Figure 2). The gap between the two has grown larger as R&D increased and RSA expenditures declined. In 2007, R&D was 1.7 times that of the RSA spending and in 2011, R&D is 2.4 times that of RSA.

Figure 2. Total expenditures by activity, Government of Alberta, 2006-07 to 2011/2012 (in thousands of dollars)



Source: Government of Alberta’s Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Figure 3. Infographic for GoA's research investments



Research Activities Expenditure of the GoA 2011/2012

The Ministry of Enterprise and Advanced Education accounts for the largest percentage of research investments capturing 56.3% of the total provincial expenditure. Under EAE, Alberta Innovates – Technology Futures (\$165.5 million) captures 29.2% of the total GoA research expenditures and 51.9% of EAE's. Alberta Innovates – Health Solutions (\$79.0 million) accounts for 14% of the GoA's total and 24.8% of EAE's (Figure 4). AI – Energy and Environment solutions accounts for 3.0% of the total GoA research expenditure and 5.4% of EAE. ALBERTA INNOVATES - Bio Solutions captures 2.3% of GoA expenditures and 4.0% of EAE's research investments.

Following EAE in research investment is Environment and Sustainable Resource and Development. In the previous year, Environment ranked second largest in research investing and Sustainable Resource Development ranked third. As a newly combined ministry, they account for about 18.2% (\$103.3 million) of the total research spending of the GoA. Energy follows with 6.6% (\$37.5 million) and Health with 6.4% (\$36.1.0 million). Agriculture and Rural Development follows closely with 5.7% (\$32.0 million) of research investments.

Table 2 shows the total expenditures of the twelve responding GoA ministries and seven agencies in the past 3 years. The total Government of Alberta investment on research shows an increase of \$514,000 or 0.1% from 2010/2011 to 2011/2012 which is very moderate compared to the fluctuations observed year-by-year.

A few ministries are responsible for the increase in research investments namely Enterprise and Advanced Education, Agriculture and Rural Development, Energy, Infrastructure, and Tourism, Parks and Recreation. Energy had the greatest increase from about \$15.0 million to \$37.5 million, a 150% increase. This increase at Energy is mostly driven by new carbon capture projects.

Historically, Enterprise and Advanced Education including the agencies and corporations accounted for the largest amount in expenditures for research activities, averaging \$323.6 million in the last three years. During the same three years, the top R&D and RSA spending ministries following EAE were Energy, Environment and Sustainable Resource Development, and Health.

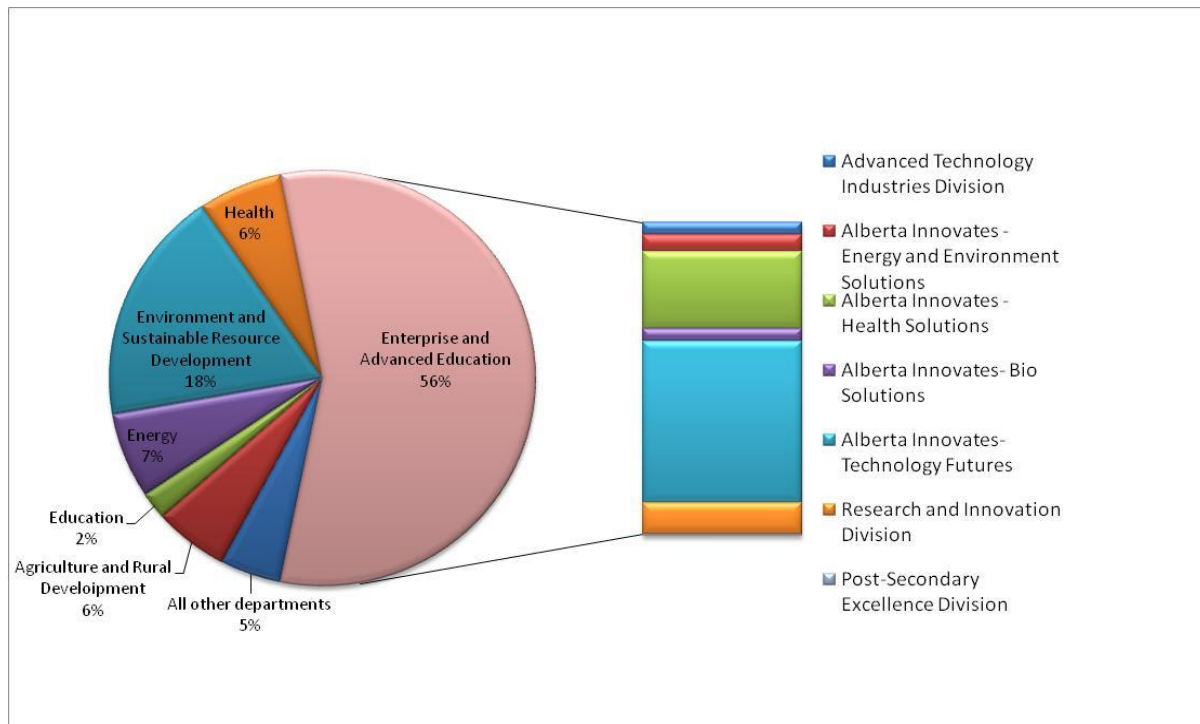
Table 2. Total expenditures by department, ministry or agency on science, 2009/10, 2011/12, and 2011/12

Department, ministry or agency	2009/2010	2010/2011	2011/2012
	in thousands		
Advanced Education & Technology			
Alberta Innovates - Energy and Environment Solutions	26,888	20,859	17,268
Alberta Innovates - Health Solutions	77,886	79,802	78,991
Alberta Innovates - Bio Solutions	24,291	21,916	12,803
Alberta Innovates - Technology Futures	162,592	156,369	165,542
Innovation and Advanced Technologies	17,641	14,383	12,803
Post-Secondary Excellence Division	313	382	333
Research and Innovation Division	3,217	22,782	31,315
Total Advanced Education & Technology	335,237	316,493	319,055
Agriculture and Rural Development	35,916	31,427	32,044
Children and Youth Services	2,200	2,180	...
Culture	...	...	4,971
Culture and Community Spirit	3,932	3,932	...
Education	31,625	32,841	11,974
Employment and Immigration	2,295	2,099	...
Energy	26,793	14,977	37,458
Environment	61,465	57,430	...
Environment and Sustainable Resource Development	...	...	103,277
Health	...	...	36,110
Health and Wellness	28,287	36,768	...
Housing and Urban Affairs	887	721	...
Human Services	...	...	3,689
Infrastructure	18,174	3,979	6,325
Justice and Attorney General	2,140	3,384	...
Justice and Solicitor General	...	...	2,490
Sustainable Resource Development	40,141	49,232	...
Tourism, Parks and Recreation	1,101	1,069	1,217
Transportation	12,297	9,279	7,715
Total	603,951	565,811	\$566,325

Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Figure 4 illustrates the proportions of research investments by ministry. Education, Agriculture and Rural Development, Health, Energy Environment and Sustainable Resource Development, and Enterprise and Advanced Education account for 95.4% of research activities investments. All other departments in the figure includes Culture, Human Services, Infrastructure, Justice and Solicitor General, Tourism, Parks and Recreation, and Transportation. Together they make up 4.6% of the total Alberta research activities expenditure for 2011/2012.

Figure 4. Total expenditures by department, ministry or agency, 2011/2012



Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

In 2011/2012, the natural science spending is \$526.6 million and for social sciences \$64.2 million, capturing 93.0% and 7.0%, respectively, of the total research investment activities expenditure of the GoA. The 2011/2012 natural science total research spending is the largest Alberta recorded total in the last 5 years. This is a large shift from last year's distribution of 88.6% natural sciences and 11.4% social sciences. From 2006/2007 to 2011/2012, the average distribution is 89% natural sciences and 11% social sciences.

Under the natural sciences, the majority of funding is dedicated towards R&D, about 73.0% and 27.0% is spent on RSA. The opposite is true for social sciences where 89.8% is dedicated to RSA and only 10.2% is for R&D.

The major contributors to activities in natural sciences in 2011/2012 are: Enterprise and Advanced Education (\$316.9 million), Environment and Sustainable Resource Development (\$99.8 million), and Energy (\$37.5 million).

The major contributors to activities in social sciences in 2011/2012 are: Health (\$13.1 million), Education (\$12.0 million), and Human Services (\$3.7 million).

Table 3. Total expenditures 2006/07 to 2011/12 by science type

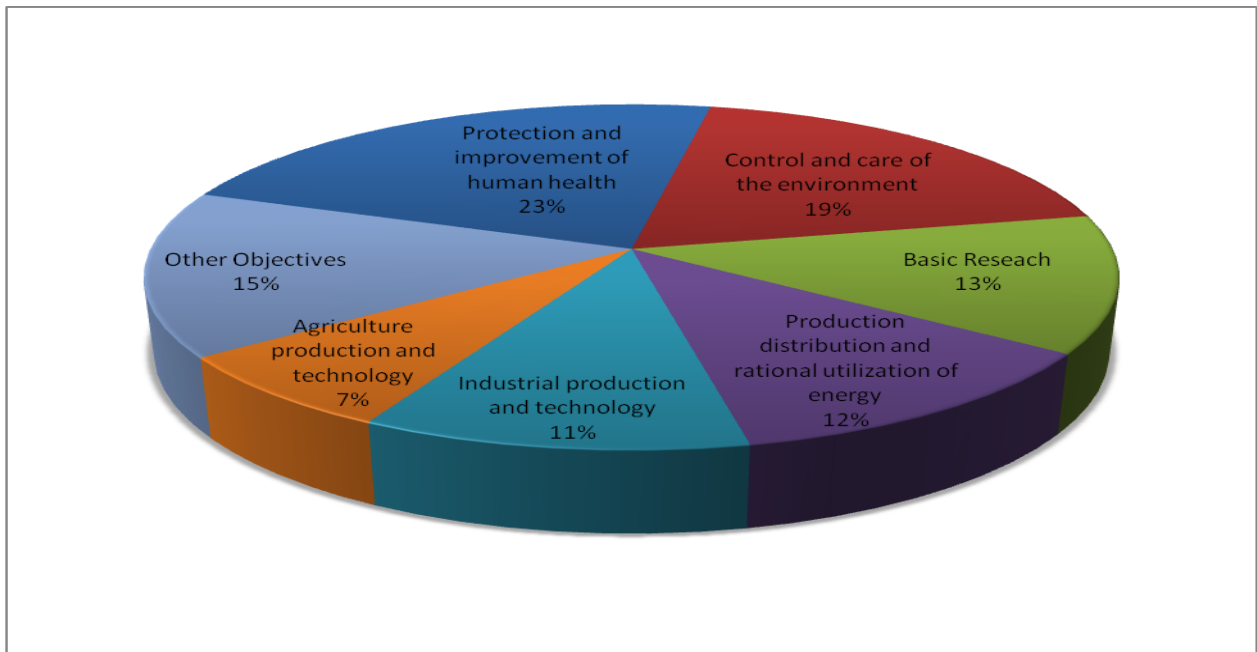
Activity	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
	thousands of dollars					
Total Research Investments	455,926	592,173	622,652	603,951	565,811	566,325
Natural Science	424,710	508,739	553,266	540,052	501,572	526,685
Total R&D	307,283	360,136	392,339	407,383	372,846	384,184
Total RSA	117,427	148,603	160,927	132,669	128,726	142,501
Social Sciences	31,216	83,434	69,386	63,899	64,239	39,640
Total R&D	10,739	14,777	15,001	5,765	7,812	4,075
Total RSA	20,477	68,657	54,385	58,134	56,427	35,565

Source: Government of Alberta’s Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Total Expenditures by Objectives

Much like 2010/11, the largest portion of the total research investments of GoA in 2011/2012 is dedicated to the protection and improvement of human health with \$127.4 million (22.5% of the total spending). The second largest spending objective is control and care of the environment which accounts for \$105.9 million or 18.7% of the total spending while basic research totaled \$72.8 million (12.8%). Very close to basic research is production, distribution and rational utilization of energy at \$68.3 million or 12.1% of the total spending (see Figure 5).

Figure 5. Objectives of total research expenditures, 2011/2012



Source: Government of Alberta’s Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Total Expenditures by Performer

In the 2011/2012 survey, the GoA (internal expenditures) was the largest performer conducting 36.4% of the total GoA research expenditures (\$206.3 million). This was a 4.1% decline from the previous year's level of \$215.1 million.

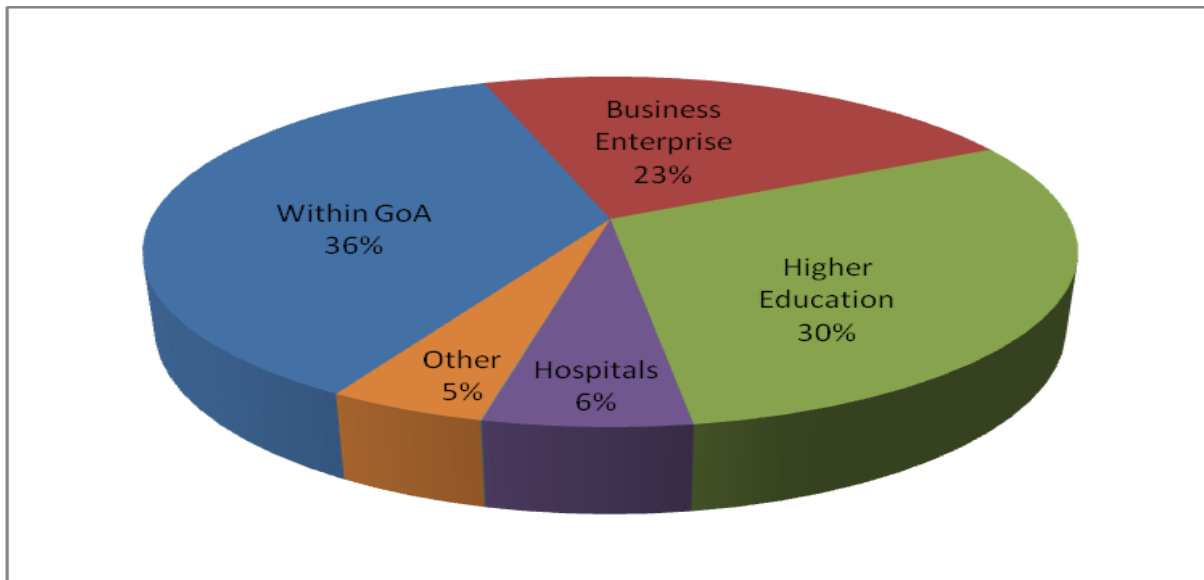
Higher education performed about 30.0% or \$ 169.7 million of research activities. The actual funding to post-secondary institutions declined from \$174.1 million in 2010/11.

Business enterprises rank third as performers of research activities. They performed 22.9% (\$129.7 million) of GoA's research activities expenditure.

After observing an increase in the previous fiscal year, funding to hospitals for research activities investments declined by 16.5% in 2011/2012 from \$40.9 million to \$34.2 million.

Figure 6 illustrates the distribution of research performers. Table 4 shows the trend of the funding from 2006 to 2011.

Figure 6. Total expenditure by performing sector, 2011/2012



Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Table 4. Total expenditures by performing sector, 2006/2007 to 2011/2012 preliminary

Performing sector	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
thousands of dollars						
Intramural	211,839	242,640	267,130	236,679	215,103	206,329
Business Enterprise	54,925	124,476	130,526	106,974	102,827	129,675
Higher Education	132,927	131,513	150,201	189,367	174,130	69,745
Hospitals	19,287	56,380	33,644	24,913	40,920	34,176
Other	36,948	37,164	41,151	46,018	32,831	26,400
Total	455,926	592,173	622,652	603,951	565,811	566,325

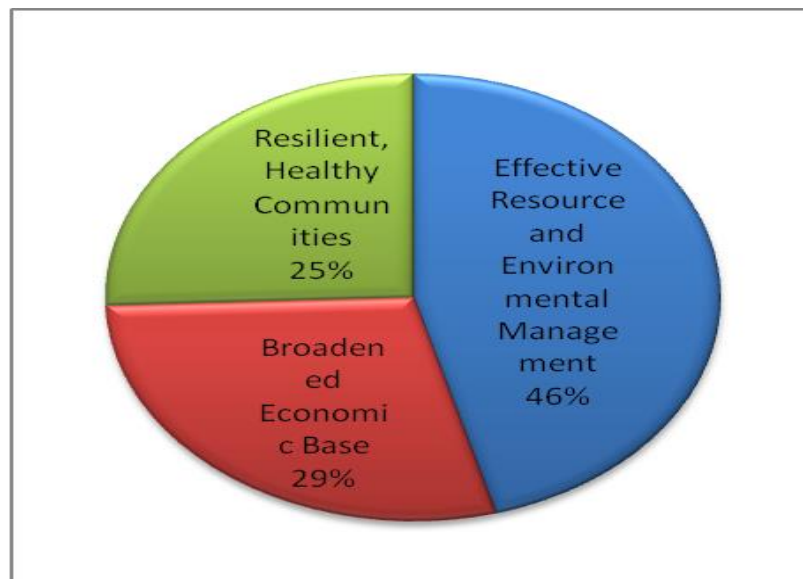
Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Alberta Research and Innovation Plan Desired Outcomes

This year, Alberta Enterprise and Advanced Education asked the respondents to categorize their investments by the outcomes described in the Alberta Research and Innovation Plan (ARIP). These outcomes are effective resource and environmental management, broadened economic base, and resilient healthy communities.

The results show that the GoA dedicated 46% of its research spending to effective resource and environmental management. This is mostly driven by the investments of Environment and Sustainable Resource Development, Alberta Innovates - Technology Futures, and Energy. About 29% is dedicated to broadened economic base led by Alberta Innovates - Technology Futures and Agriculture and Rural Development. Lastly, about 25% was directed to the outcome of resilient, health communities and is led by Alberta Innovates - Health Solutions and Health.

Figure 7. Research Investments by Alberta Research and Innovation Plan Outcomes



Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Table 5. ARIP Outcomes by the Ministries

Ministry	Effective Resource and Environmental Management	Broadened Economic Base	Resilient, Healthy Communities	Total Investments
In thousands of dollars				
Agriculture and Rural Development	13,172	18,872	0	32,044
Culture	2,976	0	1,995	4,971
Education	11,974	0	0	11,974
Energy	37,458	0	0	37,458
Enterprise and Advanced Education	86,835	139,486	92,733	319,054
Alberta Innovates - Bio Solutions	6,121	1,183	5,499	12,803
Alberta Innovates - Energy and Environmental Solutions	12,778	2,418	2,072	17,268
Alberta Innovates - Health Solutions	0	16,442	62,549	78,991
Alberta Innovates - Technology Futures	55,522	98,850	11,169	165,541
Innovation and Advanced Technologies	0	9,547	3,256	12,803
Post Secondary and Community Education	10	22	301	333
Research and Innovation Division	12,404	11,024	7,887	31,315
Environment and Sustainable Resource Development	103,277	0	0	103,277
Health	0	0	36,110	36,110
Human Services	0	0	3,689	3,689
Infrastructure	0	0	6,325	6,325
Justice and Solicitor General	0	0	2,490	2,490
Tourism, Park and Recreation	777	434	7	1,217
Transportation	2,315	3,858	1,543	7,716
Total	\$258,784	\$162,650	\$144,892	\$566,325

Source: Government of Alberta's Research Investments 2011/2012, internal assessment by Enterprise and Advanced Education.

Final Remarks

The Government of Alberta's Research Investments Report 2011/2012 reflects the Government of Alberta's dedication in supporting research activities in the province. The 2010/2011 fiscal year amounts invested by the GoA in R&D and RSA, reporting year 2011/2012, shows an effort to maintain most of the investment activities and proceed with a few new projects. The result was a slight increase in the total research investments. By breaking down into science type and science activity, we observe strong activity in the natural sciences and research and development while there is a decline in social sciences R&D and RSA.