

# Government of Alberta's Research Investments Report 2012/2013

Innovation and Advanced Education

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Alberta  Government

## Table of Contents

Executive Summary .....	i
Overall Results .....	1
GoA Research Investments Survey 2012/2013 .....	4
Total Expenditures by Objectives .....	7
Total Expenditures by Performer .....	7
Alberta Research and Innovation Plan (ARIP) Desired Outcomes .....	9
Final Remarks .....	10
Table 1. Government of Alberta expenditures on reserach activities.....	2
Table 2. Total expenditures by department, ministry or agency on science, 2009/10, 2011/12 2011/12, and 2012/2013.....	5
Table 3. Total expenditures 2006/2007 to 2012/2013 by science type .....	7
Table 4. Total expenditures by performing sector, 2006/2007 to 2012/2013 preliminary .....	8
Table 5. ARIP Outcomes Ministry .....	9
Figure 1. Government of Alberta’s research expenditure as a percentage of total government expenditure, 1999-2013.....	1
Figure 2. Total expenditures by activity, Government of Alberta, 2008/2008 to 2012/2013 (in thousands of dollars) .....	2
Figure 3. Infographic - GoA's research investments .....	3
Figure 4. Total expenditures by department, ministry or agency, 2012/2013.....	6
Figure 5. Objectives of total research expenditures, 2012/2013 .....	7
Figure 6. Total expenditure by performing sector, 2012/2013 .....	8
Figure 7. Research Investments by Alberta Research and Innovation Plan Outcomes.....	9

## Executive Summary

The Ministry of Innovation and Advanced Education (IAE) maintains the time series of the collection and analysis of the Government of Alberta's Research Investments Survey (survey) for 2012/2013. The survey monitors the Alberta government's research expenditure and provides up-to-date information to enhance research and innovation policy evaluation, development, and implementation.

The survey provides information to analyze the efficiency of Government of Alberta's (GoA) research investment through reporting where research expenditures are assigned. The data collected through the survey can be used to analyze the efficiency, effectiveness, and relevancy of various research projects across ministries and by provincial priorities as well.

The report discusses the GoA's research investments in the 2012/2013 fiscal year (April 1, 2012 to March 31, 2013) and captures the research spending of any merged or new ministries.

The Innovation and Advanced Technologies Division collected feedback from respondent Alberta government ministries and agencies to determine how to improve the Government of Alberta Research Investments Survey and incorporated necessary changes in the 2012/2013 survey.

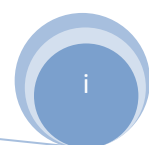
The information presented provides a broad perspective of the Government of Alberta's involvement in research activities. These activities consist of research and experimental development (R&D) and a number of activities closely related to R&D and referred to as related scientific activities (RSA). The report contains indicators of research expenditures for various aspects such as: department or agency, type of activity, science type, expenditure outcomes, as well as 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 Government of Alberta. This document summarizes the findings on research investment information from Government of Alberta ministries, departments, and agencies.

Eleven ministries participated in the survey as well as six entities reporting within IAE.<sup>1</sup> These participants in total reported over \$800 million of research investment for 2012/2013 in natural and social sciences. At the same time, IAE continues to work with all ministries across GoA to enhance future survey participation and capture as accurately as possible the total Government of Alberta research investments. This calls for an active participation from ministries including those that did not participate this year to bring forward investments in natural sciences and social sciences. With recognition of the importance of social benefits and research and innovation as evidenced by the creation of the Social Innovation Endowment Fund and other initiatives, IAE will strongly encourage participation from all ministries.

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<sup>1</sup> Alberta Innovates – Health Solutions is now reporting to Alberta Health.



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.

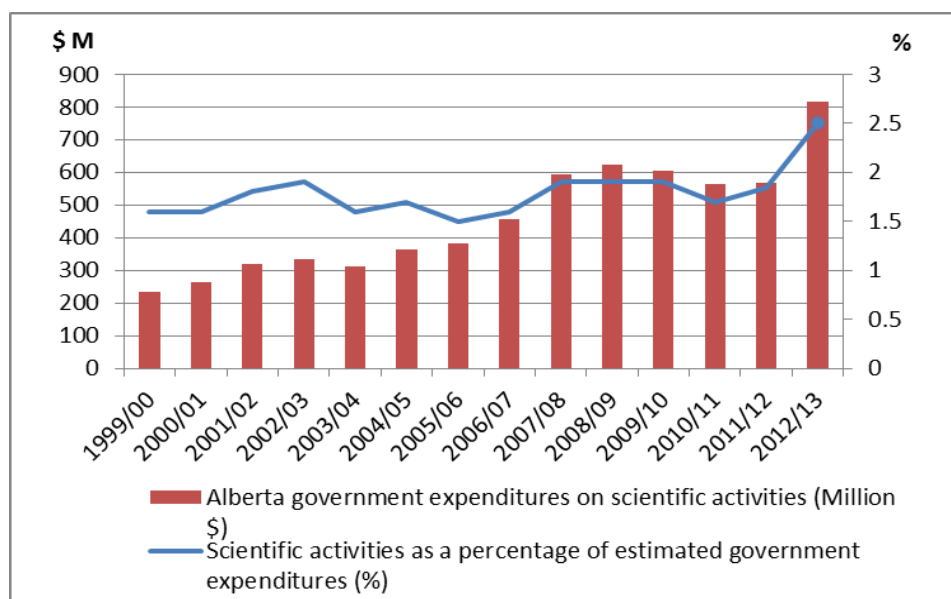
The key findings of the Government of Alberta Research Investments Survey are:

- The Government of Alberta invested a total of \$ 814.4million on research for fiscal year 2012/2013, a 43.8% increase compared to 2011/2012.
- In 2012/2013, 89.6% or \$730.0 million of the total research expenditure was spent on natural sciences research and 10.4% or \$84.4 million on social sciences. Research expenditure in natural sciences is historically greater than expenditure in social sciences.
- Compared to the previous year's figures, research investments increased dramatically. This 2012/2013 year's increase was fuelled by significant growth of research investments in the Ministry of Energy (increase from \$37.5 million to \$179.4 million) and the Ministry of Environment and Sustainable Resource Development (ESRD) (increase from \$103.3 million to \$199.6 million).
- About 68.4% (\$556.8million) of the total research expenditure was dedicated to R&D and 31.6% (\$257.6 million) was dedicated to RSA. Historically, provincial R&D expenditures are greater than RSA.
- The control and care of the environment objective drew the largest percentage of research expenditures, capturing 26.2% (\$213.5 million) of the total. It was followed by the objectives relating to protection and improvement of human health (19.5%; \$158.6 million), protection, distribution and rational utilization of energy (13.4%; \$109.2 million), agriculture production and technology (8.3%; \$67.8 million), and forestry (6.4%; \$51.9 million).
- The Government of Alberta invested 44.2% of its research spending into effective resource and environmental management, 30.1% was dedicated to broadened economic base, and 25.7% led to the outcome of resilient, healthy communities.
- Of the 11 ministries that participated in this year's survey, Innovation and Advanced Education (\$302.4 million), Environment and Sustainable Resource Development (\$199.6 million), Energy (\$179.4 million), Health (\$56.3 million), and Agriculture and Rural Development (\$48.5 million) were the five ministries with the highest level of research investments.

## Overall Results

The Government of Alberta (GoA) invested a total of \$814.4 million on research activities during the fiscal year 2012/2013. This represents a 43.8% increase from the previous year's \$566.3 million. The investment in both the natural sciences and social sciences displayed significant growth compared to last fiscal year, from \$526.7 million to \$730.0 million in natural sciences, and from \$39.6 million to \$84.4 million in social sciences. The increase was largely attributable to increased expenditures by the Ministry of Environment and Sustainable Resource Development (ESRD) and the Ministry of Energy. The research investment by ESRD increased from \$103.3 million in 2011/2012 to \$199.6 million in 2012/2013. The research investment in Energy for 2012/2013 was \$179.4 million, a more than fourfold increase from the \$37.5 million in 2011/2012.

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



Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

Table 1 presents the historical expenditures for Alberta on research activities and as a percentage of estimated government expenditures. Alberta government expenditures increased every year and the share dedicated to research activities had been in the range of 1.4% to 1.9% (Figure 1) until 2012/2013. The 2012/2013 fiscal year represented the highest research investments as a percentage of GoA expenditures at 2.5%.

**Table 1. Government of Alberta expenditures on research activities**

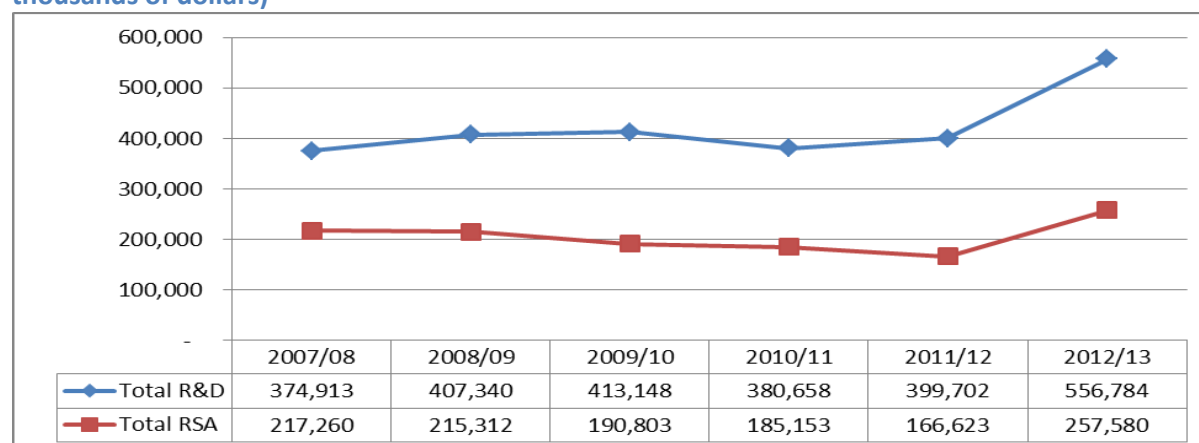
Year	Alberta government expenditures on scientific activities (Million \$)	Alberta government expenditures (Million \$)*	Scientific activities as a percentage of estimated government expenditures (%)
1999/00	234.5	14,527.30	1.6
2000/01	263.7	16,174.50	1.6
2001/02	317.7	17,982.80	1.8
2002/03	333.4	17,146.80	1.9
2003/04	313.5	19,200.10	1.6
2004/05	362.6	21,423.20	1.7
2005/06	381.7	25,547.70	1.5
2006/07	455.9	28,170.10	1.6
2007/08	592.1	31,749.60	1.9
2008/09	622.6	32,994.10	1.9
2009/10	603.9	31,694.30	1.9
2010/11	565.8	33,406.30	1.7
2011/12	566.3	30,799.45	1.8
2012/13	814.4	32,487.43	2.5

<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 in sciences started to decline in 2009/2010, slightly recovered in 2011/2012, and rose significantly in 2012/2013. The trend was the same for both R&D and RSA in 2012/2013 (Figure 2). R&D increased by 39.3% and RSA rose by 54.6% in 2012/2013.

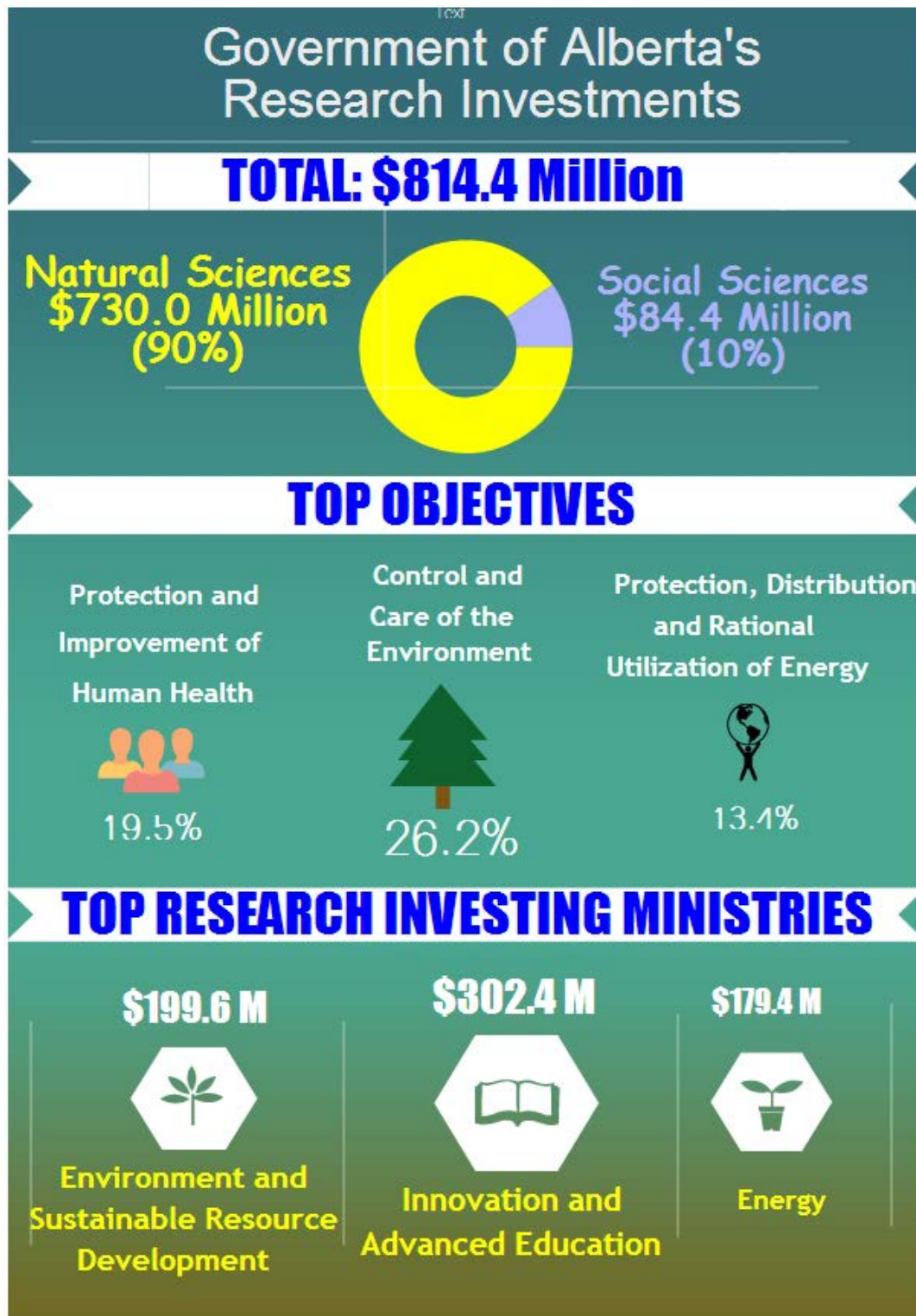
Historically, research and development expenditure has remained about double of the related scientific activities amounts (see Figure 2). Over time, the gap between the two has grown larger as R&D increased and RSA expenditures declined. In 2007, R&D was 1.7 times that of the RSA spending, and in 2012/2013, R&D was 2.2 times that of RSA.

**Figure 2. Total expenditures by activity, Government of Alberta, 2007/2008 to 2012/2013 (in thousands of dollars)**



Source: Government of Alberta’s Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

Figure 3. Infographic: GoA's research investments



## GoA Research Investments Survey 2012/2013

Table 2 shows the total expenditures of the responding GoA ministries and agencies in the past four years. The total Government of Alberta's research investments showed a considerable increase of \$248.0 million (43.8%) from 2011/2012 to 2012/2013 compared to the moderate fluctuations observed year-by-year previously. ESRD and the Ministry of Energy mainly accounted for this large increase.

Declining slightly in research expenditure from the \$319.1 million in 2011/2012, the Ministry of Innovation and Advanced Education accounted for the largest percentage of research investments in 2012/2013, capturing 37.1% (\$302.4 million) of the total provincial research expenditure. Within IAE, Alberta Innovates – Technology Futures (\$154.6 million) captured 51.1% of IAE's research investment and 19.0% of the total GoA's research expenditures. Alberta Innovates – Health Solutions (\$72.1 million) accounted for 23.8% of IAE's and 8.8% of the GoA's research expenditure. Alberta Innovates – Energy and Environment Solutions (\$13.4 million) was responsible for 4.4% of IAE's research investment and 1.6% of the GoA's research expenditures. Alberta Innovates - Bio Solutions (\$11.3 million) captured 3.7% of IAE's research investments and 1.4% of GoA's research expenditures. Historically, Innovation and Advanced Education including the agencies and corporations accounted for the largest amount in expenditures for research activities, averaging \$318.3 million in the last four years. During the same four years, the top R&D and RSA spending ministries following IAE were ESRD, Energy, and Health.

In 2012/2013, ESRD retained its second place among all the ministries with a research investment of \$199.6 million. In 2012/2013, ESRD contributed 63.3% of its research expenditure into effective resource and environmental management, and 92.8% of the total expenditure was in the natural sciences.

In 2012/2013, the three largest research projects in Energy were: Carbon Capture and Storage (CCS, including regulatory design work and administration costs), Bioenergy Producer Credit Program and Innovative Energy Technologies Program (IETP). These were responsible for over 98.4% of the total research investment by Energy for 2012/2013. These contributed to a substantial increase of research expenditure in Energy from \$37.5 million in 2011/2012 to \$179.4 million in 2012/2013. Effective resource and environmental management accounted for 65.6% of the total research expenditure, and 99.7% of the total investment were contributed to natural sciences.

The Ministry of Health and the Ministry of Agriculture and Rural Development were ranked the fourth and fifth highest research expenditure department with \$56.3 million and \$48.5 million of research investments in 2012/2013 respectively.<sup>†</sup>

Another department displaying a substantial increase in research investment was Human Services, rising from \$3.7 million in 2011/2012 to \$7.6 million in 2012/2013.

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<sup>†</sup>Please note that the reported research investment Agriculture and Rural Development is approximately accurate without including the funding from Alberta Livestock and Meat Agency (ALMA) and Alberta Crop Industry Development Fund (ALIDF).



**Table 2. Total expenditures by department, ministry or agency on science, 2009/2010, 2011/2012, 2011/2012 and 2012/2013**

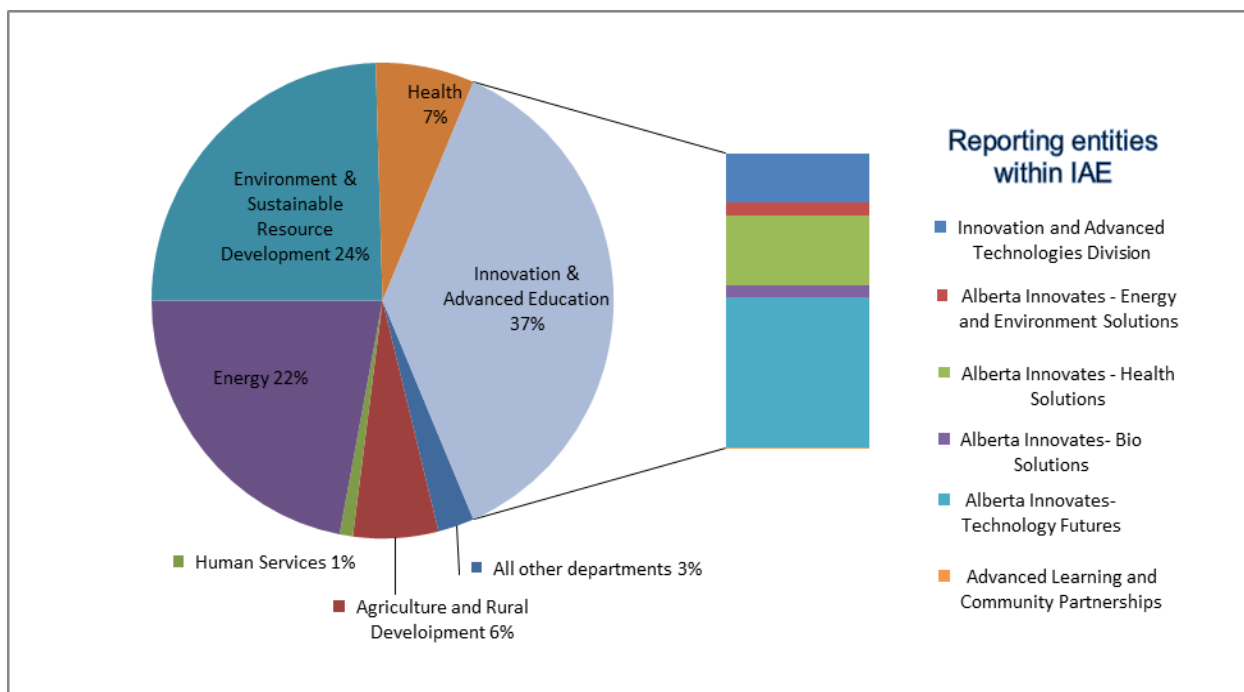
Department, ministry or agency	2009/2010	2010/2011	2011/2012	2012/2013
	in thousands			
Innovation and Advanced Education				
Alberta Innovates - Energy and Environment Solutions	26,888	20,859	17,268	13,403
Alberta Innovates - Health Solutions	77,886	79,802	78,991	72,058
Alberta Innovates - Bio Solutions	24,291	21,916	12,803	11,259
Alberta Innovates - Technology Futures	162,592	156,369	165,542	154,635
Innovation and Advanced Technologies Division	17,641	14,383	12,803	50,651
Advanced Learning and Community Partnerships Division	...	...	...	438
Post-Secondary Excellence Division	313	382	333	...
Research and Innovation Division	3,217	22,782	31,315	...
<b>Total Innovation and Advanced Education</b>	<b>335,237</b>	<b>316,493</b>	<b>319,055</b>	<b>302,444</b>
Agriculture and Rural Development	35,916	31,427	32,044	48,481
Children and Youth Services	2,200	2,180	...	...
Culture	...	...	4,971	4,971
Culture and Community Spirit	3,932	3,932	...	...
Education	31,625	32,841	11,974	6,921
Employment and Immigration	2,295	2,099	...	...
Energy	26,793	14,977	37,458	179,359
Environment	61,465	57,430	...	...
Environment and Sustainable Resource Development	...	...	103,277	199,569
Health	...	...	36,110	56,271
Health and Wellness	28,287	36,768	...	...
Housing and Urban Affairs	887	721	...	...
Human Services	...	...	3,689	7,557
Infrastructure	18,174	3,979	6,325	6,240
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	1,451
Transportation	12,297	9,279	7,715	1,100
<b>Total</b>	<b>603,951</b>	<b>565,811</b>	<b>566,325</b>	<b>814,364</b>

Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

Note: Research and Innovation Division is now part of Innovation and Advanced Technologies Division.

Figure 4 illustrates the proportions of research investments by ministry. Human Services, Agriculture and Rural Development, Health, Energy, Environment and Sustainable Resource Development, and Innovation and Advanced Education accounted for 97.5% of research activities investments. All other reporting Departments including Culture, Education, Infrastructure, Tourism, Parks and Recreation, and Transportation together made up 2.5% of the total Alberta research investments for 2012/2013 (Figure 4).

**Figure 4. Total expenditures by department, ministry or agency, 2012/2013**



Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

In 2012/2013, the natural sciences spending was \$730 million and social sciences expenditure was \$84.4 million, capturing 89.6% and 10.4%, respectively, of the total research investments of GoA. The 2012/2013 natural sciences total research spending was the largest Alberta recorded total in the last 5 years. Research investment in social sciences showed a more dramatic proportionate growth, doubling the amount from last fiscal year.

The major contributors to research activities in natural sciences in 2012/2013 were: Innovation and Advanced Education (\$301.2 million), Environment and Sustainable Resource Development (\$185.3 million), and Energy (\$ 178.8 million).

The major contributors to research activities in social sciences in 2012/2013 were: Health (\$50.8 million), Environment and Sustainable Resource Development (\$14.3 million), and Human Services (\$7.6 million).

**Table 3. Total expenditures 2006/2007 to 2012/2013 by science type**

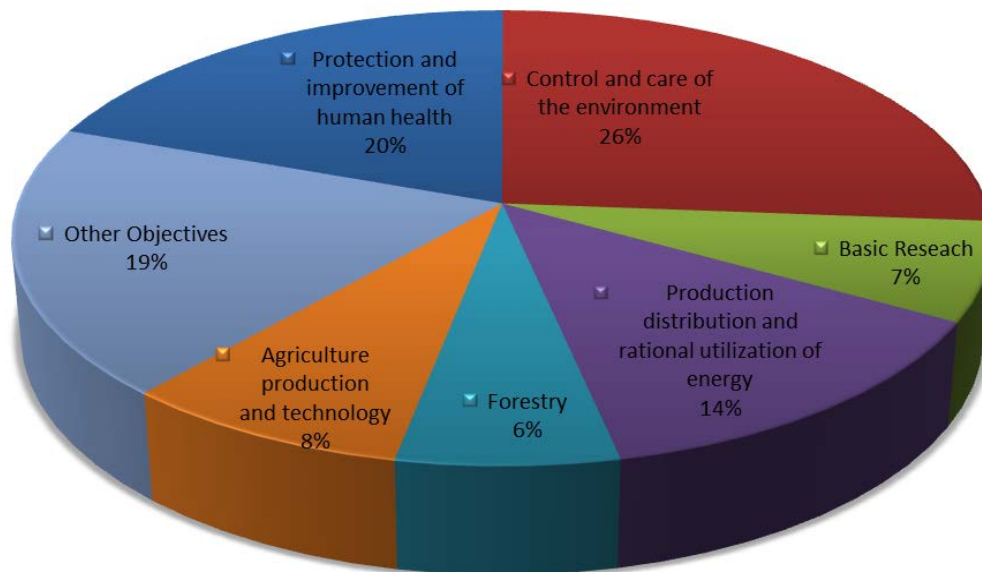
Activity	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013
	thousands of dollars						
<b>Total Research Investments</b>	<b>455,926</b>	<b>592,173</b>	<b>622,652</b>	<b>603,951</b>	<b>565,811</b>	<b>566,325</b>	<b>814,364</b>
<b>Natural Science</b>	<b>424,710</b>	<b>508,739</b>	<b>553,266</b>	<b>540,052</b>	<b>501,572</b>	<b>526,685</b>	<b>729,963</b>
Total R&D	307,283	360,136	392,339	407,383	372,846	384,184	516,585
Total RSA	117,427	148,603	160,927	132,669	128,726	142,501	213,378
<b>Social Sciences</b>	<b>31,216</b>	<b>83,434</b>	<b>69,386</b>	<b>63,899</b>	<b>64,239</b>	<b>39,640</b>	<b>84,401</b>
Total R&D	10,739	14,777	15,001	5,765	7,812	4,075	40,199
Total RSA	20,477	68,657	54,385	58,134	56,427	35,565	44,202

Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

## Total Expenditures by Objectives

In 2012/2013, the largest portion of the total GoA research investments was dedicated to the control and care of the environment (\$213.5 million; 26.2%). The second largest spending objective was protection and improvement of human health (\$158.6 million; 19.5%), followed by production, distribution, and rational utilization of energy (\$109.2 million; 13.4%), agriculture production and technology (\$67.8 million; 8.3%), and basic research (\$57.1million; 7.0%).

**Figure 5. Objectives of total research expenditures, 2012/2013**



Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

## Total Expenditures by Performer

In the 2012/2013 survey, the business enterprise was the largest performer of scientific activities, conducting 36.0% of the total GoA research investment (\$292.8 million). This was a 125.8% increase from the previous year's level of \$129.7 million.

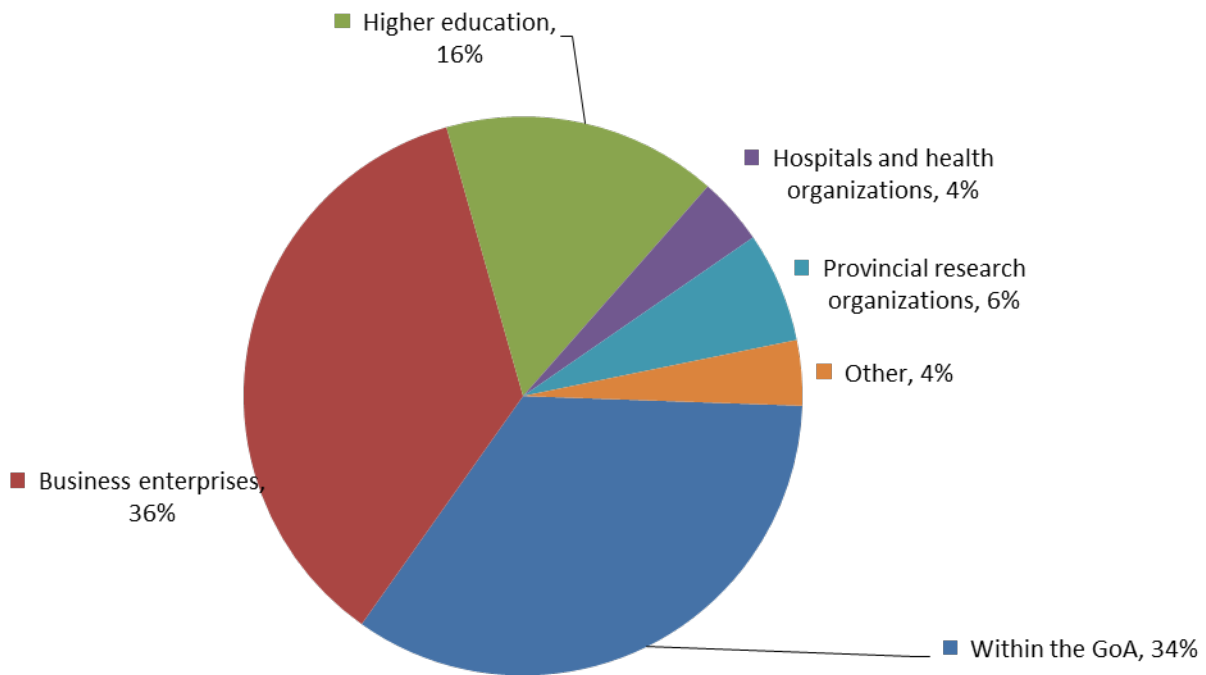
The GoA (internal expenditures) performed about 34.4% (\$280.4 million) of research activities, ranking second amongst all the performers.

Higher education came third as performers of research activities, accounting for 15.5% (\$126.1 million) of GoA's research activities expenditure.

Following higher education were provincial research organization (6.4%), and hospitals and health organizations (3.9%), with total research expenditures of \$52.3 million and \$31.9 million respectively.

Figure 6 illustrates the distribution of research performers. Table 4 shows the trend of the funding from 2006 to 2012.

**Figure 6. Total expenditure by performing sector, 2012/2013**



Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

**Table 4. Total expenditures by performing sector, 2006/2007 to 2012/2013 preliminary**

Performing sector	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013
	thousands of dollars						
Intramural	211,839	242,640	267,130	236,679	215,103	206,329	280,358
Business Enterprise	54,925	124,476	130,526	106,974	102,827	129,675	292,839
Higher Education	132,927	131,513	150,201	189,367	174,130	169,745	126,099
Hospitals and Health Organizations	19,287	56,380	33,644	24,913	40,920	34,176	31,892
Provincial Research Organizations	...	...	...	...	...	0	52,298
Other	36,948	37,164	41,151	46,018	32,831	26,400	30,878
<b>Total</b>	<b>455,926</b>	<b>592,173</b>	<b>622,652</b>	<b>603,951</b>	<b>565,811</b>	<b>566,325</b>	<b>814,364</b>

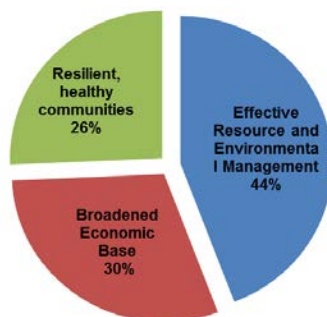
Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

## Alberta Research and Innovation Plan Desired Outcomes

Alberta Innovation and Advanced Education asked the survey respondents to categorize their investments by the outcomes 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 in 2012/2013, the GoA dedicated 44.2% of its research spending to effective resource and environmental management. This was mostly driven by the investments in Environment and Sustainable Resource Development, Energy, and Alberta Innovates - Technology Futures. About 30.1% of the total research investment was assigned to broadened economic base, with Alberta Innovates - Technology Futures and the Ministry of Energy being the top two contributors for this outcome. Lastly, about 25.7% of research expenditure was directed to the outcome of resilient, healthy communities. Alberta Innovates - Health Solutions and the Ministry of Health were the highest research expenditure contributors for this categorized outcome.

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



Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

Table 5. ARIP Outcomes by Ministry

Ministry	Effective Resource and Environmental Management	Broadened Economic Base	Resilient, Healthy Communities	Total Investments
in thousands of dollars				
<b>Agriculture and Rural Development</b>	22,039	26,442	0	48,481
<b>Culture</b>	2,976	0	1,995	4,971
<b>Education</b>	0	0	6,921	6,921
<b>Energy</b>	117,687	61,672	0	179,359
<b>Environment and Sustainable Resource Development</b>	126,280	39,717	33,572	199,569
<b>Health</b>	1,998	0	54,273	56,271
<b>Human Services</b>	0	426	7,131	7,557
<b>Infrastructure</b>	0	6,240	0	6,240
<b>Innovation and Advanced Education</b>	87,790	109,611	105,043	302,444
Alberta Innovates - Energy and Environment Solutions	9,802	2,739	862	13,403
Alberta Innovates - Health Solutions	0	11,520	60,538	72,058
Alberta Innovates- Bio Solutions	3,493	3,003	4,763	11,259
Alberta Innovates- Technology Futures	61,854	78,864	13,917	154,635
Innovation and Advanced Technologies	12,641	13,260	24,750	50,651
Advanced Learning and Community Partnership	0	225	213	438
<b>Tourism, Parks and Recreation</b>	739	679	33	1,451
<b>Transportation</b>	795	125	180	1,100
<b>Total</b>	<b>360,304</b>	<b>244,912</b>	<b>209,148</b>	<b>814,364</b>

Source: Government of Alberta's Research Investments 2012/2013, internal assessment by Innovation and Advanced Education.

## Final Remarks

The Government of Alberta's Research Investments Report 2012/2013 reflects the Government of Alberta's dedication in supporting research activities in the province. The 2012/2013 fiscal year research investment by the GoA in R&D and RSA shows an effort to expand most of the investment activities and proceed with a few new projects. The result was a substantial increase in the total research investments. The investments categorized by science type and science activity reflected high levels of activities in the natural sciences and social sciences. The distribution of investment categorized by ARIP outcomes demonstrated similar pattern to 2011/2012. Effective resource and environmental management, broadened economic base, and resilient, healthy communities represented 44.2%, 30.1% and 25.7% of the research investments by ARIP outcomes respectively.