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**STAGE ONE**

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**R E S U L T S**

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Setting Research  
Priorities for Alberta

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**Alberta Science and Research Authority Survey (ASRA)**

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Over 300 participants responded to the first round of ASRA's priority setting process. 1200 questionnaires were mailed out. A twenty-five percent response rate is very good for such a process. Participants were asked to list the top three research application areas (RAAs) they affiliate with most closely. The five highest "primary" affiliations were energy production; agriculture; health; education; information and communications; and the environment. The remaining RAAs were not well represented. When all three choices were considered, and weighted, however, the order changed somewhat as presented in Figure 1.

**Figure 1. Affiliation with an RAA**  
(First Priority and then Weighted Values)

First Priority RAA	Weighted Priority RAA
7. Energy Production	9. Environment
1. Agriculture and Agriculture Products	1. Agriculture and Agriculture Products
11. Health	7. Energy Production
6. Education	12. Information and Communications
12. Information and Communications	6. Education
9. Environment	11. Health
3. Biotechnology	3. Biotechnology

The weighting demonstrates that respondents had a strong "affiliation" with the environment. The complete ranking results are presented in Figure 2.

**Figure 2. “Highest Priority” RAA Ranked from Highest to Lowest**

	<b>First Priority</b>	<b>Second Choice</b>	<b>Third Choice</b>
<b>7</b> - Energy Production	50	14	12
<b>1</b> - Agriculture	47	19	16
<b>11</b> - Health	37	17	21
<b>6</b> - Education	32	26	34
<b>12</b> - Info & Communications	29	35	28
<b>9</b> - Environment	28	42	48
<b>3</b> - Biotechnology	17	39	27
<b>13</b> - Manufacturing	16	12	18
<b>2</b> - Arts and Culture	7	7	9
<b>8</b> - Energy Products	6	39	12
<b>16</b> - Transportation	6	3	8
<b>4</b> - Community Services	5	11	8
<b>14</b> - Mineral Production	4	5	7
<b>10</b> - Forestry	3	4	6
<b>15</b> - Tourism	2	1	5
<b>17</b> - Other	2	0	0
<b>5</b> - Construction	1	8	2
<b>Total Respondents</b>	292	282	261

Q. 2, 3, 4, 5, 6, and 7 Descriptions of the RAAs

2. *Please review the sixteen RAAs and their description in the background report. If you find the description either too broadly or too narrowly defined, please indicate this and your reasons.*
3. *If you have suggestions for any deletions, additions or changes to the description of each RAA, please indicate these in column 3.*
4. *For those RAAs with which you are most familiar, what are the knowledge disciplines that support each of them?*
5. *Please list any RAAs that were not included or that should be separated from within the previous list.*
6. *From your perspective, which RAAs do you believe could provide the most positive future economic and social benefits to all Albertans?*
7. *In any of the RAAs, are there emerging ideas, concepts and technologies that may potentially create large socio-economic impacts?*

The results of questions two to seven have been incorporated directly into the revised and expanded RAA descriptions, found in the accompanying Background Report. Many suggestions, changes and modifications have been incorporated into these revised descriptions; however, no additional RAAs were added or amalgamated. Several respondents had suggested integrating Energy Production and Energy Products into one RAA, or keeping them separate but dividing them into upstream and downstream activities. It was decided that for the needs of the ASRA process, they would be left as two separate areas.

## Q. 8 Assessment Framework

*ASRA has provided an overall framework in the background report for assessing and prioritizing the allocation of provincial research dollars at the macro, RAA level. Do you have any comments or suggestions about this framework?*

197 respondents replied to this question. Forty-six (23%) of those indicated that they were satisfied with the overall framework. Their comments ranged from “seems logical” and “this is a good start” to an enthusiastic “excellent - well thought out and organized!” Whether respondents agreed or disagreed with the framework, both acknowledged the difficulty of the task. Almost two-thirds of respondents provided positive suggestions as well as criticisms. Of those respondents who suggested improvements, the improvements can be summarized as follows:

- Cooperation at All Levels — According to respondents, the framework failed to mention the importance of cooperation. Respondents mentioned various forms of cooperation, such as collaborative or interdisciplinary research; cooperation and sharing between government, universities and industry; and coordination between government bodies. Such cooperation is essential if Alberta hopes to compete in the international marketplace.
- Future Focus — Another concern respondents had was that the framework focuses on the short term rather than on long term planning. One respondent commented that “the proposed framework seems conducive to only five year planning. We should be thinking five generations.”
- Economic Benefit versus Quality of Life — The majority of these suggestions focus on striking a balance between economic return and social benefit. The framework gives priority to those investments that promise economic returns. Opinions differed on whether this was positive or negative. A few respondents commended ASRA for proposing market driven research. The majority in this group feared, however, that both social concerns and innovation might suffer because of this “underlying economic imperative.”
- Strengths versus Emerging Opportunities — This category reflects another dichotomy between those who believe that research should focus on improving well-established or unique Alberta industries versus those who believe emerging opportunities must be supported. The two accompanying arguments are that Alberta has “the edge” when it comes to agriculture and energy production, but must increase its research efforts if it is to compete in biotechnology or information technology on a global scale.
- Objective Decision-Making — Another important element needed to guide the framework is a means of making objective decisions regarding research funding. Several respondents criticized the questionnaire because “each section of the community will flag to its own interest areas,” and “asking a person to comment on RAAs outside of one’s realm of experience produces comments of questionable value.” The word “subjective” was frequently used to describe the framework.
- Specific Changes to Framework — Respondents provided a wide range of suggestions on how to improve the structure of the framework and on how to apply the framework to decision-making. They frequently commented that the definitions for feasibility and attractiveness are not clear or need to be expanded. Changes to the framework included the addition of three new categories for assessment: future outlook, risks involved, and impact. The most common advice was to avoid being too rigid with applying the framework.
- Other Comments — A range of other comments included: ensure research is of the highest quality; be supportive of all innovation; involve small private companies in decision-making; acknowledge the role of serendipity in research; and support the “backyard inventor-type.”

## Q. 9 Criteria for Setting Priorities

*From the list of indicators provided in the background report, from your perspective, please list those which are the most important. Also, please add any others that you believe are important.*

This question was the most complex to answer and analyze and resulted in a number of suggestions for new indicators. When asked to list the most important indicators as well as add new ones, the response rate was strong in all four indicator categories. In terms of the Criteria for Determining Attractiveness, respondents were very supportive of the lists presented by ASRA as illustrated in Table 1 and 2. The indicators are listed from most popular to least popular.

**Table 1. ASRA Indicators Supporting Potential Absolute Benefits**

<b>Indicators</b>	<b>Number of 'Hits'</b>
Export potential	111
Projected market growth	87
Size of market	83
Contribution to productivity	81
Social enhancement	59
Health and safety improvement	52
Import replacement potential	16
Avoided damage	15
<b>Total Occurrences (excluding new)</b>	<b>504</b>

Respondents suggested a number of new indicators in this category. The most frequently mentioned indicators in order of priority are:

- environmental quality, enhancement, protection and sustainability,
- quality of life and contribution to community improvement,
- economic return to Alberta's economy, and
- long term value.

**Table 2. ASRA Indicators Supporting Ability to Capture Benefits**

<b>Indicators</b>	<b>Number of 'Hits'</b>
Adequate skills	70
Adequate investment	63
Probability of creating new enterprises	58
Access to marketing networks	50
Can locals exploit potential	49
Linkages with other RAAs	41
Can locals compete	37
Is technology acceptable	36
Is it uniquely Albertan	20
Risk of leakage to others	3
<b>Total Occurrences (excluding new)</b>	<b>427</b>

New indicators suggested by respondents, in order of priority:

- employment issues i.e. training, education,
- infrastructure,
- access to industry base, raw materials,
- Alberta’s competitive advantage,
- research to benefit Albertans,
- government attitude/policy,
- management,
- long-term outlook, and
- environmental concerns.

In the section on Identifying Criteria for Determining Feasibility, ASRA identified two sets of criteria — R & D Potential and R & D Capacity. Due to a misprint in the questionnaire, there was not a clear distinction between these two categories. Hence, many respondents amalgamated them into one category. The results are also presented as one category for this reason. Table 3 summarizes the results of this section.

**Table 3. ASRA Indicators Supporting R & D Potential and R & D Capacity**

<b>Indicators</b>	<b>Number of ‘Hits’</b>
Fertility of research area	86
Proximity to realizable potential	64
What is Alberta’s capacity	64
Is Alberta’s science and research internationally competitive	58
Does a critical mass exist	42
Location on ‘S’ curve	40
What is Alberta’s timeframe for effective application	28
Is Alberta’s science and research nationally competitive	29
Should work be done in Alberta	19
<b>Total Occurrences (excluding new)</b>	<b>430</b>

New indicators suggested by respondents, in order of priority:

- human resources — knowledge, skills, expertise, education,
- interdisciplinary research/partnerships,
- uniqueness/comparative advantage,
- soundness of research/reputation,
- infrastructure,
- funding/available capital,
- risk/impact,
- market potential,
- intellectual interest,
- long term focus,
- return on investment,
- government role,
- social/public good,
- competition, and
- basic research requirements.

Q. 10 What are the issues or concerns in Alberta?

*What are the issues or concerns in Alberta that would benefit from specific research activity?*

The 194 respondents to this question submitted a wide range of issues and concerns that would benefit from research activity. Virtually every research application area (RAA) was addressed in these responses. In general, respondents emphasized the need for research that would result in far-reaching social benefits rather than merely economic benefits. By far the greatest concern that respondents expressed is for the environment. The second most-frequently mentioned research issue is biotechnology. Both the environment and biotechnology were given cross-disciplinary significance: respondents from every RAA saw their importance with respect to their own industries.

Respondents' issues have been summarized according to the following broad categories:

- **Protection of the Environment and Sustainability:** Over one-third of all responses to Question Ten concerned the environment. Respondents in this category most frequently emphasized the importance of sustainable practices in forestry, agriculture, energy, and production. The second greatest concern pertained to water and air quality. Some respondents saw the need to study soil quality and erosion. The overriding environmental concern among energy-sector respondents was CO<sub>2</sub> emissions and global warming. Other environmental issues that respondents mentioned several times are recycling, ecotourism, and wildlife loss and protection.
- **Quality of Life and Social Concerns:** The corollary between a happy, healthy and well-educated population and a prosperous economy was alluded to several times. However, others emphasized that the reverse corollary is not necessarily true: Alberta's financial success does not lead to enhanced quality of life for all. Increased employment, research into social class and welfare, especially factors contributing to poverty, improving both the effectiveness and efficiency of community services as well as improving the situation of children and youth were all seen as necessary to enhancing quality of life. Other areas that would benefit from research include the effects of technological change, social change and stress on people as well as the impacts of government cuts. Improving the quality of life will be mutually reinforcing because more talented individuals will be persuaded to work in Alberta. Efforts to enhance the social environment should not be confined within Alberta's borders, however.
- **Productivity and Product Enhancement:** The common theme among respondents in this category is the creation of "value-added" products. One of the ways to improve products in this way is to encourage cooperation between RAAs. For example, several respondents from the agricultural sector suggested that biotechnological research would add value to agricultural products. Value-added production was also considered essential for forest products and energy resources. Related to production concerns is the marketing and distribution of Alberta products, mentioned by a few of the respondents. Distribution is dependent on infrastructure, especially transportation. According to one respondent, Canada lacks "companies or programs capable of bridging the gap between the laboratory research and the commercialization stage of a project. New ideas are not easy to sell and researchers do not have the financial means to properly market a brand new technology."
- **Resource Management:** Many respondents reasoned that better resource management would lead to sustainability — in the case of renewable resources — and efficiency. In the energy sector, respondents' research concerns included tar sands processing, heavy oil recovery and sustainable alternatives to fossil fuels. Sustainability in the forestry industry was also mentioned repeatedly particularly regarding the effects of clear-cutting and deforestation. Several respondents pointed out the importance of discovering new resource deposits. There was also a great deal of support for investigating sustainable agricultural practices such as replacements for pesticides and methods of soil conservation. Better resource management also depends upon improved technology according to several respondents. Again, respondents pointed out the value of interdisciplinary research such as the possible uses of computer technology in resource management and production, and collaboration with biotechnological research applications.

- Health and Medical Research: This category includes improving human health, the health system and medical research in general. The majority of respondents in this category were concerned about the effects of government cutbacks on individuals, society and the economy. One respondent suggested examining “how to be socially responsible while limiting the cost of health care.” Other research suggestions pertaining to the delivery of health care were to focus on health policy and better information management. Concerning improving health, there were various references to investing in research into preventative and alternative therapies. Finally, medical research especially biomedical, genetics and pharmaceutical production must be supported.
- Economic Diversification: Many respondents believe that Alberta relies too heavily on primary industries and needs to diversify. In Question Ten, the most frequently mentioned areas for diversification are “high-tech” industries such as information technology, pharmaceutical production and biotechnology. The idea that Alberta should continue to support existing industries while encouraging diversification is again echoed by respondents. Several respondents argued that large research expenditures are vital to such emerging industries but will prove very profitable. There is also a need to diversify the products that Alberta produces.
- Education: Respondents acknowledged that both economic and research investments into all levels of education must be made in order to improve both the education system and the level of expertise of Albertans. The role of universities and institutions in the research process was emphasized by several respondents. One respondent suggested that “research institutions such as the Alberta Research Council should be encouraged to work more closely with universities.” Many respondents also saw education as an important aspect of the quality of life in Alberta.
- Attitudes Towards Research: This category takes into account the attitudes of respondents towards research rather than suggestions for specific research activity. The majority of respondents expressing opinions about research emphasized the importance of return on research investments as well as the need to remain, or become, globally competitive. Comments pertaining to the role of government referred to policies, government downsizing and tax laws that encourage industries to locate in Alberta as well as support existing industries. Several respondents also mentioned the importance of both basic and applied research for Alberta. In addition, several respondents believe that the public should decide how research dollars should be spent. Finally, the necessity of long-term research support and planning arises again in responses to this question: “it should not be ‘flavour of the month’ approach bending to opinion or fluctuation in economic and political changes.”

#### Q. 11 Other Comments

*Do you have any other thoughts of comments that you would like to share with us?*

This question gave respondents (159) the opportunity to advise ASRA, voice their concerns, demonstrate their approval of the process and enlist support for their particular research interests. Again, many of the same themes and concerns showed up in the responses to this question, as in previous questions.

- Advice/Suggestions for Setting Research Priorities — The majority of respondents to this question offered their advice regarding setting research priorities in Alberta. The greatest emphasis was on education and training. Quality education and research institutions, as well as a favourable political climate, were seen as vital to attracting other talented individuals to Alberta. Several respondents addressed the issue of whether research should be funded publicly or privately. A large number of respondents were also concerned that ASRA continue to support basic (curiosity driven) research and “facilitate serendipity of discovery” because “it is very difficult if not impossible to predict what research will succeed and what research will fail.” Again, respondents wanted to ensure that ASRA funds research that has economic feasibility; but at the same time, many other respondents cautioned ASRA not to be too driven by economic concerns. The suggestion that “good quality research comes from good quality review” was echoed by several respondents.

The balance of suggestions focused on ways to help ASRA achieve their goal of prioritization. Respondents advised ASRA to move quickly, remain apolitical, strive for excellence, be decisive, encourage networking across disciplines and between industry and government, plan for the long-term, increase consultation with small business and study initiatives similar to this one. The AHFMR was cited several times as a successful example for ASRA to emulate.

- Criticisms of ASRA Framework and Research in Alberta — Respondents expressed many of the same concerns in this question as in Question Eight. Several respondents were not satisfied with the definitions found in the background report or with the attractiveness/feasibility framework. There were also a number of comments that the ASRA documents were difficult to understand. Several respondents disliked the ‘peg hole’ structure of the questionnaire. Other criticisms pertaining to the ASRA documents were the lack of long-term planning reflected in the framework; the lack of quality of life considerations; the one-sided economic focus, the timing (Round Three to take place in summer months) and short-time frame of the process; the possibility of biased results (respondents comment outside of their area of expertise); the lack of a role for exploration; and the Web site. Several respondents doubted the legitimacy of the process as well as the possibility for success.

Criticisms referring to Alberta’s research efforts addressed the role of government in directing and funding research. Referring to the bureaucratization of the research process, respondents were exasperated with the money spent on administration; the “planning paralysis” of government bodies unable to make decisions; the thwarting of innovation by “conservative” government representatives; and the funding rigmarole where “researchers have to lobby ten to fifteen companies or government departments to receive even small amounts of funding.”

- Positive Support for the ASRA Process — Fewer respondents took the time to congratulate ASRA’s efforts. Those who did, however, were thankful for the opportunity to participate in the process and were glad to see such an initiative taking place. Several respondents emphasized the vital importance of this process. There were a number of requests for questionnaire results. Respondents were also impressed that a range of public opinion was being gathered because, as one respondent put it “input is essential to preventing myopic notions about ‘the big picture.’” A couple of respondents commended the framework for its economic focus; while several others were satisfied with the thorough coverage of research areas — particularly the inclusion of social research— and the framework in general.

Detailed summary papers have been prepared for questions eight to eleven and are available upon request. As mentioned, the results of questions two to seven have been built directly into the new RAA descriptions in the background report in this stage. Please contact ASRA for these summaries.