Survey of Albertans' Value Drivers Regarding Oil Sands Development and Reclamation

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August 2010

Oil Sands Research and Information Network

OSRIN is a university-based, independent organization that compiles, interprets and analyses available knowledge about returning landscapes and water impacted by oil sands mining to a natural state and gets that knowledge into the hands of those who can use it to drive breakthrough improvements in reclamation regulations and practices. OSRIN is a project of the University of Alberta's School of Energy and the Environment (SEE). OSRIN was launched with a start-up grant of $4.5 million from Alberta Environment and a $250,000 grant from the Canada School of Energy and Environment Ltd.

OSRIN provides:

- **Governments** with the independent, objective, credible information and analysis required to put appropriate regulatory and policy frameworks in place
- **Media, opinion leaders and the general public** with the facts about oil sands development, its environmental and social impacts, and landscape/water reclamation activities – so that public dialogue and policy is informed by solid evidence
- **Industry** with ready access to an integrated view of research that will help them make and execute reclamation plans – a view that crosses disciplines and organizational boundaries

OSRIN recognizes that much research has been done in these areas by a variety of players over 40 years of oil sands development. OSRIN synthesizes this collective knowledge and presents it in a form that allows others to use it to solve pressing problems. Where we identify knowledge gaps, we seek research partners to help fill them.

Citation

This report may be cited as:

Chapman, K.J. and S.B. Das, 2010. *Survey of Albertans' Value Drivers Regarding Oil Sands Development and Reclamation*. Oil Sands Research and Information Network, University of Alberta, School of Energy and the Environment, Edmonton, Alberta. OSRIN Report No. TR-3. 13 pp.

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REPORT SUMMARY

A random sample of 1,032 Albertans, aligned with the Statistics Canada 2006 demographic profile of the Province of Alberta, completed an on-line survey with two elements: a conjoint best-worse survey, and a set of attitudinal questions. The goal of the CSI-OSRIN Oil Sands Survey (the survey) was to gather empirical information as a basis for oil sands policy development for both industry and government.

In contrast with conventional opinion polling, conjoint surveys force respondents to make trade-offs among sets of alternatives. The choices available in the alternatives presented are randomly generated by a computer program, and presented several times in different combinations. The consistency and tenacity with which respondents make certain choices over others enables the conjoint survey to determine the core values and principles that are most important. To think of it another way, the top choices become the essence of both a social license to operate for industry and the consent of the citizenry to be governed. In effect, they indicate which aspects of oil sands stewardship and development are most negotiable, and which are least negotiable, when it comes to responding to the public's expectations.

Compared with conventional opinion polling, a conjoint survey is a more accurate indicator of actual preferences and a more precise determinant of behaviours. The survey therefore identifies the priorities of perceived values, performance and aspirations around responsible and sustainable oil sands development. We hope this survey can be an empirical foundation of any public policy design, development and deployment regarding the oil sands. The results offer a clear understanding of public expectations.

The survey found that the top three drivers related to development and reclamation of oil sands were: Type of reclamation (20%), Wildlife habitat (19%) and Ecological monitoring (18%). There is significant consistency in priority choices between these 2010 survey data and a similar study CSI conducted in 2007 (Chapman et al. 2009) on the values and priorities of Albertans with regard to responsible and sustainable oil sands development. Based on the priority preferences as to what should guide and drive oil sand development this survey result shows where action is needed and communications should be focused.

The survey then looked at how Albertans perceive issues are being addressed.

- For the **type of reclamation** driver 31% believe that the focus is on reclamation to sustain wildlife and biodiversity while 23% believe it is to return land to a "state of nature". Surprisingly 21% believe that reclamation is about letting nature take its course (i.e., no reclamation).
- For the **wildlife habitat** driver 78% believe that there is some wildlife habitat protection when developing oil sands, 16% believe there is no protection and 6% believe there is full protection.
- For the **monitoring ecological impacts** driver 47% of Albertans believe government is doing the monitoring, 36% believe industry is and 11% thought it was done by a third-party. Only 6% felt there was no monitoring done.

Perceptions around reclamation indicated that Albertans expect government to set the rules, regulations and define best practices for reclamation and the companies operating in the oil sands should then take the lead for reclamation responsibilities. 78% of survey participants completely agreed or agreed with this position, while 16% slightly agreed. Only 6% disagreed with this to one degree or another.

When asked if companies operating in the oil sands should be solely responsible for reclamation the survey found that 69% of participants completely agreed or agreed with this position and 16% slightly agreed. There were 15% who disagreed with this position to some degree or other.

When queried if oil sands companies should be held liable for all environmental damages caused by their operations the survey found 87% completely agreed or agreed with this position, 9% slightly agreed and only 4% had some level of disagreement with this approach.

When asked about perception on how well the Alberta government is responsibly managing the oil sands resource 31% agreed or completely agreed they were doing the job and 18% disagreed or disagreed completely. There was a significant swing group of 51% in the middle – 34% who slightly agreed the government was responsibly managing the oil sands and 17% slightly disagreed.

Most of the choices people identified as important to them coincide with the current state of oil sands development and management. However there were some key attributes where there was a clear difference. These attributes represent the areas where government and industry risk loss of the social licence to operate unless further work is done to address the misalignment between what people perceive is happening and what is actually happening. Work in these areas could include better communication of the current state and why it is appropriate or what is being done to correct the current state if it is inappropriate.

ACKNOWLEDGEMENTS

The Oil Sands Research and Information Network (OSRIN), School of Energy and the Environment, University of Alberta provided funding for this project. Cambridge Strategies Inc. co-funded the study.

CSI designed the survey in collaboration with OSRIN and conducted this survey in conjunction with Tim Glowa of Houston, Texas (formerly of Calgary, Alberta). Mr. Glowa is a statistician and expert on conjoint survey techniques and analysis.

1 INTRODUCTION

Cambridge Strategies Inc. (CSI) and the Oil Sands Research and Information Network (OSRIN) collaborated on a survey to map certain values of Albertans relating to the stewardship of the Alberta Oil Sands. The goal of the CSI-OSRIN Oil Sands Survey (the survey) was to gather empirical information as a basis for oil sands policy development for both industry and government.

The survey arose from the following premise: by understanding the values underlying the attitudes of Albertans towards stewardship of the oil sands, OSRIN can better direct and deliver the research and information required to ensure policy decisions are based on science and evidence, and also that they align with values and priorities of Albertans. Figure 1 shows the logic model for this approach to policy development.

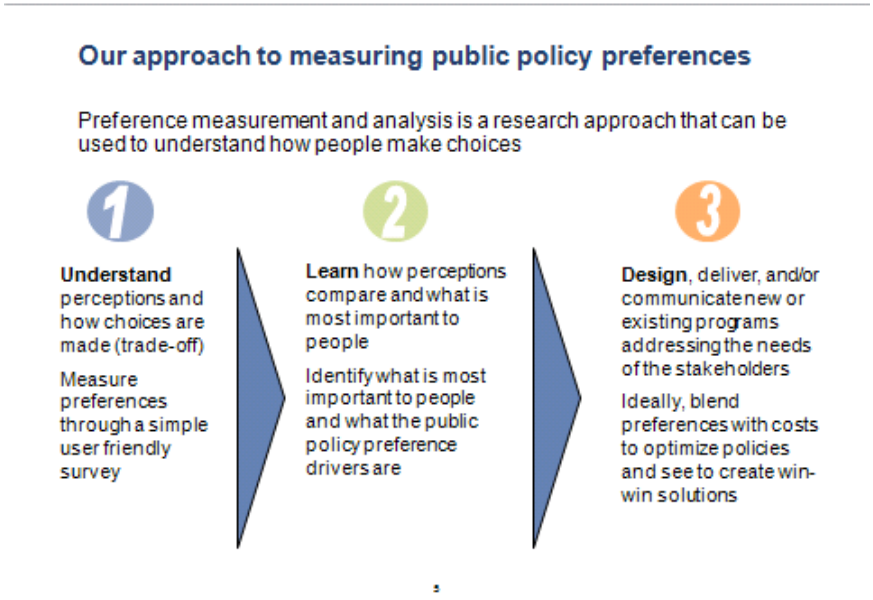


Figure 1. Linkage Between the Survey and Policy Development

1.1 Survey Methodology

A random sample of 1,032 Albertans, aligned with the Statistics Canada 2006 demographic profile of the Province of Alberta, completed an on-line survey between May 6 and May 11, 2010, with two elements: a conjoint best-worse survey, and a set of attitudinal questions. Participants were also given an opportunity to provide comments and 168 did.

In contrast with conventional opinion polling, conjoint surveys force respondents to make trade-offs among sets of alternatives (see Appendix 1 for samples of the trade-off choices a participant may have been asked to make). The choices available in the alternatives presented are randomly generated by a computer program, and presented several times in different combinations. The consistency and tenacity with which respondents make certain choices over others enables the conjoint survey to determine the core values and

principles that are most important. To think of it another way, the top choices become the essence of both a social license to operate for industry and the consent of the citizenry to be governed. In effect, they indicate which aspects of oil sands stewardship and development are most negotiable, and which are least negotiable, when it comes to responding to the public's expectations.

Compared with conventional opinion polling, a conjoint survey is a more accurate indicator of actual preferences and a more precise determinant of behaviours.

The survey therefore identifies the priorities of perceived values, performance and aspirations around responsible and sustainable oil sands development. We hope this survey can be an empirical foundation of any public policy design, development and deployment regarding the oil sands. The results offer a clear understanding of public expectations.

The survey is statistically valid +/-3.0 percentage points nineteen times out of twenty to what would be the results if the entire Alberta adult population was surveyed.

1.2 Survey Attributes

CSI and OSRIN chose eight relevant oil sands development attributes (Appendix 2 provides descriptions of some of the attribute terms that were given to participants). In no particular order or priority, the attributes we focused on were:

1. Water use for habitat, community and industry needs;
2. CO_2 capture as a proxy for greenhouse gas emissions;
3. Land use policy;
4. Wildlife habitat protection;
5. The pace of reclamation;
6. The priority for development between industry, community and environmental needs;
7. The role and responsibility for monitoring ecological impacts; and
8. Type of reclamation.

Each of these eight attributes had three to five possible *levels*, or expectations of development approach – survey respondents would have seen only one of these levels each time they made a choice. For example:

- In the type of reclamation attribute the following levels were available
  - No planned reclamation – let nature take its course
  - Reclaim for recreational use, such as golf course, parks and lakes
  - Reclaim for other commercial use, including agriculture and forestry
  - Reclaim to habitat that sustains biodiversity
  - Reclaim to "state of nature" before disturbance.

- In the wildlife habitat protection attribute the following levels were available
  - No habitat protection
  - Some habitat protection
  - Complete habitat protection
- In the ecological monitoring attribute the following levels were available
  - Ecological impacts monitored by industry
  - Ecological impacts monitored by independent third party
  - Ecological impacts monitored by government
  - Ecological impacts are not monitored

The attitudinal questions within the survey related to how Albertans perceived the oil sands are being managed on all eight of these attributes[1].

Additionally, some of our questions related to the responsibility of the oil sands industry; the oil sands' importance to Alberta's prosperity; and perceptions on how well the government is doing in managing the province's growth. We also inquired into the nature of the responsibility for reclamation between government and industry.

CSI asked a number of additional questions in the survey that were not sponsored by OSRIN; results for these questions are available through the authors.

2 ALBERTANS' VALUE DRIVERS

Results show that, of the eight survey attributes listed above, all were considered as being important by the survey participants. However, there was a significant grouping of three key attributes. There was a secondary grouping of three lesser attributes and a final grouping of two that were much less significant in the ranking and relative importance.

The ranking of the attributes is summarized below and shown in Figure 2.

The top three attributes driving Albertans' values were:

#1	Type of reclamation	20%
#2	Wildlife habitat	19%
#3	Ecological monitoring	18%

The middle three attributes driving Albertans' values were:

#4	CO_2 capture/Greenhouse gas emission	14%
#5	Water usage	12%
#6	Determinants of reclamation pace	10%

[1] Specifically participants were given the following instructions: We are now going to ask you some questions relating to how the oil sands are managed. Please respond by thinking how the oil sands are **currently managed**, rather than how you think they **should be managed**.

The attributes of the least relative importance were;

#7	Land use choices between growth and conservation	6%
#8	Choices of what drives oil sands development	2%

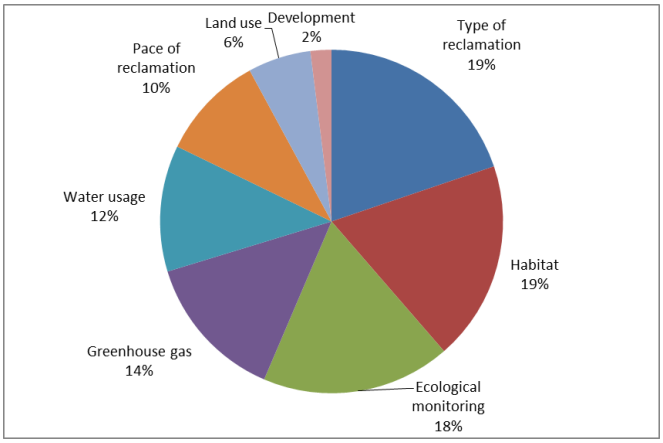


Figure 2. Relative Ranking of Albertans' Value Drivers

There is significant consistency in priority choices between these 2010 survey data and a similar study CSI conducted in 2007 on the values and priorities of Albertans with regard to responsible and sustainable oil sands development (Chapman et al. 2009). Each of these discrete studies showed habitat protection as a dominant value. The signal difference between the 2007 and 2010 surveys is that the latter included attributes on "type of reclamation" and "ecological monitoring," which in essence delve further into "how" habitat protection is to be realized and measured. In the 2010 survey, these two new attributes joined habitat protection as the top value drivers (which one can interpret as Albertans' view of the essential preconditions for sustainable development).

Ecological monitoring concerns were introduced in this survey for the first time and they topped the water use concerns and greenhouse gas issues. Water and GHG concerns were in a slightly higher priority in the 2007 survey than in this survey due in part to the introduction of reclamation type and ecological monitoring as attributes and the elimination of the royalties and technology solutions attributes that were in the 2007 survey.

Based on the priority preferences as to what should guide and drive oil sand development this survey shows where action is needed and communications should be focused. To attend to reclamation type, habitat concerns, ecological monitoring and greenhouse gas emissions you have the potential to satisfy the concerns of over 70% of Albertans. However, if you focused on the pace of development and the trade-off of land use between economics and environment you would only satisfy the concerns of 8% of Albertans.

It is evident from these that ecological concerns continue to dominate the values mindset of Albertans when compared to more economic related issues like land-use and development issues. Even the pace of reclamation is only a preferential driver for 10% of the survey participants. It appears that Albertans understand that oil sands reclamation is a long term activity and should be guided by environmental needs, not industry concerns.

However the type of reclamation that is acceptable to Albertans is a more top of mind value concern.

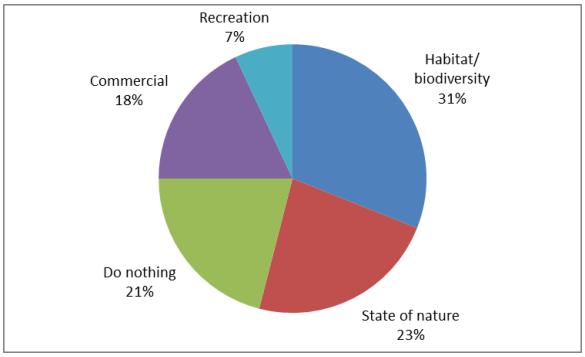
Albertans have no rigid preference on what is acceptable for reclamation standards and reflect a complex and multi-faceted understanding of reclamation. Being the top value driver for 20% of survey participants, the most acceptable type of reclamation was to reclaim lands to a level that sustains wildlife habitat and biodiversity. To return lands to a "state of nature" without reference to biodiversity was also very acceptable. There is a significant amount of support for reclamation that focuses on other commercial uses like agriculture and forestry and recreational uses like golf courses, parks and lakes. The least acceptable option was to not actively reclaim lands and "let nature take its course."

Ultimately, this survey shows, as did the 2007 survey, that Albertans want a stewardship and green priority approach applied to the on-going development of their oil sands much more than they want an economic growth priority and approach. Ecologically responsible and sustainable development through stewardship is more important to the majority of Albertans than is expanded growth through more projects or through accelerated production levels. These are not mutually exclusive concerns but the key values which Albertans are relating. But they continue to be predominantly stewardship rather than economic when it comes to the development of their oil sands.

3 PERCEPTIONS OF OIL SANDS MANAGEMENT

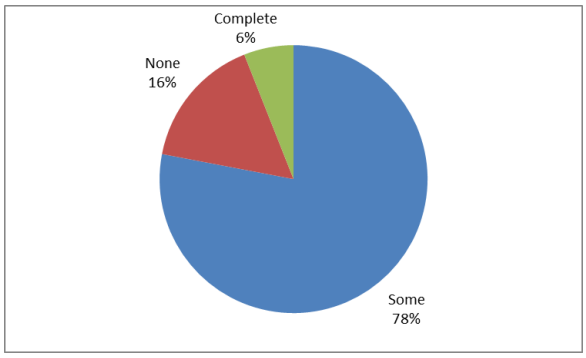
The conjoint results describe what Albertans want to see done and where the focus should be on oil sands development. By also measuring their present perceptions, we can determine Albertan's aspirations for current and future oil sands development. Therefore, we next asked questions about how the participants believed the oil sands are currently being developed in relation to the eight attribute areas. The following results are what Albertans believe to be the reality of oil sands development today.

3.1 How the Type of Reclamation is Determined



This was the #1 ranked Value Driver in the 2010 survey at 20%. There are mixed perceptions as to how this is decided currently. The dominant preference is to return the lands to sustain wildlife habitat and biodiversity and 31% believed that was what the basis of the oil sands reclamation policy is now. There were 23% who believe the policy is to meet the second ranked preference to return land to a "state of nature" like it was before disturbance. There are 21% of survey participants who believe the current reclamation policy is akin to the lowest acceptable type of reclamation, which was to let nature take its course and do nothing. About 18% believe the current policy is to allow for reclamation to other commercial uses like agriculture and forestry with 7% thinking the policy is to reclaim to other recreational uses like golf courses, parks and lakes.

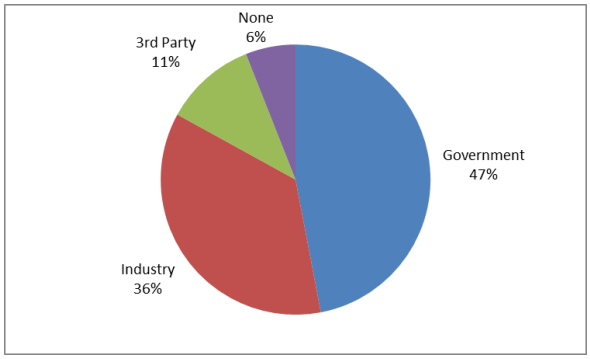
3.2 Wildlife Habitat Protection



This was the #2 ranked Value Driver at 19%. The survey found that 6% believe there is *complete* wildlife habitat protection; 78% believe that there is *some* wildlife habitat protection; and 16% believe that there is *no* wildlife habitat protection.

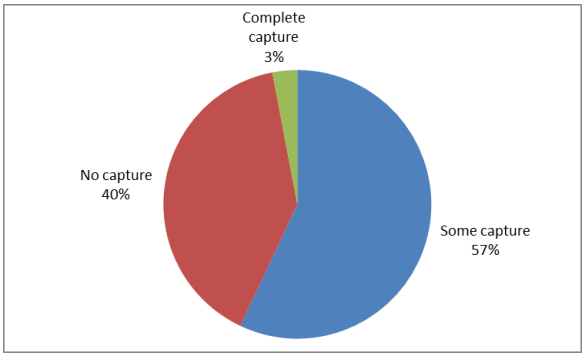
Wildlife Habitat was the #1 value driver in 2007 at 18%. Back then, 5% believed there was complete protection, 73% believed there was some protection and 22% were of the opinion there was no habitat protection. The 2007 results cannot be directly compared to the 2010 survey because in the current survey we added additional stewardship attributes that relate to wildlife habitat, namely the type of reclamation and ecological monitoring.

3.3 How Monitoring for Ecological Impacts is Determined



This was the #3 ranked Value Driver at 18%. There is a significant amount of ecological monitoring being done by industry, government and third parties but there is not a great deal of knowledge about what is actually happening and what is being discovered through ecological monitoring[2]. This question was not asked in the 2007 survey so there are no comparables. In the 2010 survey 47% of participants believed the government was doing the monitoring, 36% believed industry was responsible and 11% were of the view that independent third parties were doing the ecological monitoring. Only 6% felt there was no ecological monitoring.

3.4 CO_2 and Greenhouse Gas Emission Concerns



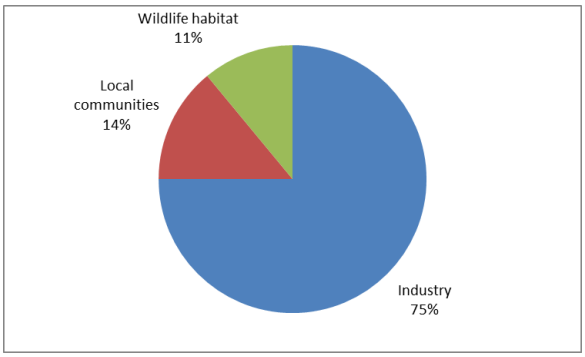
This was the #4 ranked Value Driver at 14%. The survey found 3% believe there is *complete* CO_2 capture, 57% believe there is *some* CO_2 capture, and 40% believe there is *no* CO_2 capture.

CO_2 capture was the #2 value driver in the 2007 survey. Then 5% believed there was complete capture, 61% thought there was some and 34% believed there was no CO_2 capture associated with oil sands development. The truth is that there is no CO_2 capture associated with oil sands

[2] OSRIN will be releasing the results of an inventory of oil sands environmental programs.

development in either 2007 or 2010. Albertans are becoming slightly more aware of this given the different results between the two studies.

3.5 Water Usage in Oil Sands Development

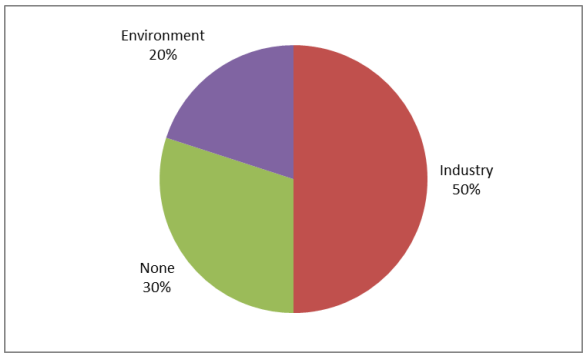


This was the #5 ranked Value Driver at 12%. The survey found 11% believe water usage is determined by the needs to protect wildlife habitat, 75% believe water usage is determined by the needs of industry, and 14% believe water usage is determined by needs of local communities.

Water Usage was tied as the #3 most important value driver in the 2007 survey when 12% believed wildlife habitat determined water usage, 73% felt industry needs dominated and 16% said community needs drove policy on water usage. The differences between the 2007 and 2010 survey results are insignificant. The fact that it is now ranked #5 overall is also not a significant difference in that is still fits as an important attribute within the stewardship values.

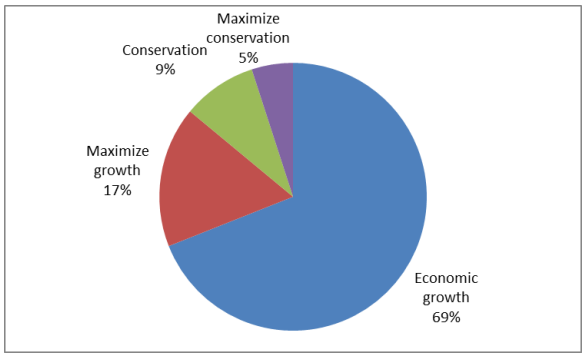
3.6 Reclamation Pace

This was the #6 ranked Value Driver at 10%. The survey found 30% believe there is no formal policy on the pace of reclamation, 20% believe the pace of reclamation is driven by environmental needs, and 50% believe the pace of reclamation is driven by industry needs.



In the 2007 survey this attribute was tied for third place overall with water usage at 12%, however the framing of the issue was different so a direct comparison is not possible. That said, in 2007, 10% believed that no land reclamation is taking place, 24% believed the reclamation pace is set to meet ecological needs, and 66% believed the reclamation pace is set to meet industry needs.

3.7 Priority for Land Use in the Oil Sands



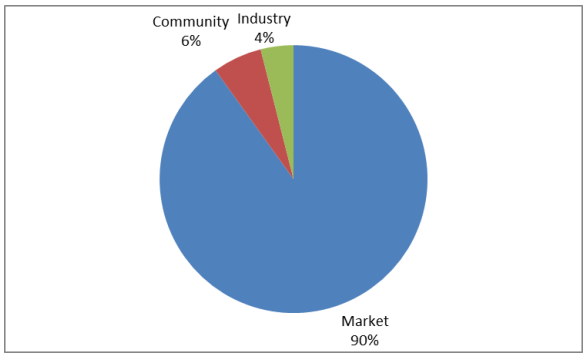
This was the #7 ranked Value Driver at 6%. The survey found 5% believe land use policy is to maximize conservation and preservation, 9% believe land use policy stresses conservation over economic growth, 69% believe land use policy stresses economic growth over conservation, and 17% believe land use policy is to maximize economic growth.

In the 2007 study this attribute was tied for fifth place with how royalty rates were structured. The royalty rate attribute was not studied in 2010. The land use priority policy findings in 2007 were: 7% believe land use policy is to maximize conservation and preservation, 8% believe land use policy stresses conservation over economic growth, 63% believe land use policy stresses economic growth over conservation, and 21% believe land use policy is to maximize economic growth.

Most significant is the 6 point increase in 2010 over 2007 in Albertans who believe that the land use policy stresses economic growth over conservation.

3.8 Most Influential Driver Guiding Oil Sand Development Today

This was the lowest ranked (#8) Value Driver at 2%. The survey found 91% believe policy decisions on oil sand development are market driven, 6% believe policy decisions are driven by community capacity and well-being, and 4% believe policy decisions are driven by industry needs.



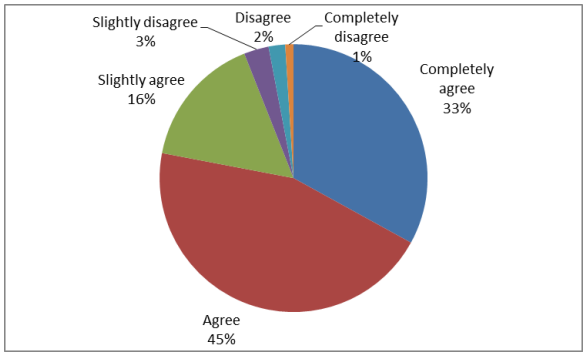
This attribute was also the lowest ranked in 2007 with virtually the same results even with a slightly different wording of the question. In 2007 the responses were: 90% believe policy decisions on oil sand development are market driven, 6% believe policy decisions are driven by community capacity and well-being, and 4% believe policy decisions are driven by industry needs.

4 PERCEPTIONS OF GOVERNMENT MANAGEMENT OF OIL SANDS

In determining whether our sample population was well-informed on jurisdiction for managing Alberta's natural resources, we found 81% correctly identified the Government of Alberta as having jurisdiction over natural resources compared to 76% in the 2007 survey. Only 6% believed the Government of Canada was in control. Interestingly, 11% believed that natural resource management was the responsibility of the oil industry in Alberta. These are similar to the 2007 findings.

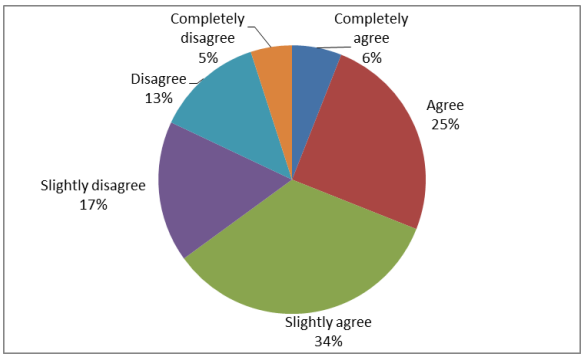
There is an acknowledgement of a legitimate role of the Government of Canada in oil sands development policy amongst Albertans. When asked if Canada currently plays a role in how Alberta is discovering, refining and processing oil sands 30% completely agreed or agreed with 38% slightly agreeing. There were 31% of survey participants who disagreed with this proposition to some degree or another.

When asked if it is important for the Government of Canada to have a role in the development of the oil sands 34% completely agreed or agreed, 28% slightly agreed while 38% disagreed with their involvement in Albertans oil sands to some degree or another. When asked if the government of Canada was increasing its role in the development of the Alberta oil sands 25% completely agreed or agreed, 43% slightly agreed and 32% disagreed with this statement to some degree or another.

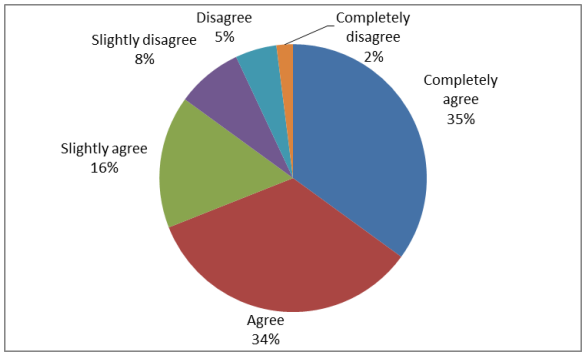


Perceptions around reclamation indicated that Albertans expect government to set the rules, regulations and define best practices for reclamation and the companies operating in the oil sands should then take the lead for reclamation responsibilities – 78% of survey participants completely agreed or agreed with this position, while 16% slightly agreed. Only 6% disagreed with this to one degree or another.

When asked about perception on how well the Alberta government is responsibly managing the oil sands resource 31% agreed or completely agreed they were doing the job and 18% disagreed or disagreed completely. There was a significant swing group of 51% in the middle – 34% who slightly agreed the government was responsibly managing the oil sands and 17% slightly disagreed.

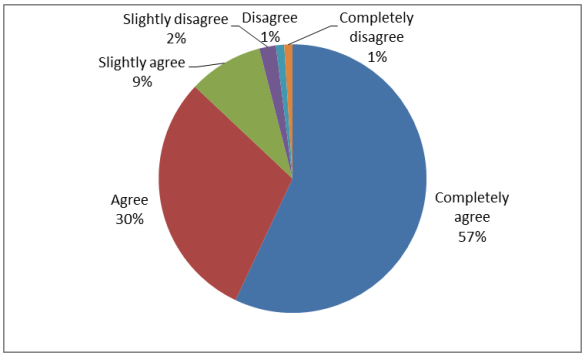


5 ACCOUNTABILITY OF OIL SANDS COMPANIES



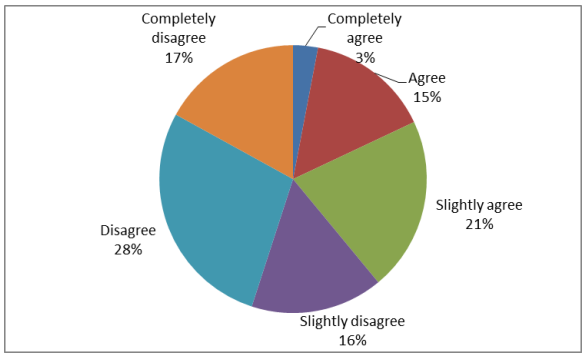
When asked if companies operating in the oil sands should be solely responsible for reclamation the survey found that 69% of participants completely agreed or agreed with his position and 16% slightly agreed. There were 15% who disagreed with this proposition in some degree or other.

When queried if oil sands companies should be held liable for all environmental damages caused by their operations the survey found 87% completely agreed or agreed with this position, 9% slightly agreed and only 4% indicated some level of disagreement with this approach.



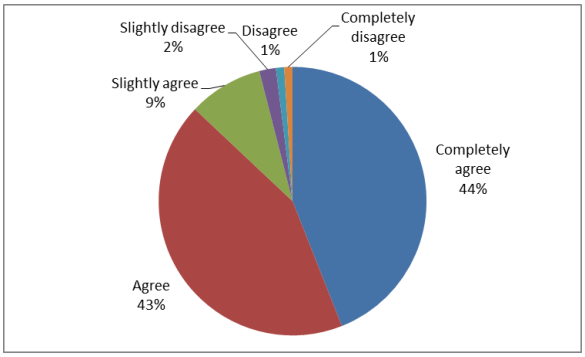
6 ADDITIONAL ISSUES

Some 89% of Albertans believe that the oil sands are an important part of Alberta's prosperity and only 8% felt it was neither important nor unimportant. The remaining 3% said the oil sands were not significant to Alberta's prosperity.



In delving deeper into the biodiversity aspect of reclamation we found some mixed feeling about using non-native plants. When asked if non-native plants could be used in reclamation efforts 45% completely disagreed or disagreed, 16% slightly disagreed and 21% slightly agreed while 18% were agreeable or completely agreeable to the use of non-native plants for reclamation purposes.

When asked about the goal of reclamation supporting and sustaining a wide diversity of plant and animals 87% completely agreed or agreed with 9% slightly agreeing. Only 4% disagreed with requiring this level of reclamation.



7 CONCLUSIONS

Three reclamation-related issues have been identified as relatively important issues for Albertans: type of reclamation, habitat protection and ecological monitoring. Focusing on these issues in research, demonstration and communication efforts will address the concerns of over 55% of Albertans. Conversely, focusing efforts on priority for land use or the drivers for development will only address the concerns of 8% of Albertans.

Most of the choices people identified as important to them coincide with the current state of oil sands development and management. However there were some key attributes where there was a clear difference. These attributes represent the areas where government and industry risk loss of the social licence to operate unless further work is done to address the misalignment between what people perceive is happening and what is actually happening. Work in these areas could include better communication of the current state and why it is appropriate or what is being done to correct the current state if it is inappropriate. The three key areas are:

- CO_2 capture – most people believe that there is some or complete capture of CO_2 at oil sands developments (there is none now)
- Water usage – most people believe that water usage is determined by the needs of industry (at low river flows instream flow needs determine withdrawal rates)

- Pace of reclamation – most people believe that pace of reclamation is driven by environmental needs (it is driven by availability of lands that are no longer required for mining, processing or tailings management).

8 REFERENCES

Chapman, K.J., S.B. Das, S. Sankey and Z. Saher, 2009. *The Oil Sands Survey: Albertans' Values Regarding Oil Sands Development*. Cambridge Strategies Inc., Edmonton, Alberta. 6 pp. Available at the Cambridge Strategies website at http://www.cambridgestrategies.com/index.php/our-work?start=10 (Last accessed July 30, 2010).

APPENDIX 1: Sample Conjoint Survey Questions

The following are two examples of the trade-off choice a participant may have been asked to make in the conjoint survey. As you will note, not all eight attributes form part of each choice and only one level of each attribute is found in each choice. To make the appropriate selection a participant would be expected to read all of the options in each column and then base their decision on the "best combination". By repeating the various attributes and levels several times the priority attributes come to the fore.

If these were the only two options available for managing Alberta's oil sands resources, which do you prefer? *(Choose only one below. Please assume these two options differ only on the features shown)*

Greenhouse Gas Emissions	Capture some CO_2	Do not capture CO_2
Priority for land use	Maximize economic growth	More economic growth than conservation
Habitat	No habitat protection	Complete habitat protection
Monitoring Ecological Impacts	Ecological impacts monitored by government	Ecological impacts monitored by industry
Type of Reclamation	No planned reclamation – let nature takes its course	Reclaim to "state of nature" before disturbance
Oil Sands Development	Driven by community capacity and well-being	Driven by market forces (supply, demand, prices)

If these were the only two options available for managing Alberta's oil sands resources, which do you prefer? *(Choose only one below. Please assume these two options differ only on the features shown)*

Water usage	Satisfy business needs	Protect wildlife habitat needs
Greenhouse Gas Emissions	Complete CO_2 capture	Do not capture CO_2
Priority for land use	Maximize conservation/preservation	More conservation than economic growth
Habitat	Some habitat protection	No habitat protection
Pace of Reclamation	Pace of reclamation driven by environmental needs	No formal pace of reclamation set
Type of Reclamation	Reclaim to "state of nature" before disturbance	Reclaim for other commercial use, including agriculture and forestry

APPENDIX 2: Terminology Used in the Survey

The following descriptions of terminology used in the survey were provided to participants before they started making choices in the conjoint survey.

Water: Water is used in oil sands extraction, to separate oil from clay and sand.

Greenhouse Gas Emissions: Oil sands development emits carbon dioxide (CO_2). CO_2 is a greenhouse gas, and a contributor to climate change. Methods to capture these emissions are being developed.

Land Use: Land use relates to uses of the land, including urban development, transportation, oil, gas, forestry and recreation.

Habitat: Habitat is the natural home of plants and animals; a place which provides food, shelter and water.

Reclamation: Reclamation is the process of returning land to a useful and/or a natural state.

Monitoring ecological impact: Sampling and analyzing the impacts of oil sands development on living organisms and their environment.