An Assessment of Alberta's Climate Change Action Plan

By Matthew Bramley

September 2002

Pembina Institute
for Appropriate Development

About the Pembina Institute

The Pembina Institute's mission is to implement holistic and practical solutions for a sustainable world.

The Pembina Institute is an independent non-profit research, education and advocacy organization that promotes environmental, social and economic sustainability through the development of practical solutions for businesses, governments, individuals and communities. The Pembina Institute provides policy research leadership on climate change, energy policy, green economics, renewable energy, and environmental governance, as well as extensive formal and public education programs.

The Pembina Institute's Climate Change Program is working to ensure that Canada participates in the global effort to curb climate change by ratifying the Kyoto Protocol. In addition, the program advocates for the implementation, by both federal and provincial governments, of policy measures that will secure major reductions in Canada's greenhouse gas emissions. It also works to further awareness and understanding of climate change and climate change solutions among Canadian governments, businesses, other organizations and individuals.

Contents

1. Introduction and summary

On May 21, 2002, the government of Alberta released *Albertans & Climate Change: A Plan for Action*. The plan "is designed to provide a practical alternative to the Kyoto Protocol," to achieve "meaningful, long-term emissions reductions"[1] and "can serve as the basis for an effective, collaborative, equitable national approach to climate change . . . while contributing responsibly to solve global issues."[2]

These are bold claims that demand scrutiny. The following sections present a detailed assessment of how well the Alberta climate change action plan lives up to those claims. The main findings are as follows:

1. The plan's overall target to reduce greenhouse gas (GHG) emissions intensity by 50% by the year 2020, while initially seeming impressive, does not represent a particularly large deviation from business as usual. In reality, emissions intensity naturally declines without government action; the plan aims only to speed up the "natural" average rate of decline in emissions intensity from about 1.4–1.7% per year to 2.0–2.3% per year.

2. The government expects the plan to result in Alberta's GHG emissions remaining fully 20–35% higher in 2020 than in 1990. But if Alberta's GDP continues to grow at 4% per year, as it did during the 1990s, then the plan's GHG emission intensity target could be met even while the province's emissions rise to 66–83% above the 1990 level. Using 1990 as the base year (as is standard practice in climate change discussions), the Alberta climate change action plan is therefore actually a plan to increase emissions significantly, not reduce them.

3. Following Canada's non-legally binding commitment to stabilize our national GHG emissions at the 1990 level by 2000, emissions actually ended up 20% higher in 2000 than in 1990. Canadians will therefore rightly regard any unilateral Alberta or Canadian alternative to Kyoto with the greatest scepticism as it would be voluntary from an international perspective. Countries that have ratified the Kyoto Protocol, by contrast, will be held to their commitments by the international community and face sanctions in the event of non-compliance.

4. The plan proposes that, within Canada — a country whose *average* per capita emissions are the second highest in the world — the province whose emissions per capita far outstrip those of any other of the most populous provinces should be allowed to keep its total emissions far above its 1990 level for decades to come, while at the same time global emissions are reduced by over 50%. This emphatically belies the plan's claims to be equitable, "[contribute] responsibly to solve global issues," or be a credible alternative to the Kyoto Protocol.

[1] Government of Alberta (May 2002 a), *Albertans & Climate Change: A Plan for Action*, p. 2. Available at http://www3.gov.ab.ca/env/climate/actionplan/docs/actionplan.pdf.
[2] Government of Alberta (May 2002 a), *op. cit.*, p. 5.

5. The plan implies a belief by the provincial government that consumers of Alberta's exported oil and natural gas should be responsible for the GHGs emitted in the production and distribution of fossil fuels. Fuel consumers already shoulder 80–95% of the responsibility for GHG emissions from the lifecycle of fossil fuels. The government of Alberta thinks that consumers should shoulder the remaining 5–20% as well. If applied more generally, this extraordinary logic would result in all industries being absolved from any responsibility for any of the pollution they create.

6. Of the 48 distinct actions contained in the plan, only 22 (less than half) are both clearly committed to and have some chance of directly resulting in GHG emission reductions beyond business as usual. The remainder are emissions targets, broad policy directions worded in general terms, initiatives to undertake policy analysis, and commitments to put in place infrastructure to support GHG emissions trading.

7. Of the 48 actions in the plan, just eight (one in six) fall into categories potentially capable of Kyoto-level emission reductions: regulatory measures, financial incentives or economic instruments, and/or direct investments in emission reductions. A cautious welcome can be given to the plan's commitment to develop a GHG emissions trading system for Alberta, although there is no language to provide any reassurance that such a system will be environmentally effective. The plan's commitment to establish an Energy Efficiency Office is also welcome, but needs to be translated from a broad intention into a detailed specification of the mechanisms to be used and the funding levels to be provided.

8. Overall, the plan contains few actions capable of achieving significant emission reductions any time soon. Those actions that may potentially be capable of doing so are not specified in enough detail to evaluate their likely impact. In particular, the plan provides no indication of the level of funds that the Alberta government intends to commit to the actions it contains. It is therefore far from clear whether the plan is capable of achieving even the claimed reductions relative to business-as-usual growth in the province's emissions. It is ironic that, while the Alberta government has often challenged the federal government to provide a convincing, detailed action plan to implement the Kyoto Protocol, it appears unable itself to deliver such a plan to achieve its own, far weaker, provincial objective.

9. For some of the largest GHG emission sources, the plan omits a large number of key policy measures:
   - offering financial incentives to promote the purchase and use of fuel efficient vehicles;
   - changing the taxation of transportation fuels to promote GHG emission reduction;
   - providing additional funding for public transit;
   - establishing a renewable energy portfolio standard (requiring electricity suppliers to source a minimum percentage of their product from low-impact renewable sources);
   - mandating demand side management activities (requiring electricity and gas suppliers to undertake energy efficiency programs with their customers);
   - establishing taxes or credits to incorporate environmental costs into energy prices;

- mandating the national energy codes for buildings and houses;
- offering tax incentives for energy efficiency investments in industry;
- reducing support for fossil fuel exploration and development;
- ensuring government procurement of green power; and
- adopting regulations requiring the capture of landfill gas.

In particular, the plan does not mention passenger transportation, barely mentions trucking, and mentions renewable sources of electricity only as a second-rank subject for research and in the vaguely-worded commitment to "continue to reduce regulatory barriers for low impact electrical generation."

2. A plan to increase emissions

The emissions intensity target

The Alberta climate change action plan's overall target is to "reduce greenhouse gas emissions intensity, or emissions relative to GDP, by 50% by the year 2020."[3] Although the plan itself omits to say which base year will be used to measure the 50% reduction, a media backgrounder provided at the plan's release makes clear that the 50% target is relative to 1990.[4]

GHG emissions intensity measures the impact on the global climate of each dollar of GDP. But it does not measure the impact of the whole economy on the climate system and therefore has no direct environmental relevance. Indeed, the long-term trend in Canada is for the economy to grow, and for GHG emissions to grow, but for emissions intensity to fall steadily because emissions have grown more slowly than the economy. Reductions in national or provincial emissions intensity have consistently been accompanied by increases in absolute emissions.

Table 1 shows the trend in Alberta's GHG emissions and GDP since 1990. It shows that, between 1990 and 2000, Alberta's GHG emissions intensity fell by 13% even as the province's GHG emissions rose by 30%. Detailed assessments show that, during the 1990s, neither provincial[5] nor federal[6] governments made much effort to reduce Alberta's province-wide GHG emissions; the 1990s could therefore be considered to come close to representing "business as usual." If this business-as-usual trend in emissions intensity were to continue, Alberta's emissions intensity would fall to 66% of the 1990 level by 2020.[7]

[3] Government of Alberta (May 2002 a), *op. cit.*, p. 10.
[4] Government of Alberta (May 2002 b), *Albertans & Climate Change: A Plan for Action, Alberta's Targets*, media backgrounder. Available at http://www3.gov.ab.ca/env/climate/actionplan/background.html.
[5] R. Hornung (September 2000), *Provincial Government Performance on Climate Change: 2000*, Pembina Institute. Available at http://www.pembina.org/publications_item.asp?id=24.
[6] R. Hornung and M. Bramley (March 2000), Five Years of Failure: Federal and Provincial Government Inaction on Climate Change During a Period of Rising Industrial Emissions, Pembina Institute. Available at http://www.pembina.org/publications_item.asp?id=3.
[7] $0.87^3=0.66$.

Table 1. Alberta's GHG emissions and GDP since 1990.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GHG emissions (Mt CO_2e)[8]	171	173	180	185	194	200	203	205	206	214	223
GDP ($millions, 1997 constant prices)[9]	80.69	81.61	83.37	89.06	94.51	97.32	99.68	107.17	111.98	114.10	120.47
GHG emissions intensity (tonne/ $ GDP)	2.12	2.12	2.16	2.08	2.05	2.06	2.04	1.91	1.84	1.88	1.85

Arguably, the long-term business-as-usual rate of decline in GHG emissions intensity should be even greater than 13% per decade. In the US, for example, national GHG emissions intensity fell by 17% between 1990 and 2000 (while GHG emissions rose by 14%).[10] Table 1 shows that Alberta's own GHG emissions intensity fell at a rate of 16% per decade between 1990 and 1998. If Alberta were to meet a 16% per decade rate of decline between 1990 and 2020, its emissions intensity in 2020 would be just 59% of the 1990 level.[11]

According to the media backgrounder provided at the Alberta climate change action plan's release,[12] the provincial government expects the plan to result in a provincial GHG emissions intensity in 2020 of between 50 and 55% of the 1990 level. We have just seen that even in a business-as-usual scenario, the intensity in 2020 might be 59–66% of the 1990 level. (The government media backgrounder itself estimates, with no justification, a business-as-usual reduction in GHG emissions intensity to 70% of the 1990 level by 2020, or 11.2% per decade.) In other words, the plan's emissions intensity target, while initially seeming impressive, does not represent a particularly large deviation from business as usual. To express the figures in a different way, the plan aims only to speed up the "natural" average rate of decline in emissions intensity from about 1.4–1.7% per year[13] to 2.0–2.3% per year.[14]

Implications for absolute emissions

What does this mean for actual emissions, as opposed to emissions intensity? After all, only the absolute level of GHG emissions provides a direct measure of the impact on the global climate. The environment only "cares about" absolute emissions; it is oblivious to GDP.

[8] L. Henderson et al. (June 2002), *Canada's Greenhouse Gas Inventory 1990–2000*, Environment Canada, p. 194 of the pdf file. Available at http://www.ec.gc.ca/pdb/ghg/ghg_docs_e.cfm. "Mt CO_2e" means megatonnes (millions of tonnes) of carbon dioxide equivalent.
[9] Statistics Canada (2002), *CANSIM II, table 384-0002*. Available at http://www.statcan.ca.
[10] Natural Resources Defense Council (2002), *Untangling the Accounting Gimmicks in White House Global Warming, Pollution Plans.* Available at http://www.nrdc.org/globalWarming/agwcon.asp.
[11] $0.84^3=0.59$.
[12] Government of Alberta (May 2002 b), *op. cit.*
[13] $0.87^{1/10}=0.986$; $0.84^{1/10}=0.983$.
[14] $0.55^{1/30}=0.980$; $0.50^{1/10}=0.977$.

The Alberta government media backgrounder cited above — but not, curiously, the action plan itself — provides projections of the plan's impact on future emissions, reproduced here in Table 2. The numbers are revealing: they show that the government expects its plan to result in Alberta's GHG emissions remaining fully 20–35% higher in 2020 than in 1990.[15] These are clearly not the "meaningful, long-term emissions reductions" that the plan claims. On the contrary, the plan would allow Alberta's GHG emissions to remain far above their 1990 level for decades to come. Using 1990 as the base year (as is standard practice in climate change discussions), the Alberta climate change action plan is actually a plan to increase emissions significantly, not reduce them.

Table 2. Alberta's GHG emissions, past, present and future.

Year	GHG emissions (Mt CO_2e)	Change relative to 1990
1990[16]	171	0%
2000[17]	223	30%
2020, business as usual[18]	278	63%
2020, with Alberta climate change action plan[19]	205–230	20–35%

The "reductions" referred to by the plan only have any meaning in the highly relative context of comparison to the province's rampant business-as-usual growth in emissions. (The third line of Table 2 shows the government of Alberta's own projection of that growth, which corresponds to its assumption, mentioned above, of a business-as-usual reduction in GHG emissions intensity to 70% of the 1990 level by 2020, or 11.2% per decade.) And as will be seen in section 4, it is far from clear whether the plan is capable of achieving even these reductions.

The plan's projected GHG emissions increase of 20–35% between 1990 and 2020 merits further examination. According to the government media backgrounder cited above, these emissions increases correspond to an emissions intensity in 2020 of 50–55% of the 1990 level. By comparing these two ranges, it can be calculated that the Alberta government is assuming that the provincial GDP will grow by 140–145% between 1990 and 2020, or 3% per year.[20] But Table 1 shows that Alberta's GDP actually grew by 4% per year during the 1990s. If this more robust rate of growth were to continue until 2020 — as the government surely hopes it will — then an emissions intensity in 2020 of 50–55% of the 1990 level would correspond to GHG emissions in 2020 fully 66–83% higher than the 1990 level.[21] In other words, there is a real

[15] The Pembina Institute has previously used the range 22–37% instead of 20–35%. The discrepancy is the result of Environment Canada's recent revision of Alberta's 1990 GHG emissions from 168 to 171 Mt CO_2e.
[16] L. Henderson et al., *op. cit.*
[17] L. Henderson et al., *op. cit.*
[18] Government of Alberta (May 2002 b), *op. cit.*
[19] Government of Alberta (May 2002 b), *op. cit.*
[20] $1.2 \div 0.5 = 2.4$; $1.35 \div 0.55 = 2.45$; $2.4^{1/30} = 1.03$; $2.45^{1/10} = 1.03$.
[21] $120.47 \div 80.69 = 1.493$; $1.493^{1/10} = 1.041$; $1.493^{3} = 3.33$; $3.33 \times 0.5 = 1.66$; $3.33 \times 0.55 = 1.83$.

possibility that the Alberta climate change action plan's GHG emission intensity target could be met even while the province's emissions rise to 66–83% above the 1990 level.

While the action plan itself contains no estimate of its impact on the province's absolute emissions (this information was left instead to a media backgrounder), the plan does state no fewer than four times that its emission intensity target will result in reducing GHG emissions generated by "Alberta-based consumption" to about 10% below the 1990 level in 2020. The vagueness of the plan and its paucity of actions capable of achieving significant emission reductions (see section 4) make this statement highly questionable. But when taken at face value it creates the misleading impression — one that the Alberta government, to our knowledge, has not sought to dispel — that the plan would merely result in delaying the Kyoto timetable by ten years (the Kyoto Protocol requires Canada to reduce its net annual GHG emissions to an average of 6% below the 1990 level during 2008–2012). For example, a national Broadcast News item of May 16, 2002 reported that "instead of meeting the targets laid out in the Kyoto accord within 10 years, the Alberta plan calls for a 20-year deadline."

The possibility, demonstrated above, that the Alberta plan could instead result in the province's emissions rising as high as 83% above the 1990 by 2020, shows that the notion that the plan would result in only a modest delay of the Kyoto targets could not be further from the truth. The Kyoto targets apply to all emissions, not just those related to domestic consumption.[22] When all emissions are included, the Alberta plan results in a large, and possibly very large, increase in emissions above the 1990 level, not a reduction.

3. Zero credibility as an alternative to Kyoto

The Kyoto Protocol

The Kyoto Protocol is a global agreement endorsed by some 180 countries worldwide. The GHG emission targets it contains apply to 38 industrialized countries and amount to a reduction in the combined emissions of those countries of 5% between 1990 and 2008–2012. The Kyoto negotiations were arduous because these countries had to agree on a fair way to share out the 5% reduction: some countries took on deeper reductions, some were allowed small increases. Part of the credibility of the protocol comes from the fact that it was the outcome of tough negotiations entered into voluntarily. Logically, therefore, to some approximation it entails an equitable sharing of responsibility to reduce emissions.

The Kyoto Protocol is only intended to be a small first step towards the ultimate objective of the United Nations Framework Convention on Climate Change: "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The Intergovernmental Panel on Climate Change has shown beyond reasonable doubt that stabilization of GHG concentrations in the atmosphere *at*

[22] The distinction between emissions related to domestic consumption and total emissions is discussed further near the end of section 3.

any level will eventually require global emissions to reduced by well over 50%.[23] A series of emission reduction agreements going far beyond those now required by the Kyoto Protocol will therefore have to be negotiated internationally for the period after 2012.

Another important aspect of the protocol is the enormous flexibility it provides Canada and other countries in meeting their targets. Canada is required to reduce its *net* annual GHG emissions to an average of 6% below the 1990 level, but can do so through a combination of domestic emission reductions and purchases of international emissions units via three separate emissions trading mechanisms (hence "net"). It is important for Canada to achieve its Kyoto target as much as possible through domestic emission reductions, but the trading mechanisms provide an important "safety valve."

The Kyoto Protocol and the associated Marrakech Accords (2001), which spell out the protocol's operational details, comprise more than 250 pages of detailed legal text, the fruit of many years of intense negotiations among the entire international community. The Alberta climate change action plan, on the other hand, is a 32-page draft document issued by one of Canada's provincial governments that contains few convincing actions and much vagueness (see section 4). From this perspective alone, its claim to "provide a practical alternative to the Kyoto Protocol" is ludicrous.

The Alberta plan compared to Kyoto

Section 2 showed that the Alberta climate change action plan could result in very large increases in the province's GHG emissions — increases that are far, far removed from Kyoto-level emission reductions, not to mention the subsequent, deeper reductions required for the period after 2012. This alone suffices to show that the Alberta plan utterly fails to live up to its claim to be "a practical alternative to the Kyoto Protocol."

But there is another important question to ask about any unilateral Canadian or Albertan alternative to Kyoto: regardless of the targets an alternative plan might contain, what confidence could Canadians and others have that those targets would actually be met?

A unilateral Canadian alternative to Kyoto would not be legally binding on Canada: it would essentially be a voluntary gesture on Canada's part. It is instructive to look at what happened the last time Canada took on a non-legally binding target for limiting GHG emissions. This was the commitment made at the Rio Earth Summit, in 1992, to stabilize our national GHG emissions at the 1990 level by 2000. What actually happened? Federal and provincial governments put in place very few measures to significantly reduce emissions, and Canada's GHG emissions in 2000 ended up 20% higher than in 1990.[24]

In other words, history teaches Canadians to regard any unilateral Canadian or Albertan alternative to Kyoto with the greatest scepticism. After all, policymakers know very well at the domestic level that voluntary measures, not backed up by serious consequences in the event of

[23] Intergovernmental Panel on Climate Change (2001), *Climate Change 2001, The Scientific Basis, Summary for Policymakers and Technical Summary of the Working Group I Report*, p. 75–76.
[24] L. Henderson et al., *op. cit.*

failure, cannot deliver Kyoto-level emissions reductions. It is no different at the international level. One of the most important aspects of the Kyoto Protocol is that is a legally binding instrument. Countries that have ratified the protocol will be held to their commitments by the international community and face sanctions in the event of non-compliance — not the case with a unilateral Canadian alternative. This diminishes even further the credibility of the Alberta plan as an alternative to Kyoto.

Equity

How does the Alberta climate change action plan measure up on the yardstick of equity? After all, the plan claims it "can serve as the basis for an effective, collaborative, equitable national approach to climate change . . . while contributing responsibly to solve global issues."

Is it equitable within the Canadian context for Alberta to plan to increase its GHG emissions by at least 20% and possibility as much as 83% by 2020? To answer this question, we must look at where the other provinces stand. Table 3 shows that Alberta emits more GHGs than any other province, and that with only 10% of Canada's population it emits 31% of Canada's emissions. Alberta's per capita emissions are higher than those of any other province — over four times higher those of Ontario or British Columbia and six times higher than those of Québec.

Table 3. Emissions and emissions per capita by province in 2000.

Jurisdiction	GHG emissions (Mt CO_2e)	Population (million)	GHG emissions per capita (tonnes CO_2e)
Alberta	223	3.009	74.1
Ontario	207	11.685	17.7
Québec	90.4	7.378	12.3
British Columbia	65.9	4.059	16.2
Saskatchewan	61.8	1.022	60.5
Nova Scotia	21.5	0.941	22.8
Manitoba	21.4	1.146	18.7
New Brunswick	20.2	0.755	26.7
Newfoundland	8.81	0.537	16.4
The territories	2.35	0.099	23.8
Prince Edward Island	2.15	0.138	15.6

Certainly, there are obvious geographical and economic reasons for these differences, but they also result from deliberate choices that could reasonably have been made differently during the years since it became clear that climate change represents a serious environmental threat. For example, the government of Alberta is even now allowing a major expansion in coal-fired electricity and oilsands developments in the province — the prime drivers in the province's emissions growth — rather than encouraging a significant shift to less GHG-emitting energy solutions like energy efficiency, renewable energy and natural gas.

The question of how to equitably share responsibility to reduce GHG emissions among the provinces is a complex one that would require more analysis. But Alberta's climate change action plan proposes that, in Canada, where *average* per capita emissions are the second highest in the world,[25] the province whose emissions per capita far outstrip those of any other of the most populous provinces be allowed to keep its total emissions far above their 1990 level for decades to come. This is not equitable by any stretch of the imagination, especially when global emissions need to be reduced by over 50% during the coming decades — a goal that the Alberta action plan acknowledges and accepts.[26]

In other words, what the government of Alberta is saying is this: we want to significantly increase absolute emissions; someone else, meanwhile, should reduce their emissions to offset our emissions growth and then go even further to achieve the magnitude of emission reductions required for the country as a whole. How can the government pretend that this is "contributing responsibly to solve global issues"?

Part of the reason why the provincial government is taking this position is its belief that consumers of Alberta's exported oil and natural gas should be entirely responsible for the GHGs that are emitted in the production and distribution of fossil fuels. Hence the distinction made in the action plan between emissions related to "Alberta-based consumption" and emissions associated with the production and distribution of fossil fuels for export (see section 2). A media backgrounder provided at the Alberta climate change action plan's release makes clear exactly what is meant by this distinction: the government's "business as usual" and "Alberta action plan" projections of emissions associated with fossil fuel exports in 2020 are identical.[27] In other words, the plan is intended to have *no effect at all* on emissions associated with exports, currently 26% of Alberta's total emissions.[28]

It is important to note that 80–95% of the GHG emissions from the lifecycle of fossil fuels occur when the fuels are consumed, i.e., burned. Only 5–20% of the emissions occur when energy is used to produce and distribute the fuels. But the government of Alberta is not content that fuel consumers already shoulder 80–95% of the responsibility for life cycle emissions. It apparently thinks that fuel consumers should shoulder the other 5–20% as well. This extraordinary logic further belies the Alberta climate change action plan's claim to be an equitable alternative to Kyoto.[29] If applied more generally, it would result in all industries being absolved from any responsibility for any of the pollution they create.

---

[25] H. Turton and C. Hamilton (August 2002), *Updating Per Capita Emissions for Industrialized Countries*, The Australia Institute. Available at http://www.tai.org.au.

[26] Government of Alberta (May 2002 a), *op. cit.*, p.10.

[27] Government of Alberta (May 2002 b), *op. cit.*

[28] Government of Alberta (May 2002 b), *op. cit.*

[29] It will be evident that the Pembina Institute believes Alberta must take on a far greater responsibility to reduce GHG emissions than proposed by the government's action plan, and that it must do so in the context of Canadian ratification and implementation of the Kyoto Protocol. It is, therefore, important to point out the enormous flexibility that exists within the Kyoto framework to accommodate Alberta's need for time to restructure its economy away from such heavy reliance on fossil fuels and on the most GHG-intensive fossil fuels (oil from oilsands and coal). For one thing, Canada can use purchases of international emissions trading units — whose price is expected to be modest — towards meeting its Kyoto target if domestic emissions reductions prove genuinely difficult to achieve (although they should be prioritized). And federal and provincial governments have full flexibility to allocate the Kyoto target among provinces or economic sectors in a way that minimizes any

4. Few convincing actions and no dollars

The discussion up to this point has been entirely focused on the implications of the Alberta climate change action plan's intensity target for the province's future GHG emissions and the ability of the plan to be considered as a credible alternative to the Kyoto Protocol. But what of the actions, as opposed to the targets, contained in the plan?

The actions in the plan

The Appendix to the present document contains a complete list of the 48 distinct actions that the Alberta plan specifies once repetitions are eliminated and groups of closely related or overlapping actions are collected into single items. Included in the definition of "actions" are targets or broad policy directions that lack details on how they will be realized as well as more specific actions. The 48 actions are classified by type in Table 4.

Table 4. Classification of the 48 actions contained in the Alberta climate change action plan.

Type of action	Number of actions clearly committed to	Number of actions under consideration	Total number of actions
Emissions target	2	0	2
Broad policy direction	8	0	8
Direct investment in emissions reduction	1	1	2
Regulation	1	0	1
Financial incentive	2	0	2
Voluntary agreements / possible regulation	1	0	1
Emissions trading infrastructure	5	0	5
Research	4	0	4
Demonstration	4	0	4
Education/outreach	7	0	7
Policy analysis	9	0	9
Government operations	2	1	3

Overall, what this analysis most reveals is the vagueness of the action plan. To begin with, the plan is labelled a "draft," so it is uncertain as to whether the government feels bound by the commitments it contains. Beyond that, only 22 (less than half) of the 48 items are specific actions, clearly committed to and have some chance of directly resulting in GHG emission reductions beyond business as usual:

- one direct investment in emission reductions;
- one regulatory measure;

unreasonable economic impacts. This could potentially result in Alberta being allowed a modest increase in its emissions by 2008–2012 even while Canada meets its Kyoto target.

- two financial incentives;
- one set of voluntary agreements with a possibility of regulation;
- four research initiatives;
- four demonstration initiatives;
- seven education/outreach initiatives; and
- two initiatives to reduce emissions from government operations.

It is certainly essential to set emissions targets, although the most important one in the plan (the 50% reduction in emissions intensity) is, as shown above, altogether inadequate. Likewise, it is useful to set broad policy directions, but within the plan these are worded in such general terms that it is impossible to tell whether they are merely good intentions or portend real action. Nine of the actions in the plan are simply initiatives to undertake policy analysis — again, an important activity, but one with no guarantee of producing emission reductions. Five of the actions in the plan are commitments to put in place infrastructure to support GHG emissions trading, which is discussed further below.

Investments in research and demonstration and education/outreach initiatives have their place in a government's toolbox of policy measures to reduce GHG emissions, but their effectiveness in reducing emissions has an uncertain timeframe and is far from guaranteed. Voluntary measures are clearly inadequate on their own. Accordingly, policymakers understand that Kyoto-level emission reductions cannot be achieved without regulatory measures, financial incentives or economic instruments, and/or direct investments in emission reductions.[30] Just eight (one in six) of the 48 actions in the Alberta climate change action plan fall into these categories, and only six of these are clearly committed to:

- two direct investments (only one of which is clearly committed to);
- one regulatory measure;
- two financial incentives; and
- three initiatives to reduce emissions from government operations (only two of which are clearly committed to).

These eight actions are listed in Table 5.

[30] See M. Bramley (November 2001), *Contribution on Climate Change to the Canadian National Assessment for the World Summit on Sustainable Development*, section 5.2. Available at http://www.canada2002earthsummit.gc.ca/pdf/bramley_e.pdf.

Table 5. Actions in the Alberta climate change action plan that fall into the categories of regulation, financial incentives and direct investments in emission reductions. (The wording is taken directly from the plan itself; items under consideration but not clearly committed to are in italics; actions are numbered as in the Appendix to this report.)

9. Alberta will consult on . . . The viability of developing a joint industry/government mutual "carbon fund" approach to purchase international offsets/credits and advance Alberta economic and technology transfer opportunities.
11. The Alberta government will consider actions that include the following: *• Support programs for energy retrofits in government facilities.* *• Purchase hybrid vehicles for the government fleet.* *• Move to the use of more green power for government facilities.* *• Establish an "innovation fund" for leadership in reducing emissions within government.*
23. Facilitate access to electricity generated from a diversity of energy sources and energy conservation alternatives. • Continue to reduce regulatory barriers for low impact electrical generation.
26. Integrate increased energy efficiency into management decisions within government and promote adoption of sustainable business practices.
27. Finalize an energy retrofit program for government-owned buildings.
30. Establish market-based mechanisms for facilitating urban lighting retrofits.
33. Partner with Climate Change Central and others to establish mechanisms for reducing the up-front capital costs of retrofits, new appliances or distributed energy sources.
37. Partner with municipalities to ensure existing infrastructure programs encourage more efficient forms of development. / *For example, to what extent can funds be earmarked towards municipal energy efficient investments or alternatives to new infrastructure (e.g. promotion of telecommuting)?*

Action 9 has some merit in that it shows the Alberta government is considering taking on some financial responsibility for the province's emissions by purchasing international GHG emission reductions (although it is not clear why purchases of reductions in the rest of Canada are not mentioned).

Actions 11, 26 and 27 apply to emissions from government operations, an area where the government boasts of being "acknowledged as a national leader."[31] It is true that the government of Alberta scored quite well in this area (7.5 out of 10) in the Pembina Institute's most recent assessment of provincial government performance on climate change (although British Columbia did even better).[32] However, according to the government of Alberta, emissions from its own operations amount to just 0.2% of the province's total emissions.[33] While it is certainly important for governments to set a good example, actions to reduce emissions from their own operations are barely perceptible in the context of total national or provincial emissions. In addition, action 11 is only under consideration and action 26 is quite vague.

[31] Government of Alberta (May 2002 a), *op. cit.*, p. 12.
[32] M. Bramley and L.-A. Robertson (September 2001), *Provincial Government Performance on Climate Change: 2001*, Pembina Institute. Available at http://www.pembina.org/publications_item.asp?id=38.
[33] Government of Alberta (October 2001), *Action Plan 2000–2005 for Canada's Voluntary Challenge and Registry Program*, p. 4.

Action 23 is a welcome regulatory initiative to promote renewable energy, but it is unclear exactly what regulatory changes the government has in mind, and therefore impossible to judge the likely impact of this action.

Actions 30 and 33 represent welcome commitments to provide financial incentives to improve energy efficiency, but no details are provided on the level of these incentives or the mechanism by which they will be delivered.

Finally, action 37 appears to represent a commitment to make provincial government investment in municipal infrastructure conditional on achieving energy efficiency gains. Again, without details on how stringently the provincial government will apply such conditions, it is impossible to judge the likely impact of this action.

In addition to these eight actions, two important broad policy directions signalled in the action plan deserve highlighting. A cautious welcome can be given to the commitment to develop a GHG emissions trading system for Alberta (action 6 in the Appendix) because domestic emissions trading, if properly designed, is an economic instrument that can send a clear price signal to drive down GHG emissions from major emitters. However, the devil is in the details: An environmentally effective emissions trading system must impose a stringent and declining cap on total emissions from covered sectors, and place limits on the use of both domestic project-based emission reduction credits and emissions permits or credits purchased from outside Canada. Unfortunately there is no language in the Alberta climate change action plan to provide any reassurance that a future Alberta GHG emissions trading system will meet these criteria. In particular, as mentioned in section 3, the plan is intended to have *no effect at all* on emissions associated with fossil fuel exported outside Alberta, currently 26% of the province's total emissions and a much higher proportion of total industrial emissions. More generally, it appears that the emissions cap inherent in the trading system will be the sum of the sectoral emissions targets set for each participating economic sector (action 4 in the Appendix). As these sectoral targets are to be negotiated on a voluntary basis, they are unlikely to be stringent. It is to be hoped that the plan's suggestion to "ensure meaningful results [from the sectoral targets] by using . . . regulatory requirements" is put into practice.

A further concern with the envisaged future Alberta emissions trading system arises from the plan's ruling out of the auctioning of emissions permits.[34] This will largely prevent the system from respecting the polluter-pays principle.

The plan's commitment to "establish an Energy Efficiency Office within Climate Change Central to act as a focus point for Albertans looking for assistance in pursuing energy efficiency opportunities and to disseminate educational tools" is also welcome. Now it must be translated from a broad intention into a detailed specification of the mechanisms to be used and the funding levels to be provided. An Energy Efficiency Office will only be truly effective if it is in a position to provide meaningful financial incentives (and better still, to make energy efficiency regulations).

[34] Government of Alberta (May 2002 a), *op. cit.*, p. 15: "Alberta's approach to emissions trading will not be based on the generation of revenues . . ."

Overall then, the Alberta climate change action plan contains few actions capable of achieving significant emission reductions any time soon. Those actions that may potentially be capable of doing so are not specified in enough detail to evaluate their likely impact. In particular, the plan provides no indication of the level of funds that the Alberta government intends to commit to the actions it contains. This is an astonishing omission in light of the plan's claims to include "immediate actions to address climate change" and to achieve "meaningful, long-term emissions reductions."[35] Observers of politics know that there is an important difference between statements of intent and programs provided with defined funds in a government budget.

In summary, it is far from clear whether the plan is capable of achieving the emission reductions it claims (see Table 2) relative to business-as-usual growth in the province's emissions. It is ironic that, while the Alberta government has often challenged the federal government to provide a convincing, detailed action plan to implement the Kyoto Protocol, it appears unable itself to deliver such a plan to achieve its own, far weaker, provincial objective.

Key actions missing from the plan

The Pembina Institute has created a comprehensive framework for assessing provincial government action to reduce GHG emissions through its *Provincial Government Performance on Climate Change* reports.[36] These reports assess governments' progress in implementing 38 distinct policy initiatives covering all nine key areas in which federal and provincial governments have recognized that action is required:

- Transportation / Land Use Planning
- Energy Utilities
- Buildings
- Industry
- Greenhouse Gas Emissions Trading
- Government House in Order
- Other Sources of Greenhouse Gas Emissions (landfills, agriculture, forestry)
- Technology Development
- Enhancing Awareness and Understanding

The 38 policy initiatives encompass the most significant measures that could be taken in each of these nine areas; the vast majority of these measures have been recommended for implementation by national multi-stakeholder consultation processes. When its progress in implementing these initiatives was assessed in September 2001, the government of Alberta achieved a score of only 31.5 out of 100.[37] This compared to 39 for British Columbia, 30.5 for Ontario, 34.5 for Québec and 26 for Saskatchewan. Clearly, the government of Alberta is not a leader in addressing climate change, contrary to the claim it made in a full-page advertisement in the Globe and Mail on July 27, 2002.

[35] Government of Alberta (May 2002 a), *op. cit.*, p. 2.
[36] M. Bramley and L.-A. Robertson, *op. cit.*
[37] M. Bramley and L.-A. Robertson, *op. cit.*

We have not attempted to assess precisely how the government of Alberta's score under the Pembina Institute's framework might increase if its climate change action plan were fully implemented. It is likely that marks would increase most significantly in the areas of technology development, emissions trading, buildings and government house in order. But a comparison of the plan and the list of 38 policy initiatives reveals a large number of key policy measures, relating to some of the largest GHG emission sources, that are missing from the plan:

- offering financial incentives to promote the purchase and use of fuel efficient vehicles;
- changing the taxation of transportation fuels to promote GHG emission reduction;
- providing additional funding for public transit;
- establishing a renewable energy portfolio standard (requiring electricity suppliers to source a minimum percentage of their product from low-impact renewable sources);
- mandating demand side management activities (requiring electricity and gas suppliers to undertake energy efficiency programs with their customers);
- establishing taxes or credits to incorporate environmental costs into energy prices;
- mandating the national energy codes for buildings and houses;
- offering tax incentives for energy efficiency investments in industry;
- reducing support for fossil fuel exploration and development;
- ensuring government procurement of green power; and
- adopting regulations requiring the capture of landfill gas.

Road vehicles account for 8% of Alberta's GHG emissions; electricity generation accounts for 23%.[38] Yet the Alberta climate change action plan does not mention passenger transportation, barely mentions trucking, and mentions renewable sources of electricity only as a second-rank subject for research and in the vaguely worded commitment to "continue to reduce regulatory barriers for low impact electrical generation." The plan makes not a single mention of wind energy, currently the most promising, fast-growing low-impact renewable energy source worldwide. These are especially striking omissions.

5. Conclusion

Alberta's climate change action plan is based on a false premise: that there is a conflict between reducing GHG emissions and economic prosperity. This false choice is evoked time and again in the plan. Yet a recent elaborate economic modelling exercise jointly overseen by federal and provincial governments (including that of Alberta) determined that implementing the Kyoto Protocol in Canada would, at worst, barely make a dent in projected GDP growth; at best it would actually increase the rate of national GDP growth. Alberta's GDP was projected to grow by between 25.9 and 26.7% between 2000 and 2012 if Canada implements the Kyoto Protocol, compared to 27.3% if it does not.[39] These are trifling impacts. The government of Alberta is being dishonest by posting prominently on its Web site[40] "An Assessment of the Economic

[38] L. Henderson et al., *op. cit.*
[39] Government of Canada (May 2002), *A Discussion Paper on Canada's Contribution to Addressing Climate Change*, p. 41. These results exclude the cases that assumed an improbably high price of international emissions units ($50/tonne CO_2e).
[40] http://www3.gov.ab.ca/env/climate/actionplan/index.html

Impacts of the Kyoto Protocol" based on a two-year-old federal-provincial economic modelling exercise now rendered invalid by subsequent developments in international climate negotiations — while making no mention of the results of the more recent exercise whose results have just been cited.

It is also important to stress that the federal-provincial economic modelling work has neglected a series of benefits likely to accrue from implementing the Kyoto Protocol, including benefits to human health, avoided costs of climate change impacts, technological innovation and reduced uncertainty for investors.[41] The Pembina Institute recently conducted a survey of real-world evidence of ways initiatives to reduce GHG emissions and address other environmental challenges have affected a variety of indicators of competitiveness.[42] The findings provide a sound basis for concluding that Canada's economic competitiveness, when defined broadly, is likely to benefit, not suffer, from a decision by the federal government to ratify the Kyoto Protocol.

The Alberta climate change action plans states that "actions we develop must be compatible with our largest trading partner — the U.S. — in order to ensure we maintain our competitiveness."[43] This claim is inspired by the argument that the U.S. is not acting on climate change and that, since the Canadian economy is strongly linked to that of the U.S., Canada cannot afford to act either. This fails to recognize the fact that governments in the U.S. have, to date, taken far more significant action to reduce GHG emissions than have governments in Canada. In particular, state governments in the U.S. are far ahead of provincial governments in Canada in implementing GHG-reducing measures. Although the Bush Administration has abandoned leadership on climate change, the U.S. federal government still administers a much more substantial body of GHG-reducing measures than does Canada's federal government.[44] Implementing the Kyoto Protocol would have the practical effect, for a number of years at least, of closing rather than widening the gap between the U.S. and Canada.

Finally, the Alberta climate change action plan complains that "the timeframe for the Kyoto target (2008–2012) allows little time for technological change and capital stock turnover."[45] This is the complaint of a government that has spent a decade talking a lot about climate change but doing very little to address it. Canada committed at the Rio Earth Summit, in 1992, to stabilize national GHG emissions at the 1990 level by 2000. The government of Alberta (and all other governments in Canada) should have been acting vigorously to reduce GHG emissions under its jurisdiction from 1992 onwards. Instead, here we are, ten years later, and the government says that little time is available to make the changes needed. Now it is proposing a plan that will allow the province's emissions to remain far above their 1990 level for decades to come. This is indefensible.

---

[41] S. Boustie, M. Raynolds and M. Bramley (June 2002), *How Ratifying the Kyoto Protocol Will Benefit Canada's Competitiveness*, Pembina Institute, p. 7–9. Available at http://www.pembina.org/publications_item.asp?id=132.
[42] S. Boustie, M. Raynolds and M. Bramley, *op. cit.*
[43] Government of Alberta (May 2002 a), *op. cit.*, p. 3.
[44] M. Bramley (May 2002), *A Comparison of Current Government Action on Climate Change in the U.S. and Canada*, Pembina Institute and World Wildlife Fund Canada. Available at http://www.pembina.org/publications_item.asp?id=129.
[45] Government of Alberta (May 2002 a), *op. cit.*, p. 9.

Appendix. A complete list of actions specified in the Alberta climate change action plan.

The table below contains a complete list of actions specified in the Alberta climate change action plan, the page number on which the action is described and a classification of the type of action. Some "actions" are in fact merely targets or broad policy directions with no details on how they will be realized. The entries in the first column use the language found in the plan itself. In several cases the plan states a single action twice, sometimes worded slightly differently; these repetitions have generally been excluded from the table, although in some cases both versions are listed under a single item for clarity. Where possible, in the interest of simplicity, a group of closely related or overlapping actions has been collected into a single item. In a few cases, the plan indicates that actions are under consideration but have not clearly been committed to; the most significant of these items are shown in the table in italics. Including these actions under consideration, the table identifies 48 distinct actions.

Action	Page	Action type
1. Reduce greenhouse gas emissions intensity, or emissions relative to GDP, by 50 per cent by the year 2020.	10	Emissions target
2. Work to be "best-in-class" in both reducing emissions intensity of energy exports, and emissions from Alberta-based industrial and consumer activity / The Alberta government will establish a framework that assures "best in class" production of energy, regardless of the ultimate destination of these products.	10/ 11	Broad policy direction
3. Work to fulfill the goal of the United Nations Framework Convention on Climate Change - preventing atmospheric concentrations of greenhouse gases from reaching dangerous levels - by moving towards more significant emission reductions over the longer term to 2050.	10	Broad policy direction

Action	Page	Action type
4. Sector-specific emission reduction strategies developed through transparent processes . . . that: • Include greenhouse gas emission targets (e.g. intensity targets such as greenhouse gas emissions per kilowatt hour of generation). • Ensure meaningful results by using management tools such as sectoral agreements, reporting of results and regulatory requirements. • Consider the use of emission trading systems to provide additional flexibility and help minimize the costs of achieving targets. / Facilitate and negotiate agreements with specific economic sectors, including electricity, oil and gas, transportation, forestry, municipalities and other industries to gain commitment for action for reducing greenhouse gas emissions. / In addition to the Alberta electricity and petroleum sectors, partnership agreements will be sought with a broader range of sectors that may include: agriculture, construction sector, municipal sector, forestry, oil and gas, petrochemicals and trucking.	11/ 12/ 13	Voluntary agreements/ possible regulation
5. Implement a mandatory greenhouse gas emissions reporting program for large emission sources.	13	Education/outreach
6. Lead the development of an approach to emissions trading that reflects Alberta's unique needs and circumstances, complements the negotiated sectoral agreements, and works with national, continental and international systems.	14	Broad policy direction
7. Alberta will develop an Emission Reduction Registry, which will ensure registered emission reductions have clear and unique title and can form the basis for transparent verification protocols.	14	Emissions trading infrastructure
8. Alberta will establish rules within the next six months determining eligibility for emission credits to meet the offset requirement. / Develop specific criteria for application of sink credits to current offset obligations for new thermal power plants.	14/ 25	Emissions trading infrastructure
9. Alberta will consult on . . . The viability of developing a joint industry/government mutual "carbon fund" approach to purchase international offsets/credits and advance Alberta economic and technology transfer opportunities.	*15*	*Direct investment in emissions reduction*
10. A new target of a 26 per cent reduction [of emissions from government operations] below 1990 levels by 2005 has been established.	15	Emissions target
11. The Alberta government will consider actions that include the following: *• Support programs for energy retrofits in government facilities.* *• Purchase hybrid vehicles for the government fleet.* *• Move to the use of more green power for government facilities.* *• Establish an "innovation fund" for leadership in reducing emissions within government.*	*15*	*Government operations*

Action	Page	Action type
12. [Support] strategic research related to energy research and development that reduces the costs and environmental footprint associated with energy production, distribution and use in Alberta. / Alberta's investment in greenhouse gas reducing technologies will be coordinated through the Alberta Energy Research Institute (AERI). / Alberta's integrated and comprehensive Energy Research Strategy will play a key role in transforming separate sectors (oil and gas, coal, power and petrochemical) of the economy into an integrated energy industry focused on the utilization of Alberta's resources to their fullest potential.	16	Research
13. Implement a provincial fuel cell strategy through demonstration projects.[46]	4	Demonstration
14. By 2003, the Alberta government will partner with industry on three commercial projects to use carbon dioxide to enhance oil production or maintain reservoir pressure.	18	Demonstration
15. The Alberta Geological Survey, in partnership with the Geological Survey of Canada will expand and support activities in the analysis of Alberta's subsurface suitability, capacity and safety for CO_2 sequestration in hydrocarbon reservoirs, coal beds, and deep saline formations (location, capacity, and characteristics for various CO_2 storage options). / The Alberta Geological Survey and Geological Survey of Canada, Alberta Research Council, Natural Resources Canada, Alberta universities, consortia and industry will work in partnership to assess the integrity and safety of such locations, both in the short and long term.	18/ 19	Research
16. The Alberta Geological Survey and the Alberta Research Council will expand efforts in mapping and characterizing coal beds and developing a better understanding of Alberta's coal bed methane potential. They will identify which coal beds are appropriate for enhanced methane production by CO_2 injection and storage, and address issues related to the disposal of produced water.	19	Research
17. Partnerships will be pursued with industry players that are already engaged in research efforts, and also to bring in new players. A key component will be to proceed with technical demonstration projects for Enhanced Coal Bed Methane Recovery.	19	Demonstration
18. Identify infrastructure needs (e.g. pipelines or other facilities required for CO_2 transmission to selected sites) and assess the merits of building the infrastructure through incremental efforts under an industry consortium, or of allowing for sole ownership if a company expresses interest in building a CO_2 infrastructure. / Recommend how to proceed with infrastructure development (e.g. mega-project vs. project by project investments).	19	Policy analysis
19. Work in collaboration with government agencies (including the federal government), industry, and Climate Change Central to identify the types of economic, fiscal and regulatory frameworks that are conducive to a Carbon Management Strategy.	19	Policy analysis

[46] This item appears only in the Executive Summary of the plan but may be intended to be an element of the previous item.

Action	Page	Action type
20. Through demonstration projects in Alberta and elsewhere (e.g. Weyburn, Sask.) resolve any outstanding and new health, environmental and safety issues dealing with capture, transportation and storage. / Establish a CO_2 monitoring component on storage and leakage associated with three existing commercial demonstration projects.	20	Demonstration
21. Consult with Public to Increase Awareness, Understanding and Acceptance [of CO_2 storage]	20	Education/outreach
22. Achieving greenhouse gas emissions reductions within the building and transportation sectors will require a broad mix of initiatives, including incentives for energy efficient investments and minimum energy efficiency expectations.	20	Broad policy direction
23. Facilitate access to electricity generated from a diversity of energy sources and energy conservation alternatives. • Continue to reduce regulatory barriers for low impact electrical generation.	21	Regulation
24. Facilitate access to electricity generated from a diversity of energy sources and energy conservation alternatives. • Assess opportunities to enhance market signals for low impact generation. • Pursue options for load shifting. • Examine roles of different players in the market (e.g. generators, distribution companies, retailers, energy performance contractors) and identify opportunities for pursuing energy efficiency improvements. • Identify barriers to the broader adoption of new approaches to energy use - especially distributed generation and district heating.	21	Policy analysis
25. Communicate energy conservation opportunities to government staff.	21	Education/outreach
26. Integrate increased energy efficiency into management decisions within government and promote adoption of sustainable business practices.	21	Government operations
27. Finalize an energy retrofit program for government-owned buildings.	21	Government operations
28. Work with education and health sectors to identify opportunities for a cooperative approach to energy efficient retrofits. / Work with municipal, education, health and commercial sectors to identify opportunities for a cooperative approach to energy efficiency retrofits (e.g. aggregation of energy savings opportunities).	21/ 22	Policy analysis
29. Create awareness and choices for the adoption of energy conservation opportunities by Albertans. / Establish a new Energy Efficiency Office within Climate Change Central to act as a focus point for Albertans looking for assistance in pursuing energy efficiency opportunities and to disseminate educational tools.	22	Education/outreach
30. Establish market-based mechanisms for facilitating urban lighting retrofits.	22	Financial incentive

Action	Page	Action type
31. Facilitate establishment of district heating systems, where practical and cost effective.	22	Broad policy direction
32. Develop and implement a municipal building energy audit program.[47]	4	Education/outreach
33. Partner with Climate Change Central and others to establish mechanisms for reducing the up-front capital costs of retrofits, new appliances or distributed energy sources.	22	Financial incentive
34. Engage industry sectors in the identification of stewardship opportunities [for energy efficiency].	22	Education/outreach
35. Work in partnership with the building construction sector to increase the efficiency of new buildings.	22	Broad policy direction
36. Establish a task force to consult with stakeholders and consumer groups to explore economic incentives for energy conservation and identify potential revenue sources.	22	Policy analysis
37. Partner with municipalities to ensure existing infrastructure programs encourage more efficient forms of development. / *For example, to what extent can funds be earmarked towards municipal energy efficient investments or alternatives to new infrastructure (e.g. promotion of telecommuting)?*	22/ 20	Direct investment in emissions reduction
38. Explore the use of biological sinks (agriculture soils and forestry) in Alberta as part of the Alberta strategy for addressing climate change.	24–25	Policy analysis
39. Develop a policy statement on ownership of the carbon in the soil.	25	Broad policy direction
40. Establish the framework for a measuring, monitoring and verification system [for sinks credits].	25	Emissions trading infrastructure
41. Undertake a full cost analysis of greenhouse gas reducing practices, including monitoring and verifying reductions.	25	Policy analysis
42. Develop a land use registry for documenting greenhouse gas emissions reductions and removals (where sound science-based emission coefficients can be linked at a later date).	25	Emissions trading infrastructure
43. Examine an appropriate mechanism for dealing with liability in emissions removal.	25	Emissions trading infrastructure
44. Identify the magnitude of the risk - assess the risk/cost of a range of emissions from previously sequestered soil carbon.	25	Policy analysis
45. Establish an adaptation research program including collaboration with other governments in Canada.	26	Research

[47] This item appears only in the Executive Summary of the plan but appears to belong among the items listed here.

Action	Page	Action type
46. Assess the impacts associated with current and future climate extremes. / Explicitly assess current responses to climate extremes. / Assess the ability of our major systems (natural, economic and institutional) to adapt to the range of possible future climates. / Develop options to increase adaptability of those systems that are not sufficiently robust.	27	Policy analysis
47. Incorporate improved responses to climate extremes explicitly into management and planning. / Implement changes to management systems to ensure that they have the ability to address possible future climates.	27	Broad policy direction
48. Keep Albertans informed of the risks and opportunities of climate change and engage them in adaptation efforts.	27	Education/outreach