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An Analysis of Manitoba's Proposed Plan to Reduce Greenhouse Gas Emissions as Contained in the *Manitoba Climate and Green Plan*

By Harvey Stevens

AUGUST
2018

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ISBN 978-1-77125-420-5

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Executive Summary

At the Paris Climate Change meetings in late 2015, Canada committed to reducing green house gas (GHG) emissions by 30 per cent below 2005 levels by 2030.

Applying this commitment to Manitoba means that by 2030, the GHG emissions for that year have to be 14,158 kt of CO2eq instead of the 20,225 kt they were in 2005 and the 20,935 kt they were in 2016.

Rather than state its GHG reduction target as a *fixed* amount by 2030, the provincial *Made in Manitoba Climate and Green Plan* prefers to talk in terms of *cumulative* reductions over time and sets no cumulative emissions target. Instead, the plan presents five illustrative cumulative emissions pathways, the most aggressive of which results in a fixed level of 15,500 kt by 2030, some 1,400 kt more than the target. The plan also states that the government's proposed flat $25 per tonne carbon price will result in cumulative reductions (from the Business-as-Usual option) of 1,071 kt between 2018 and 2022, compared to cumulative reductions of 991 kt under the federal phased in carbon pricing rate of $10 per tonne in 2018 to $50 per tonne by 2022.

However, the discussion document fails to show that the "R-GEEM" modeling exercise it commissioned to produce these results also indicates that by 2021, the federal carbon pricing plan will result in GHG emissions levels that are 13 kt lower than the flat $25 per tonne price and, by 2022, the federal plan will result in emissions that are 76 kt lower. Projecting the R-GEEM model results out to 2030 shows that the federal carbon price will result in 608 kt fewer emissions than the provincial carbon price between 2023 than 2030. So, on both a fixed and cumulative emissions basis, the federal pricing plan out-performs the proposed provincial flat carbon price by 2030.

The province also commissioned a second GHG modeling exercise (EC-PRO), the results of which it did *not* include in its plan. Two main carbon pricing options were compared — the current federal plan of a $10 per tonne per year increase between 2018 and 2022 with no further increases and one that featured a continuously increasing carbon price up to $130 per tonne by 2030. The results showed two things — that neither plan produced substantial decreases in GHG emissions and that, without continuously increasing the price of carbon, GHG emissions will rise. An analysis of the EC-PRO results indicates that the price of carbon has to rise by an

average of $6.78 per tonne per year to prevent an increase in GHG emissions. Thus, vigorous complementary measures are required to substantially reduce GHG emissions in Manitoba.

The province's *Manitoba Climate and Green Plan* document does propose a set of complementary measures (see, page 55) which could lead to *cumulative* reductions in emissions of between 1,300 to 1,500 kt between 2018 and 2022. However, even in combination with the effect of the $25 per tonne carbon price, the impact would fall far short of the reductions needed to achieve the targeted emissions levels by 2030.

What is worse is that the document completely ignores a review of the effects of proposed provincial plans for increasing the economic activity of the province. For example, in late 2016, the Minister of Agriculture talked about wanting to increase the number of cattle in the province from the current herd size of 400,000 cows to its previous all-time high of 750,000, an increase of 350,000 head. According to National Inventory Report data, each head of non-dairy cattle emits 2.255 kg of CO_2e per year, with the result that an increase of 350,000 head of cattle would lead to GHG emission increases of 789 kt per year. The hog industry is also calling for an additional 1.2 million hogs being produced in Manitoba over the next 5 to 10 years. That increase would add 251 kt of CO_2e per year. Thus, if the provincial government allows these increases to livestock in Manitoba, it will have to find additional reductions of 1,000 kt of CO_2e just to prevent an overall increase.

Given the woeful inadequacy of the proposed complementary measures, far more aggressive measures are required for all sectors of the economy and not just those covered by the federal carbon pricing backstop legislation. The transportation fleet needs to be switched to electricity, existing natural gas household and industrial customers need to switch to net emission-free heat (hydro-electric, geothermal, solar or biomass) or solo drivers to switch to using the bus to commute to work and farmers need to reduce the intensity of inorganic fertilizer application to their crops and switch to less GHG intensive livestock production.

To properly implement the proposed carbon savings account process, the Province must commit to robust modeling and program design that uses best information to design the most cost effective programs and estimate their impact on GHG reductions.

Introduction

At the Paris Climate Change meetings in late 2015, Canada committed to reducing GHG emissions by 30 per cent below 2005 levels by 2030. By way of implementing that commitment, it met with provinces in March 2016 and issued a federal-provincial declaration on clean growth and climate change and set up a working group to explore options. In October 2016, the federal government released the federal benchmarks that established the minimum standards that provinces must meet for carbon pricing. That pricing schedule called for a carbon price to be applied to a range of fossil fuels that would increase from $10 per tonne of Greenhouse Gas Emissions (GHGs) in 2018 to $50 per tonne by 2022. In December 2016, all provinces, except Manitoba and Saskatchewan signed onto the Pan-Canadian Framework on Clean Growth and Climate Change. That framework stipulated that provincial jurisdictions were required to come up with their own plans for reducing carbon emissions that would be in conformity with the federal requirements. In October 2017, Manitoba released its Climate and Green Plan discussion document which proposed a carbon tax of $25 per tonne that would remain at that level through to 2032. In March 2018, the Climate and Green Plan Implementation Act was introduced which will be debated and passed this fall with a December 1st implementation date.

This report assesses the validity of the claim outlined in the provincial government's *Manitoba Climate and Green Plan* document that its carbon pricing proposal and complementary measures will result in larger reductions in GHG emissions than the federal carbon pricing schedule. In addition, it looks at the range of other measures required to achieve the federal target of a 30 per cent reduction in GHG emissions from 2005 levels by 2030.

The Challenge and Manitoba's Proposed Response

Applying the federal commitment to Manitoba means that by 2030, the GHG emissions for that year have to be 14,158 kt CO_2eq instead of the 20,225 kt they were in 2005 and the 20,935 kt they were in 2016. This is the conventional way that the targets have been calculated — a fixed level of (reduced) GHG emissions by a target year. However, the Climate and Green Plan document prefers to calculate *cumulative* reductions over time, noting that it is not simply the level of emissions in a future target year that we should be concerned about but rather the cumulative emissions over the whole period. And so, it presents its emissions reductions goals as cumulative amounts. On page 16 of the document is a chart which shows that, over the 2018 to 2022 time period, the Province's proposed "Made-in-Manitoba" plan of a constant $25 per tonne carbon tax will result in 1,070 kt *fewer* GHG emissions compared to 990 kt *fewer* emissions under the federal carbon pricing plan. Additional complementary measures are presented on pages 16 and 55 of the discussion document which could result in total cumulative emissions reductions of between 2,394 and 2,635 kt of GHGs over the initial five year period of the proposed 15 year plan (2018 to 2032).

An Assessment of the Impact of the "Made-in-Manitoba" GHG Carbon Tax on GHG Emissions

In order to estimate the impact of its proposed constant $25 per tonne carbon tax, the Manitoba government commissioned two modeling exercises. The one was through Environment and Climate Change Canada (ECCC) and its proprietary energy-economy model called EC-PRO. The second was through EnviroEconomics, an independent environmental economics expert consulting service, using its R-GEEM model. Both models are computable general equilibrium models (CGES) which incorporate provincial production and consumption patterns through detailed input-output tables as well as information on energy use and GHG emissions related to the combustion of fossil fuels. Only the results of the R-GEEM model are presented in the Technical Backgrounder document which describes the modeling conducted for the Made-in-Manitoba approach and in the discussion document.

In order to assess the claims made in the *Manitoba Climate and Green Plan* document, the detailed numerical results of both modeling exercises were obtained from the Manitoba government through a Freedom of Information and Protection of Privacy Act (FIPPA) request. Those results are presented below.

Results of the R-GEEM Modeling

Table 1 presents the annual estimates of GHG reductions in Manitoba under three scenarios — a Business as Usual case, the $25 per tonne constant carbon tax on combustion fuel with an Alberta-style output based pricing on large emitters, and the federal carbon tax schedule of $10 per tonne in 2018 rising to $50 per tonne in 2022 coupled with an Alberta-style output based pricing on large emitters.

As described in the discussion document, Table 1 confirms that the Manitoba Hybrid pricing plan results in higher *cumulative* reductions than the federal carbon pricing schedule over the first five years. However, in terms of the *level* of GHG emissions, the federal pricing schedule results in lower emissions in 2021 and even lower in 2022. And the trend in the difference in GHG emissions between the Manitoba and federal plans is increasingly in favour of the federal plan, going from +69 kt in 2018 to -76 kt in 2022. Thus, while the cumulative emissions reductions are slightly higher for the Manitoba carbon pricing plan over the first five years, the annual emissions by 2022 are lower under the federal pricing plan by 76 kt.

Furthermore, when we extrapolate the strong linear trend in GHG emissions predicted by the

TABLE 1 **Estimated GHG Emissions (kt CO_2eq) between 2018 and 2002 by Type of Carbon Pricing Plan — Manitoba — R-GEEM Model**

Carbon Pricing Option	2018	2019	2020	2021	2022	Cumulative Emissions	Cumulative Reductions over BAU
Business as Usual (BAU)	23,120	23,060	23,010	22,940	22,890	115,019	—
MB Hybrid $25/tonne	23,008	22,900	22,792	22,667	22,581	113,948	1,071
Federal Hybrid	23,077	22,967	22,825	22,654	22,505	114,028	991
Difference (Fed. – MB)	+69	+67	+28	-13	-76	+80	-80

SOURCE: R-GEEM Modeling Results. Province of Manitoba.

TABLE 2 **Projected GHG Emissions (kt CO_2 eq) between 2023 and 2030 by Type of Carbon Pricing Plan — Manitoba — Based on R-GEEM Model**

Year	Business-as-Usual	MB Hybrid Plan	Federal Hybrid Plan	Difference (Fed-MB)
2023	22,830	22,463	22,387	-76
2024	22,772	22,355	22,279	-76
2025	22,714	22,246	22,170	-76
2026	22,656	22,137	22,061	-76
2027	22,598	22,029	21,953	-76
2028	22,540	21,920	21,844	-76
2029	22,482	21,811	21,735	-76
2030	22,424	21,703	21,626	-76
Cumulative Emissions	181,016	176,664	176,055	-76
Difference in Cumulative Emissions from BAU Plan	—	-4,352	-4,961	-608

R-GEEM model above, we get cumulative reductions between 2023 and 2030 that are higher for the federal than the Manitoba carbon pricing plan, as shown below in Table 2.[1] Over this time period, the *cumulative reductions* in GHG emissions under the federal pricing plan are an estimated 608 kt more than under the Manitoba plan. And, by 2030, the estimated level of GHG emissions is 76 kt less under the federal than the Manitoba plan.

Thus, the R-GEEM modeling shows that the federal carbon pricing plan is superior to the Manitoba plan, both in producing larger cumulative reductions in GHG emissions as well as lower end-point GHG emissions by 2030. Nonetheless, the estimates set out in Tables 1 and 2 show that by 2030, the federal carbon pricing plan will result in a total decline in GHG emissions between 2018 and 2030 of only 1,451 kt (21,626–23,077); whereas, the required reductions under Canada's commitment at the Paris meeting requires a reduction of 6,777 kt between 2016 and 2030 (20,935–14,158). Thus, either higher carbon prices and/or aggressive complementary measures are required to reach the Paris commitment.

1 The linear trend for the MB Hybrid plan has been used to extrapolate for both the MB and Federal Hybrid Plans as it features a fixed carbon tax over time which is what the Federal Hybrid plan features between 2023 and 2030.

TABLE 3 **Estimated GHG Emissions (kt CO_2eq) between 2018 and 2030 by Type of Carbon Pricing Plan — Manitoba — EC-PRO Model**

Year	Business-as-Usual	Federal Hybrid Plan — $50 CAP	Continously Increasing Carbon Price (CICP)	Difference (CICP-Fed. Plan)
2018	22,080	21,910	21,910	0
2019	22,150	21,870	21,870	0
2020	22,170	21,860	21,860	0
2021	22,210	21,810	21,810	0
2022	22,290	21,790	21,790	0
2023	22,350	21,830	21,750	-80
2024	22,400	21,870	21,710	-160
2025	22,450	21,910	21,670	-240
2026	22,510	21,940	21,620	-320
2027	23,000	22,030	21,640	-390
2028	23,130	22,070	21,610	-460
2029	23,240	22,110	21,560	-550
2030	23,310	22,210	21,580	-630
Cumulative Emissions	293,290	285,210	282,380	-2,830
Difference in Cumulative Emissions from BAU Plan	—	-8,080	-10,910	-2,830

SOURCE: EC-PRO modeling results. Province of Manitoba.

Results of the EC-PRO Modeling

The modeling done by ECCC shows the impact of the existing federal pricing schedule that sees the carbon price remain at $50 after 2022 and one that features a continuous $10 per year increase in carbon prices from $10 per tonne in 2018 to $150 per tonne by 2032. Within these two options, we have selected for presentation the hybrid scheme that features a carbon tax on combustion fuel and an Alberta-style output based pricing on large emitters and the revenue recycling option that features a direct and indirect cost rebate to low- and middle-income households and contributions to a green fund. In the set of EC-PRO options, these are described as the "2A-RR4" and "2B-RR4" options.

Table 3 presents the results of the EC-PRO modeling for Business-as-Usual (BAU) and these two options.

There are several differences in the results of the EC-PRO and R-GEEM modeling exercises worth noting over the initial 2018 to 2022 time period. First, the EC-PRO option sets the GHG emissions in 2018 at a lower level than the R-GEEM model and more in line with the National Inventory Report estimates. Second, it shows a growth in GHG emissions under the BAU model, compared with a decline in GHG emissions with the R-GEEM model. Third, with the Federal Hybrid model, it shows GHG emissions declining by 120 kt between 2018 and 2022; whereas, the R-GEEM model shows them declining by 572 kt. Finally, for the Federal Hybrid pricing option, it shows GHG emissions *increasing* as of 2023 when the price of carbon is maintained at $50 per tonne. By comparison, the projection of the downward linear trend of the R-GEEM model has the GHG emissions continuing to decrease after 2022.

Without a detailed understanding of the assumptions built into each model, it is not possible to assess which of the two models offers a more realistic assessment. However, given that

the R-GEEM model did not extend past 2022, the EC-PRO estimates of increasing GHG emissions, once the price of carbon has been capped at $50 per tonne, are more plausible than continuously declining GHG emissions.

In addition to the finding that GHG emissions will grow once the price of carbon has been capped at either $25 or $50 per tonne, there is one other sobering result presented in Table 3 — the small decline in GHG emissions even with a constantly increasing carbon tax. Between 2018 and 2030, this increasing tax will result in a decline of only 330 kt (21,580–21,910) compared to required reduction of 6,777 kt. The R-GEEM modeling results suggest a larger decline but these results are suspect, given the larger reductions between 2018 and 2022 and the continued decline in GHG emissions even with the cap on the price of carbon at $50 per tonne. To the extent that the estimates of the EC-PRO model are true, they indicate that strong complementary measures will be required to meet the federal objective of a 30 per cent reduction in GHG emissions by 2030.

The results of the EC-PRO model also allow one to calculate the annual increase in the carbon tax required to prevent GHG emissions from growing. If one looks at the change in emissions under the $50 per tonne capped option and the continuously increasing carbon tax option between 2022 and 2023, one sees that, under the capped price option, GHG emissions grow by 40 kt (21,830–21,790); while, under the increasing price option, GHG emissions *decline* by 40 kt (21,750–21,790). Thus, the total change in GHG emissions is 80 kt and the total effect of capping vs. increasing the carbon tax is 80 kt per $10 change in the carbon tax. Accordingly, preventing the 40 kt decline in carbon taxes between 2022 and 2023 would have required a $5 per tonne increase in the carbon tax (40/80 x $10). When this calculation is carried out for each of the successive years up to 2030, the average annual increase in the carbon tax is $6.78 per tonne. Thus, the results of the EC-PRO modeling exercise indicate that to prevent GHG emissions from rising, there needs to be an annual increase of $6.78 per tonne in the price of carbon.

An Assessment of the Impact of the "Made-in-Manitoba" Complementary Measures on GHG Emissions

On page 16 of the *Manitoba Climate and Green Plan* discussion paper, the Manitoba government makes the claim that its "Made-in-Manitoba" plan will reduce GHG emissions between 2018 and 2022 by 2,480 kt of GHGs, compared to only 990 kt under the Federal Plan. However, the comparison is specious because it assumes that there would be none of the complementary measures listed in Manitoba plan if the federal carbon price schedule were adopted. This would not be the case as the Province would proceed with complementary measures, regardless of which carbon pricing schedule is adopted. In fact, with the additional carbon tax revenues available under the federal carbon pricing scheme, there would be more money available to finance complementary measures.[2]

Page 55 of the discussion document presents the set of proposed complementary measures in more detail and indicates their likely cumulative impact on GHG emissions. Some of them are suspect. For example, the proposed 5 per cent biodiesel mandate is estimated to eliminate between 360 and 431 kt of GHGs over 5 years, or 80 kt per year. Yet, the following table, based on actual diesel fuel consumption and the known GHG content of biodiesel and regular diesel fuel show reductions of only 5.0 kt per year for a total of 25 kt over the 5 years, indicating an overstatement of GHG reductions of between 335 and 406 kt.

If we assume, as the province did, that the GHG emissions factor for biodiesel is 0 kgs/litre, then the annual reduction in GHG emissions due to an increase from 2 to 5 percent is 64 kt per year for a total of 320 kts over the 5 years resulting in an overstatement of between 40 and 111 kt.

The 270 kt reduction for organics diversion are achievable if Manitoba reduces the organic content of landfills to that of the best performing province in Canada — PEI. As well, the independent estimate of 96 kt of GHG savings due to the electrification of the Winnipeg transit fleet suggests that the provincial estimated reductions of only 47 kt underestimate the achievable reductions. Thus, the projected cumulative reductions over the first five years of the plan are likely on the high side.

2 Based on the revenues shown in the EC-PRO modeling over the 2018 to 2022 period, the federal carbon tax schedule would raise $1,760 million compared to $1,475 million under the flat $25 per tonne carbon tax.

TABLE 4 **Estimated Annual Reductions in GHG Emissions from Increasing Biodiesel Content from 2 to 5 per cent**

Biodiesel Concentration	Total Diesel Fuel (millions litres)	Total GHGs Produced (kt CO_2eq)			Impact
		Biodiesel[1]	Regular Diesel[2]	Total	
2 per cent	774.0	39.32[3]	2,090.48	2,129.80	—
5 per cent	774.0	98.30	2,026.49	2,124.79	-5.01
10 per cent	774.0	196.60	1,919.83	2,116.43	-13.37

SOURCE: Statistics Canada, CANSIM Table #405-0002; 2017 National Inventory Report, Part 3. Table A6-12.
1: The GHG emissions factor for biodiesel is 2.540 kgs/litre.
2: The GHG emissions factor for regular diesel is 2.756 kgs/litre.
3: 39.32 = 774 x 0.02 x 2.540. The other GHGs are calculated in the same manner.

What the list of complementary measures fails to mention are the proposed measures under consideration by the government that will *increase* GHG emissions. Failing to recognize and include these measures gives a false picture of the changes in GHG emissions due to provincial government policies. One policy that will have a very negative impact is the proposed increase in the number of cattle in the province from the current herd size of 400,000 cows to its previous all-time high of 750,000, an increase of 350,000 head. According to National Inventory Report data, each head of non-dairy cattle emits 2.255 kg of CO_2e per year, with the result that an increase of 350,000 head of cattle would lead to GHG emission increases of 789 kt per year. The hog industry is also calling for an additional 1.2 million hogs being produced in Manitoba over the next 5 to 10 years. That increase would add 251 kt of CO_2e per year. Thus, if the provincial government allows these increases to livestock in Manitoba, it will have to find additional reductions of 1,000 kt of CO_2e just to prevent an overall increase.

Missed Opportunities for Further GHG Reductions

Clearly, additional initiatives are required to put the provincial plan on track for even coming close to meeting the federal target of a reduction of 6,777 kt of GHG emissions by 2030. Based on an independent analysis of the National Inventory Report background data, supplemented by information provided by Manitoba Hydro,[3] Table 5 presents additional options for reducing GHG's along with an estimate of the annual reductions in GHGs achievable from each measure.

These estimates have been derived by taking the GHG emission factors associated with the various GHG emission sources as calculated by Environment and Climate Change Canada staff for the National Inventory Report and multiplying them by the number of units involved. A fuller description of the methodology is contained in the report cited in the footnote. For some of the measures listed below, specific programs are indicated, such as the feebate program or the increase in the ethanol and biodiesel content of fuels. For others, what is needed is an analysis of the measures that would be required to, for example, induce existing natural gas customers to switch to net emission-free heat (hydroelectric, geothermal, solar or biomass) or solo drivers to switch to using the bus to commute to work or farmers to reduce the intensity of inorganic fertilizer application to their crops. But it is precisely this kind of modeling work that is required to put meat to the bones of any proposed measures for reducing GHG emissions. To properly implement the proposed carbon savings account process, the Province must commit to robust modeling and program design that uses best information to design the most cost-effective programs and estimate their impact on GHG reductions.

3 Harvey Stevens, *Getting From Here to There — Selected Measures for Meeting Manitoba's Carbon Reduction Requirements by 2030 and Their Impact on Greenhouse Gas Emissions*. November, 2016.

TABLE 5 **Additional GHG Reduction Measures Showing Estimated Annual GHG Reductions**

Additional Measures	Estimated GHG Annual Reductions (kt CO_2eq)
1. Stationary Combustion	
- Every 10% of new gas customers between 2016 and 2031 switch to net emission-free heating	-19 kt
- Every 10 % of existing gas customers switch to net emission-free heating	-91 kt
2. Road Transport	
- Every $10/tonne increase in the carbon tax on gasoline	-36 kt
- Every 10 per cent shift from solo car to bus commuting	-6 kt
- Every 10 per cent shift from solo car to bike commuting	-7.3 kt
- Feebate program with an average fuel consumption ratio of 10 l/100 kms. with rebate and fee of $220 per litre below and above that threshold	-7.2 kt
- Every 10 per cent reduction of light duty vehicles with all electric vehicles	-393 kt
- Raising ethanol content from 8.5 to 10 per cent	-63 kt
- Raising biodiesel content from 2 to 5 per cent	-4.6 kt
- Every 5 percent conversion of light duty gas vehicles, trucks and heavy duty diesel vehicles to Compressed Natural Gas	-82 kt
3. Agriculture	
- Every 10 per cent reduction of cattle herds replaced by equal weight hogs[1]	-192 kt
- Every 10 per cent reduction of cattle herds replaced by equal weight poultry[1]	-162 kt
- Reduction of intensity of inorganic fertilizer application to fields from the 2015 average level of 35.1 kg./acre to the 2005 average level of 22.2 kg./acre	-861kt
4. Solid Waste Disposal	
- Lower the organic content of landfills to that of PEI's	-356 kt
- Flare all of the methane produced at landfills	-975 kt

1 It requires 3.25 hogs and 93 poultry to equal the dressed weight of one head of cattle.

One Option for Meeting the Paris Commitment by 2030

As noted above, to meet the Paris commitment by 2030, Manitoba must reduce its GHG emissions to 14,158 kt which is 6,777 kt less than their 2016 level. According to the EC-PRO modeling results, the federal schedule of a carbon tax increasing to $50 per tonne by 2022 and remaining at that level for the next eight years will result in an increase in GHG emissions of 300 kt while a schedule featuring an annual increase in the price of carbon of $6.78 per tonne will hold GHG emissions constant. Accordingly, the provincial government's proposed flat rate of $25 per tonne up to 2030, will result in even higher increases in GHG emissions than the 300 kt under the flat $50 per tonne federal plan. Thus, at least 7,077 kt of reductions must be achieved by complementary measures to reach the federal target.

Based on the estimated reductions set out in Table 5, what will it take to achieve this level of reduction? The following table offers one menu.

This table indicates the level of effort that will be required to achieve the target of 30 per cent below 2005 emissions. Whether it is either practically or politically possible to achieve these kinds of reductions is obviously a matter for discussion. However, the key message contained in the list of measures below is that it will require an immense effort to achieve the targeted reductions and that the kind of measures listed in the discussion document will fall far short of achieving them. The plan put forward by the previous government and the draft plan presented by this government both present an inadequate response to the challenge presented by the federal climate commitment.

TABLE 6 **A Menu of Complementary Measures Required to Meet the Federal Commitment**

Measure	Reductions (kt CO_2eq)
1. Flare methane at all landfill sites in Manitoba	-970
2. Switch 100% of existing and new natural gas customers to net emission-free htng.	-1,100
3. Achieve a 63% all-electric composition of the light duty fleet	-2,484
4. Convert 20% of light and heavy duty truck fleet to CNG	-160
5. Replace 60% of cattle by equal weight in hogs	-1,150
6. Reduce intensity of inorganic fertilizer application to 2005 levels	-860
7. Sub-totalof $220 per litre below and above that threshold	-6,724
8. Additional Measures Listed in the Discussion Document	-370
9. TOTAL	**-7,094**

1 It requires 3.25 hogs and 93 poultry to equal the dressed weight of one head of cattle.

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