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POLICY BRIEF

Regulating Carbon Emissions in Canada

A Timbit with that Double-Double? Costs and emission reductions of renewed carbon policy in Alberta

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June 2014

Summary

Alberta is set to renew its 2007 Specified Gas Emitters Regulation (SGER), which will expire in September 2014. Recent indications are that Alberta is considering a "double-double" approach, which doubles the current regulatory standard of a 12 per cent intensity improvement and CAD$15[1] price ceiling.

A renewed SGER policy based on double-double parameters would deliver emission reductions inside and outside the oil and gas sector while providing research and development (R&D) incentives through technology fund recycling. The costs of the double-double proposal are less than the price of a Timbit per barrel, or $0.13. Emission reductions would be equal to about 20 per cent of Canada's remaining Copenhagen emissions gap in 2020.

Based on our analysis, four recommendations are worth considering:

- Credit for cogeneration needs a second look.
- Index the SGER price to cost inflation.
- Review the intensity benchmark against which the intensity improvement is measured.
- Expand coverage to entities with emissions of more than 50,000 tonnes annually.

It is time for industry and government to hoist their coffee mugs and toast a more stringent "double-double" SGER renewal.

[1] All prices are in Canadian currency unless otherwise noted.

Context

There is so much divisiveness bundled in oil sands projects approvals now that one has to wonder if there is any path forward. In this toxic environment, Alberta is set to renew its 2007 SGER, which will expire in September 2014. Recent indications are that Alberta is considering a "double-double" approach, which doubles the current regulatory standard of a 12 per cent intensity improvement as well as the $15 price ceiling on the compliance obligation (Wood & Healing, 2014). We have been down this road before, and despite signals that this proposal is a go, the emergence of Jim Prentice as front runner to become premier has cast some doubt on the proposal yet again (Cheadle, 2014).

Still, the expectation is that the SGER will be renewed soon. The open question is whether or not it will be rolled over for a one-year renewal in September to allow the new premier to add his or her touch to SGER 2.0, or whether Alberta will move forward with the double-double proposal in advance of a new premiere.

In this policy brief, a historical review of the SGER is first provided. Then, the economic and emission implications of a double-double proposal are revealed, using original modelling based on Sawyer and Beugin (2013). This analysis includes estimates of the size of the compliance obligation in 2020 as well as how it might be distributed across the compliance pathways of sector reductions, offsets and technology fund payments. Finally, cost implications are revealed, including average costs per tonne of carbon and costs per barrel of oil produced.

We conclude that the costs of the double-double proposal are less than the price of a Timbit per barrel, or $0.13. Emission reductions under a renewed double-double SGER would be equal to about 20 per cent of Canada's remaining Copenhagen emissions gap in 2020, with a total compliance obligation in the order of 29 million tonnes (Mt), including 24 Mt in emission reductions and the equivalent of 5 Mt in payments to the technology fund.

The SGER's Historical Performance

The SGER covers about half of Alberta's total greenhouse gases (GHGs) and about 70 per cent of industrial emissions. Participating firms covered with emission constraints must emit more than 100 kilo tonnes (Kt) per year, which includes 106 facilities in 13 economic sectors (Alberta Environment, 2014a).[2]

The SGER pairs an emission intensity obligation, such as emissions per barrel of oil produced, with a maximum ceiling on the price of compliance. The emission intensity constraint is calculated as an annual reduction from a fixed baseline of observed data for the first 3 to 5 years of facility operation. From this fixed baseline a total 12 per cent improvement is required under the current SGER, phased in at 2 per cent per year. The emission intensity is converted to tonnes per year for compliance purposes.

Compliance flexibility is multifaceted, with firms able to:

- Make reductions onsite.
- Buy or sell Emissions Performance Credits (EPCs) from facility reductions.
- Buy offsets from multiple uncovered sectors, with no limit on banking or vintage.
- Purchase compliance credits at $15, where payments into a technology fund generate compliance credits. The price ceiling is fixed and therefore decreases in real terms at the rate of inflation annually.

[2] Another 50 or so facilities emitting more than 50 Kt and less than 100 Kt are covered by the Specified Gas Reporting Regulation (SGRR). These facilities, in addition to the SGER facilities (>100 Kt), are required to report annually on GHG emissions (Government of Alberta, 2004).

Cogeneration credits converted to EPCs are also a major compliance pathway, where cogeneration emissions for electricity but not heat are exempt, manifesting as a credit for electricity generation relative to an assumed natural gas combined cycle (NGCC) baseline. That is, a reference technology method assumes a more emission-intensive NGCC baseline from which EPCs are granted to facilities that install highly efficient cogeneration units (McGarrigle, 2014).

Figure 1 provides an overview of the annual performance of the program across the compliance pathways, while Figure 2 provides the total for the 2007–2012 period (Alberta Environment, 2014a). As can be seen, total compliance rose to 14 Mt in 2012. Since SGER's inception, about 70 per cent of compliance has come from cogeneration credits and technology fund payments (Figure 2). There is some question of whether or not cogeneration is a baseline technology in oil sands production (McGarrigle, 2014). The additionality of cogeneration credits within the SGER is therefore an open question, which we address below. Similarly, technology fund payments likely have little impact on short-term reductions. That said, the technology fund focus on research, development and deployment increases innovation and learning-by-doing, driving down abatement costs and likely technology deployment in the longer term.

Both figures below use lighter shading to indicate a decreasing tangibility in GHG reductions from compliance.

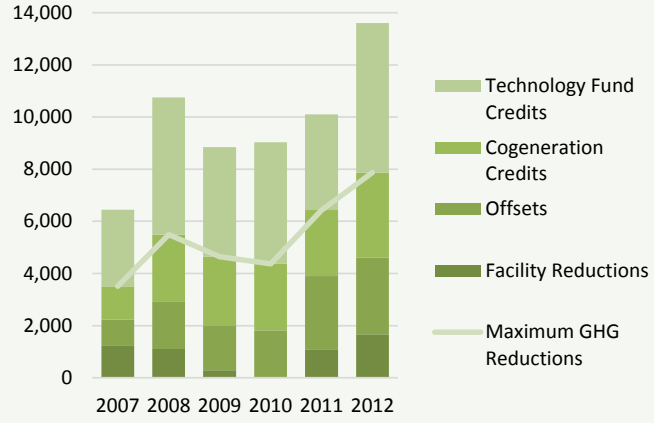

FIGURE 1: SGER COMPLIANCE 2007–2012 (KT CO_2E)

Source: Alberta Environment (2014a)

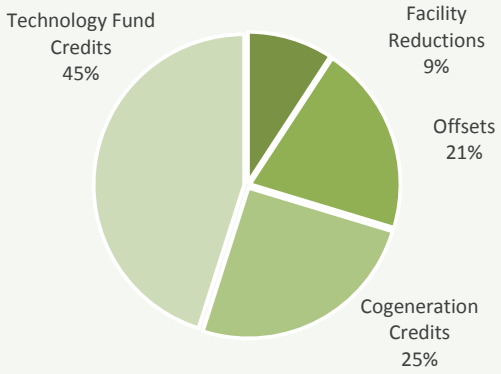

FIGURE 2: SGER COMPLIANCE, 2007–2012

Source: Alberta Environment (2014a)

Compliance reporting in 2012 indicates significant variation by sector (Alberta Environment, 2014b). The 106 facilities had total emissions of 120 Mt with a compliance obligation of 9.1 Mt or 7.5 per cent of emissions (tonnes owed in Table 1). Cogeneration credits totalled 3.2 Mt while 2.9 Mt of EPCs were issued by the regulator. Net credits owed were 6.1 Mt, calculated as the difference between credits owed and EPCs issued. The cogeneration credit (or a facility reduction) does not have to be fully applied in a given year, with unlimited credit banking. The compliance gap, or net credits owed, is made up of a mix of offsets and technology fund credits not reported in the figure. Average compliance costs for the net credits averaged just over $10/tonne, assuming the $15/tonne price ceiling.

A driving force behind compliance is the cogeneration credit, where for a number of sectors, compliance net credits (tonnes owned minus EPCs issued) and net compliance costs are negative once the cogeneration credit is applied. In the case of in situ oil sands, for example, the average cost or credit rebate is -$7 per tonne, driven largely by the

cogeneration credit. This heavy use of cogeneration credits, coupled with a question about the additionality of the credits generated using a baseline reference technology (NGCC), likely indicates a need for a closer look at this compliance pathway. There are no indications of how cogeneration will be treated under a renewed SGER.

TABLE 1: 2012 SGER COMPLIANCE BY SECTOR

SECTOR	COVERAGE		FACILITY COMPLIANCE (KT)				NET COMPLIANCE COST (NET CREDITS@$15)/ TONNES OWED)
	COVERED FACILITIES	GHGS (MT)	TONNES OWED	COGEN CREDITS	EPCS ISSUED	NET CREDITS OWING (OWED – EPCS)	
Chemicals	9	6.9	194	191	156	38	$2.94
Coal	4	0.7	159	0	0	159	$15.00
Fertilizer	5	4.4	329	0	2	327	$14.91
Forest	4	5.6	0	623	488	-488	-$15.00
Gas Plant	29	6	876	45	258	618	$10.58
In Situ Oil Sands	14	21.8	611	798	907	-296	-$7.27
Oil Sands Mines, Upgraders	5	24.9	2,740	537	0	2,740	$15.00
Mineral	4	1.9	1	0	82	-81	-$1,215
Pipeline	4	2.8	304	0	56	248	$12.24
Power Plant	22	40.9	3,628	1,058	808	2,820	$11.66
Refining	4	3.8	265	0	112	153	$8.66
Total*	**106**	**120.3**	**9,143**	**3,253**	**2,947**	**6,196**	**$10.17**

**Source values reported do not always sum to the total due to rounding errors and data omissions.*

Source: Alberta Environment (2014b).

SGER Renewal at Double-Double

In this section, we provide one view on the compliance implications of updating key SGER parameters to a double-double level: a 24 per cent intensity standard and a $30 price ceiling. We also provide observations on increasing the effectiveness of the program using modelling to highlight the implications of alternative design choices. The modelling framework and assumptions employed in the analysis below are discussed in Sawyer and Beugin (2012, 2013). The model used was developed to assess possible federal oil and gas regulations, and therefore covers only oil and gas emissions, or about 45 per cent of SGER emissions in Table 1 above.

Key modelling assumptions include:

- The baseline year for achieving the intensity standard is 2020. We recognize a historical period will be used, but we use a 2020 baseline to simplify the analysis. This assumption likely overstates our cost and emission reduction estimates.
- Offsets purchases at 80 per cent of the SGER price, which is somewhat conservative given offsets are routinely trading at a discount of 65 per cent relative to the current SGER price ($15).

We model four scenarios that likely represent the current range of feasible renewal options and provide a few additional scenarios to reveal the implications of alternative design choices:

- The D2 or *double-double* (24 per cent/$30), which doubles the current intensity standard and the price ceiling.
- The D2-d or *double-double, differentiated intensity standard* (12 per cent and 24 per cent/$30), applies the differentiated standard across sectors with oil sands seeing the full 24 per cent intensity standard and remaining conventional oil and gas seeing 12 per cent. We also explore a uniform intensity standard and a differentiated price ceiling ($15 conventional; $30 oil sands).
- D2-no cogeneration (24 per cent/$30) removes the cogeneration credits to assess the compliance impact.
- D2-real price 2020 removes the current nominal pricing in SGER and replaces it with real pricing (adjusted for inflation). Absent a construction price index for oil and gas in Alberta, we use Statistics Canada's industrial product price index for energy and petroleum products. Using the historical trend from 2006 to 2013 indicates that cost inflation could be in the order of 1.28 per cent between 2014 and 2020. This implies that the price ceiling of $30 in the scenario erodes in real terms by 22 per cent to $23 between now and 2020 (Statistics Canada, 2014).

The scenarios are provided in Table 2 below.

TABLE 2: SCENARIOS IN PLAY

PROPOSAL NAME	INTENSITY STANDARD IN 2020 % REDUCTION FROM BASE YEAR	PRICE CEILING FOR TECHNOLOGY FUND PAYMENTS
1. 24/30 (D2)	24%	$30
2. 12:24/$30 (D2-d)	12% for conventional O&G; 24% oil sands	$30
3. D2-no cogeneration	24%	$30
4. D2-Real Price 2020	24%	$30

GHG and Cost Impacts in 2020

For each scenario, we calculate the compliance obligation in tonnes, the use of compliance pathways and the cost implications. Table 3 provides the results.

The **double-double proposal** (D2) would see compliance in the order of 29 Mt in 2020, with the majority of compliance from outside the sector: about a third of compliance comes from in-sector reductions, half from offsets and the remaining fifth in technology fund payments.

Technology fund payments are in the order of $157 million in 2020, with offset transactions valued at $370 million. To the extent the offset market cannot respond to this rising demand, technology fund payments would be substitutes. While the marginal cost incentive is $30 per tonne, the average cost of compliance across all pathways is $22 per tonne, with a total cost of just over $600 million annually. For Alberta's oil sands sector, this works out to be about $0.13 per barrel, or less than the cost of a Timbit. But since there are royalty and tax interactions, the province and the federal government eat about 40 per cent of the Timbit that comes with the double-double.

The **double-double with a differentiated intensity standard** (D2-d: 12 per cent conventional oil and gas, 24 per cent oil sands) really has little impact on the overall performance of the scenario. Yes, costs and compliance are decreased (Table 3), but only marginally as oil sands operations shoulder the greater intensity standard and have the largest share of emissions and production in the province. On aggregate, differences in compliance against the double-double manifest as 0.5 Mt less in technology fund payments, implying no impact on GHG performance while the differentiated standard reduces the cost impact on the non-oil sands operations. For the conventional oil and gas sector, differentiating the intensity standard raises their costs about 10 per cent against the D2 proposal above.

Alternatively, the impact of the doubling of the price ceiling has a large impact on the conventional sector. In this variant on this proposal, with a differentiated price ceiling ($15 conventional, $30 oil sands)[3] and a uniform intensity standard (24 per cent), compliance for the conventional sector is more or less unaffected. Given a steep marginal abatement cost for internal reductions, including a $30 price below enhanced oil recovery costs for the heavy oil sector, sector reductions are negligible. Average costs then almost double as higher price offsets and technology fund payments are heavily utilized at the higher $30 price ceiling.

In the **cogeneration scenario (D2-no cogen)**, the issuance of cogeneration EPCs is removed. In the scenario, total compliance costs rise about 11 per cent with no cogeneration. But it is the heavier use of technology fund payments for compliance that differs from the D2 scenario, with an increase from 5 Mt to 8 Mt, or 35 per cent. The policy effectiveness question is then one of cogeneration credit additionality versus the R&D benefits of technology fund spending.

Removing the **nominal pricing (D2-real price)** in the SGER to account for inflation would maintain the long-term signal of the policy. In this scenario, the implications of nominal pricing are assessed by weakening the $30 price signal by a historical cost inflation trend of 22 per cent between now and 2020. In a sector with high cost inflation and long-lived capital, we would anticipate both a reduced incentive to deploy low-emitting technology and a muted impact for continuous improvement. This intuition is borne out in the results where compliance shifts away from internal reductions to technology fund payments. This effect would be magnified if a longer view were taken on the impact of inflation on the real price of the SGER over the life of the facility.

TABLE 3: ALBERTA GHG AND COST IMPACTS IN 2020

	COMPLIANCE (MT)				COST IMPACTS ($2013)		
INTENSITY (%)/ TECH FUND ($)	TOTAL	SECTOR	OFFSETS	TECH FUND	AVERAGE COST ($/TONNE)	PER BBL. BEFORE TAX/ROYALTY*	TOTAL (MLN)**
1. 24/30 (D2)	29.3 Mt	8.7 Mt	15.5 Mt	5.2 Mt	$22	$0.13	$635
2. 12:24/30 (D2-d)	28.8 Mt	8.7 Mt	15.5 Mt	4.7 Mt	$21	$0.13	$619
3. 24/30, D2-no cogeneration	29.3 Mt	5.9 Mt	15.5 Mt	8.0 Mt	$24	$0.14	$707
4. 24/23, D2-real price	29.3 Mt	8.3 Mt	12.1 Mt	8.9 Mt	$18	$0.11	$536

** Oil costs divided by oil production, before tax and royalty interactions reduce costs further.*

*** Undiscounted costs.*

Source: Sawyer & Beguin (2012)

[3] This option would perform similar to a two-tiered technology fund, with the offset market providing the informal link between the sectors with differentiated price ceiling.

Conclusion

With the upcoming renewal of the SGER looming, Alberta has an opportunity to win some social license. Inevitably, someone will confuse the marginal cost of the proposed SGER update with the average cost and make an ill-informed comparison that the SGER renewal is weak in comparison to a carbon tax. Expect to see blog posts that claim the SGER is only $5 per tonne while the B.C carbon tax is $30. This is simply wrong, as an updated $30 SGER price ceiling would provide an incentive to abate similar to a $30 carbon tax. The difference is that under the carbon tax, firms must pay the $30 on all remaining emissions after compliance is achieved, with no impact on additional emission reductions and a very large impact on competiveness. It is questionable whether or not even an average cost of $50 per tonne would have much of an impact on investment decisions for new oil sands production (Leach, 2014).

But the SGER in its current form is not all free donuts and coffee, and could use some additional tweaks to improve effectiveness. Based on our analysis and modelling, the following recommendations are worth pursuing:

1. **Credit for cogeneration needs a second look**. The SGER is likely delivering some incremental cogeneration given new oil sands design teams hotly debate cogeneration economics. However, the size of this compliance pathway (historically 25 per cent of total compliance) coupled with a concern that cogeneration is business as usual raises GHG additionality questions. Alberta Environment would be prudent to assess its current SGER cogeneration parameters to ensure cogeneration credits granted are indeed additional emission reductions.
2. **Index the SGER price to cost inflation**. The current nominal price in the SGER sends a decreasing incentive in time to abate as it erodes with inflation. In a sector with high cost inflation, it makes sense to index the SGER price ceiling to ensure the real incentive is at least uniform in time.
3. **Review the intensity benchmark against which the intensity improvement is measured**. Given the high level of entrants to the sector, and that start-up phases are emission intensive, it is likely worth looking to improve how intensity benchmarks are set. Using industry benchmarks for the intensity standard would allow for a true comparison of performance across facilities. Alternatively, updating the facility benchmark based on a rolling average would ensure the intensity standard reflects ongoing emissions performance. While we did not look at the setting of the intensity benchmark in detail, it is an area that needs more attention.
4. **Expand the SGER to cover entities emitting greater than 50 Kt annually**. The current threshold of 100 Kt could be extended to those above 50 Kt that are currently reporting under the Specified Gas Reporting Regulation. Their inclusion would add in the order of 40 per cent more facilities and 16 per cent more emissions (Alberta Environment, 2014b).

Given a new premier will be shortly acclaimed in Alberta, it is probably enough for now to update the twin SGER parameters of intensity and price. In time, more attention is likely needed to strengthen and improve the effectiveness of the policy.

A renewed SGER policy based on double-double parameters would deliver emission reductions inside and outside the oil and gas sector while providing R&D incentives through technology fund recycling. Where possible, technology fund recycling should reinforce the main objective of the policy and be oriented to deliver short-term emission reductions as well.

A double-double SGER will not significantly close Canada's Copenhagen target gap, delivering perhaps 20 per cent of the current 122 Mt gap.[4] Still it is time for industry and government to hoist their coffee mugs and toast a more stringent SGER renewal. When the economically obese complain the double-double costs too much, remind them the cost is less than a Timbit per barrel.

[4] The gap is reported in Environment Canada (2013).

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Published by the International Institute for Sustainable Development.

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