Output Based Pricing System Regulations Review:

Comment from The Energy and Environmental Policy Area at The School of Public Policy, University of Calgary

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This document is a response to the call for written feedback on the "Review of the federal OBPS Regulations: Consultation paper" released by Environment and Climate Change Canada (ECCC) in December 2021 (hereafter the "Consultation Paper").[1,2]

We have organised our comments along five major themes in the sections below.

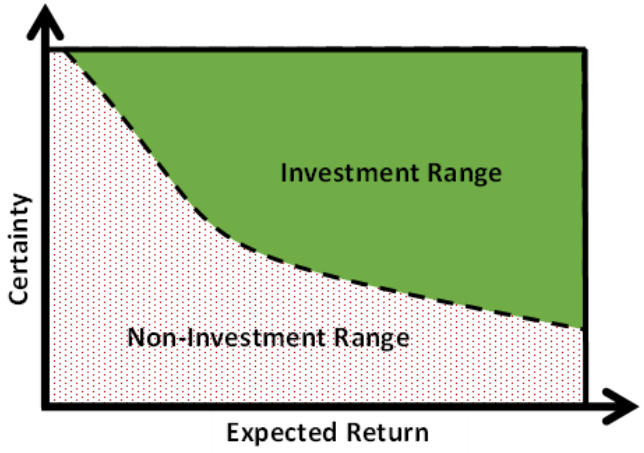
Contents

[1] Review of the OBPS Regulations: Consultation paper - Canada.ca
[2] Should ECCC be interested in engaging further on any of the topics below (or related issues), we welcome the opportunity to do so.

The Importance of Policy Certainty

We support and applaud ECCC's creation of a dynamic schedule for the OBPS standards, as this policy certainty allows facilities subject to the OBPS to make long-term cost-effective compliance investments. Policy certainty also facilitates innovation in emissions-reducing technology, and financial support for both upstream innovation and downstream adoption of clean technology. We also support ECCC's consideration of measures to create policy certainty by maintaining a credit market that provides a continuous decarbonization incentive to firms through the price of credits, and we comment on those measures below in the Section "Maintaining an Effective Credit Market".

Certainty and predictability in the marginal and average carbon price is important for efficient decarbonization and the effective allocation of capital investment.[3] Generally, the higher the perceived risk of uncertainty about future regulations and market outcomes, the higher the expected return required to motivate a financier to finance a project (see the figure below).



Source: Fellows G. Kent, Jennifer Winter, and Victoria Goodday (2021) "Review of barriers to fullscale deployment of emissions-reduction technologies." The School of Public Policy Publications (Research Papers) 14 (14)

Because policy changes related to carbon pricing and OBPS standards can affect the return on capital investment, the risks of significant policy changes translate directly into commercial risks for investors. This is particularly true if the potential capital investment introduces a low emissions intensity technology (greenfield or brownfield[4]). If the emissions price is not known with relative certainty, then there is increased variance (increased risk) in the expected return on investments intended to deliver a reduction in emissions intensity relative to the industry average. This increase in risk is counterproductive to economic efficiency and decarbonization efforts as it generates a higher hurdle rate for a potential capital investment's expected return on investment.

[3] We employ the economic definition of efficient here. In carbon pricing, "efficient" generally refers to an outcome where the marginal cost of emissions-reductions is equal across facilities regardless of industry or geography.

[4] Greenfield investments are new investments or new projects at a previously undeveloped site, whereas brownfield investments are additions to existing facilities.

Modelling Transparency, and Specific CGE Modelling Concerns

ECCC proposes a dynamic schedule for the OPBS standards in its Consultation Paper based on modelling conducted with several in-house models, as described in Annex 1 of the paper. While this use of formal modelling is laudable, the reliance on in-house modelling without provision of the models' detailed methods and equations or the models themselves along with adequate input data for replication makes it difficult for qualified individuals to comment on the dynamic schedule proposed. We cannot investigate, for example, the reasonableness of the models' underlying assumptions and the sensitivity of modelled outcomes to variations in input assumptions. This is a shortcoming in ECCC's approach to policy development and feedback that is not up to par with academic standards of transparency.[5] At a minimum, ECCC should publish an independent report of its modelling exercises and outcomes used as the basis for its proposed policy, including detailed methods and data descriptions as well as results with measures of uncertainty. Ideally, ECCC would make its models available for public use or publish its methods in detail.

We discuss these issues in more detail with regard to ECCC's use of its in-house EC-Pro Computational General Equilibrium (CGE) model. Many of the policy decisions related to OBPS application and stringency are informed by this model. EC-Pro does not appear to have an up-to-date equation listing or publically available code that could be used to replicate ECCC's CGE-based assessments. We note that EC-Pro has been significantly modified over the last decade (the most recent observable modification appears to be described in Zhu et al. with the addition of a recursive dynamic closure).[6] Additionally, the available citation does not give a full equation listing or a detailed account of calibration data and shocks. In order for appropriate public vetting of ECCC's modelling work, we recommend that a redistributable version of EC-Pro be made publicly available (ideally through disclosure on ECCC's website or upon request).[7]

Further, although it is difficult to properly identify the full set of assumptions made in application of the EC-Pro model, we have concerns about what we believe to be the likely assumptions employed in the model's application.

- In CGE models coded using the MPSGE programming language in GAMS (as EC-Pro is) it is typical to assume that labour is mobile between sectors but not between regions. This has the potential to dramatically bias CGE model results at a subnational level, particularly when considering small open economies. As modelled, a subnational reaction to a shock would be

[5] We recognize the proprietary nature of data that serves as inputs into modelling for policies such as the OBPS Regulation. However, data aggregation, anonymization, or data sharing agreements with qualified individuals (such as academic scholars) can overcome this challenge.

[6] Zhu, Y., Ghosh, M., Luo, D., Macaluso, N. and Rattray, J., 2018. Revenue recycling and cost effective GHG abatement: An exploratory analysis using a global multi-sector multi-region CGE model. Climate Change Economics, 9(01).

[7] Note that the available publications (such as Zhuet et. al. 2018) are not accompanied by materials sufficient to allow for replication. Furthermore, the available publications do not appear to run the same counterfactual exercises as those cited in justifying the policy decisions related to OBPS standards and modifications.

to reallocate labour away from high emissions intensive sectors towards lower emissions intensive sectors within a region, limiting the economic damage. However, inter-regionally mobile labour is likely to relocate to regions with already strong low emissions intensive sectors or jurisdictions with less stringent carbon pricing. Internal trade and a strong system of fiscal transfers, such as in Canada, also matters for dampening or exacerbating these effects.[8]

A similar issue is present in the assumptions made related to capital markets. It is our understanding that EC-Pro assumes a closed capital market such that there are no international flows of capital (which would imply a perfectly or near perfectly elastic supply of capital in the model). This may imply that the modelled results could under-represent the impact of carbon pricing on capital markets since, again, the carbon pricing shock would cause a reallocation of capital away from higher emissions intensity sectors towards lower emissions intensity sectors rather than allowing capital to exit the Canadian economy when faced with a reduction in the return on (the modelled price of) capital in emissions intensive sectors.

- The OBPS standards are calculated, and credits are allocated at the product level. Whereas the EC-Pro model is calibrated to industry (not industry by product) data. This may create an aggregation bias in the modelled results. Rather than continue to calibrate future versions of EC-Pro to symmetric IO tables, we believe that ECCC should consider adopting an industry by product specification in order to calibrate the model directly to the supply-use tables available from Statistics Canada.

Maintaining an Effective Credit Market

The Consultation Paper indicates a concern over the "risk of having too many credits in the market, which would drive down the price of surplus credits and weaken the price signal." Indeed, carbon markets are subject to price fluctuations that can discourage cost-effective investment, even though the stringency of the market is adequate to meet decarbonization goals.[9] However, the Consultation Paper suggests that "Tightening standards along a predictable schedule is one action the government can take to reduce uncertainty." A more typical and reliable method of guaranteeing a price trajectory for producers is to use a price collar, an administratively set price floor and ceiling that can be managed with a bank of credits. We recommend decoupling the dynamic stringency path of the OBPS Regulations with design elements intended to provide price certainty for producers, such as a price floor (the regulations already have a ceiling via the emissions price on facility emissions above the OBPS standard), to ensure the stringency of the policy is in line with decarbonization goals.

[8] Tombe, T. and Winter, J. (2021), Fiscal integration with internal trade: Quantifying the effects of federal transfers in Canada. *Canadian Journal of Economics/Revue canadienne d'économique*, 54: 522-556. https://doi.org/10.1111/caje.12491

[9] Borenstein, S., Bushnell, J., Wolak, F.A., Zaragoza-Watkins, M., 2019. Expecting the Unexpected: Emissions Uncertainty and Environmental Market Design. American Economic Review 109, 3953–77. https://doi.org/10.1257/aer.20161218

Note that, while tightening standards along a predictable schedule will reduce the supply of credits as the stringency of the standards is ramped up (compared to a more lax schedule), it can create an incentive for firms to bank credits. This, in turn, could lead to a sizeable drop in the market price of credits when they are offered for sale. Currently, offset credits and surplus credits are valid for eight and five years, respectively, after they are earned.[10] However, there is still a potentially strong incentive for firms to hold credits for future use. Considered within the context of a firm's opportunity cost of capital, firms have an incentive to hold a credit if they expect the future market credit price to increase more than their risk-adjusted weighted-average cost of capital (WACC) on an annual basis. For example, from 2022 to 2023 the excess emissions charge will increase from $50/tonne to $65/tonne; this is a 30% increase. Assuming that the price of credits will be correlated with the excess emissions charge, given the requirement that firms must provide 25% of their compensation for excess emissions via this charge starting in 2022, the price of credits may have a similar year-on-year increase. While the risk-adjusted WACC may vary widely across firms subject to the OBPS regulations, it is likely that a large proportion will have a risk-adjusted WACC considerably lower than 30%.[11] This suggests that credit banking may be an issue wherein large proportions of earned credits may remain unused for several years, potentially causing a significant reduction in the price signal when they do re-enter the market.

The discussion paper notes the role of OBPS stringency in mitigating this issue. While stringency can reduce the generation of new credits, it may still incent credit banking that will lead to significant price reduction in the future. The limited terms of credits (five and eight years) may help mitigate undesirable price fluctuations, but they do not necessarily provide the type of price certainty that businesses need to make long-term emissions abatement choices.

An alternative (or complementary) approach that may be worth additional study is the imposition of a price floor in the credit market. With the example incentive structure given above, a price floor would have little to no effect on the incentive to bank credits and the resulting continued potential for a future flood of credits onto the market. However, it would eliminate the risk that surplus credits could significantly weaken the price signal in future years. In addition, a price floor protects the value of credits for existing firms. This in turn would strengthen the current incentive to reduce emissions intensity by providing firms with more certainty about the market value of any earned offset credits.

A price floor could be enforced through the use of the federal government as a "buyer of last resort" willing to pay an amount equal to the price floor to remove surplus credits from the market. Additionally, a price floor is simple; it would allow ECCC to reduce the suite of measures designed to maintain a stringent carbon price and would settle uncertainty related to the efficacy of these measures, the potential creation of new measures, and the changing scope of the system (Section 3.3 in the Consultation Paper).

[10] According to sections 70 and 71 of the Output-Based Pricing System Regulations: https://laws-lois.justice.gc.ca/PDF/SOR-2019-266.pdf

[11] For example, privately owned utilities like pipeline companies have an average range for risk adjusted WACC of between 8% and 15% as per Canadian Energy Regulator (previously the National Energy Board) filings.

International Trade Issues

The risk of emissions leakage due to emissions pricing in Canada comes from unilateral domestic action in the absence of comparable action by Canada's trading partners. The risk is that emissions-intensive and trade-exposed sectors, in facing a domestic emissions price, have increased costs that cause them to lose market share domestically through import competition and internationally through export competition.

As noted in the Consultation Paper, "The OBPS is designed to put a price on the carbon pollution of large industrial facilities, while mitigating the risks of carbon leakage and the adverse competitive impacts due to carbon pollution pricing." Many of the large industrial facilities supported through the OBPS face competitiveness impacts in both domestic and international markets. Accordingly, the OBPS must be designed to support facilities selling their product in the domestic market and facing competition from international imports with unpriced emissions, as well as facilities that are exporting their product and facing competition in the international market from firms with unpriced emissions.

By directly reducing carbon pricing costs for large facilities (while maintaining the marginal carbon price incentive) the OBPS is designed to support domestic facilities in both markets. This is in contrast, for example, to border carbon adjustments, which only support facilities that are competing in the domestic market by pricing emissions embodied in imports. This is an important consideration moving forward, as border carbon adjustments are explored in Canada. Of particular note is the distinction between the EU, which is preparing to implement a Carbon Border Adjustment Mechanism but is consistently a net importer of embodied emissions, versus Canada which shifts between a net importer and net exporter position.[12] While we understand the Department of Finance is leading consultations on border carbon adjustments for Canada, and that it is outside of the scope of the current OBPS review, it will be important for ECCC to work closely with the Department of Finance from the outset. Of particular importance will be determining how the OBPS can be integrated with any border carbon adjustments to ensure that domestic facilities are still receiving support for exported goods, while at the same time not receiving duplicate support for goods that are sold in the domestic market.

We also note an opportunity for border carbon adjustments relative to the OBPS, which is that it allows for competitiveness concerns to be separated from the stringency of the OBPS policy. For example, Section 3.1.2.1 of the Consultation Paper described different dynamic OBPS standards based on the risk of carbon leakage and adverse competitiveness impacts by sector. With the implementation of border carbon adjustments, it is possible to maintain more stringent policy for sectors at higher leakage risk while still supporting their competitiveness in the domestic market. This is another important element when considering how border carbon adjustments can be integrated with Canada's existing OBPS.

[12] Eora database, https://worldmrio.com/

Given the complexity of designing WTO-compliant border carbon adjustments, and the complexity of calculating the emissions embodied in trade, any implementation of a BCA should be targeted to maximise the benefits to leakage reduction and minimise administrative costs.[13] Regardless, both the OBPS and any potential BCA should be regularly reviewed for true leakage risk — both marginal and average prices in place in competitor jurisdictions — and adequate stringency in meeting Canada's emissions-reduction targets.

Internal Trade Issues

Differences in policy across jurisdictions changes relative prices and introduces misallocation of resources such as labour, capital and other inputs, which lowers productivity.[14] To the extent that emissions-pricing policies differ across Canada, this creates two issues. One is the difference in coverage of emissions pricing — whether types of emissions or sectors or the economy face an emissions price and the corresponding incentive to reduce emissions. The second issue is when emissions are priced, whether the marginal and average prices are the same or different across jurisdictions.

For jurisdictions with an OBPS for large emitters, the benchmark for the federal carbon price has been an effective mechanism for ensuring that large facilities across Canada face a harmonised marginal price on emissions for which they pay an excess emissions charge (or provincial equivalent). Less clear, however, is the degree of harmonisation across provinces with regards to the marginal price of emissions credits. With six separate output-based pricing systems for large emitters across Canada, none of which are currently linked and all of which have their own systems and rules with respect to eligible credits, there is potential for large variation in the marginal price of credits.

Given current allocation of capital across regions, the harmonisation of marginal carbon prices is important to help promote efficient trade and decarbonization in the short-run. One of the mechanisms through which the federal government can pursue greater harmonisation in marginal credit prices is by taking a leading role in developing linkages between federal and provincial output-based pricing systems. We applaud and support ECCC's efforts to promote or maintain linkage of OBPS systems across domestic jurisdictions, precisely for the reasons discussed in Box 1 of the Consultation Paper (minimising total compliance costs and the risk of emissions leakage between jurisdictions). The availability of a functional federal GHG offset credit market can help link domestic OBPS systems without additional administrative complexity or before linkages are established.

[13] Cosbey, A., Droege, S., Fischer, C., and Munnings, C. (2019), Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs from the Literature, Review of Environmental Economics and Policy 13:1, 3-22.
Böhringer, C., Fischer, C., Rosendahl, K.E. et al. (2022), Potential impacts and challenges of border carbon adjustments. Nature Climate Change 12, 22–29. https://doi.org/10.1038/s41558-021-01250-z

[14] Restuccia, D. (2019), Misallocation and aggregate productivity across time and space. Canadian Journal of Economics/Revue canadienne d'économique, 52: 5-32. https://doi.org/10.1111/caje.12364

Also of note is that there is significant variation in average carbon costs across jurisdictions with an OBPS for large facilities. For example, a report commissioned by ECCC and completed by the Canadian Institute for Climate Choices,[15] finds that in jurisdictions with an OBPS in place, the average carbon cost for covered emissions from large facilities ranges from a low of $3.00 per tonne of CO2e in Newfoundland and Labrador to a high of $5.90 per tonne in Prince Edward Island.[16] These differences are driven primarily by different rules across jurisdictions for how output-based standards are defined. This in turn determines the share of total emissions from large facilities in each jurisdiction that face a compliance obligation. While not directly within the scope of the current review, there would be value in ECCC pursuing a longer-term focus on ensuring greater harmony in average carbon pricing costs across jurisdictions. This would help to promote efficient capital allocation and decarbonization in the long-run.

Concluding Remarks

From an academic point of view, we are delighted to see ECCC pursue cost-effective policies to facilitate achievement of Canada's decarbonization goals. In particular, the recent Consultation Paper on the OBPS Regulations sets a dynamic schedule for standards, which will allow businesses to make long-run, cost-effective decisions regarding emissions abatement technology with confidence about future policy.

However, we point out that the current OBPS credit market, as designed, does not provide participants with as much price certainty as it could if a price floor were created. A price floor would be simple to implement and eliminate the need for the government to continually consider concerns about the credit price as it performs other tasks related to the OBPS Regulations that will affect the credit market, such as working to link domestic systems, facilitating exit of subnational systems, and finalising a federal GHG offset market. Additionally, a credit price floor would allow ECCC to decouple the policy's stringency created by dynamic schedule for standards from concerns about the market price. *In general, we would like to emphasise that the stringency of the policy should be driven by Canada's decarbonization goals.*[17] *Concerns over the credit price, carbon leakage, and competitiveness should be addressed with other policy tools (such as a price floor and border carbon adjustments).*

[15] Sawyer, D., S. Stiebert, R. Gignac, A. Campney, and D. Beugin. 2021. 2020 Expert Assessment of Carbon Pricing Systems. Canadian Institute for Climate Choices.
https://publications.gc.ca/collections/collection_2021/eccc/En4-434-2021-eng.pdf

[16] The remaining estimates for jurisdictions with an OBPS (all in dollars per tonne) are $3.30 in Alberta, $5.60 in Saskatchewan, $5.10 in Manitoba, $4.10 in Ontario and $5.60 in New Brunswick. The estimates on Ontario and New Brunswick, however, are based on implementation of the federal OBPS in these provinces. As both provinces have recently transitioned to a provincial OBPS, these estimates are no longer current.

[17] Additionally, consideration of decarbonization technology available to firms, depending on the sectors in discussion, may also be important to consider when crafting policy stringency.

We applaud ECCC's reliance on modelling to craft the dynamic schedule for OBPS standards. However, we find ECCC's lack of transparency regarding its modelling and results to hamstring qualified reviewers' ability to appropriately comment on the schedule. In particular, we suspect that the CGE modelling used to create the schedule may suffer from a number of limitations, including assumptions about labour and capital mobility that may lead to substantial biases in the Canadian setting. We make a number of concrete, actionable recommendations to increase transparency, namely: public posting of ECCC's models or a detailed methods publication with model equations, public posting of non-proprietary input data and the availability of data use agreements with qualified individuals for anonymized proprietary data, and public posting of ECCC's results along with measures of uncertainty.

The OBPS is designed to partially mitigate emissions leakage in response to unilateral Canadian climate action. However, as Canada plans to raise its federal carbon price to $170 by 2030, leakage could become a greater concern. If Canada adopts border carbon adjustments, they can complement or replace the existing federal OBPS system in supporting the EITE facilities competing in the domestic market. Under the federal OBPS policy, different stringency levels (ranging from 80 to 95% of historical emissions intensity) are set depending on each sector's competitiveness and leakage risks. While border carbon adjustments provide an opportunity to separate competitiveness and leakage concerns from the stringency of the policy, in practice, designing and implementing an equitable border carbon adjustment may prove challenging given the variance in carbon-pricing policies across Canada. Differences in policy across jurisdictions also harm the effectiveness of domestic policies and incentives to reduce emissions by leading to misallocation of resources and introducing large variations in the marginal price of credits and average carbon costs. Therefore, harmonising marginal and average prices across jurisdictions would promote efficient decarbonisation, alleviate misallocation of resources and support EITE industries' competitiveness in the domestic market.

Finally, we note that linkage of domestic systems should continue to be a goal to increase the cost-effectiveness of the OBPS Regulations and prevent carbon leakage. The federal government has an important role in harmonising policy and creating minimum standards for emissions regulations across provinces in order to reduce unnecessary compliance costs on Canadian businesses. Better harmonisation (or regular reviews of the costs across jurisdictions) will promote deeper decarbonisation and alleviate misallocation of resources. Harmonisation will also make designing and implementing a BCA easier (which in turn helps to separate policy stringency from competitiveness and leakage risks).