

A PROCESS FOR EVALUATION OF CLIMATE POLICY PLATFORMS AND GREENHOUSE GAS REDUCTION TARGETS

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Overview

Global efforts have failed to address climate change and reduce emissions. In democratic countries, a key reason for continued rise in emissions is the inability for citizens and politicians to estimate the likely effects of proposed climate policy platforms (Jaccard 2020). Through this research we present a climate platform evaluation framework to identify policies that could impact future emissions and economic growth, then simulate these in an energy economy emissions model. To demonstrate this framework and methodology for assessing the sincerity and viability of climate plans, we evaluate two Canadian political party climate platforms using the gTech computable general equilibrium model. Specifically, we assess the proposed climate measures of two left-leaning parties at the federal level: the NDP and Green Party, both with plans to reach a 2030 emissions target. We compare our own emissions and economic growth projections under these parties' climate platforms to two pre-existing assessments of Canada's leading political parties: the Conservatives and the Liberals. Our results exemplify the importance of rigorous policy design and assessment and point to the need for independent assessment of climate and energy system transition policies across all democratic jurisdictions. The demonstrated process provides a tool that can help voters and private actors identify viable climate platforms and targets.

Methods

In this research, we develop a climate platform evaluation framework and apply it to the case of Canada's 2021 federal election campaign. However, we specifically design and present our framework to be applicable to any jurisdiction with competing climate platforms and targets. Three components comprise this framework: (1) a method to assess what policies to allow for evaluation, (2) the use of energy-economy-emissions modeling to estimate the likely greenhouse gas (GHG) reductions and GDP cost of mitigation under each platform, and (3) a process to re-simulate climate platforms with more stringent policies and observe GDP impacts in cases where stated policies do not achieve promised targets.

The first component of our evaluation framework involves assessing each competing platform to generate a set of policies to be included in model simulations. In this step, we exclude any measures or policies that lack specific details for implementation, are beyond jurisdiction capacity, are reliant on third party collaborations, provide research and development support, or influence foreign emissions. We include policies such as carbon pricing, compulsory regulations, subsidies and government procurement. Following this exercise, we chose to use a computable general equilibrium energy-economy-emissions model called gTech (owned by Navius Research in Vancouver, BC). gTech solves to find equilibrium conditions in both energy and non-energy commodity markets, represents Canada's full economy, and possesses energy and emissions details for over 300 technologies in both energy supply and demand sectors. Thus, it is well suited to our task of simulating the effect of energy and emissions policies on both long-run GDP growth and emissions trends.

gTech solves as a system of non-linear equations representing 1) household utility and 2) sectoral production functions. Consistent with theories of economic actors optimizing their behaviour (Dixon and Parmenter 1996), the system solves when all commodity markets clear and each firm and representative household has minimized costs or maximized welfare, respectively. These linkages between inputs and outputs and their ease of substitutability are estimated from a social accounting matrix that serves to characterize production and utility functions for all representative economic agents. In gTech, utility functions are characterized for 45 representative households, and production functions for 90 energy supply and demand sectors. Households, sectors and government are linked through the supply and demand of factors of production and commodities, based on established circular theory of the economy (Burfisher 2011). Industrial sectors are described by nested constant elasticity of substitution functions. While traditionally this has resulted in top-down economic models overestimating the cost of technological change in response to policy (Rhodes et al. 2021), the gTech model remedies these limitations by explicitly simulating technology or capital stock turnover through disaggregated technology choices of households and firms (Hoyle et al. 2024; Peters et al. 2010). This functionality was originally derived from the CIMS partial equilibrium simulation model, whose market share equation simulates the evolution of capital stock as needed to satisfy demand in each model time period. Thus, gTech is considered a *technologically explicit* energy-economy-emissions model.

We simulate four scenarios in gTech out to the target year 2030 to determine their impacts on total emissions and GDP growth: *NDP* – the NDP’s climate plan, *ndp50* – NDP plus additional carbon pricing necessary to reach NDP’s stated target of a 50% reduction in emissions by 2030, *GREEN* – the Green Party’s climate plan, and *green60* – the Green Party’s climate plan plus carbon pricing to reach 60% reduction target. We compare our modelling results to three scenarios completed by previous analyses using the same model and policy inclusion criteria: *REF* – current policies, *LIB* – the Liberal Party’s climate plan, and *CON* – the Conservative Party’s climate plan.

Results

Our findings include both pre-modelling evaluation and modelling results. The results of our pre-modelling evaluation are a description of each party’s climate platform after our removal of ineligible measures or baseless targets. We find that the Liberal platform relies primarily on a system of carbon pricing, the Conservative platform on flexible regulations, the NDP platform on household taxation and public spending, and the Green platform on weaker existing policies and a ban on oil and gas fracking. Our modelling results indicate that under both the Liberal and Conservative plans emissions are likely to fall within 2-3% of their stated target of a 30% reduction below 2005 levels by 2030. The NDP plan results in a 12% reduction, falling short from its target of a 50% cut in emissions by 2030. Similarly, while the Green Party platform promises a 60% reduction in emissions by 2030, we estimate the effects of their plan to be closer to a 28% reduction (by design, *ndp50* and *green60* reach 50% and 60% reductions, respectively). By 2030, we estimate that the Liberal plan will slow GDP growth relative to “business as usual” scenario (*REF*) by -1.6%, the Conservative plan by -0.9%, the NDP plan by -0.4% and the Green Party plan by -2.9%. When the NDP and Green plans are supplemented by additional carbon pricing (a first-best policy) to reach their promised targets, we find the GDP growth reductions to be -5.8% and -6.7%, respectively. We note a major caveat which is that while useful to compare to a common baseline, the *REF* scenario is unrealistically optimistic about future economic growth because it does not account for increasing climate damages, as expected under continued lack of action.

Conclusions

Through this research we present and exemplify a comparative evaluation framework to assess competing climate platforms. Future studies might model scenarios of domestic policy platforms - as in this study - in combination with a global model capable of determining the economic costs of climate damages under alternative mitigation scenarios. This would enable citizens and politicians to better understand the potential net costs or net benefits of proposed climate mitigation strategies. Though we chose to demonstrate its use by assessing four major competing party platforms prior to Canada’s 2021 federal election - those of the Liberal, Conservative, New Democratic and Green parties – our framework can be used in any democratic jurisdiction with competing climate plans to enable citizens, and politicians, to know in advance of an election which climate platforms are likely to influence emissions and energy system transformation and how costly they will be on the economy. Our evaluation framework first identifies eligible policies from each climate platform, and importantly, only clearly stated policies with proven impacts on energy-use and emissions (or the economy) are extracted for modelling. We then use a general equilibrium model with technological detail to simulate likely emissions and GDP impacts. Methodical extraction and simulation of the future impacts of proposed climate platforms holds politicians accountable for putting forth policy platforms that have a high likelihood of reducing emissions with minimal impact on economic growth, enabling citizens to support viable climate policies in their jurisdiction.

References

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