Canada's Approach on the Social Cost of Greenhouse Gases

National Academy of Science Symposium on the Social Cost of Carbon

Washington, DC

Warren Goodlet

Environment and Climate Change Canada

June 14, 2017

Background

- Government of Canada departments and agencies are required to conduct cost-benefit analysis of high-impact regulatory proposals as part of their Regulatory Impact Analysis Statements
- An approach is required to determine the appropriate value associated with GHG emission changes
- Two approaches were considered
  - Marginal abatement cost
  - Social cost of carbon (or other GHGs)

Background (cont.)

- The social cost of GHGs was determined to be the better option for Canada, for the following reasons:
  - It measures emission variations from a damage perspective, which is better suited to the cost-benefit analysis framework
  - Implementation was fairly simple, as the U.S. Interagency Working Group had already developed the most credible approach to date
  - The IWG's approach also included the use of a 3% discount rate, which is consistent with Canada's Treasury Board Secretariat guidance on cost-benefit analyses of Canadian regulations

Adaptation of estimates for Canada

- IWG raw model output (a series of 10,000 for each model, scenario, and discount rate) form the basis of the approach used in Canada; however, a few modifications are made to adapt it to the Canadian context:
  - Conversion to Canadian dollars
  - Use of only the 3% discount rate (in order to be consistent with Treasury Board Secretariat guidance)
  - For the 95th percentile estimates Canada uses the distribution of estimates produced by the DICE and PAGE models only (FUND is excluded as it does not attempt to measure catastrophic impacts)

Evolution of SC-GHG use in Canada

- The use of SC-GHG metrics in Canada has evolved over time, in three main phases.
- Initially, an illustrative SC-CO_2 of $25/tonne was used in Regulatory Impact Analysis Statements (RIAS) in cost-benefit analyses, based on literature
- Examples of such use include:
  - 2010: Light-Duty Vehicles Regulations
  - 2010: Renewable Fuels Regulations (5% ethanol in gasoline)
  - 2011: Biodiesel Regulations (2% renewable fuels)

Evolution of SC-GHG use in Canada (cont.)

- Then, the SC-CO_2, based on that developed by the EPA, began being used in the main analysis; global warming potential was used to convert non-CO_2 GHGs into $CO2_e$
- Examples of such use include:
  - 2012: Coal-fired Electricity Regulations
  - 2013: Heavy-Duty Vehicles Regulations
  - 2014: Light-Duty Vehicles Amendments

Evolution of SC-GHG use in Canada (cont.)

- In April 2016, ECCC published its technical update document, which was the first public document (besides RIAS) communicating the use of SC-GHG approaches. The Social Cost of Methane and Nitrous Oxide, again based on that developed by the US EPA, is also used in Canada.

- Examples of such use include:
  - 2016: Proposed ODSHAR Amendments (HFC Regulations)
  - 2017: Proposed Heavy-Duty Vehicles Amendments
  - 2017: Proposed Methane Regulations for Oil & Gas

Use of SC-GHG approaches in Canada

- Besides the minor differences in adapting the approaches from the IWG's Technical Documents, the Government of Canada has used the SC-GHG in the same way as U.S. Departments
- Canadian Federal Departments use the SC-CO_2 in cost-benefit analysis to evaluate CO_2 emission variations, and also use the SC-N_2O and SC-CH_4 for N_2O and CH_4
- For other GHGs, Canada uses the SC-CO_2, and applies the global warming potential of the GHG evaluted in order to estimate the appropriate impact to value
- SC-GHGs also used when presenting projects for Cabinet approval following environmental assessments

Importance of IWG Work on SC-GHG

- In developing its SC-GHG approach, Environment Canada leaned heavily on the work of the IWG
- For Canada to develop its own estimates of SC-GHG from the ground up would require a significant increase in modelling capacity and would be a lengthy undertaking
- Collaboration with U.S. counterparts has been very helpful in bringing the SC-GHG into regulatory use in Canada
- As the SC-GHG approach used in Canada depended on model output from the U.S. work, our update cycle has followed IWG updates

Provincial use of SC-GHG approaches

- In Canada, the SC-GHG is not only being used by all federal departments in regulatory analyses, but also by some provinces.
- The province of Québec uses the SC-CO_2 in cost-benefit analyses of regulations, including the recent ZEV mandate it has put forward
- The Government of Ontario also uses a SC-CO_2, but does not have a formal approach established; some departments use ECCC estimates, whereas others use an average of a number of estimates

Next Steps

- ECCC has followed the NAS review process with much interest, although some questions specific to Canadian policymakers could not be answered through this process (which exchange rate to use, assess necessity for a different approach to the 95th percentile, etc.)
- As was stated in ECCC's last update paper, the department will look to Canadian academics to potentially conduct a peer review of Canada's approach to developing the SC-GHG, in particular on the process for converting estimates into Canadian values
- A number of academics in Canada have shown interest in the SC-CO_2 and could be involved in this process

Next Steps

- ECCC continues to look for the most robust scientific evidence to further improve its approach to valuing climate impacts from GHG emissions
- ECCC monitors advancements in scientific and economic research and is very interested in the work done by Resources for the Future and other think tanks on the metric
- As such, Canada's approach is expected to remain unchanged in the near future, until there are new developments that reflect advancements in the best available science

SC-CO_2 Estimates

Year	Canadian Estimates ($CAN 2012)		US Estimates ($US2007)	
	Central	95th Percentile	Central	95th Percentile
2010	34.1	131.5	31	86
2020	45.1	190.7	42	123
2030	54.5	235.8	50	152
2040	64.7	281.9	60	183
2050	74.8	319.8	69	212

SC-CH_4 Estimates

Year	Canadian Estimates ($CAN 2012)		US Estimates ($US2007)	
	Central	95th Percentile	Central	95th Percentile
2010	946.1	2,857.3	872	2,429
2020	1,311.6	3,930.8	1,209	3,180
2030	1,726.1	5,539.2	1,591	4,225
2040	2,215.2	7,420.7	2,042	5,476
2050	2,709.0	9,045.9	2,497	6,654

SC-N_2O Estimates

Year	Canadian Estimates ($CAN 2012)		US Estimates ($US2007)	
	Central	95th Percentile	Central	95th Percentile
2010	12,847	42,476	11,839	31,232
2020	16,641	54,490	14,981	39,278
2030	20,115	69,188	18,538	49,108
2040	24,460	85,525	22,542	60,171
2050	29,135	102,711	26,841	71,762