Department of Commerce
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The Social Cost of Carbon

Washington State Energy Office Recommendation for Standardizing the Social Cost of Carbon When Used for Public Decision-Making Processes

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Inter-Agency Memo
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BACKGROUND & RECOMMENDATION

On the 29th of April, 2014 Governor Inslee signed Executive Order 14-04 on Washington Carbon Pollution Reduction and Clean Energy Action. This executive order requires public acquisition processes for buildings and vehicles to consider the cost of externalities including greenhouse gas emissions.

In regards to public buildings within the energy efficiency section: "Ensure the cost-benefit tests for energy-efficiency improvements include full accounting for the external cost of greenhouse gas emissions."

In regards to public vehicle acquisitions within the state government operations section: "The Department of Enterprise Services will move forward with state procurement of these vehicles where the life-cycle costs and benefits are comparable, including consideration of the benefits of emission reductions."

As a result of these two sections and the general intent of the Executive Order it is likely that many State agencies will be integrating the Social Cost of Carbon (SCC) into their decision-making and reporting processes. The goal of this memo is to ensure that all agencies are using the same values for the SCC as consistency is essential to achieving comparable results.

The Washington State Energy Office in consultation with the Washington State Department of Ecology recommends that all Washington State agencies use the most recent estimates produced by the federal interagency working group for the SCC.

The most recent federal estimate for the SCC can be found on the U.S. Environmental Protection Agency's (EPA) website[i]. The table below from the federal interagency technical support document[ii] details year-by-year estimates for the social cost of emitting one metric ton of carbon dioxide equivalent greenhouse gases. The costs are listed in 2007 dollars and calculated for various discount rates. The marginal cost of emission escalates over time so an accurate calculation will require estimating emissions for each year that an asset will be operated, multiplied by that year's SCC.

The SCC estimates presented in this technical support document are not meant to capture the total cost of emitting carbon dioxide into the atmosphere as many external costs have not yet been calculated. The presented values represent the expected external costs created from net changes in: agricultural productivity, human health, property damage from increased flood risk, and the value of ecosystem services due to climate change.

The 2013 update to the initial 2010 SCC technical support document resulted in a higher estimate for the SCC as additional impacts were monetized. This is expected to be a continuing trend and Washington State agencies should ensure they are using the most current version of the technical support document when calculating the SCC for public decision-making processes.

When using the following table the 2007 dollar values need to be adjusted to the current year's dollar value based on the historical change in the Consumer Price Index (CPI). The Bureau of Labor Statistics' CPI Calculator[iii] can assist with this calculation. When using this table for public acquisition and design processes the SCC column associated with the 2.5% discount rate should be used.

Table A1: Annual SCC Values: 2010-2050 (2007$/metric ton CO_2)

Discount Rate Year	5.0% Avg	3.0% Avg	2.5% Avg	3.0% 95th
2010	11	32	51	89
2011	11	33	52	93
2012	11	34	54	97
2013	11	35	55	101
2014	11	36	56	105
2015	11	37	57	109
2016	12	38	59	112
2017	12	39	60	116
2018	12	40	61	120
2019	12	42	62	124
2020	12	43	64	128
2021	12	43	65	131
2022	13	44	66	134
2023	13	45	67	137
2024	14	46	68	140
2025	14	47	69	143
2026	15	48	70	146
2027	15	49	71	149
2028	15	50	72	152
2029	16	51	73	155
2030	16	52	75	159
2031	17	52	76	162
2032	17	53	77	165
2033	18	54	78	168
2034	18	55	79	172
2035	19	56	80	175
2036	19	57	81	178
2037	20	58	83	181
2038	20	59	84	185
2039	21	60	85	188
2040	21	61	86	191
2041	22	62	87	194
2042	22	63	88	197
2043	23	64	89	200
2044	23	65	90	203
2045	24	66	92	206
2046	24	67	93	209
2047	25	68	94	211
2048	25	69	95	214
2049	26	70	96	217
2050	26	71	97	220

DISCUSSION

Federal rule making generally seems to present the complete table and calculate three different social costs of carbon. This approach is inconsistent with the goal of this memo which is to develop consist values to be used within public building design and vehicle acquisition processes. It is highly recommended for these comparison processes that a single discount rate is used.

Below are five justifications for why we recommend using a 2.5% discount rate.

1. **Align with OFM Real Discount Rate**: RCW 39.35.030(9) "'Life-cycle cost' means the initial cost and cost of operation of a major facility over its economic life. This shall be calculated as the initial cost plus the operation, maintenance, and energy costs over its economic life, reflecting anticipated increases in these costs discounted to present value at the current rate for borrowing public funds, as determined by the office of financial management." When choosing the discount rate column for public decision-making processes it can be argued that agencies should choose the column of data

that most closely matches the current real discount rate established by the Washington State Treasury and published by the Office of Financial Management within the Washington State Life Cycle Cost Tool[iv]. The current real discount rate of .9% indicates that the column of data associated with the 2.5% discount is the closest match.

2. **Anticipate Additional External Costs**: The federal SCC values do not include all expected external costs of carbon dioxide equivalent emissions. Instead they focus just on the impacts which could be clearly monetize at the time of the study. For this reason the SCC is expected to increase over time as additional impacts are monetized and a greater scope of social costs are applied to those impacts already monetized. This trend can be seen in the 2013 revision of the 2010 SCC values. Note the 2013 3% column is roughly equal to the 2010 2.5% column. An argument could be made that we can stay ahead of this trend by choosing the higher SCC values represented by the 2.5% discount rate.

2010 Published SCC (2007$)

Discount Rate	5%	3%	2.5%	3%
Year	Avg	Avg	Avg	95th
2010	4.7	21.4	35.1	64.9
2015	5.7	23.8	38.4	72.8
2020	6.8	26.3	41.7	80.7
2025	8.2	29.6	45.9	90.4
2030	9.7	32.8	50.0	100.0
2035	11.2	36.0	54.2	109.7
2040	12.7	39.2	58.4	119.3
2045	14.2	42.1	61.7	127.8
2050	15.7	44.9	65.0	136.2

2013 Published SCCC (2007$)

Discount Rate	5.0%	3.0%	2.5%	3.0%
Year	Avg	Avg	Avg	95th
2010	11	32	51	89
2015	11	37	57	109
2020	12	43	64	128
2025	14	47	69	143
2030	16	52	75	159
2035	19	56	80	175
2040	21	61	86	191
2045	24	66	92	206
2050	26	71	97	220

3. **Incorporate Intergenerational Discount Rates**: The discount rate applied to GHG emissions is an "intergenerational discount rate" applied to society as a whole. An intergenerational discount rate is not well represented by a private sector discount rates which seek profit, or the cost of governments to obtaining capital in a low-risk environment. The papers below discuss some of the scientific thinking surrounding the challenge of discounting intergenerational costs. There is no clear conclusion on what value should be used but generally it is agreed that the value should be much lower than private sector discount rates. This is why the SCC tables do not present data for discount rates above 5% despite the fact many profit-seeking institutions use discount rates from 8-15%.
    - Guidelines for Preparing Economic Analyses[v]
    - How Should Benefits and Costs Be Discounted in an Intergenerational Context?[vi]

4. **Recognize Public Responsibility**: Overestimating the SCC for public asset decision-making processes will result in more energy efficient buildings and vehicles which reduce operational costs, increase resiliency to price spikes, and reduce the government's contribution to climate change. However, these benefits are obtained at a higher upfront capital cost than was warranted due to the overestimation. Underestimating the SCC results in less energy efficient buildings and vehicles, larger operation costs, and a greater contribution to climate change. Both overestimating and underestimating the SCC lead to a net economic loss to society.

Game Theory		Value Chosen	
		2.5%	3%
Correct Value	2.5%	Optimal Desgin	Wasted money, higher operational costs, higher costs to society
	3%	Wasted money, lower operational costs, lower costs to society	Optimal Design

Game theory points out that there is a higher risk associated with underestimating the SCC than there is with overestimating the SCC as it is easier to operate an efficient asset in a low cost environment than it is to operate an inefficient asset in a high cost environment. As much of the risk associated with underestimating the SCC falls on society, public entities are under a unique responsibility to mitigate the risk associated with underestimation.

5. **Washington State Leads on Climate Issues**: The federal interagency working group that developed the SCC table provided no guidance as to which discount rate should be used for government design and procurement processes. However, many federal processes reference the 3% discount rate as the "central estimate". This may simply mean that it is the middle of the three proposed discount rates but it has led to the 3% rate being the more commonly quoted value for federal processes. As Washington State wants to lead on climate issues it makes sense for us to adopt the lower 2.5% discount rate column, and the higher associated social cost of carbon, for our public building design and vehicle acquisition processes.

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[i] United States Environmental Protection Agency, The Social Cost of Carbon – Accessed 8/3/14. www.epa.gov/climatechange/EPAactivities/economics/scc.html

[ii] Interagency Working Group on Social Cost of Carbon, United States Government – November, 2013. www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf

[iii] Bureau of Labor Statistics, CPI Inflation Calculator – Accessed 8/3/14. www.bls.gov/data/inflation_calculator.htm

[iiv] Office of Financial Management, Forms – Accessed 8/3/14. www.ofm.wa.gov/budget/forms.asp#capital

[v] Guidelines for Preparing Economic Analyses, U.S. Environmental Protection Agency – December, 2010 http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-06.pdf/$file/EE-0568-06.pdf

[vi] How Should Benefits and Costs Be Discounted in an Intergenerational Context?, Resources for the Future – 2012 http://www.rff.org/rff/documents/rff-dp-12-53.pdf