

# (Short) Legislative History of Cost Management

- 2003 - S. 139 (McCain-Lieberman): no mechanism.
- 2005 – S.A. 868 (Bingaman): \$7 safety valve in 2010, escalating at 5%.
- 2007 – S. 1766 (Bingaman-Specter): \$12 TAP in 2012, escalating at 5%+inflation.
- 2007 – S. 280 (Lieberman-McCain): Firm-level borrowing.
- 2007 – S. 2191 (Lieberman-Warner): CMEB can increase annual cap by 5% through borrowing from future allocations; condition partly based on high end of CBO price estimates. Also includes firm-level borrowing, potential expansion of offsets / borrowing with high costs.

# Intellectual History

- Weitzman (1974) – price and quantity regulation leads to different outcomes when costs are uncertain.
- Roberts and Spence (1978) – price and quantity mechanisms can be combined.
- Newell and Pizer (2003) – pollutants that accumulate (like CO<sub>2</sub>) tend to favor price regulation.
- Ellerman and Jacoby (2004) – banking (plus borrowing) may solve the problem.

Table: Allowance Price Comparison (2005 \$/tCO<sub>2</sub>e)

	2015	2020	2025	2030	2035	2040	2045	2050
<b>1) EPA Reference</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>2) S. 2191</b>								
ADAGE	\$29	\$37	\$48	\$61	\$77	\$98	\$125	\$159
IGEM	\$40	\$51	\$65	\$83	\$106	\$135	\$173	\$220
<b>3) S.2191 w/ Low International Action</b>								
ADAGE	\$27	\$35	\$44	\$56	\$72	\$92	\$117	\$149
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>4) S.2191 w/ Unlimited Offsets</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	\$11	\$15	\$19	\$24	\$30	\$39	\$50	\$63
<b>5) S.2191 w/ No Offsets</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	\$77	\$98	\$126	\$160	\$205	\$261	\$333	\$425
<b>6) S.2191 Constrained Nuclear &amp; Biomass</b>								
ADAGE	\$39	\$49	\$63	\$80	\$101	\$129	\$164	\$208
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>7) S.2191 Constrained Nuclear &amp; Biomass, and CCS</b>								
ADAGE	\$55	\$69	\$88	\$112	\$142	\$181	\$229	\$290
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>8) S.2191 Constrained Nuclear &amp; Biomass, and CCS + Beyond Kyoto + Natural Gas Cartel</b>								
ADAGE	\$55	\$70	\$88	\$112	\$142	\$180	\$228	\$288
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>9) Alternative Reference</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>10) S.2191 Alt. Ref.</b>								
ADAGE	\$22	\$28	\$36	\$46	\$59	\$75	\$95	\$121
IGEM	\$35	\$45	\$57	\$73	\$93	\$118	\$151	\$193

Table: Allowance Price Comparison (2005 \$/tCO<sub>2</sub>e)

	2015	2020	2025	2030	2035	2040	2045	2050
<b>1) EPA Reference</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>2) S. 2191</b>								
ADAGE	\$29	\$37	\$48	\$61	\$77	\$98	\$125	\$159
IGEM	\$40	\$51	\$65	\$83	\$106	\$135	\$173	\$220
<b>3) S.2191 w/ Low International Action</b>								
ADAGE	\$27	\$35	\$44	\$56	\$72	\$92	\$117	\$149
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>4) S.2191 w/ Unlimited Offsets</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	\$11	\$15	\$19	\$24	\$30	\$39	\$50	\$63
<b>5) S.2191 w/ No Offsets</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	\$77	\$98	\$126	\$160	\$205	\$261	\$333	\$425
<b>6) S.2191 Constrained Nuclear &amp; Biomass</b>								
ADAGE	\$39	\$49	\$63	\$80	\$101	\$129	\$164	\$208
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>7) S.2191 Constrained Nuclear &amp; Biomass, and CCS</b>								
ADAGE	\$55	\$69	\$88	\$112	\$142	\$181	\$229	\$290
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>8) S.2191 Constrained Nuclear &amp; Biomass, and CCS + Beyond Kyoto + Natural Gas Cartel</b>								
ADAGE	\$55	\$70	\$88	\$112	\$142	\$180	\$228	\$288
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>9) Alternative Reference</b>								
ADAGE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
IGEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>10) S.2191 Alt. Ref.</b>								
ADAGE	\$22	\$28	\$36	\$46	\$59	\$75	\$95	\$121
IGEM	\$35	\$45	\$57	\$73	\$93	\$118	\$151	\$193

# Sources of cost uncertainty

- Short-term demand. Baseline emissions of greenhouse gases vary naturally from year to year by a few percent owing to differences in weather, economic activity, and energy supply issues.
- Short-term supply / offsets. The volume and price of available offsets may vary because of changes in implementing regulations, demand from other programs, supply constraints in originating countries / sectors, or estimation errors and natural variation.
- Longer-term costs. Over longer periods of time, costs can deviate from expectations because either economic growth or technological developments do not proceed as expected.
- Longer-term supply (regulatory expectations). In programs with banking, expectations about future compliance costs can drive current market prices; if market participants expect allowances to be valuable in the future because of tighter regulations, they will want to purchase any undervalued, current allowances for later use, thereby driving up current prices.

# Billy's Proposal Taxonomy

---

- Safety valve – unlimited additional allowances at specified price (possibly with symmetric removal at price floor).
- Reserve (quantity-limited safety valve) – automatic movement of a fixed quantity of emissions from future caps to current cap as price exceeds specified level.
- Borrowing – individuals can borrow future allowances but must repay with interest.
- Triggered mechanisms – if prices exceed  $X$  then more  $Y$  allowed.
- CMEB – independent board has the ability to intervene if costs are high (more about governance than a distinct mechanism).