

Carbon Sequestration: Public Policy Issues

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Global Warming Regulation: the Candidates' Positions

Obama:

- Reduce greenhouse gas emissions 80% below 1990 levels by 2050

McCain:

- Reduce greenhouse gas emissions 60% below 1990 levels by 2050

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How It Will Likely Work

(McCain – Lieberman – Warner – Boxer)

- Annual targets
- Tradable allowances
- Auctions
- Free allowances
- Auction proceeds
- Offsets

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Regulation of Greenhouse Gases Under the Clean Air Act

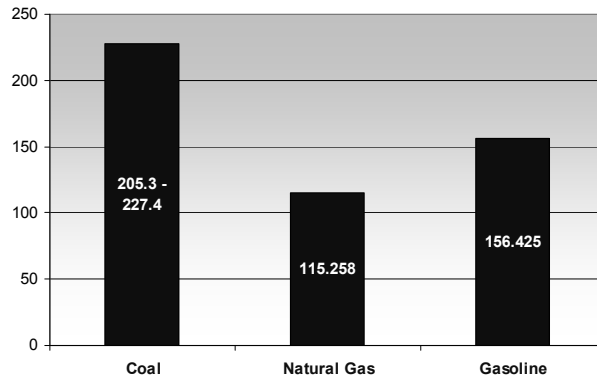
- *Massachusetts v. EPA*
- Section 202 endangerment finding
- Obama's position reported on Bloomberg
- Section 108 endangerment finding
- Implications of endangerment findings

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Coal – the Big Target

CO₂ Emissions (pounds per million BTU's)

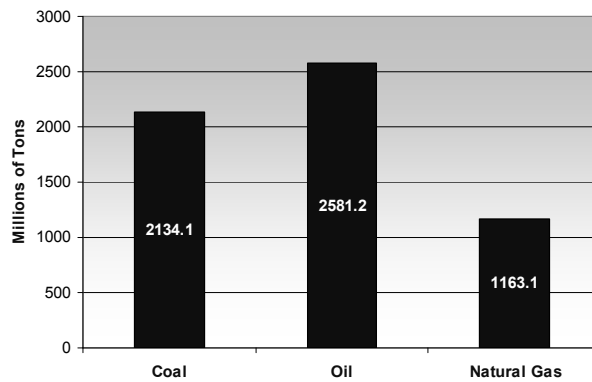


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Coal – the Big Target (cont'd)

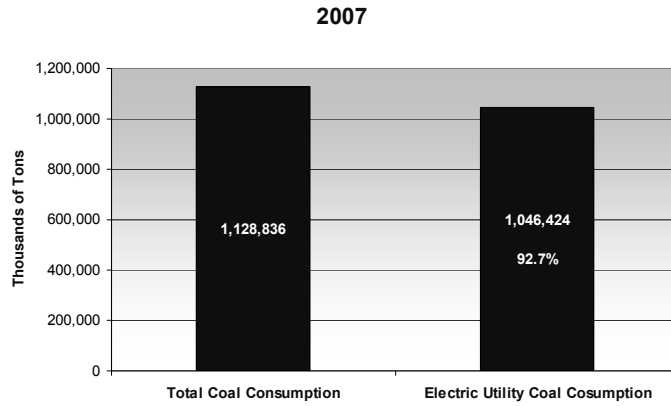
Total CO₂ Emissions by Fuel (2006)



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Coal – An Electric Utility Fuel

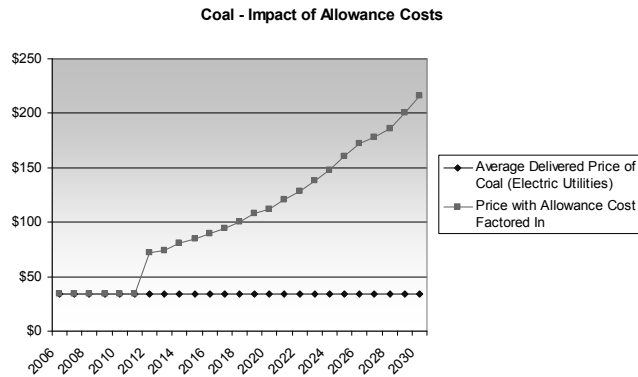


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Coal – Impact of Allowance Costs

Average delivered price of coal (per ton)
(Electric Utilities) 2006 = \$34.26

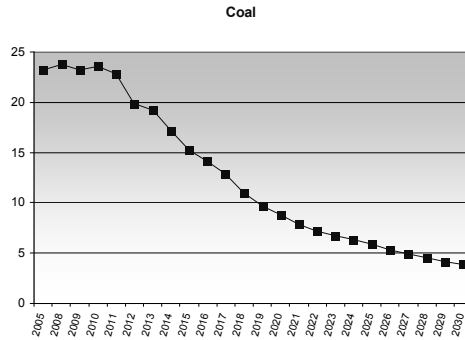


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Impact on Coal

1. No international offsets, no CCS



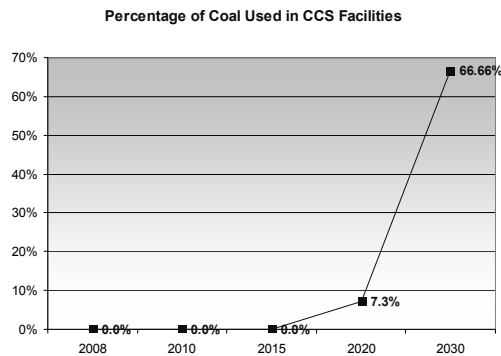
2005	23.19
2006	23.74
2007	23.19
2008	23.56
2009	22.83
2010	19.91
2011	19.21
2012	17.13
2013	15.26
2014	14.08
2015	12.89
2016	11.00
2017	9.62
2018	8.84
2019	7.82
2020	7.22
2021	6.73
2022	6.34
2023	5.90
2024	5.28
2025	4.96
2026	4.53
2027	4.15
2028	3.90
2029	3.90
2030	3.90

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Impact on Coal (cont'd)

2. If CCS is available, percentage of coal used in CCS facilities



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Automobile Powered By Coal-Fired Electricity Beats Gasoline

Assumptions:

- 3 miles per kWh
- 24 miles per gallon (8 kWh per gallon)

Electricity generated at 8000 BTU heat rate

Coal emissions – 205.3 lbs./million BTU

Gasoline emissions – 19.564 lbs./gallon

Electric car – 1.83 miles/lb. of CO₂

Gasoline car – 1.23 miles/lb. of CO₂

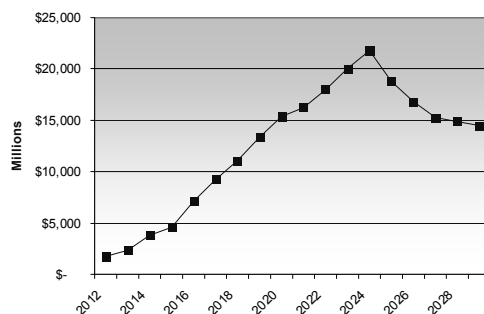
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Incentives for CCS – Free Allowances

4% of all allowances 2012-2030

Value of Free Allowances Per Year



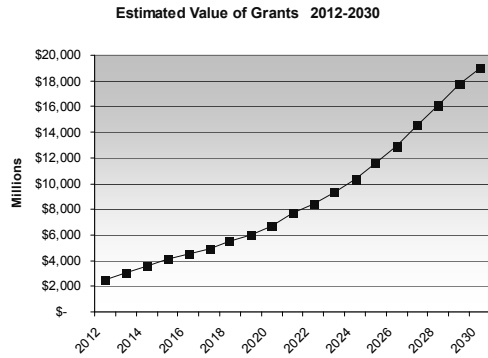
2012	\$ 1,730
2013	\$ 2,380
2014	\$ 3,780
2015	\$ 4,610
2016	\$ 7,080
2017	\$ 9,200
2018	\$ 11,110
2019	\$ 13,300
2020	\$ 15,380
2021	\$ 16,280
2022	\$ 17,970
2023	\$ 20,010
2024	\$ 21,790
2025	\$ 18,820
2026	\$ 16,790
2027	\$ 15,320
2028	\$ 14,870
2029	\$ 14,450

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Incentives for CCS

Grants from designated share of auction proceeds

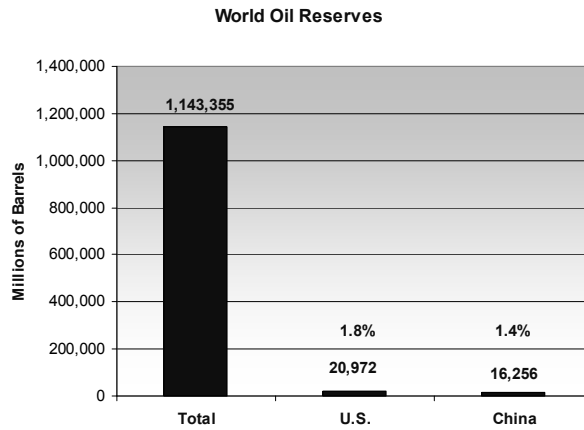


Estimated Value of Grants	
2012	\$ 2,463
2013	\$ 3,013
2014	\$ 3,611
2015	\$ 4,115
2016	\$ 4,502
2017	\$ 4,918
2018	\$ 5,534
2019	\$ 6,012
2020	\$ 6,721
2021	\$ 7,728
2022	\$ 8,398
2023	\$ 9,324
2024	\$ 10,374
2025	\$ 11,562
2026	\$ 12,897
2027	\$ 14,589
2028	\$ 16,123
2029	\$ 17,752
2030	\$ 18,950

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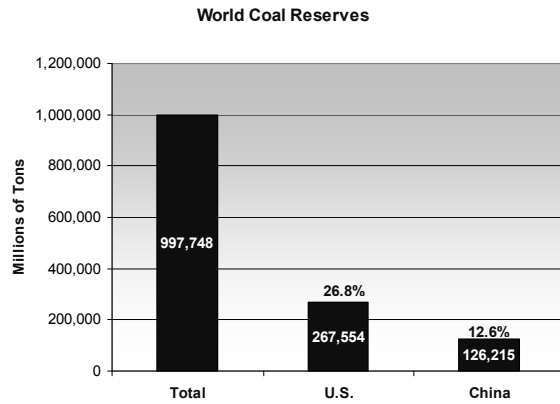
CCS – the Strategic Imperative



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CCS – the Strategic Imperative (cont'd)



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CO₂ Emissions

Ultimately, CCS will be necessary to continue use of natural gas.

	Millions of Tons of CO ₂
Natural Gas – 2008	1249
Total Allowed CO ₂ Emissions – 2050 At 20% of 1990	1003

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