

Illinois Climate Change Advisory Group

7/3/2007

Subgroup: Power/Energy

Policy Name: #9 Policies to encourage carbon capture and storage

Policy Type: Incentives and other policies

Estimated 2020 Reductions Compared to BAU: 11.1 million metric tons CO₂

Affected sectors, subsectors or entities (As the case may be)

Sector: Electric

Subsector: Electricity suppliers

Entities: Regulated electric utilities (Commonwealth Edison, Ameren, Mid-American, etc.) and alternative retail electric suppliers (ARES)

Description

As called for in the Governor's Energy Independence Plan, provide incentives to encourage the development of carbon capture at new fossil fuel power plants in Illinois. To ensure that developers have a market for the electricity from these plants, also require the Illinois electric utilities and alternative retail electric suppliers (ARES) to purchase up to 5% of their peak electric load from power plants that sequester carbon, if available. HB 1834 (Hannig) has language which could be adopted for this purpose. A tracking system, such as PJM's Generation Attributes Tracking System (GATS), could be used by generators and utilities to keep track of how much electricity comes from these carbon sequestering power plants.

Rough estimate of reductions from BAU in 2020

Given projected peak demand of 36,000 MW in 2020 (assuming 1.3% annual growth from 29,800 MW in 2005), then 5% is equivalent to 1,800 MW. The emissions benefits of 1,800 MW of electric generation with carbon capture depend both on the sequestration rate and what types of generation these plants would displace. We assume that a 90% sequestration rate is the highest practical level attainable in the time period of 2015-2020. The emissions reduction then ranges from 9.2 million metric tons to 12.6 million metric tons from the BAU in 2020, depending on whether existing plants are retired, planned conventional plants are displaced, or carbon capture and storage are added to planned gasification plants. Policies to encourage carbon capture and storage would reduce emissions by 11.1 million metric tons if a mix of plants is displaced. (See attached tables for the calculations and assumptions.) Additional variables to take into account are the location of the plants displaced – that is, in-state versus out-of-state – and how much of the carbon captured is used for enhanced oil and gas recovery.

Timetables, duration and stringency

Carbon capture technologies are not expected to be available until around 2015.

Barriers to implementation

The main barrier is the uncertainty in the reliability and economics of integrated gasification combined cycle (IGCC) and other technologies capable of carbon capture.

Interstate Cooperation

Pennsylvania has allowed IGCC to be counted towards its RPS.

Potential Scenarios for Reducing Carbon Emissions through Carbon Capture and Storage

Add Sequestration to Planned Gasification Plants

Description	MW	Capacity Factor	Annual Generation (MWhr)	Heat rate (Btu/kWhr)	Fuel Input (mmBtu)	Emission Coefficient (lbs CO2/mmBtu)	CO2 Production (metric tons/yr.)	CCS	Net CO2 Emissions (metric tons/yr.)
New IGCC plants w/ CCS	1,800	85%	13,402,800	9713	130,181,396	205.3	12,120,744	90%	1,212,074
New IGCC plants w/o CCS	(1,800)	85%	(13,402,800)	8309	(111,363,865)	205.3	(10,368,708)	0%	(10,368,708)
New conventional coal-fired plants	0	85%	0	8844	0	205.3	0	0%	0
Existing coal-fired plants	0	85%	0	11097	0	205.3	0	0%	0
Net Change:	0		0		18,817,531				(9,156,634)

Displace Planned New Conventional Coal-fired Plants

Description	MW	Capacity Factor	Annual Generation (MWhr)	Heat rate (Btu/kWhr)	Fuel Input (mmBtu)	Emission Coefficient (lbs CO2/mmBtu)	CO2 Production (metric tons/yr.)	CCS	Net CO2 Emissions (metric tons/yr.)
New IGCC plants w/ CCS	1,800	85%	13,402,800	9713	130,181,396	205.3	12,120,744	90%	1,212,074
New IGCC plants w/o CCS	0	85%	0	8309	0	205.3	0	0%	0
New conventional coal-fired plants	(1,800)	85%	(13,402,800)	8844	(118,534,363)	205.3	(11,036,329)	0%	(11,036,329)
Existing coal-fired plants	0	85%	0	11097	0	205.3	0	0%	0
Net Change:	0		0		11,647,033				(9,824,254)

Displace/Retire Existing Coal-fired Plants

Description	MW	Capacity Factor	Annual Generation (MWhr)	Heat rate (Btu/kWhr)	Fuel Input (mmBtu)	Emission Coefficient (lbs CO2/mmBtu)	CO2 Production (metric tons/yr.)	CCS	Net CO2 Emissions (metric tons/yr.)
New IGCC plants w/ CCS	1,800	85%	13,402,800	9713	130,181,396	205.3	12,120,744	90%	1,212,074
New IGCC plants w/o CCS	0	85%	0	8309	0	205.3	0	0%	0
New conventional coal-fired plants	0	85%	0	8844	0	205.3	0	0%	0
Existing coal-fired plants	(1,800)	85%	(13,402,800)	11097	(148,730,872)	205.3	(13,847,822)	0%	(13,847,822)
Net Change:	0		0		(18,549,475)				(12,635,748)

Displace Mix of Planned New and Existing Plants

Description	MW	Capacity Factor	Annual Generation (MWhr)	Heat rate (Btu/kWhr)	Fuel Input (mmBtu)	Emission Coefficient (lbs CO2/mmBtu)	CO2 Production (metric tons/yr.)	CCS	Net CO2 Emissions (metric tons/yr.)
New IGCC plants w/ CCS	1,800	85%	13,402,800	9713	130,181,396	205.3	12,120,744	90%	1,212,074
New IGCC plants w/o CCS	(450)	85%	(3,350,700)	8309	(27,840,966)	205.3	(2,592,177)	0%	(2,592,177)
New conventional coal-fired plants	(450)	85%	(3,350,700)	8844	(29,633,591)	205.3	(2,759,082)	0%	(2,759,082)
Existing coal-fired plants	(900)	85%	(6,701,400)	11097	(74,365,436)	205.3	(6,923,911)	0%	(6,923,911)
Net Change:	0		0		(1,658,596)				(11,063,096)