Current Competitive Positioning
Pending EPA New Source Performance Standard and the Clean Power Plan

There is ample information on various DOE websites defining cost and performance baselines for the various types of power plant options currently in today's available mix. I used DOE/NETL- Baseline 341/082312, August 2012, and DOE/NETL- Baseline 2010/1397, November 2010.

The competitive scenario is totally dictated by the 1000 lb-CO_2/MWh emissions standard promulgated in the EPA New Source Performance Standard (NSPS), first released in 2014. Under that requirement a new Supercritical Pulverized Coal plant (SCPC) with Carbon Capture (CCS), **Case 12**, is competing against a Natural Gas Combined Cycle (NGCC) plant without CCS, **Case 13**.

I use the term "competition" loosely, because given this threshold level; it is hardly a fair fight. How un-level is it?

Grossly unlevel.

		Supercritical PC		NGCC	
Case		11	12	13	14
CO2 Capture		No	Yes	No	Yes
Gross Power Output - kWe		580,400	662,800	564,700	511,000
Auxilliary Power Requirements - kWe		30,410	112,830	9,620	37,430
Report Net Power Output - kWe		549,990	549,970	555,080	473,570
Net Plant HHV Efficiency - %		39.30%	28.40%	50.20%	42.80%
Net Plant HHV Heat Rate - Btu/kWh		8,687	12,002	6,798	7,968
Total Plant Cost - $/kW		1995	3583	725	1509
Total Overnight Cost - $/kW		2452	4391	891	1842
Total as Spent Cost - $/kW		2782	5006	957	1986
LCOE - mils/kWh		80.95	137.28	59.59	86.58
CO2 Emissions - lb/MWh		1768	244	804	94
$/MMBtu		2.94	2.94	6.13	6.13
Load Factor		85%	85%	85%	85%
kW Nominal Gross		580,411	662,836	559,532	593,471
550,000	kW Nominal Net	550,000	550,000	550,000	550,000
Total as Spent Capital		$1,529,834,783	$2,753,292,297	$526,223,607	$1,092,280,160
Cost Premium vs. NGCC Case 13		1,003,611,175	2,227,068,690	-	566,056,553
kWh/year		4,095,300,000	4,095,300,000	4,095,300,000	4,095,300,000
MMBtu/year		35,575,871	49,151,791	27,839,849	32,631,350
Annual Fuel		$104,593,061	$144,506,264	$170,658,277	$200,030,178
Fuel Cost vs. NGCC Case 13		($66,065,216)	($26,152,012)	-	$29,371,901
LCOE		$331,514,535	$562,202,784	$244,038,927	$354,571,074
Fuel%		31.6%	25.7%	69.9%	56.4%
$60.00	per tonne	$197,051	$27,194	$90,438	$9,021
CO2 Cost vs. NGCC Case 13		$106,612	($63,244)	-	($81,417)
tonnes-CO2/year		3,284	453	1,507	150

Look at **Cases 12**, the SCPC w/CCS and compare it to **Case 13**, the NGCC w/out CCS.

- The SCPC w/CCS plant is 5X the first cost
- And, the efficiency of an SCPC w/CCS is ½ at 28.4% vs. 50.2%
- The Levelized Cost of Electricity (LCOE) for the NGCC without/CCS is ½ that of the SCPC w/CCS and this is based on $6.13/mmBtu cost for natural gas.
- If the current price for natural gas is considered, the LCOE is 1/3 that of the SCPC

And, you wonder why gas turbines have had record levels of sales??

There are some who would have you believe that this is purely the result of low gas prices, and that this is "just the market place exerting itself". This is hardly the case. Yes, the price of gas is a factor, but the real driver is that CCS is required in **Case 12**, but not for **Case 13**. Yes, the price of natural gas is a huge accelerant, but still that of an accelerant.

The Coal Industry has been spending its political capital trying to make the NSPS threshold simply go away, in which case the competitive comparison would be **Case 11** vs. **Case 13**. In such a comparison, the first cost for the SCPC is 3X and the efficiency at 39.3% vs. 50.2%.

The Coal Industry might want to consider a strategy to push full CCS, which would then position their **Case 12** against the NGCC **Case 14**. The first cost difference would be 2.5X and the efficiency would be 28.4% for the SCPC w/CCS vs. 42.8% for the NGCC w/CCS. Not pretty, but they could actually have the environmentalist community on their side.

The recently announced Clean Power Plan pretends to be agnostic on how each of the states reach their assigned targets, but behind the targets themselves is the built-in assumption that NGCC's without will provide a ~70% contribution, which would then be driven by the same 1000 lb-CO_2/MWh threshold.

The unanswered question in all of this is whether or not this 1000 lb-CO_2/MWh threshold, either explicit or implied, reaches the presumed target of 2°C/450ppm. It should be noted that neither the NSPS nor the CPP mention a target, let alone a target of 2°C/450ppm.

It is hard to reach a target if you don't have one, but on second thought it is actually easier to reach a target if you don't have one!