May 16, 2012

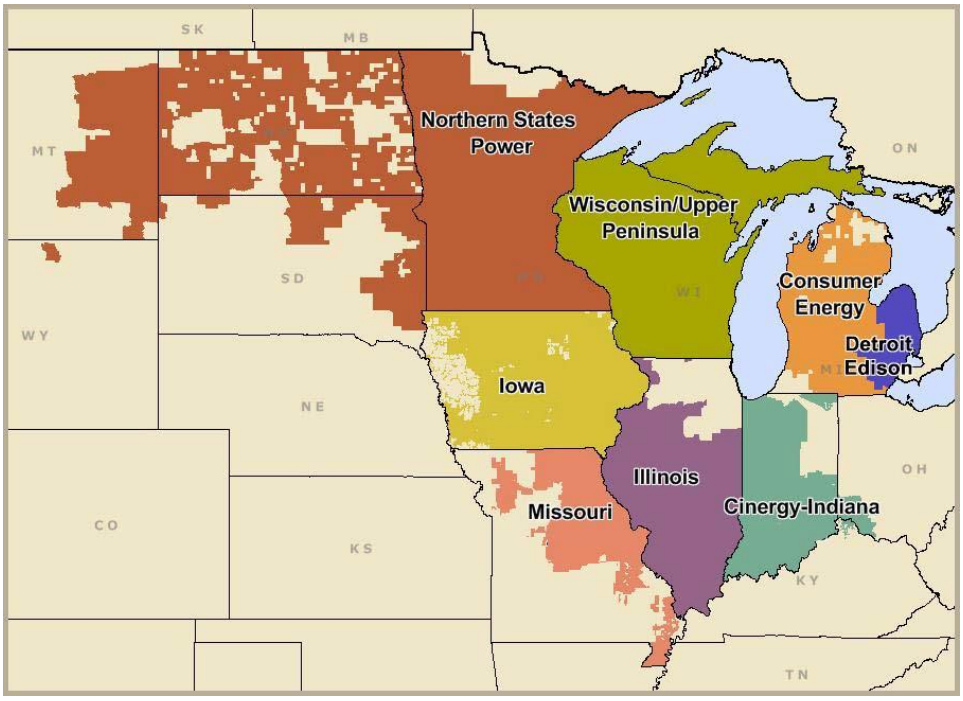
Comments on the May 2012 Brattle Group Report

I have reviewed the Brattle Group Study and have the following comments:

The MISO Region is Relatively Underscrubbed When Compared to Other Regions and this has implications for their assumed "soft cap"

According to the FERC web site: MISO covers most of North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Illinois, Indiana, Michigan and parts of Montana, Missouri, Kentucky, and Ohio. As shown below, the parts of Ohio, Kentucky and Montana are relatively small parts of those states. Using NEEDS v4.10, I compared the scrubbed and unscrubbed capacity in North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Wisconsin, Illinois, Indiana, Michigan and Missouri to the rest of the country.

Figure 1. MISO Region [1]



Figures 2a and 2b compare the scrubbed capacity in the in the MISO region versus the rest of the country. Outside of MISO, nearly 66% of coal capacity is scrubbed while only 40% is scrubbed in the MISO region. This has implications for establishing the MISO "soft cap" because Brattle Group looks at historical retrofits in determining their "soft cap". I would argue that the "soft cap" they have assumed should be raised by about 65% to make it comparable to the rest of the country.

[1] http://www.ferc.gov/market-oversight/mkt-electric/midwest.asp#geo

Figure 2a. MISO Coal Capacity

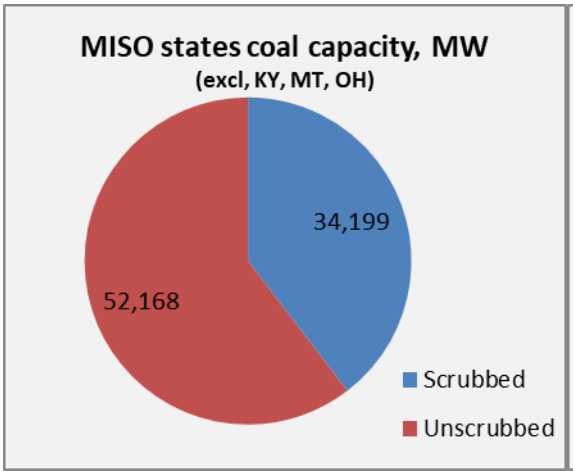
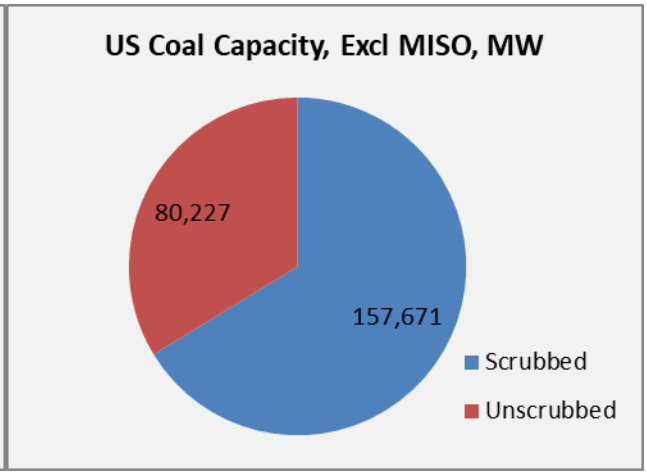


Figure 2b. US coal capacity, excluding MISO



They use boilermaker numbers that are far too low.

Brattle Group states that they use BLS data on available boilermakers. The May 2011 Occupational Employment Survey shows 18,850 boilermakers in total and when you look at the Industry Profile for the boilermaker occupation it shows only 1,850 in Utility System Construction (there are also other areas such as Building Equipment Contractors, Industrial Machinery Repair and Maintenance that also could apply to retrofit of power plant equipment that Brattle Group did not include).

What is troubling, or perhaps telling, is that the Brattle Group didn't do a sanity check of such a critical assumption. They didn't ask themselves, "If there are only 1850 boilermakers in the US, how could all of those CAIR Retrofits and new builds have taken place?" For example, Figure 15 of their report shows a peak of about 90 GW FGD equivalent in construction in 2009 *which we know occurred*. In fact from 2007 to 2011 there are four solid years over 50,000 MW FGD equivalent. Yet, if you look at Figures 18 and 20 of their report, you would reach the conclusion that there are only enough boilermakers in the US to support an effort that is between 10 and 60 GW and averages about 50 GW over four years. *In other words, using the Brattle Group's assumptions, the CAIR retrofits could not have happened.* They should have sanity checked such a critical assumption.

The BLS labor force data is generally reliable for most common occupations (teachers, plumbers, dentists, etc.) but for a very specialized trade like boilermakers it is not. BLS conducts monthly surveys of 60,000 households[2] out of roughly 114 million US households,[3] or about 0.05% of all US households. If the 18,850 total boilermakers that BLS has estimated were spread evenly among the households, only about 10 of the 60,000 households surveyed would have a boilermaker. A one boilermaker difference in the survey equates to nearly 2000 boilermakers nationwide! So, when BLS shows estimates of the number of boilermakers that work in the five different industry groups that they list for boilermakers and how they are distributed among states from this sample of only about 10 boilermakers, it should be

[2] http://www.bls.gov/opub/hom/homch1_b.htm
[3] http://quickfacts.census.gov/qfd/states/00000.html

recognized that there is a large potential for error. I would compare it to measuring the size of a flea with a yardstick. As a result, the BLS data doesn't have as much resolution as data available from industry. BLS data can also be misinterpreted, which is what I believe Brattle Group did in arriving at only 1850 boilermakers being available for power plant construction work.

Better data on construction boilermaker employment is available from the National Association of Construction Boilermaker Employers (NACBE) and information on available union boilermakers[4] is available from the International Brotherhood of Boilermakers. I provided detailed boilermaker statistics in the recent update of the 2002 report.[5] Figure 3 shows a graph taken out of that report showing the construction boilermaker membership – all of whom are available for utility construction work. In contrast, Brattle Group assumes only 1850 boilermakers available for utility construction out of the BLS estimate of 18,850 total boilermakers (what are all the other guys doing?)

Figure 4 shows boilermaker employment manhours from the NACBE plotted against SCR and scrubber retrofits, and you can see the high correlation between the two. I have a lot more confidence in this data than what BLS generates for the reasons I've described.

On the positive side . . .

Figure 17 of the Brattle Group report is interesting because it shows that, except for wet scrubbers, every conceivable control technology can be installed in the MATS time frame when a one-year extension is available. I don't recall the IPM modeling results for MATS, but I don't expect MATS to be a driver for wet FGD (I think it actually lowered FGD retrofits from the base case). So, in a sense, this is supportive.

Of course, the Brattle Group also relies on the EEI study that was issued about a year prior to the rule being finalized, and was likely prepared before MATS was even proposed. In this EEI study make numerous assumptions that overstate the cost to comply with MATS. I believe that they assume that all or nearly all boilers need scrubbers to comply with the HCl limit, and that ACI is always used with a fabric filter. Table 1 shows some comments I made regarding assumptions used in the NERA report issued late last year. You can download this at www.AndoverTechnology.com.

[4] There are some non-union boilermakers, but data is less available on them

[5] Andover Technology Partners, "*ENGINEERING AND ECONOMIC FACTORS AFFECTING THE INSTALLATION OF CONTROL TECHNOLOGIES", December 15, 2011*

Figure 3. Construction Boilermaker Membership.

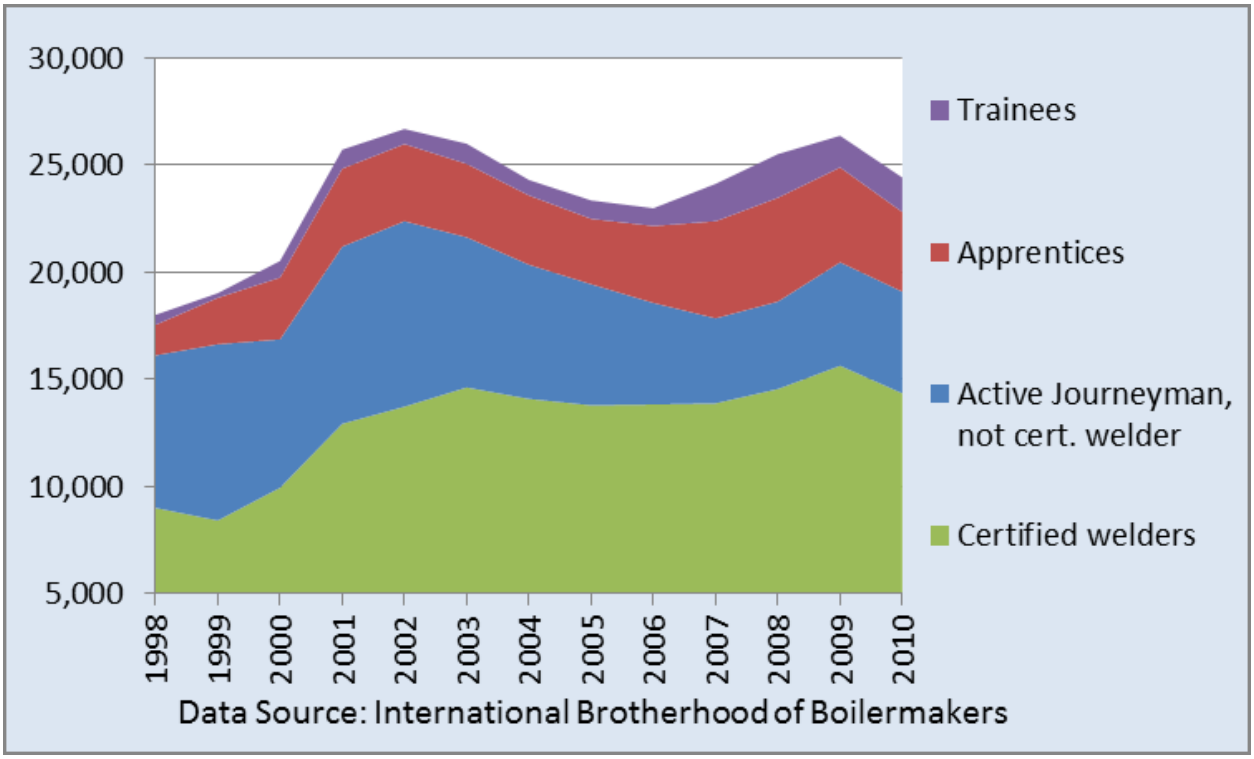


Figure 4. Boilermaker manhours and new scrubber and SCR's in service on coal units

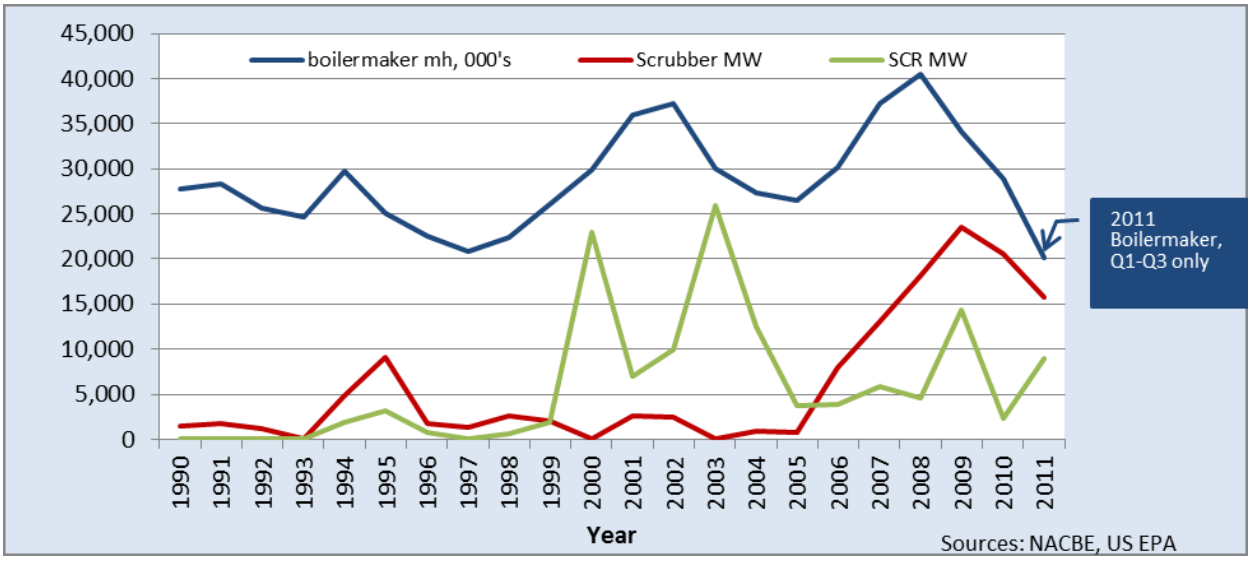


Table 1. NERA Assumptions, Actual Practice and Impacts of the Assumptions

NERA Assumption	***Unit-by-unit compliance requirements***
Actual Practice	*The proposed rule allows facility-wide averaging in demonstrating compliance. This will mean that smaller units co-located with larger units may not need to install additional controls if the larger unit is achieving sufficiently low emissions.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more technology retrofits and higher costs than will actually be necessary.*
NERA Assumption	***All coal units will require HCl Controls – DSI with a fabric filter, wet FGD or Dry FGD***
Actual Practice	*Most western fuels, especially PRB fuels, have low intrinsic chlorine and have high free lime in the fly ash. In most cases, the inherently low HCl is neutralized very effectively by the ash without any additional equipment and this is supported by the coal and stack test data companies reported to EPA. Few subbituminous coal units are likely to need HCl controls.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more DSI and scrubber retrofits and higher costs than will actually be necessary.*
NERA Assumption	***DSI is not applicable for boilers larger than 300 MW***
Actual Practice	*This assumption is simply untrue. Dominion's Kinkaid plant, with two 660 MW boilers burning PRB coal, has been utilizing DSI for SO_2 control upstream of the existing ESPs as part of its BART compliance strategy.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more scrubber retrofits and higher costs than will actually be necessary.*
NERA Assumption	***All DSI installations require a fabric filter***
Actual Practice	*While beneficial, a fabric filter is generally not necessary for DSI. In fact, DSI using trona or sodium bicarbonate actually **improves** the performance of the existing ESP.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more fabric filter retrofits and higher costs than will actually be necessary.*
NERA Assumption	***Only remedy for Hg emissions is ACI with a fabric filter***
Actual Practice	*Some ACI installations may need a fabric filter, but many will not. Experience thus far has found that fabric filters have generally **not** been necessary for ACI systems. Moreover, scrubbed units can generally increase Hg capture through chemical addition (such as bromide addition), or other approaches that are far less expensive than ACI with a fabric filter.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more fabric filter retrofits and higher costs than will actually be necessary.*
NERA Assumption	***Only remedy for PM emissions is a fabric filter***
Actual Practice	*Many ESPs can be upgraded to meet the PM standard at a much lower cost than a fabric filter. In fact, retrofit of DSI can improve ESP performance and provide acid gas reductions.*
Impact of Assumption	*This incorrect assumption will result in forecasting an apparent need for more fabric filter retrofits and higher costs than will actually be necessary.*