

# ***THE IMPACT OF EPA REGULATION AND U.S. SUPREME COURT OVERSIGHT ON THE SHAREHOLDERS OF U.S. UTILITIES UTILIZING COAL***

Kirk Philipich  
University of Michigan – Dearborn  
313-593-4731  
klpdba@umich.edu

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## **Abstract**

The vast majority of previous market-based research regarding the EPA has focused on individual firm effects due to violations. The current study attempts to identify industry/portfolio effects due to the issuance of new regulations and to any subsequent legal efforts challenging these new regulations. The issuance of both the draft and final versions of the Clean Power Plan is analysed for any market reaction that may have occurred to U.S. coal-burning utilities. Additionally, three U.S. Supreme Court rulings are analysed which: (1) directly related to the legitimacy/legality of the Clean Power Plan, or (2) were intervening and may have impacted the plan itself or the market's estimate of its chances to survive court challenges. The analysis revealed a significant and negative market reaction to the release of the final version of the Clean Power Plan. Additionally, the analysis identified a significant and positive market reaction to a U.S. Supreme Court ruling that struck down previous attempts by the EPA to regulate the mercury emissions of power plants because the EPA had not considered the cost to the economy of these regulations. However, this market reaction may be limited to a group of smaller utilities and/or those with thinly traded securities.

Keywords: Clean Power Plan, U.S. Supreme Court, Event Study

## 1. Introduction

The primary focus of the current research is an event study analysis of the impact on shareholders of U.S. coal-burning utilities to the creation and announcement of the Environmental Protection Agency's (EPA) Clean Power Plan. The regulations contained within the Clean Power Plan were intended to drastically reduce the amount of carbon emissions from power plants, primarily coal-burning power plants, by forcing utilities to replace coal-burning units with either natural gas-burning units or with renewable sources. If allowed to stand, these regulations would require utilities to spend billions of dollars and the entire electricity grid system would require major overhauls (Smith, 2015; Snead, 2012).

Three events related to the issuance of the Clean Power Plan are examined: (1) date on which the draft or "for discussion" version of the Clean Power Plan was issued by the EPA, (2) date on which the final version of the Clean Power Plan was issued by the EPA, and (3) the date on which the U.S. Supreme Court ruled that various aspects of the Clean Power Plan had to be litigated in lower courts, thus delaying, and in effect stopping, the plan going into effect. Additionally, two other Supreme Court rulings that were issued during this time period that may have had an impact on the Clean Power Plan itself and/or on how the market may have reacted to the plan are also examined.

The results reveal a significant and negative market reaction to the issuance of the final version of the Clean Power Plan. Both a corresponding group of international utilities and a group of U.S. utilities that were not coal-burning showed no such significance. It is somewhat surprising that no market reaction was found when the draft version was issued. Neither the size of the utilities nor the thinness of the trading in their securities was found to impact this result. Thus, as has been found with a myriad of other legislative and agency actions, the market reacts to newly created laws and regulations.

One of the two other Supreme Court intervening rulings elicited a significant, positive market reaction. This ruling, requiring the EPA to consider the costs to the economy of its regulations, forced the EPA to withdraw rules limiting the amount of mercury emissions coming from coal-burning power plants. However, after further analysis, it appears that only the smallest U.S. utilities and/or those U.S.

utilities with thinly traded securities saw a significant market reaction to this ruling. Thus, the generalizability of this result is unclear.

## **2. Background and prior literature**

There is a vast literature that examines the market response to legislative and agency actions of the U.S. Government. This literature extends to tax policy, energy policy, environmental policy, and health and safety policy to name just a few. Thus, if the action taken by the U.S. Government affects a large number of publicly traded companies in a material manner, then an event study has most likely been used to attempt to discern the market's view of or estimate of the action's future ramifications. Because event studies are more likely to identify market reactions to new, previously unknown information, few of these studies examine both the initiation of new legislation and/or regulations and any further developments impacting the legitimacy of these governmental actions. The current study attempts to examine newly announced regulations by the EPA and further actions taken by the U.S. Supreme Court ruling on its legitimacy.

### *2.1. Events of interest*

The primary action taken by the EPA of interest to the current study is the adoption and planned implementation of the Clean Power Plan. The Clean Power Plan was the Obama administration's primary regulatory action taken in regards to climate change. As required by law, the EPA made public its draft version of the Clean Power Plan on June 2, 2014 (Harder, 2014) and made public the final version of the Clean Power Plan on August 3, 2015 (Smith, 2015). The primary industries that these new regulations were intending to impact were the coal industry and the portion of the utility industry that employed coal to generate electricity because the Clean Power Plan sought major reductions in carbon emissions.

However, various states and utility and/or business or trade groups immediately filed suit to prevent these regulations from being enforced. On February 9, 2016, the U.S. Supreme Court ruled that before it could rule, several items contained within the Clean Power Plan had to be litigated by the lower courts (Harder and Kendall, 2016). This ruling by the U.S. Supreme Court, for all practical purposes, stopped the Clean Power Plan from being implemented because a presidential election was being held the following fall. Thus, these three dates, June 2, 2014, August 3, 2015, and February 9, 2016, are all key dates to be examined by the current study in an attempt to identify significant market reactions within the coal-burning portion of the U.S. electric utility industry.

Two additional intervening actions by the U.S. Supreme Court may have had an impact not only on the market's reaction to the three key dates above, but possibly on the regulations themselves and/or on the likelihood that the Clean Power Plan would ever be implemented. On June 23, 2014, the Supreme Court ruled, in a separate action, that the EPA was within its rights, granted to it by legislative action (the amended version of the Clean Air Act), to regulate greenhouse gases originating from power plants (Kendall and Harder, 2014). This ruling, coming just after the draft version of the Clean Power Plan was made public, may have emboldened the Obama administration to regard the Clean Power Plan to be unstoppable or may have led to its regulations, in their final form, to be more restrictive. Additionally, once this ruling was made, it may also have impacted the market to also believe that the regulations being proposed by the Clean Power Plan were unavoidable.

Subsequently, on June 29, 2015, in another separate ruling by the U.S. Supreme Court, previous EPA regulations meant primarily to limit the mercury emissions of coal-burning power plants were struck down (Anonymous, 2015). In this action the U.S. Supreme Court held that the EPA was required by law to consider the costs to the U.S. economy of any regulations it put forth. Likewise, this ruling by the U.S. Supreme Court may have caused the market to improve its forecasts for the coal-burning segment of the electric utility industry and/or made the market perceive that the eventual Clean Power Plan regulations would have to be less severe or face being struck down by the U.S. Supreme Court.

## 2.2. *Event expectations*

Examples of prior research that has identified significant market reactions to environmental incidents and EPA actions include: (1) firms' environmental incidents (Lundgren and Olsson, 2010), (2) firms being targeted by the EPA for investigation (e.g. Bosch et al. 1998), (3) firms being forced to comply with EPA regulations (e.g. Bosch et al. 1998), and (3) settlements being reached with the EPA (e.g. Badrinath and Bolster, 1996). Thus, one might easily expect that the establishment of regulations that precede these events and lay the framework by which EPA actions are based would also lead to significant market reactions. In addition, Philipich et al. (2017) utilized a small sample of publicly traded coal producers to show that these firms experienced negative abnormal returns when the final Clean Power Plan was released and positive abnormal returns when the U.S. Supreme Court ruled that the EPA must consider the costs to the economy of their regulations.

A reasonable expectation for the five events of interest to the current study is that: (1) the two dates corresponding to the release of the draft and final versions of the Clean Power Plan regulations, June 2, 2014, and August 3, 2015, would result in negative abnormal returns for coal-burning utilities, (2) the two dates on which the U.S. Supreme Court made public their rulings either limiting or delaying the enforcement of EPA regulations, June 29, 2015, and February 9, 2016, would result in positive abnormal returns for coal-burning utilities, and (3) the date on which the U.S. Supreme Court mostly agreed with the EPA that it could indeed place limits on greenhouse gas emissions, June 23, 2014, may result in negative abnormal returns to coal-burning utilities.

## **3. Data and methodology**

Heyes (2009) suggested that detrimental product market competition effects due to environmental regulations must be considered in order not to overstate the net benefits accruing from environmental regulations (Heyes, 2009). Thus, a traditional event-study approach is employed in order to examine industry-wide shareholder effects of the release of new EPA regulations and U.S. Supreme Court rulings.

Specifically, the event-study approach employed requires daily individual security returns for U.S. utilities and returns for an overall market proxy, all of which are gathered from CRSP. Additionally, the U.S. utilities examined all utilized coal to generate electricity. A total of forty-two utilities were identified that utilized coal and that had their security returns available on CRSP for the January 2, 2014, to March 31, 2016, time period.

During this time period many U.S. utilities either had, or were in the process of replacing some portion of their coal-fired electricity generation with natural gas. Thus, many have conjectured that this replacement was being driven by the reduced cost of natural gas. If cost is the primary, or even a secondary, driver of this replacement, then those utilities that were more proactive in their replacement of coal may see greater profits, thus greater returns. Thus, the following augmented market model is the primary vehicle through which the examination of U.S. utilities' returns is performed:

$$R_{Pt} = \alpha_P + \beta_P R_{Mt} + \beta_{NG} NG_t + \beta_{CO} CO_t + \varepsilon_t \quad (1)$$

where:

$R_{Pt}$  = the daily return on an equally-weighted portfolio of electric providers/generators,

$R_{Mt}$  = the daily return on the value-weighted CRSP index,

$NG_t$  = the daily percentage change in the spot price for natural gas, and

$CO_t$  = the daily percentage change in the spot price for crude oil.

The data collection process uncovered that “thin trading” resulted in a large number of “zero price changes” within the daily series of spot natural gas prices. Because of this thin trading its estimated coefficient could easily be “truncated” toward zero. This could lead to failing to reject this variable as having no relation to U.S. utilities' stock returns. Thus, an additional explanatory variable that may be correlated with percentage change in natural gas spot prices, the percentage change in crude oil spot prices, is also incorporated into the above augmented market model.

In order to test for any market reaction to the five events of interest, ten dummy variables, two individual days for each of five separate events, are also included, leading to:

$$\begin{aligned}
R_{Pt} = & \alpha_P + \beta_P R_{Mt} + \beta_{NG} NG_t + \beta_{CO} CO_t + \beta_{D,0} D_{D,0} + \beta_{D,1} D_{D,1} + \beta_{F,0} D_{F,0} + \beta_{F,1} D_{F,1} + \beta_{GHG,0} D_{GHG,0} \\
& + \beta_{GHG,1} D_{GHG,1} + \beta_{CC,0} D_{CC,0} + \beta_{CC,1} D_{CC,1} + \beta_{CPP,0} D_{CPP,0} + \beta_{CPP,1} D_{CPP,1} + \varepsilon_t
\end{aligned} \tag{2}$$

where:

$D_D$  = two separate dummy variables equal to “1” for the day of (day 0) and the day following (day +1) the release of the draft version of the Clean Power Plan, and “0” otherwise,

$D_F$  = two separate dummy variables equal to “1” for the day of (day 0) and the day following (day +1) the release of the final version of the Clean Power Plan, and “0” otherwise,

$D_{GHG}$  = two separate dummy variables equal to “1” for the day of (day 0) and the day following (day +1) the U.S. Supreme Court’s issuance of its ruling that the EPA was able to regulate greenhouse gas emissions, and “0” otherwise,

$D_{CC}$  = two separate dummy variables equal to “1” for the day of (day 0) and the day following (day +1) the U.S. Supreme Court’s issuance of its ruling that the EPA must consider the costs to the economy of implementing their regulations regarding mercury emissions, and “0” otherwise, and

$D_{CPP}$  = two separate dummy variables equal to “1” for the day of (day 0) and the day following (day +1) the U.S. Supreme Court’s issuance of its ruling that various aspects of the Clean Power Plan must be litigated in the lower courts, and “0” otherwise.

Because the market was expecting these events to occur, but was completely unaware of the exact timing of their release, the market likely could not anticipate their exact release; thus, any market reaction attributable to these events could not occur prior to the day that these events became known (day 0).

Again, because the market was expecting these events, and may have been awaiting their eventual consequences, any market reaction would most likely occur quickly and not be drawn-out past the day following the event becoming known (day +1). Thus, in order to provide for as powerful a test as possible and to reduce the impact of other unrelated events, the day of the release (day 0) and the following day (day +1) are examined for any market reaction to these events.

The five events being examined all occurred within approximately eighteen months. Because the impact of these events on the factors (e.g.  $\beta$ ) used in various asset pricing models (e.g. market model) is unknown and the events are closely grouped in time, it seemed appropriate to simultaneously estimate market risk ( $\beta$ ) and the potential market reaction these events might elicit. If the market reaction to these events was estimated individually, one event's estimation period would overlap another event's testing period. Thus, if any of these events do impact  $\beta$ , then by estimating equation (2) over the January 2, 2014, to March 31, 2016, time period any impacts would be included to some degree into the estimated value for  $\beta$ . Therefore, the "portfolio/industry approach" and the use of equation (2), a dummy variable regression with which to estimate any market reactions was adopted. This approach to detecting abnormal returns has been used extensively and two excellent examples of its use in the policy area are Gilligan and Krehbiel (1988) and Hughes et al. (1986).

#### **4. Results and discussion**

The analysis began by estimating equation (2) with the forty-two U.S. coal-burning utility firms formed into an equally-weighted portfolio, referred to as portfolio 1. The results from this estimation can be found in the first column of Table 1. With regards to the issuance of the Clean Power Plan, this portfolio was unaffected by the EPA's issuance of the draft version of the plan. However, on the day following the release of the final version of the Clean Power Plan the portfolio experienced a significant ( $\alpha = .05$  level) negative market reaction of -1.76%. The ruling by the U.S. Supreme Court that the EPA must consider the economic costs of new regulations in its application of the as amended Clean Air Act to regulate mercury emissions saw the portfolio experience a significant ( $\alpha = .01$  level) positive reaction of 3.13% on the day this ruling was announced. There was no detectable market reaction associated with the U.S. Supreme Court rulings that the amended Clean Air Act allowed the EPA to regulate greenhouse gases or the ruling that various provisions of the Clean Power Plan had to be litigated in the lower courts before the U.S. Supreme Court could rule on the plan's legitimacy.



Two additional portfolios were formed for which these events would not be expected to yield market reactions in order to act as a check on the portfolio 1 results. An equally-weighted portfolio of fifteen international utilities was created (portfolio 2) as was an equally-weighted portfolio of seven U.S. utilities that did employ coal to generate electricity (portfolio 3). These portfolios were then used to estimate equation (2); the results of these estimations are also reported in Table 1. As expected, the international portfolio was unaffected by any of the events examined, a result that lends some efficacy to the results found for the forty-two firm coal using utility portfolio. Interestingly, while the portfolio of U.S. utilities not employing coal (portfolio 3) was unaffected by the events affecting the coal-burning portfolio, it was significantly ( $\alpha = .05$  level) and positively affected (1.91%) on the day following the U.S. Supreme Court's ruling delaying the implementation of the Clean Power Plan.

Investors are able to form portfolios on other than an equally basis. Thus, portfolio 4 was formed by value-weighting the forty-two U.S. coal-burning utilities and was used to estimate equation (2). These results are also reported in Table 1. Again, this portfolio was significantly ( $\alpha = .05$  level) affected by the release of the EPA's final version of the Clean Power Plan. However, unlike its equally-weighted version, no detectable reaction was found for the U.S. Supreme Court's ruling that the EPA must consider the economic costs of its regulations regarding mercury emissions. The significance of this event identified with the equally-weighted portfolio and its lack of significance when employing the value-weighted portfolio could indicate that only the smallest U.S. utilities that employed coal were affected by this ruling, thus, once these smaller utilities were "under-weighted" by the value-weighted portfolio no significant reaction was discernable.

As a check on the possible influence of size on the forty-two coal-using U.S. utilities' returns, the forty-two firms were split into two twenty-one firm portfolios on the basis of their market capitalization. These two portfolios, portfolio 5, made up of the smaller firms and portfolio 6, made up of the larger firms, were both used to estimate equation (2). These results are reported in Table 2. As expected, both portfolios reveal significant ( $\alpha = .05$  level) and negative market reactions to the release of the final

version of the Clean Power Plan. Also as expected, the smaller firm portfolio, portfolio 5, reacted significantly ( $\alpha = .01$  level) and positively to the U. S. Supreme Court's ruling that the EPA must consider the economic costs of its regulations to regulate mercury emissions while its larger firm counterpart, portfolio 6, did not.

One of the arguments that is often attached to the "small-firm effect" is a lack of trading or "market thinness". Because these two notions, smallness and thin trading, do not necessarily perfectly overlap, see for example the reported thinness in the natural gas spot prices, a second comparison was also undertaken. The forty-two U.S. coal-burning utilities were split into two portfolios based upon the number of "zero returns" found in each utilities' time-series of returns. The test period used, January 2, 2014, through March 31, 2016, contains 565 trading days. Any firm having six or more trading days with a zero return, approximately 1% of the total, was considered thinly traded, a procedure resulting in an equally-weighted portfolio of thinly-traded U.S. utilities consisting of twenty-two firms (portfolio 7). The remaining firms were also used to form an equally-weighted twenty firm portfolio (portfolio 8). The results of estimating equation (2) with these two portfolios is presented in Table 2. The results for the thinly traded portfolio and the non-thinly traded portfolio yield very similar results to those for the small versus large firm estimations. Both portfolios reacted negatively to the release of the final version of the Clean Power Plan, however, only the thinly traded portfolio, portfolio 7, reacted to news of the U.S. Supreme Court striking down the EPA's attempt to regulate mercury emissions without considering the costs to the economy of these regulations.

Finally, twelve of the firms present in the small firm portfolio, portfolio 5, were also present in the thinly traded portfolio, portfolio 7. These twelve firms were used to form one final equally-weighted portfolio, portfolio 9, with which to estimate equation (2). While the  $\beta_{M,0}$  coefficient is nearly identical in the small firm estimation (3.13%) to that in the thinly traded firm estimation (2.93%), for the firms exhibiting BOTH characteristics, small market capitalization and an abundance of zero returns, the

coefficient balloons to 5.18%, a result which could indicate that these two effects, firm size and thin trading, are separable and interact with one another.

The current study was unable to identify any market reaction to the release of the draft version of the Clean Power Plan. Perhaps the market viewed this document as preliminary in nature and was unwilling to attribute any credence to this document foretelling what the final version would require. Also, no market reaction was detectable for the Supreme Court Ruling that the EPA was within its rights to regulate greenhouse gases. The timing of these events is worth noting. First, on June 2, 2014, the EPA made public its draft version of the Clean Power Plan. The market paid little attention to this announcement. Then, on June 23, 2014, the U.S. Supreme Court ruled that the EPA did have the authority to regulate greenhouse gases. Once again, the market paid little attention. However, following this Supreme Court ruling it's possible that the EPA believed that it had been given "carte blanche" authority to regulate the greenhouse emissions of power plants and created stricter rules than it had previously drafted. Thus, on August 8, 2015, when these stricter rules were made known, the market significantly reacted to the release of the final version of the Clean Power. This significant ( $\alpha = .05$  level) market reaction was detectable in ALL estimations (using portfolios 1, 5, 6, 7, 8, and 9), each containing a differing assortment or combination of coal-burning U.S. utilities. The extent of these market reactions ranged from -1.65% to -2.07%, depending on the portfolio used to estimate equation (2). This result is quite strong evidence that the release of the final version of the Clean Power Plan had a detrimental impact on all of the utilities that employ(ed) coal, thus the entire coal-burning utility industry.

With regards to the two other U.S. Supreme Court actions examined, the release of these rulings brought somewhat mixed results. The ruling by the U.S. Supreme Court that delayed the implementation of the Clean Power Plan until further litigation could take place did not elicit a significant market reaction. From the above analysis, the ruling that required the EPA to consider the economic costs of its application of the as amended Clean Air Act initially appeared to impact the entire industry, portfolio 1. However, further analysis, estimating equation (2) with portfolios 4, 5, 6, 7, 8, and 9, would seem to indicate that only the smallest and/or most thinly traded of these forty-two coal-burning utilities

experienced a market reaction to this U.S. Supreme Court ruling. For those smaller utilities with thinly traded securities the effect appears to be magnified, not unlike an interactive effect between size and thinness of trading.

## **5. Conclusions and policy implications**

The impacts of the EPA, its regulations, and adherence to and/or violations of EPA regulations has been known for some time (Endrikat, 2016). Far less is known about the market's assessment of the cost of newly promulgated EPA regulations and even less is known about the market's assessment of the most likely and most frequently used impediment to the application of new regulations, litigation which typically results in U.S Supreme Court rulings. Thus, the current study attempts to shed light on the market's assessment of both of these.

This study has illustrated that creation and dissemination of new regulations draws the attention of stock market participants. This study documented a market reaction to the release of the final version of the Clean Power Plan by examining one of its primary targets, U.S. utilities utilizing coal to generate electricity. Perhaps somewhat surprisingly, the release of the draft version of the Clean Power Plan did not elicit a detectable market response. Thus, policy makers need to be aware of the economic impact that newly promulgated regulations can have on individual market segments and potentially on the economy as a whole.

To a lesser degree, this study has also demonstrated that the creation and dissemination of new regulations is not necessarily the end of the story. The market appears to also regard the oversight provided by potential litigation to also impact its estimates of firm value. This was shown by the current study's identification of a significant market reaction by market participants trading in at least a portion of the U.S. utilities employing coal to a U.S. Supreme Court ruling that the EPA should have considered the costs to the economy of its attempt to regulate greenhouse gases. Thus, it appears that shareholders value

the oversight function and attempts by firms to force the EPA to justify its regulations before an objective body before firms adhere to newly promulgated regulations.

## References

- Anonymous, 2015. The mercurial court; the Supremes rebuke the EPA but decline to rein in its abuses. Wall Street Journal (Online), 29 June.
- Badrinath, S., Bolster, P., 1996. The role of market forces in EPA enforcement activity. Journal of Regulatory Economics 10 (2), 165-181.
- Bosch, J., Woodrow, C., Eckard E., Lee, I., 1998. EPA enforcement, firm response strategies, and stockholder wealth: An empirical examination. Managerial and Decision Economics 19 (3), 167-177.
- Endrikat, J., 2016. Market reactions to corporate environmental performance related events: A meta-analytic consolidation of the empirical evidence. Journal of Business Ethics 138 (3), 535-548.
- Gilligan, T., Krehbiel, K., 1988. Complex rules and Congressional outcomes: An event study of energy tax legislation. The Journal of Politics 50 (3), 625-654.
- Harder, A., 2014. EPA to seek 30% cut in emissions at power plants; plan sets in motion main piece of President's climate-change agenda. Wall Street Journal (Online), 01 June.
- Harder, A., Kendall, B., 2016. Supreme Court puts EPA carbon rule on hold during litigation; decision is setback for Obama's climate agenda. Wall Street Journal (Online), 09 Feb.
- Heyes, A., 2009. Is environmental regulation bad for competition? A survey. Journal of Regulatory Economics 36 (1), 1-28.
- Hughes, J. S., Magat, W. A., Ricks, W. E., 1986. The economic consequences of the OSHA cotton dust standards: An analysis of stock price behaviour. The Journal of Law & Economics 29 (1), 29-59.
- Kendall, B., Harder, A., 2014. Supreme Court ruling backs most EPA emission controls; Justices say EPA can require pollution controls but limit permitting process. Wall Street Journal (Online), 23 June.

- Lundgren, T., Olsson, R., 2010. Environmental incidents and firm value—international evidence using a multi-factor event study framework. *Applied Financial Economics* 20 (16), 1293–1307.
- Philipich, K., Bublitz, B., Ramanan, R., 2017. One conspirator or two in the death of the coal miner’s daughter. *Oil, Gas and Energy Quarterly* 66 (2), 313-326.
- Smith, R., 2015. EPA's new emissions rule to alter energy landscape; despite legal challenges, regulations are expected to change electricity business. *Wall Street Journal (Online)*, 02 Aug.
- Snead, M., 2012. Electricity production under carbon constraints: Implications for the tenth district. *Economic Review, Federal Reserve Bank of Kansas City* (1), 97-127.

Table 1 – Market model regressions (daily) with the following additional variables: (1) percentage change in spot prices for natural gas (NG) and crude oil (CO), and (2) two dummy variables for the day of (day 0) and another for the day following (day 1): (1) two EPA Clean Power Plan regulation announcements, and (2) for the release of three U.S. Supreme Court rulings

$$\text{Model} \Rightarrow R_{Pt} = \alpha_P + \beta_P R_{Mt} + \beta_{NG} NG_t + \beta_{CO} CO_t + \beta_{D,0} D_{D,0} + \beta_{D,1} D_{D,1} + \beta_{F,0} D_{F,0} + \beta_{F,1} D_{F,1} + \beta_{GHG,0} D_{GHG,0} + \beta_{GHG,1} D_{GHG,1} + \beta_{CC,0} D_{CC,0} + \beta_{CC,1} D_{CC,1} + \beta_{CPP,0} D_{CPP,0} + \beta_{CPP,1} D_{CPP,1} + \varepsilon_t$$

	<b>Portfolio 1</b>	<b>Portfolio 2</b>	<b>Portfolio 3</b>	<b>Portfolio 4</b>
$\alpha_p$	0.0004	0.0004	0.0008	0.0000
$\beta_p$	0.6705**	0.9005**	0.6366**	0.0142**
$\beta_{NG}$	0.0072	-0.0092	0.0001	0.0001
$\beta_{CO}$	-0.0107	0.0959**	-0.0267	-0.0004
$\beta_{D,0}$	-0.0045	-0.0031	-0.0057	-0.0000
$\beta_{D,1}$	0.0003	0.0034	-0.0084	0.0001
$\beta_{F,0}$	0.0000	-0.0020	0.0029	0.0001
$\beta_{F,1}$	-0.0185*	-0.0082	-0.0112	-0.0004*
$\beta_{GHG,0}$	-0.0018	0.0016	-0.0101	-0.0001
$\beta_{GHG,1}$	0.0044	0.0054	-0.0044	0.0001
$\beta_{CC,0}$	0.0172*	0.0016	0.0007	0.0001
$\beta_{CC,1}$	-0.0077	0.0019	-0.0013	-0.0001
$\beta_{CPP,0}$	0.0044	-0.0097	0.0011	0.0001
$\beta_{CPP,1}$	-0.0020	0.0024	0.0190*	-0.0000
F	21.79**	30.59**	18.03**	15.53**
R <sup>2</sup>	34%	42%	30%	27%

\*, \*\* respectively, 5%, and 1% two-tailed level of significance

Portfolio 1 => Equally-weighted returns for forty-two U.S. utilities all of which used coal

Portfolio 2 => Equally-weighted returns for fifteen international utilities

Portfolio 3 => Equally-weighted returns for seven U.S. utilities all of which did NOT use coal

Portfolio 4 => Value-weighted returns for forty-two U.S. utilities all of which used coal

D<sub>D</sub> = Dummy variables for the EPA releasing the draft version of the Clean Power Plan

D<sub>F</sub> = Dummy variables for the EPA releasing the final version of the Clean Power Plan

D<sub>GHG</sub> = Dummy variables for the U.S. Supreme Court ruling that the EPA may regulate greenhouse gases

D<sub>CC</sub> = Dummy variables for the U.S. Supreme Court ruling that the EPA must consider the cost of its regulation restricting the amount of mercury being emitted

D<sub>CPP</sub> = Dummy variables for the U.S. Supreme Court ruling that various provisions of the Clean Power Plan must be litigated in lower courts

Table 2 – Market model regressions (daily) with the following additional variables: (1) percentage change in spot prices for natural gas (NG) and crude oil (CO), and (2) two dummy variables for the day of (day 0) and another for the day following (day 1): (1) two EPA Clean Power Plan regulation announcements, and (2) for the release of three U.S. Supreme Court rulings

$$\text{Model} \Rightarrow R_{Pt} = \alpha_P + \beta_P R_{Mt} + \beta_{NG} NG_t + \beta_{CO} CO_t + \beta_{D,0} D_{D,0} + \beta_{D,1} D_{D,1} + \beta_{F,0} D_{F,0} + \beta_{F,1} D_{F,1} + \beta_{GHG,0} D_{GHG,0} + \beta_{GHG,1} D_{GHG,1} + \beta_{CC,0} D_{CC,0} + \beta_{CC,1} D_{CC,1} + \beta_{CPP,0} D_{CPP,0} + \beta_{CPP,1} D_{CPP,1} + \varepsilon_t$$

	<b>Portfolio 5</b>	<b>Portfolio 6</b>	<b>Portfolio 7</b>	<b>Portfolio 8</b>	<b>Portfolio 9</b>
$\alpha_p$	0.0004	0.0005	0.0003	0.0005	0.0002
$\beta_p$	0.7087**	0.6322**	0.7090**	0.6281**	0.7505**
$\beta_{NG}$	0.0067	0.0076	0.0078	0.0065	0.0078
$\beta_{CO}$	-0.0104	-0.0109	0.0040	-0.0268	0.0135
$\beta_{D,0}$	-0.0074	-0.0016	-0.0054	-0.0035	-0.0078
$\beta_{D,1}$	-0.0033	0.0040	-0.0010	0.0018	-0.0044
$\beta_{F,0}$	-0.0011	0.0012	-0.0022	0.0025	-0.0030
$\beta_{F,1}$	-0.0176*	-0.0195*	-0.0165*	-0.0207*	-0.0186*
$\beta_{GHG,0}$	0.0021	-0.0056	0.0005	-0.0042	0.0049
$\beta_{GHG,1}$	0.0030	0.0059	0.0031	0.0060	0.0005
$\beta_{CC,0}$	0.0313**	0.0031	0.0293**	0.0039	0.0518**
$\beta_{CC,1}$	-0.0121	-0.0034	-0.0104	-0.0048	-0.0170
$\beta_{CPP,0}$	0.0041	0.0047	0.0057	0.0030	0.0045
$\beta_{CPP,1}$	-0.0020	-0.0020	-0.0032	-0.0007	-0.0026
F	23.83**	16.98**	26.03**	15.88**	24.69**
R <sup>2</sup>	36%	29%	38%	27%	37%

\*, \*\* respectively, 5%, and 1% two-tailed level of significance

Portfolio 5 => Equally-weighted returns for the smallest (market capitalization) twenty-one U.S. utilities

Portfolio 6 => Equally-weighted returns for the largest (market capitalization) twenty-one U.S. utilities

Portfolio 7 => Equally-weighted returns for the most thinly traded (# of zero returns) twenty-two U.S. utilities

Portfolio 8 => Equally-weighted returns for the least thinly traded (# of zero returns) twenty U.S. utilities

Portfolio 9 => Equally-weighted returns for the smallest and most thinly traded twelve U.S. utilities

D<sub>D</sub> = Dummy variables for the EPA releasing the draft version of the Clean Power Plan

D<sub>F</sub> = Dummy variables for the EPA releasing the final version of the Clean Power Plan

D<sub>GHG</sub> = Dummy variables for the U.S. Supreme Court ruling that the EPA may regulate greenhouse gases

D<sub>CC</sub> = Dummy variables for the U.S. Supreme Court ruling that the EPA must consider the cost of its regulation restricting the amount of mercury being emitted

D<sub>CPP</sub> = Dummy variables for the U.S. Supreme Court ruling that various provisions of the Clean Power Plan must be litigated in lower courts