Overpaying and Underperforming

The Edwardsport IGCC Project

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on behalf of Citizens' Action Coalition, Save the Valley, Valley Watch, and Sierra Club

February 3, 2015

Duke Energy Indiana's (Duke) newest power plant, the Edwardsport IGCC[1] plant in Knox County, Indiana has now been operating for just over 18 months. The plant was originally estimated to cost $1.9 billion but the price tag has since ballooned to $3.5 billion. In June 2013, Duke declared the plant "in-service" which allows the company to begin asking that its customers pay the costs of operating the plant including the cost of fuel, the labor to run the plant, and, to a large degree, the costs to fix the plant when it is needs repair as in the instances shown on the cover of this report. Just as Duke failed to build Edwardsport on time and on budget, since the plant was placed "in-service", by any reasonable measure, Duke has also failed to deliver a plant that operates as promised.

This week, the Indiana Utility Regulatory Commission (IURC)[2] will hold hearings on Edwardsport to determine whether its operating costs can be billed to customers. Hundreds of millions of dollars are at stake.

So what have customers gotten from this money? What were the expectations of Edwardsport during its initial operating period and has it met those expectations? This report measures Duke's promises against what the company has delivered.

Duke's Broken Promises

Duke's major promises to the IURC and Duke's ratepayers regarding Edwardsport's operating performance are summed up in this statement from Duke on October 26, 2011.

> ……. *Importantly, due to its low operating cost, this plant will be among the first dispatched on our system which means that older and less efficient generation will operate less. This is a point that probably has not been emphasized enough. The plant's high efficiency means that it can turn fuel into energy at a lower cost; in fact, at the lowest cost on our system. Edwardsport will be among the cleanest coal plants in the world and will be well positioned for any anticipated new environmental rules.*
>
> – Kelley Karn, Deputy General Counsel, Duke Energy Corporation[3]

When a power plant is dispatched that means it is directed to produce electricity. The dispatcher in this case is the Midcontinent Independent System Operator (MISO), a non-profit entity whose job is to ensure reliable and cost-effective transmission of electricity between the utilities it serves including Duke Energy Indiana. At a basic level, MISO will rank power plants by cost and match them to power demand so that the least cost plants are serving demand first. The last

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[1] An IGCC or integrated gasification combined cycle power plant gasifies a solid

[2] The IURC's mission is "to assure that utilities and others use adequate planning and resources for the provision of safe and reliable utility services at reasonable cost."

[3] Opening statement in Indiana Utility Regulatory Commission Cause No. 43114-IGCC4-S1.

plant dispatched to meet demand will set the market clearing price. This concept is illustrated in Figure 1.

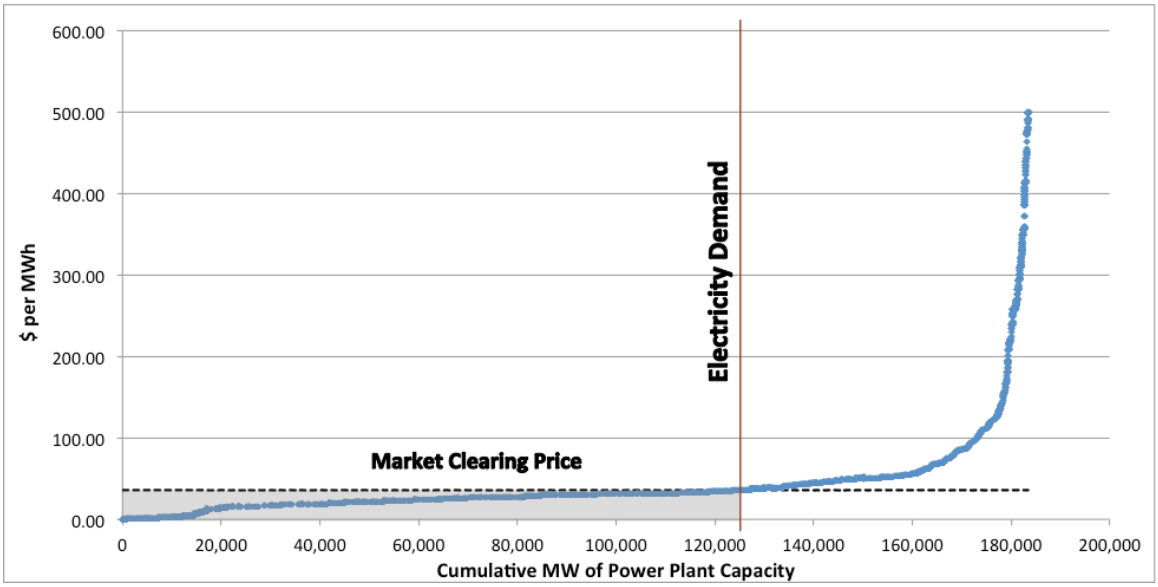

Figure 1. The Supply of Power Plants is Ordered from Least to Most Expensive (in Blue). Where Electricity Demand (in Brown) Crosses the Supply Curve the Market Clearing Price is Set.[4]

The cost by which MISO ranks power plants is the variable cost shown in blue in Figure 1. Variable costs are dominated by the cost of fuel but also include other expenses that can vary with the amount of electricity produced by the plant. The cost to build a power plant and most of the labor needed to operate and maintain it are not part of the variable cost.

The point at which electricity demand crosses the price-ordered "supply curve" of power plants sets the market clearing price shown as the black, dashed line in Figure 1. All power plants falling into the grey rectangle will therefore be dispatched to meet customer demand and will receive the market clearing price.

MISO primarily dispatches power plants on an hourly basis, but Duke's variable costs at this level of detail are proprietary information. However, using publicly available data we can determine variable costs on a monthly basis, which is a good indicator of how Duke's plants generally measure up.

Edwardsport would be the first Duke plant to be dispatched if its variable costs are less than those of the other plants on Duke's system. If Duke had kept its promise to customers, Edwardsport would be the first plant on this variable cost

[4] The horizontal axis of Figure 1 is measured in cumulative megawatts (MW). A megawatt is an instantaneous measure of a power plant's ability to produce electricity.

curve. However, as shown in Figure 2, Edwardsport was NOT the least cost plant and therefore would NOT have been the first plant dispatched.

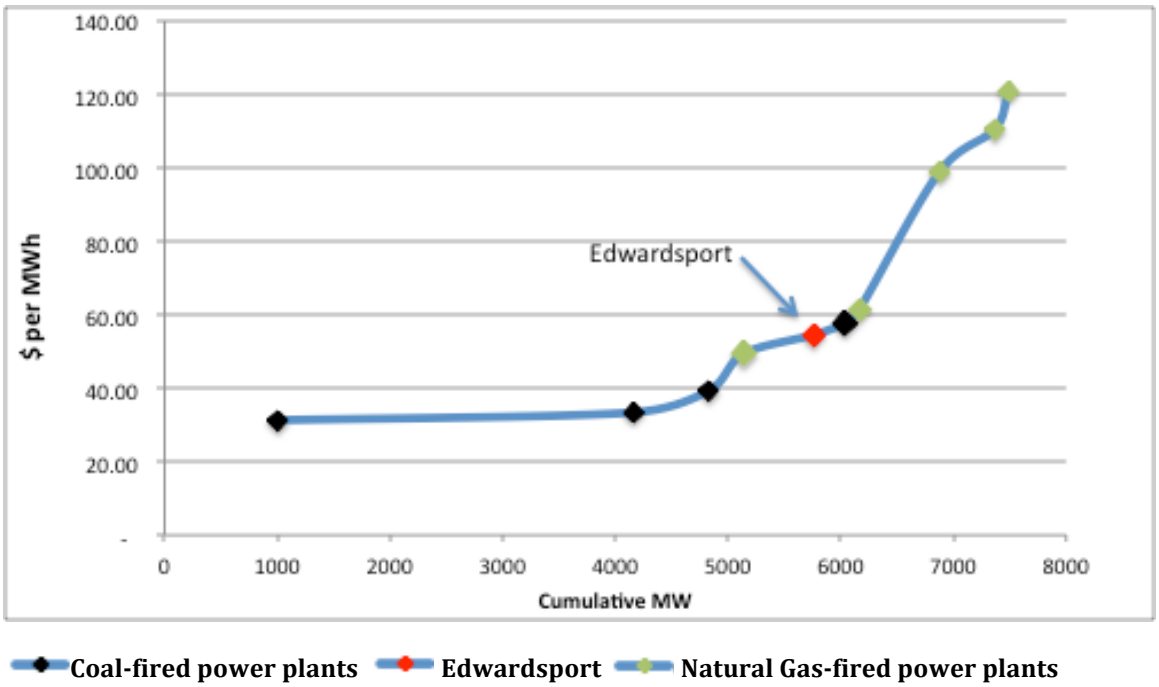

Figure 2. Edwardsport Was Not the Lowest Cost Duke Plant When it was Placed "In-Service" in June 2013.[5]

In fact, Edwardsport, represented by a red triangle in Figure 2 was, on average, only the 5th least expensive plant on Duke's system, falling behind three coal plants and one natural gas plant. And in *no* month from June 2013 through October 2014, the most recent month for which data is available, has Edwardsport been Duke's least cost plant.

Edwardsport is *not,* as Duke promised, causing "older, less efficient generation" to operate less, in large part because it is not very efficient itself. During proceedings in front of the IURC in 2010, Duke stated that Edwardsport would have an efficiency of about 36 percent in the fall and spring, a drop from the 38 percent level promised initially.[6] That means that for every unit of fuel put into the plant, a third of a unit of electricity would be put on the grid. During the summer, when it is hotter, the plant would operate at a somewhat lower but unspecified level of efficiency.

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[5] This graph show the variable costs of Duke Energy Indiana's coal and gas plants with the exception of the Madison plant since it is dispatched by an entity other than MISO. It is based on information from the U.S. Energy Information Administration and SNL Financial.

[6] Testimony of W. Michael Womack in Cause No. 43114 IGCC 4S1.

However, as shown in Figure 3, Edwardsport has failed to meet this level and in fact, it has fallen far short. Even on a monthly basis, Edwardsport has never come close to 36 percent efficiency.

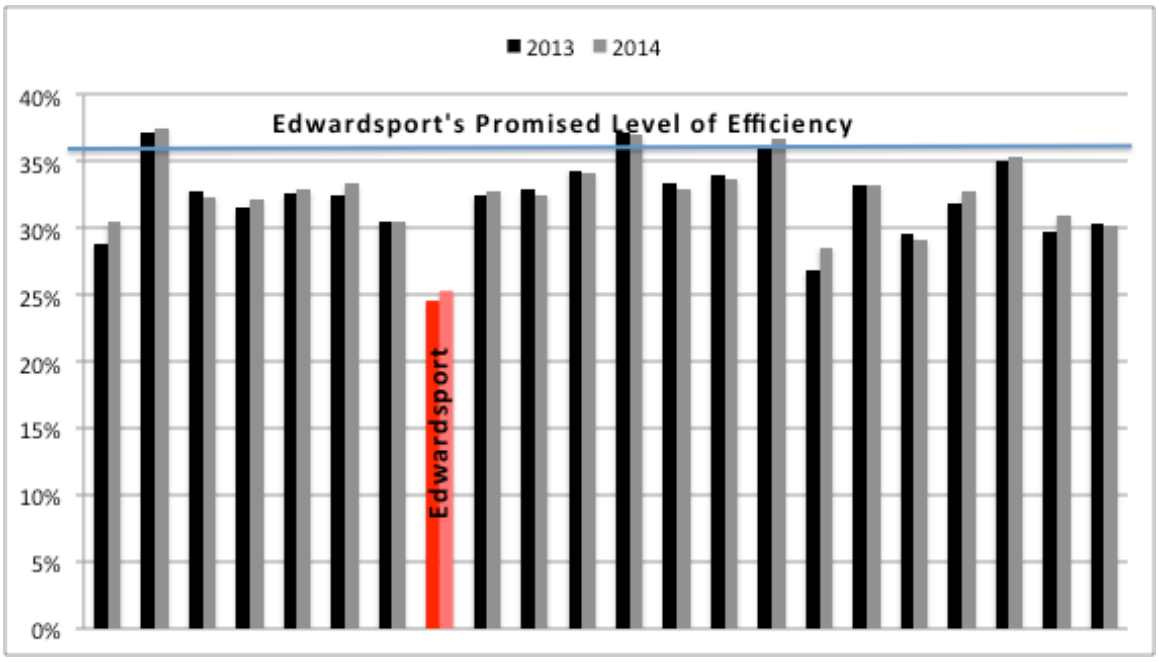

Figure 3. Edwardsport, Despite Being Duke's Newest Power Plant, is Also the Least Efficient.[7]

Edwardsport is shown in red while the other coal plants owned by Duke affiliated companies[8] are shown in black and grey. Edwardsport has the dubious distinction of being the least efficient of Duke's coal plants despite being the newest. In fact, many of these plants date to the 1950s, 60s, and 70s. Even the Walter Beckjord coal plant in Ohio, which Duke fully retired in September 2014, was more efficient than Edwardsport.

No power plant is 100 percent efficient, some power will be diverted to run equipment within the power plant (known as parasitic load) and some fuel will exit the plant as waste heat rather than electricity. As promised to the IURC and Duke customers, the division of these losses and the power actually produced by Edwardsport is depicted in Figure 4.

[7] 2014 data through October.
[8] In addition to Indiana, those companies operate in Ohio, Kentucky, North Carolina, South Carolina, and Florida.

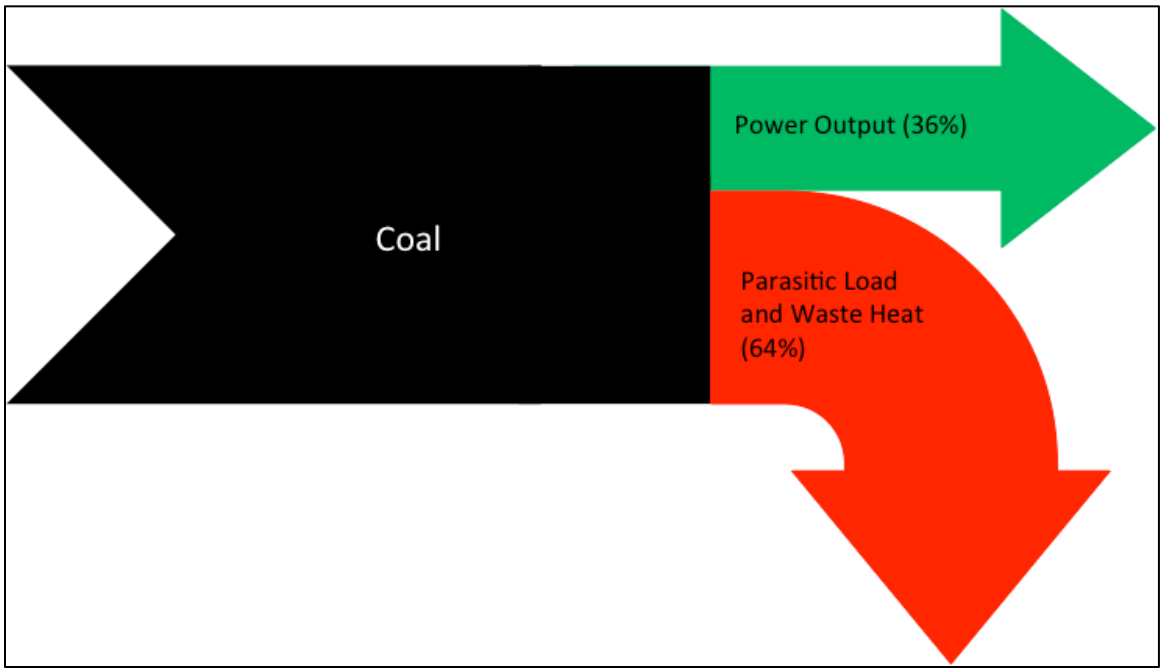

Figure 4. Duke Promised in 2010 that a Third (36%) of Edwardsport's Fuel would be Converted to Electricity.

Since April 2010, Duke has maintained that 36 percent of the fuel input would leave the plant in the form of electricity.

However, in 2013 and so far in 2014, Edwardsport produced significantly less electricity per unit of fuel than this, approximately a quarter of fuel was converted into electricity. This compares poorly to the rest of the Duke coal fleet, which achieved an average efficiency of 33 percent in 2014.

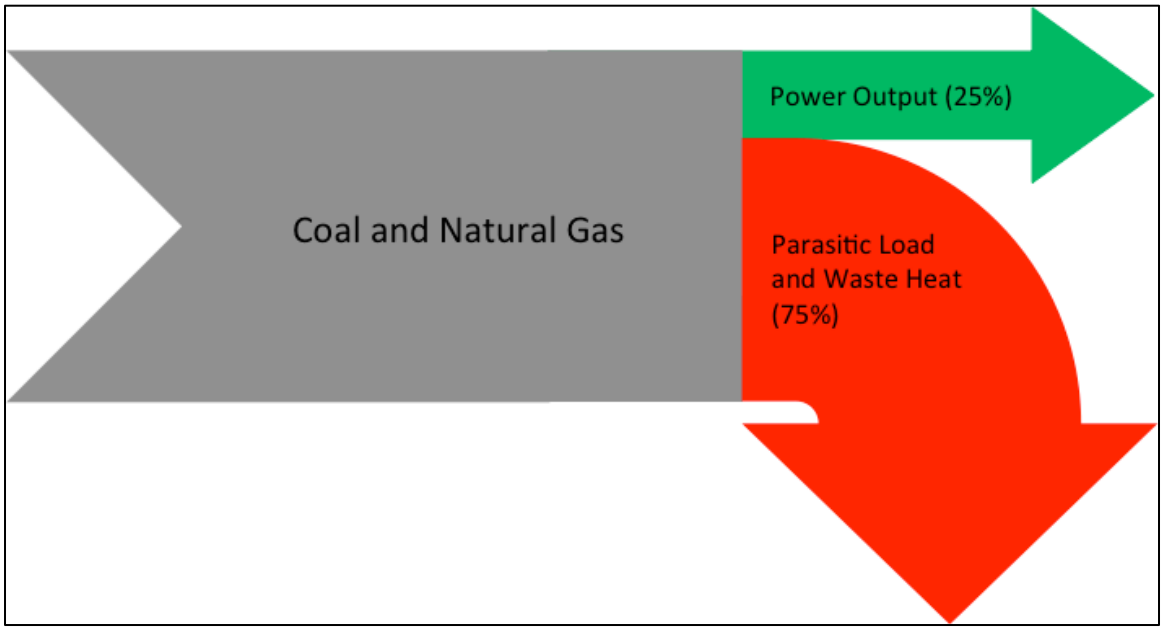

Figure 5. Since Duke Placed Edwardsport "In-Service", it has Only Been Able to Convert One Quarter (25%) of Its Fuel into Electricity.

This lower efficiency translates into higher fuel costs for customers since it takes more fuel to produce the same amount of electricity. In addition, fuel costs are higher because Edwardsport has burned natural gas, a more expensive fuel, during times when it could not gasify coal. Rather than being a "high efficiency [power plant which] means that it can turn fuel into energy at a lower cost," Edwardsport is doing the exact opposite, converting fuel into electricity at low efficiency and higher cost.

Figure 6 shows the difference in fuel costs between Duke's estimated actual fuel costs, which it has requested that regulators let it recover from customers, and the fuel costs that should have been incurred during the first twelve months of operation.

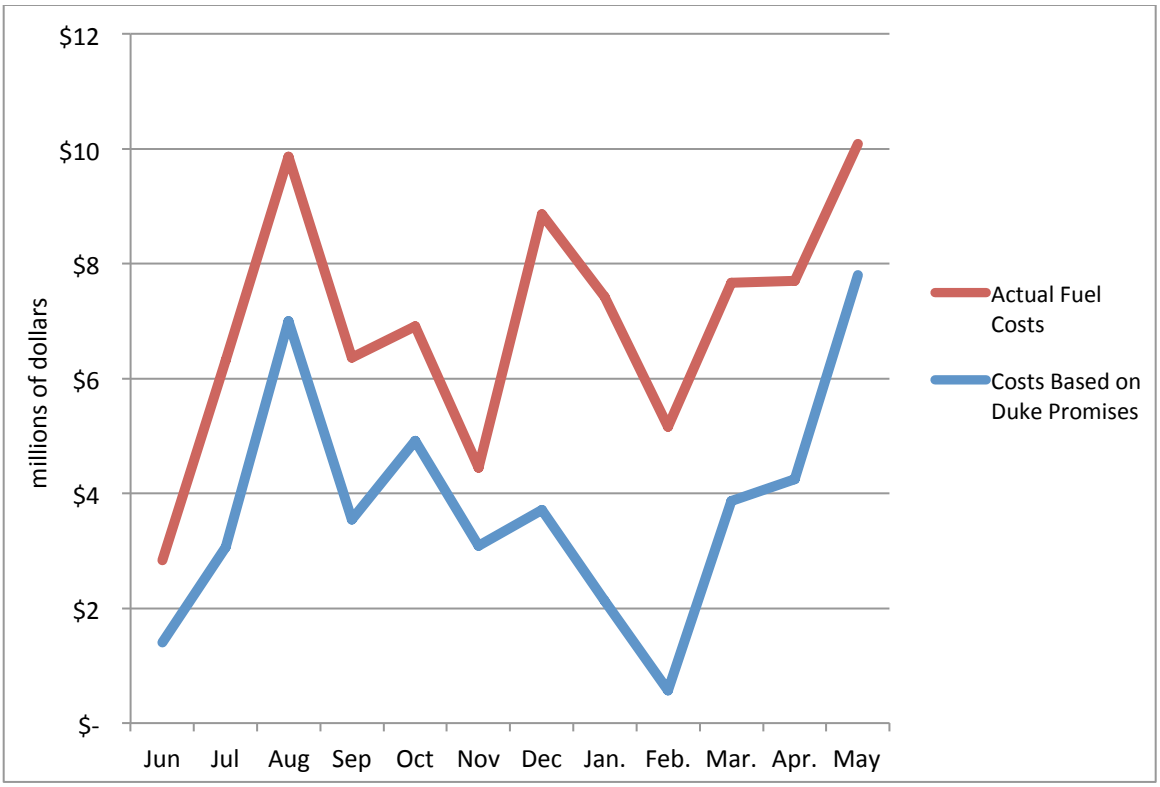

Figure 6. Edwardsport's Fuel Costs are Much Higher than What Was Promised by Duke, June 2013 – May 2014.

During its first year, Edwardsport has *cost* customers $38.3 million more in fuel costs than it should have. In total, Duke has sought to bill customers an estimated $83.6 million for fuel at Edwardsport during this time period.

Edwardsport's month to month fuel costs vary so much in part because the plant has experienced multiple equipment failures and plant shutdowns. In particular, the plant's two gasifiers, which are the only source of syngas for the plant, have encountered frequent problems.

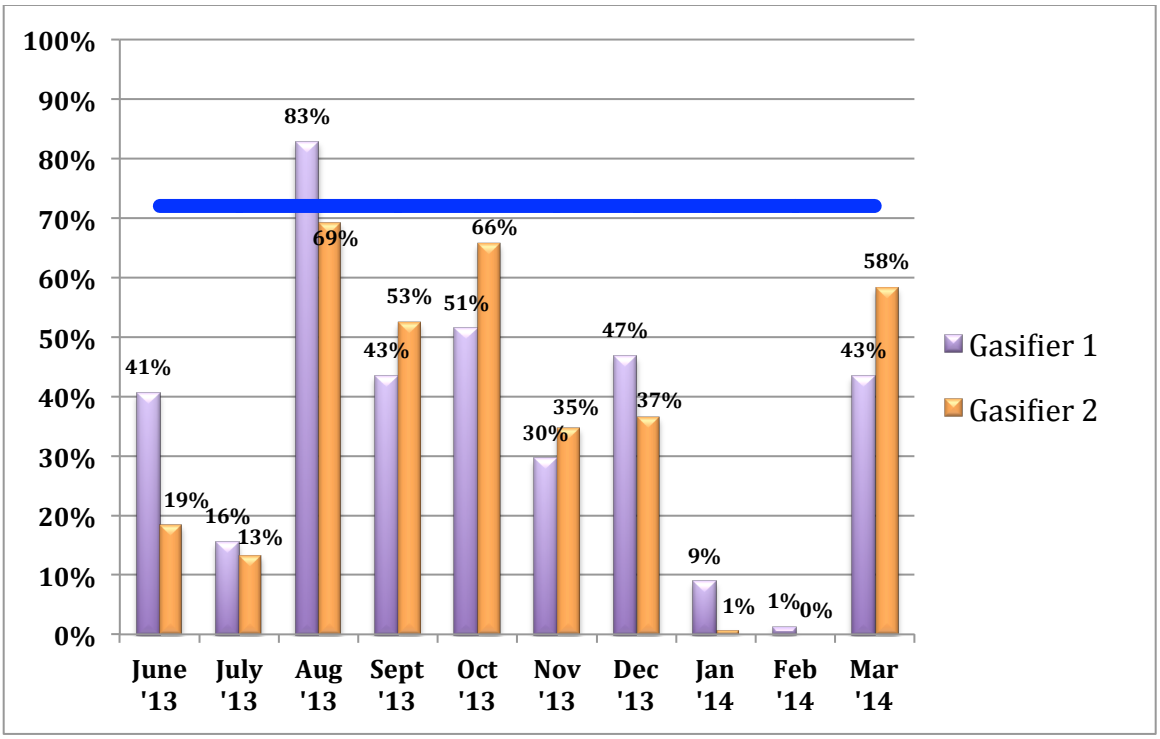

Figure 7. Edwardsport's Gasifiers Operated Much Less than Duke Predicted.[9]

Duke predicated its most recent economic analysis justifying the construction of Edwardsport on its belief that the plant would run the equivalent of 72 percent of the time during the first 15 months of operation. This number is represented near the top of Figure 7 with the horizontal blue line. However, the gasifiers have largely failed to operate even close to this amount of time, with Gasifier 1 operating an average 35 percent of the time and Gasified 2 operating an average of 36 percent of the time. When the gasifiers are down, Duke may have the option to operate Edwardsport on natural gas assuming the rest of the plant is not also down. However, this fuel is more costly, which contributes to the $38 million in increased fuel costs incurred during the first year of operation.

Customers also face extra MISO related costs. Duke has significant influence over how MISO dispatches Edwardsport through a mechanism called "must run" commit status. When a power plant is designated "must run", its owner will specify the amount and length of time power is produced regardless of how the plant's variable costs compare to the market clearing price for electricity. Power plants may use this designation to produce some minimum amount of generation so that they do have not to startup and shutdown from hour to hour which causes excessive wear and tear on the plant. However, Duke appears to be in control of nearly the entire output from Edwardsport. That is, *Duke tells* MISO exactly how much power Edwardsport will generate and when.

[9] Testimony of Jack Stultz in Cause No. 43114, IGCC-12 & 13.

If Duke had *not* determined when Edwardsport operated, the plant would have generated far less power because it is simply not competitive in the MISO market.

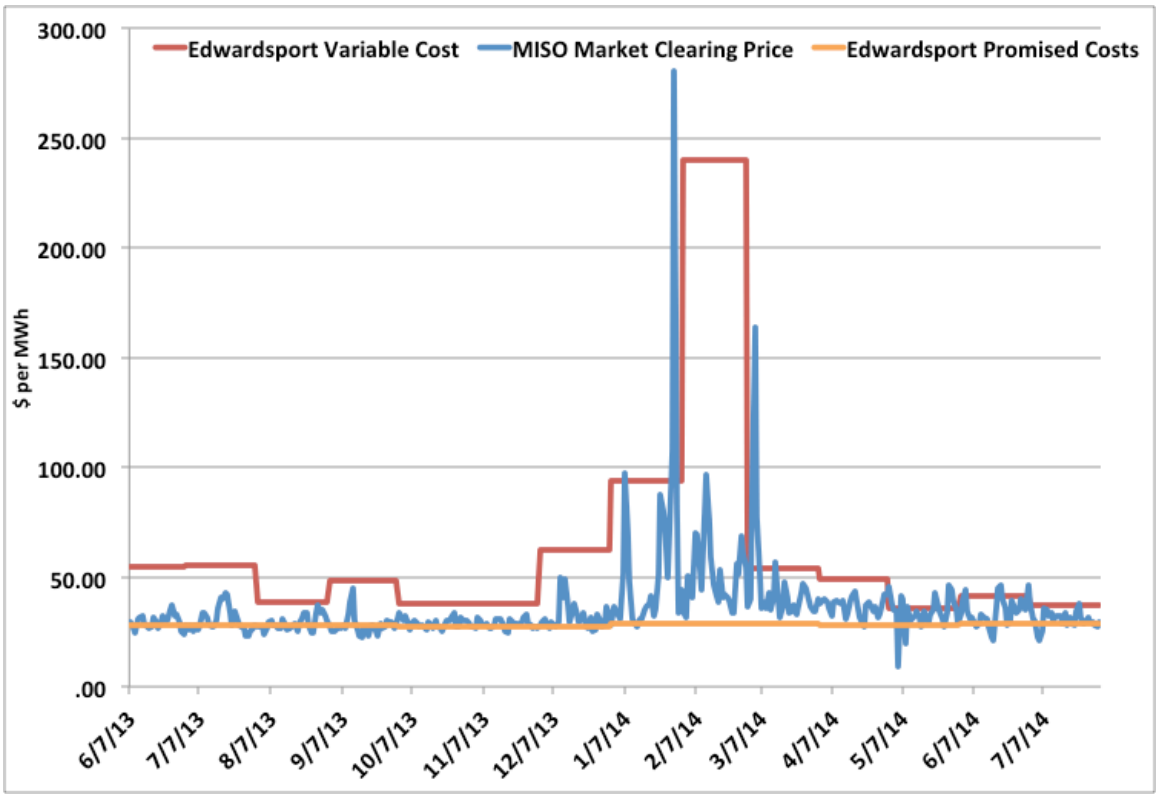

Figure 8. Edwardsport is Often More Expensive than the MISO Market Clearing Price but would be Comparable to Market Prices if it Performed as Duke Promised.

In Figure 8, Edwardsport's average monthly variable costs are shown in red. The market clearing price (in blue) is the price against which Edwardsport would have otherwise been measured. When the red line exceeds the blue, Edwardsport's costs would not be covered by the commensurate MISO revenues, which would have been essentially all of the time from June 2013 through April 2014 and most of the time thereafter. By contrast, the orange line, Edwardsport's variable cost if it had performed as promised, was very comparable to the MISO market clearing price and would have resulted in the plant likely recovering its costs from the MISO market.

Customers paid approximately $20.5 million more for electricity from Edwardsport than they would have paid had that same electricity been purchased from MISO. But customers also have to pay for power to replace what Edwardsport *should* have been generating on their behalf. If that power came from the MISO market, customers would be charged $32.5 million on top of that $20.5 million in Edwardsport's first year of operation alone.

But was Duke at least correct that Edwardsport would be among the cleanest coal plants in the world and well positioned for new environmental rules?

Comparing Edwardsport's air emissions to that of other coal plants is a bit of an apples to oranges comparison because Edwardsport has also operated to a significant degree using natural gas as its fuel. Natural gas emits roughly half the carbon dioxide (CO_2) of coal and virtually no sulfur dioxide (SO_2). So to the extent that generation using natural gas is included, the emissions rate of these two pollutants will be lower than it would using just coal at Edwardsport.

Even including that natural gas generation, among coal plants in the U.S., Edwardsport had the 9th lowest rate of SO_2 emissions, but was only 86th in NOx[10] (nitric oxide and nitrogen dioxide) and ranked an abysmally high 323rd in CO_2 emissions.

The high rate of CO_2 emissions means that Edwardsport is not "well positioned" to meet new environmental rules. In fact, Edwardsport would make compliance with the U.S. Environmental Protection Agency's (EPA) new CO_2 rules *more* difficult.

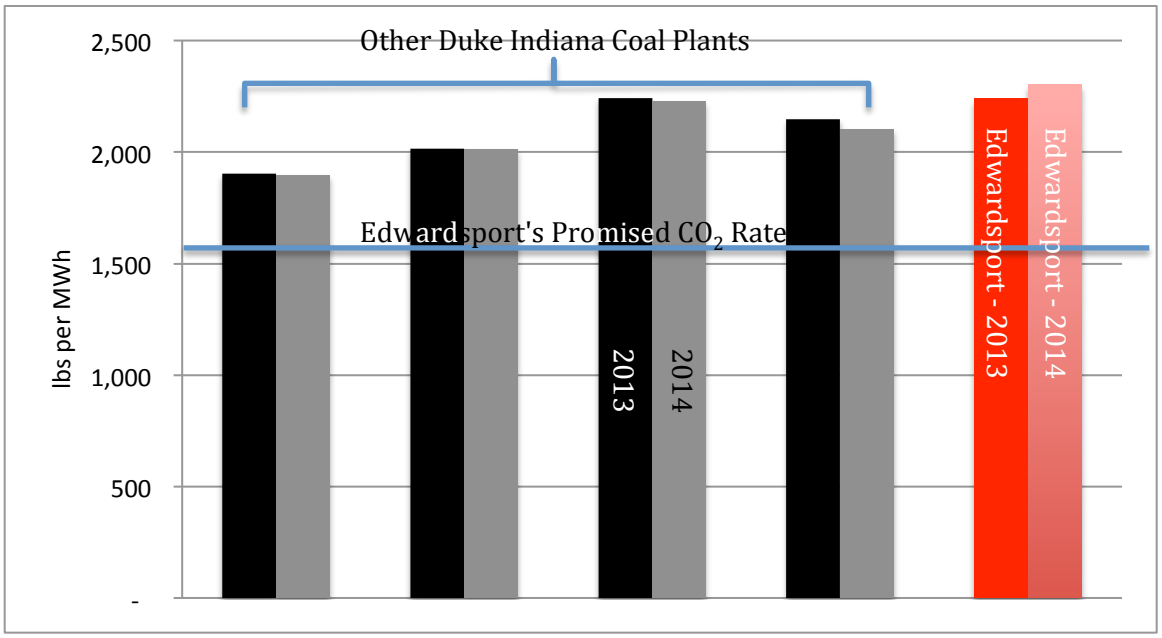

Figure 9. Duke's Existing Coal Plants Generally Have Lower CO_2 Emissions than Edwardsport (2013 and Jan. – September 2014).

Edwardsport, in red in Figure 11, generally had a higher CO_2 emissions rate than Duke's other coal plants in 2013 and 2014 - even including the natural gas generation at Edwardsport.

[10] NOx contributes to the formation of ozone and particulate matter in the air and SO_2 contributes to the formation of particulate matter and acid rain.

This higher emissions rate will cost customers money. In June 2014, the U.S. Environmental Protection Agency (EPA) released a proposed rule that would regulate CO_2 emissions from power plants. The rule requires the state of Indiana to achieve an average emissions rate of 1,531 pounds per MWh by 2030. If Edwardsport produced electricity in similar quantities to that of Duke's other coal plants, even assuming its 2013 emissions rate, customers would need to pay as much as $88 million per year in order to offset these increased emissions from Edwardsport alone.

As of September 2014, the most recent month available, Edwardsport still emitted more CO_2 than all of Duke Energy Indiana's coal plants. And Edwardsport is still emitting far more CO_2 then Duke said it would be when it was pitching the plant at the IURC. That rate is 1,557 pounds per MWh,[11] the horizontal blue line in Figure 11.

The IURC has the Power to Protect Customers and Reject these Costs

The IURC has the power to compel Duke to bear the $83.6 million in fuel costs, the estimated $32 million in replacement power costs, the potential future $88 million in EPA compliance costs, and those same categories of costs going forward. Starting this week, the IURC will hear about these and other issues related to the operation of Edwardsport. The outcome of that hearing will either provide ratepayers relief from these excessive costs or mean that customers will have to pay them for years to come.

[11] Petitioner's Exhibit 17-B in Cause No. 43114.