

FILE

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**PUCO EXHIBIT FILING**

Date of Hearing: 1/16/2019

Case No. 18-501-EL-FOR, 18-1392-EL-RDR, 18-1393-EL-ATA

PUCO Case Caption: 2018 Long-Term Forecast Report of Ohio Power Company and Related Matters, Application of Ohio Power Company for Approval to Enter Into Renewable Energy Purchase Agreements for Inclusion in the Renewable Generator Rates, and Application of Ohio Power Company for Approval to Amend its Tariffs.

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List of exhibits being filed:

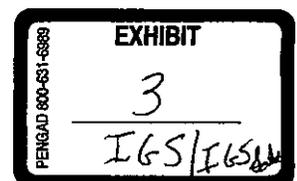
Volume III

- IGS-3,4,5
- OCC-3,4,5,6,7,8,9,10,11
- IEU-9,10,11,12,
- Kroger-1
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Reporter's Signature: Karen Sue Gibson  
Date Submitted:

Survey Responses
Renewable energy is great, but it doesn't need to be developed by AEP Ohio.
I agreed to pay slightly more for the choice that had 100% renewable energy on the ohio choice website and I suspect others do as well.
Renewable energy is not cost competitive with traditional sources without government subsidies supporting and distorting the market. It is feel good policy that accomplishes little. The free market is best to address current and future energy needs.
I simply want access and choice in selecting various degrees of clean energy in my tariff.
Look for outside investors to help keep your current customers costs as low as possible.
The free market and technology innovation should determine the pace at which renewable energy is implemented
I just want reasonable energy costs for reasonable use. No wasting money to seem politically correct.
It is not at all clear in these questions how the Distribution Utility/AEP is going to collect costs of renewable energy from customers who purchase their power from competitive suppliers. If the revenue recovery issue were included in this survey, your results might be quite different, I would think.
To the average AEP distribution customer, this survey conflates the role of the AEP utility with the (competitive) AEP power supplier. Is the provision of renewable energy only limited to the standard service offer, or would there be some mechanism at the utility level, such as a rider, which would apply to customers taking power through a competitive supplier? This survey does not feel "right" and is potentially misleading.
I already pay a premium for the Viridian company to supply solar. I hope to get a rebate this fall after a 3 year investment. This may be a good model for Aep
I appreciate that you want to increase your renewable energy availability. I currently get my power through another company through you that is 100% wind power.
Renewable energy makes good sense and I think that AEP should invest in it. My biggest concern is the investment will be through increased rates rather than corporate investment in other sources of energy.
Ohio is a deregulated state, so how is AEP Ohio developing this renewable energy? Via AEP Energy arm, or through PPA's with other developers ?
Stop wasting our money on green boondoggles.
I DO NOT want to pay for higher cost unreliable electricity so that some environmentalists can sleep at night. These folks are not even AEP customers who want renewables, let them pay extra.
U guys have sh[explative] service so y not try to male even more cutomers unhappy by bring this in to up charge more
I already have options for renewables through the deregulated choice market. AEP Ohio should not be building generation. The financial risk of any generation including renewables should be left to independent developers and certainly not rate payers of AEP Ohio.
Dont do it. I want cheaper bills...
I'm sure some how this is going to cost the consumer big \$\$\$\$. AEP rips off its customers on a daily.
If it costs more, don't do it. We have plenty of resources.



Why don't you invest in buried lines. Upgrade the line infrastructure first!
This should not be at the expense of customers.
I don't think aep really cares about renewable energy. You want to surcharge people that are doing their part for the environment now (with solar or wind power) a surcharge.
I'm okay with it as long as it doesn't increase my costs. The cost to implement this should not be passed down to the customer.
Reduce salary's of upper management.
I don't expect your company to do anything right. Let's call it like it is. You aren't interested in doing anything but taking money from your customers. We are one good thinderstorm away from not having power for weeks because you people won't upgrade your systems. Stop acting like you care about anything. You care about money. That's it. Nothing else.
We are strongly opposed to wind energy as wind turbines have been shown to have detrimental health effects on people and animals including decreased quality of life, annoyance, stress, sleep disturbance, headache, anxiety, depression, and cognitive dysfunction. Suggested causes of symptoms include a combination of wind turbine noise, infrasound, "dirty electricity", ground current and shadow flicker. Don't give in to the politically correct nonsense that wind energy is any kind of viable alternative to fossil fuels.
I am not in favor of using renewable power if it costs us customers more like it did a couple years ago. That wasn't good.
Really could care less. Use whatever is most cost efficient. And that is not solar,wind, etc..
I prefer to do business with "socially acceptable" companies. Socially acceptable companies can not take money from the government or accept tax breaks.
Maximize Hydro-Electric. Solar & Wind. DO NOT pass investment costs to consumer.
not in favor if it drives up rates. From what I read, these options need large subsidies to make them competitive and we are charged either through taxes or higher rates.
PLEASE REDUCE ENERGY COST TO USERS.
I switched my generation service to a 100% renewable supplier years ago.
It's a waste of money, and can only work with subsidies. Installing solar farms in a state that averages 65 days per year of sunny days is absurd, and we need the backup gas powered plants anyway.
It's a political thing, and has nothing to do with economics. Stick to nuclear and gas
Price is my major concern. I will not pay extra for wind, solar or any other alternative energy source. If the cost is not competitive to other sources, do not pass those additional costs to me.
THE USERS WILL HAVE TO PAY FOR THE DEVELOPMENT AS USUAL. SO WHY DO YOU ASK??
Do Not support renewable energy
There should be no limitations on private producers of renewable electricity.
Stop wasting money on these expensive sources of power when there are much cheaper and proven alternatives.

Renewable energy is nice. But, I want and need RELIABLE energy. I am not willing to pay extra for fad projects. I am not willing to sacrifice reliability for untested, unproven PC projects that are not as efficient, not as reliable. I want my energy to be as inexpensive as possible. I don't care about renewable energy.

I have no interest in AEP increasing the use of renewable energy. I do not want to pay the increased cost of such energy sources. I'm fine with the reliable, efficient and economical energy sources such as gas and coal. I do not feel the customer should pay for it.

It would be a poor use of ratepayer funds. Those are intermittent and unreliable forms of energy production. Better to keep nuclear plants running, with natural gas as peaking units.

Currently switched generation source to be 100% renewable.

Stop wasting my time and money on pipe-dream ridiculous utopian fantasy-land liberal environmental policies! Dig for coal and burn it!!! Simple as that. You should be spending your time and investment money on ways to burn coal more efficiently so you get more bang for your buck. And btw, isn't hydroelectric generation a cheaper alternative to wind and solar anyway? If your soooooo concerned about the environment (yea right, you're just virtue signaling with this survey nonsense), then build cost effective hydro producing lakes every where you can!! Solar and wind power. Pfft. What a joke! Hippies

No more renewable until it is cost competitive, and no subsidies.

Put your money into your distribution system. Your reliability totally sucks.

Encourage business & residential customers to install & use solar or wind power, that would tie in or somehow collaborate with AEP.

Its expensive and faulty.....don't waste money on it! Foolish!

I care if I am going to see a reduction in my electric bill. If I am going to pay more \$ so you can invest or u keep the \$ for yourself and we rep no benefit in our bill. I don't care

I'm more interested in getting rid of above ground power lines. I would also prefer renewable energy to be done by homeowners rather than AEP.

Another AEP ripoff.

Your customers are forced to pay but never receive any ROI.

I fu[explative] hate AEP, they are the only source of electricity in the city of Columbus which gives them the fu[explative] power to charge us very high electric bill. AEP is like the NAZI in Columbus Ohio. Fu[explative] them.

The survey is screaming that you want to go in front of the energy commission to ask for an increase in utility costs based on the fact to promote clean energy / renewable energy. In so many words you are looking for an excuse to raise rates and at the same time really produce nothing and invest nothing into renewable energy. Just to make bigger profit without any real change on your part. I know you will use my words to bite me in the butt in the long run by playing up some big campaign to dupe the energy commission to raise my rates under the falsehood that you are bending to the people's will of wanting renewable energy. You will state that this doesn't come without costs and you need to raise the rates. Just another "emperor's new clothes" rate increase by you. I wish that one time you would actually do what you claim you will do without raising our rates. However, I can see the writing on the wall. You will use this to get your rate increase and then do nothing.

Why the fu[explative] did my bill triple this month? God damn money hungry pigs. I'm broke as fu[explative] and yet you still want to steal my money.

Solar panels in Ohio ??with all our crappy rainy weather?. Overcast dYs ?. Not to mention our dreary cloudy 4 month winters !

Windmills that make tons of noise chop up our

Birds an break down an wear out fast !!. Don't waste your \$\$ on these pie in the sky sceAms !!. None of these screams can put out the kilowatt hours coal can !!. An I don't wann hear the global warming scams !! It's all total BS to get a carbon tax approved to charge me to breathe!! An these total bs wind mills that can't hold a candle to coal power will raise my electric bill how much ?? As far as the argument that coals to dirty ?? Ever hear of scrubbers ?? They actually work !!. An coals

Plants with good 1,s can put out very little emissions!! If operated correctly!!!..so drop these wind mill solar panel sceems an still to coal !!... I'm not a tree hugin liberal an will never ever believe In climate change scams !! It's all fake just like CNN news !!!

You charge way too much for electric service, actually it's all the riders you put on the bills. If your new endeavors further increase the riders and utility charges then forget it, I don't want things to change.

What I would prefer is that AEP focuses on keeping my power on consistently NOW. We have lost power in my area 3 times in the last 2 months.

The free market, capitalism, innovation and competition should dictate the rate of renewable energy acquisition.

Hope you are looking to keep costs down for customers.

This questions on this survey are so slanted toward AEP how can it be impartial?

You pay for it yourself. You have fleeced your customers enough as it is. How about you do the right thing and treat your customers as partners. Customers benefit by reducing their expenses, and you benefit because customers are happier. Don't worry, you will still make enough money to survive.

Only consideration should be cost and reliability.

I think this is a very important issue. I have actually opted for a more expensive electricity provider (through the Choice program) because they used renewable energy.

Why is my electric distribution company considering making investments in generation? Are such investments within Ohio law?

Would rather see infrastructure improvements such as more underground wires and better grid security.

AEP should not force its coustomers to pay for its upgrades and investments. FU[EXPLATIVE] AEP CORP.

The electricity generating market is both regional (Multi-state) and competitive. Regulated monopolies should not be engaged in this business in any other form than as a competitive bidder to end-users

There is no need for renewable energy. Use Ohio natural gas and coal.

Ya we over pat as it is stop riasring the price we barley can feed are families now

If we do start renewable energy I would prefer if it was done without affecting my bill. I would not be okay if this project was started and the cost to use electric went up.

Don't bother with it until the technology becomes more efficient.

lower my cost

Renewable energy is great, if it's economically feasible at this time. Don't underwrite its cost. When the time is right, it will become an option that fits into the economics of energy supply and demand.

Hard to beat conventional sources of electrical generation that is not dependant on sometimes unreliable sunlight or wind.

This is a bad idea.

Generation should be on the lowest cost basis. AEP should lobby the government to remove incentives for all types of generation and allow the market to choose.

I'm only interested if it does not raise the cost per unit. Like most folks that I know, my family can barely cover the price of our AEP bill and often have to make sacrifices in other areas just to be able to cover the electricity bill...

If its going to increase the cost of electric or add another fee/tariff to my bill, don't do it

solar is not cost effective, equipment wears out before it's pays for itself.  
It should be used only when when practicle. You cost to the customer is already to high due to you construction choices.

Put that money into client service

I care about the cost of energy, not the source. Renewable energy is generally more expensive and a less stable source.

I am more concerned with cost.

Least cost resources should continue to be the goal. Customer choice of rooftop should be facilitated but not harm other captive customers or in other words no subsidies. Rates should reflect costs of services.

As a customer I want the least cost generation for my service. Unless wind/solar projects and or purchase agreements can provide energy at a cost comparable or cheaper than current market prices then I'm not interested it in.

Regarding production in the state of Ohio...it is important for the local economy, but the price of energy is typically more important to most people. If less expensive sources can be generated outside of Ohio, then I think most people would be okay with that.

I wish AEP had lobbied for a market structure similar to NH and NJ where excess energy credits are sold at market rates and not what currently exists in the state of Ohio.

if it is cost effective do it if not don't

Whatever investments should be cost effective.

Would it make our bills lower

Please stop. The windmills are ugly, they kill birds and bats, and they are a giant waste of money (literally). If you have to use renewables, then give more credits for homeowners to purchase their own solar panels.

I would think that there would also be an ultimate decline in prices (after initial investments), and I hope that AEP passes the savings on to its customers

Windmills and solar are not cost efficient, they take up valuable land and are an eyesore especially the windmills. Ohio is not a good location for either

Too damn high

What ever it takes to lower my electric bill.

While I agree with exploring renewable energy sources, I do not agree with wind being used. My reason is because it takes more energy to manufacture wind turbines than what they will output during their life of service.
Burn coal. Keep Ohio jobs.
The return on cost doesn't seem to be there. Political correctness doesn't pay my bills.
Don't raise customer bills because of political pressure to get into a "renewable energy" boondoggle!
I don't want to pay the higher cost
Maybe give people options on their bills to have solar or wind generation options to buy or lease to own.
I wish you would do something... These bills are crazy and should not be this much...Last yr my bill in winter was sometimes \$1,500 a month that's crazy.. I am going solar next summer so I don't have to deal with these kinds of bills.
This is only good if it lowers my utility bill.
Keep coal
I would not want to see increased expense in my bill.
There is no reason to buy energy that isn't cost effective. Until the cost of production of renewable energy reaches the cost of fossil and nuclear, using it is only for publicity and helps on one
As long as it doesn't cost consumers more money it's a good idea. While we need as many ways as possible to get energy people can't afford to pay more for it.
I am opposed to this matter if my costs will increase. It would be good to have alternative and back up utilities but not at increased pricing. Obama had said our prices would significantly increase and he invested heavily into solar and wind with little benefit.
What impact will this have on our costs?
I still believe the focus should be on producing low cost generation, regardless of fuel type.
I want whatever provide cheaper energy!
From what I have read, renewable energy from solar and wind are expensive and harmful to the environment
Do what you want as long as it doesn't increase my cost.
Please use my money more wisely.
I want to know who is going to cleanup the ugly wind/solar farms when the equipment rusts/breaks down or are closed down....
Renewable energy sources have historically increased the cost of electricity to consumers, and at this time are a liability, not a benefit to the public.
I am not in favor of anything that would increase my bill
they need lower there rates
Keep the price as low as possible. We are disappointed the distr/transmission are more expensive now than making electricity.
Cost not efficient - still need electricity to run wind turbines. When product doesn't work anymore, what environmental consequences will occur? I.e. unrecycleable material, cost of replacing them.
Only if it is cheaper than other energy sources.

What I do value is consistent reliable energy and i feel that the cost of using renewable energy sources has not been fully examined. I believe the actual cost lifetime of renewable energy will be much more expensive and the worn out turbines and panels may be worse for the environment than coal or nuclear.

I don't want to see a big price increase to pay for it. Take some of your profits and do it.

this needs to be done without increasing costs to us customers. Really probably would be better and have less environmental impact to invest in nuclear instead.

While I applaud this move (and hope it'll translate to AEP being more energetic about helping consumers with home solar panels), is this going to raise our bills? would the money be better spend upgrading the current infrastructure (like moving more lines underground)?

Unfortunately this would mean higher utility cost and I am at the top now on my electric bill. I can see converting if this is not going to cost me more money. Plus with the increase knowledge and safety that has been done to the nuclear energy it is safer than the unknown side effects and waste from solar and safer to the environment than wind b/c of the oil/gas to run the wind. We can enrich uranium at very low cost to benefit customers.

I would like renewable energy but don't want to pay more for electricity  
Plus coal is very clean burning now...

Has to make economical sense

Keep the cost to the consumer below what other generation methods would be. If it's higher, don't do it.

Renewable is important, but it's not important that you build the infrastructure. If you can buy and resell renewable in a way that makes sense then do that.

I detest the giant wind turbos. Until or unless wind energy can be obtained from smaller and less invasive and ugly means, I will resist these. What good is it to destroy our birds and disturb wildlife, notwithstanding the look of pristine land/ water with these, don't think it's a good trade off

The production of equipment for wind energy creates huge amounts of pollution. Windmills are a real threat to avian wildlife! They are visually extremely unsightly! Solar maybe a better option but great amounts of pollutants are created in the production of solar cells. No "free lunch" in either of these options!

The cost of manufacturing windmills and solar panels greatly counter the practicality of using them. Any savings is substantially offset by this. Also, these forms are not constant. The wind doesn't always blow and the sun doesn't always shine. The only way to harness the power is by using batteries, which again, the harm done by manufacturing batteries and then disposing them is far worse than coal or natural gas to the environment.

Provide energy based on most cost effective technology not politics.

Burn coal. Why is it that i'm using less electric but my bill keeps going up?

Generating plants are already in place and furnish adequate and reliable power to the point that some units are idled during periods of less demand. The costs associated with the development of solar and wind power does not make sense.

Have no clue on what renewable energy initiatives aep is a part of.

I don't want it if it drives my cost higher. I think we have been too quick to abandon nuclear energy.

Not important to me at all. The priority should be to provide the cheapest, most reliable electricity regardless of source.
Please do not turn this into something that will increase the bill down the road. The rates are already ridiculously high.
Wind/solar power is notoriously unreliable and extremely expensive way to generate electricity in this area. Although I believe they have their place in the ideal geographical locations, I do not believe they are well suited for Ohio, nor am I willing to pay extra for the electricity generated by these systems. We have an all electric house, we have a geothermal (ground source) heating and cooling system. I love alternative energy, but it HAS to be affordable, efficient, and maintainable. Solar is awesome in the very sunny south west, wind only where there are no alternative energy sources and where no one minds the death toll of the birds.
If it's not going to lower my energy costs what good is it? It does not do anyone any good to jack up the cost to use something that is suppose to lower it
It is a shame that we cannot use the coal that we have.
Don't do it unless it makes economic sense for your customers and the long term viability of the solar and wind systems is assured.
I do not want AEP's efforts at integrating renewable energy to increase my bill. I have to service sites and cannot afford any increase.
Renewable energy has to be affordable to all. Expensive renewable energy negates the effort to build it.
I'd prefer a cheaper bill. I do not care about wind or solar.
Congratulations on stepping up to increase renewable energy resources when the federal government won't. We appreciate your leadership.
No
just keep my bill as low as possible
I am happy with natural gas supplied power, especially with the recent moves for cleaner production. We (Ohio and USA) have an abundance of natural gas available, so that as the primary energy source is most logical to me.
Helping to push more solar incentives programs in Ohio for not just the utility, but all solar companies to make it easier for behind-the-meter residential customers
No more wind tubines near homes. Keep the current Ohio setbacks
Just don't pass on the costs to consumers.
After accessing the Apples to Apples website a few years ago, I selected a wind generated rate of \$0.06 per kilowatt hour. My brother was shocked to hear of that rate as Licking County Cooperative rate is about \$0.13 per kilowatt hour. After an initial investment, renewable energy sources would have no fuel cost and little maintenance costs, plus the benefit of no emissions and no fly ash disposal costs.
Coal.
Renewable energy should only be increased if the cost, unsubsidized is beneficial and profitable.
Renewable energy, wind and solar, at this time are impracticable at the utility generation level. There will always be a need for central utility generation complex. A better way forward is to improve nuclear or fuel cell technologies with consumer level wind or solar generation.
Hope abundant energy will mean low monthly bill for customers
We that live in the country need our lines replaced , they are old and break easy

If investing in renewable energy sources lowers cost to AEP, those savings MUST BE passed down to its customers.
Usually these renewable energy sources consume more natural resources to build than they will save in their lifetime.
It is also important to evaluate possible negative environmental effects of adding solar and wind energy and to evaluate other alternative energy sources.
I find it unfortunate that government regulations pushed AEP away from coal. I believed the scrubbers being used at coal plants were good.
I believe wind energy does more harm than good. Look at the amount of concrete and steel used to build them and the amount of maintenance required. It also is a health hazard to neighbors who are not compensated for the encroachment on their land. I oppose this.
I have already switched my source to Acadia(wind power). tho it likely comes from out of state. Would prefer more IN STATE renewables. Thanks 4 the survey!
If it is done I don't want towers or turbines anywhere near my house. We already have a transmission line thru out front yard and I hate the sight of it.
i think you should use gas to generate power its cheep and renewable
Do whatever necessary to provide lower cost to me.
All this "climate change" GARBAGE is nonsense. COAL is our area's greatest natural resource, and we should use it. Using COAL keeps the COST of our electricity LOW, and keeps many in Ohio and neighboring states EMPLOYED. QUIT closing coal-fired power plants just because the radical left says you should.
If this will result in higher monthly bills, I am not in favor of the development of this process.
Measure the real economic and environmental consequences of renewable energy, including the manufacture of equipment required. There are real dangers with this path.
I would like to get involved in solar on my house but can't determine which companies are valid representatives of AEP and which are fly-by-nights that will leave me with a leaking roof.
from a common sense factor I would hope that these energy producing options would aide in lower consumer rates and not added cost factors???
The marketing of renewable energy suppliers resembles that of disreputable products such as cheap electronics or cancer insurance.
Want to make sure the savings from these sources are passed on to the consumer
Your flushed with cash so no reason not to make an investment in renewable energy.
Important to reduce or contain energy costs while maintaining sustainable and reliable energy
Renewable energy generation is a good idea, but my electric bill has been a lot higher since the meter was changed. I am not too excited for my bill to go up even more
I am only in favor of sources of renewable energy that LOWER my utility bill!
Just don't want to receive another bill increase, seems to happen much too often.
Would like to see use of renewable energy sources however, cost needs to remain similar or even lower than current source.
I don't know where my electric is coming from now but \$180 monthly budget is really really bad.
I don't care where or how my electricity is generated. I want the most reliable service for the cheapest price.

Develop wind outside of bat migratory flyways and don't build any hydroelectric dams. Solar should be on people's rooftops and not in farm fields
Clean Coal baby
renewable energy is way to expensive
I do not want energy provided by wind. The wind mills or whatever you call them are not cost-effective and they kill tons of birds. As for solar energy in central OH, good luck with that!ðŸ™,
AEP is sitting on plentiful natural gas. Use it to produce the cheapest electricity possible.
i feel that the wind mill farms are the cause of a lot of the climet change
Give the people cheaper electric rates. You charge way too much and keep "riders" in place years after the storm damage occurs.
Do what makes sense financially. Use the cheapest and most legal source of energy. Over time, renewable technologies could become more competitive and that's when they should be used if we are being responsible with people's limited incomes and spending ability. If we believe in other climate related items, that's fine, and I actually agree with many of those myself, but let regulation affect the pricing of energy, which would likely make renewables then the cheaper option. Do enough to learn how to adapt to renewables now, but wait for market pricing to be advantageous and ideally let the technology mature.
Hows this gonna effect my electric bill i sure dont need it to go any higher
Suggest you double and triple check your projected return on investment before you go spending a bunch of cash on renewable energy.
I am on fixed income. I can't afford increase to my electric bills to fund this venture. If this can be done at no increase in my costs or lower my bill, I am for it.
long term, is it equal or cheaper than gas. Not if it costs significantly more.
Cheaper bills
Hopefully your also exploring how to provide these services so they will be more affordable especially to those on low or fixed incomes
Cost to the customer is very important as well. Not all sources (wind etc.) are efficient in all states/areas. Such as Washington state has many cloudy days, so solar may not be as efficient.
Not interested in renewable energy if it cost more to produce than nonrenewable energy.
Do whatever keeps my electric bill lower.
Renewable energy is an expensive farce, and will never be able to supply adequate energy. Coal, oil, and gas is the only real answer.....and we have lots of those items.
It's only worth doing if it's also economical for both AEP, and us COSTUMERS.
no
A day late and a dollar short on making this move, don't you think?
I think renewable energy is a great idea, as long as it's cost effective. Last I checked, at least as a consumer, renewable energy was still quite a big investment and not really worth it for financial incentives alone.
It should not increase the cost of energy. If it does don't do it.
cost of production is very important - do not go to renewable energy at any cost
I am more concerned with keeping our prices down than with spending extra dollars to utilize 'greener' forms of energy.
Use clean coal technology until the supply makes it no longer feasible.

Increasing renewables should ONLY be done if it will not drive up price. There are some serious problems with making large, far-reaching decisions based on the largely faulty science of anthropocentric global warming. Throughout earth's 4.5 billion year history, CO2 levels have fluctuated without being correlated to temperature. Now, all of a sudden, CO2 is the climate control knob, so-to-speak. It doesn't make sense. Likewise, making policy and other important, cost-affecting decisions based on this garbage doesn't either.

AS A RETIRED COAL MINER CLEAN COAL IS THE ONLY WAY TO GO

If it is going to raise the bills I would rather you not do it.

If it costs the consumer more, I'm agin it.

I believe coal mining is extremely important, so anything else is unimportant to us.

Keep costs low that is the most important issue.

Don't pass added costs to consumer. Your rates are already exorbitant.

keep the cost down.

Just try to improve the dependability. We get a lot of brown outs and outages when there isn't even bad weather. Thanks.

Bring back reliable cheap plentiful coal with modern reasonable pollution standards

Anything to make our bill cheaper

I am a coal miner I wish to see the continued use of coal.

I am not willing to pay more for it.

Only invest in renewable energy if it available at the same cost as traditional energy sources.

Im concerned about keeping the cost of electricity down so senior citizens can pay their bill. Along with low income people.

Most renewable energy sources have a larger negative impact on the environment than fossil fuels. Solar because of toxic chemicals used to produce the cells and wind because of a tenuous (if not negative) energy balance (i.e., it takes nearly as much energy to produce, erect and maintain the wind turbines than is returned)

no

You should pass savings on to your customers!

I don't like the turbines. For the amount of electricity they provide, it's not worth it. It also defeats the purpose of the environmental impact because I think they produce their own impact on the environment.

If it costs more than coal, nuclear or coal, don't do it.

Believe it will be too costly to implement and maintain therefore passing more costs to the consumer. Also, flying creatures such as birds may be harmed.

I would like the lowest cost power, no more and no less. If renewables can not produce power at a lower cost than nat gas or coal then it should not be considered.

It was a mistake to go away from your coal power plants.

I do not want blackouts like CA and may foreign countries have because they depend too much on renewable energy. I prefer affordable and abundant energy over green energy.

the only thing i care about is affordability

Power generated by wind and solar are very expensive. I believe the country is better served by using coal and natural gas.

Lower energy costs

Livable price is primary consideration.

renewable energy, particularly wind, is a worthless feel good waste of resources
I do not want AEP to rely on renewable energy if it means that my bill will be higher.
Ohio ranks about # 40 out of the 50 states for the quality of wind and solar for energy. This means "green" energy is energy that takes a lot of my "Green"
A large solar installation in sunny CA in it 4 th year produced a record high of 1/4 of its predicted yearly KWH output. During the peak noon sun CA must pay other states to use their excess power, buying it from residents at full retail rates, shooting up costs.
Modern countries like CA, France and Sweden enjoy safe, reliable and plentiful power at about 5 c/KWH from Nuclear (without the choking regulations shooting the cost out of sight), China is building 19 new plants and went critical on 4 Westinghouse a few years ago, 7 years after ordering them.
Ref: Wall St. Journal 8-13-18, pagesA17 Phony numbers and B9 top. Also Dr. Muller, "Physics for Future Presidents" Seville Spain generates solar for only 28 cents/KWH ! Germany shutting down Nuclear has so far tripled power costs and increased carbon emissions greatly.
[DELETED DUE TO PERSONAL IDENTIFIABLE INFORMATION]
No
Wind and solar energy will never come close to meeting the energy needs of our economy. The only reasonable sources of energy are fossil fuels and nuclear energy. Renewable energy is simply pie in the sky dreams of ignorant citizens who are unaware of this reality.
nuclear could replace all of the choices you're looking at.
Only if it reduces the price for customers. I don't see the point of renewable energy if we have to pay more
Wind farms are an ugly and terrible plight on local communities.
Any investment should make economic sense based on its own merits, and not rely on tax subsidies or redistribution of wealth.
Don't want to pay more.
AEP should have taken a proactive lead into renewable sources years ago. I think this action now is similar to that of feeding a dead horse, the activities should not be a game of catchup. I send payments to an Ohio address for a product that was perhaps generated or produced in an area on the exterior of the State of Ohio geographical borders. No sympathy on either thought.
too expensive - lower the cost to natural gas based supply
FACTS and factual information critical to making informed decision. Wind turbines & solar, require open, treeless swaths of land ... which can lead to deforestation. Amber waves of grain, are far more attractive than fields of black solar panels.
Natural gas I'd plentiful
My husband currently works at AEP and his coal plant is scheduled to close down in the next couple years so I am against them changing to a different kind of energy!!!!

Reliability and cost are most important to everyone I speak to. I am an AEP employee. My friends and neighbors know this. The only things they ever talk about are with regard to AEP is: Cost, reliability, and community service.
Renewable energy is not consistent, it is subsidized at our expense, it cannot be stored and often is not available when needed.
Windmills are way too costly to build then to maintain...also take up too much green space and are noisy... for the actual amount if energy supposedly saved!!!!
it should and can cost less . don't use it as an excuse to charge more .
RELIABLE ENERGY IS IMPORTANT, NOT THE SOURCE. I tend to believe that energy that is subsidized by government is extremely unreliable, just like government regulation.
I support initiatives like this if they are cost neutral. I do not think these types of initiatives are worth paying higher rates for.
Happy to have on home contributors to energy generation. Saving money long term. NOT interested in being overcharged
I wouldn't do it, your cost are going to go through the roof, all these other companies that are doing this , aren't able to be competitive with AEP... It is not worth it... Stay with what you are doing....
In the near and long term electricity should be as inexpensive for consumers as gas is!
I am not interested in being PC about electric generation. We should not 'cave' to the radical environmental crowd that does not understand the problems with wind and solar. The high cost of these is prohibitive.
So you really think 'solar' is going to work in Ohio? You're dreaming!
I can barely afford to pay my bill as it is...disabled vet farmer ....
In the past, utilities rammed every suitable river for hydroelectric power. This is now recognized as a mistake. Much of the current growth in "renewable" power is in solar power is large solar farms that are following the same philosophy. This is the same short sighted mistake and I don't support making it.
Choices of source of energy should be based of least cost. Wind and solar apparently are not least cost based on all I have heard. Besides cost issues both do serious damage to the bird population.
We should use reasonable economical practices. Common sense solutions.
Lower prices, use gas or coal
My only concern is that utilities seem to charge customers more to make "renewable energy" that's suppose to make it cheaper since it is renewable.
Wind turbines are annoying, ugly and kill birds.
No
Don't build those ugly windmills
Wind and solar require are eye pollution for the amount of quality land. Wind and solar are kill wildlife. Wind and solar do not work if the wind doesn't blow or the sun isn't shining.
Wind and solar energy production in it's current form has been proven to be a total failure and waste of monetary resources better spent on updating and upgrading the current outdated electrical infrastructure.
choose the cheapest power - doesn't matter if it is renewable.

<p>you would think the bill would be cheaper i get bills from other electric companys and they are way cheaper you guys</p>
<p>I would prefer, whatever you do, it be cost effective above all. If we have to wait a few years for that...so be it. Thanks for including us in your decision-making.</p>
<p>Maintenance and generation costs are much higher with wind / solar power, and they can not accommodate variable load demands.</p>
<p>those windmills are nothing but a waste, can.t understand why you would want to waste good money on this crap</p>
<p>Renewable energy sources are not cost-effective compared to more traditional means of power generation, and shouldn't be considered unless, or until they become so.</p>
<p>Renewable energy in OH is probably not worth the investment since we do not have many sunny days and the only wind that can be counted on is off Lake Erie.</p>
<p>It's so expensive to install!</p>
<p>Only do it if it is cost effective. Don't do stupid stuff like try to generate solar in Ohio.</p>
<p>Do not invest in renewable energy unless it will reduce costs to consumers. I do not want to pay more for your renewable energy investment. Keep costs affordable for the poor.</p>
<p>If it lowers my bill I'm fine with it. If it costs more on my monthly bill, then I will choose a different provider. It's my bottom line that matters most right now. Not in a position to pay more</p>
<p>No</p>
<p>invest in renewable technology with profits and not raise bills.</p>
<p>Renewable energy is to expensive!</p>
<p>I want my energy cheap a reliable</p>
<p>I would like to see energy produced at the least cost whether that be coal, nuclear, renewable or some or means.</p>
<p>"Renewable energy" doesn't solve environmental issues</p>
<p>cost of service</p>
<p>Wind energy is very expensive, an eye sore, very lethal to birds and bats, and uses too much land. If it wasn't heavily subsidized by tax payers you wouldn't be doing it.</p>
<p>Don't waste money on wind generation: There a maintenance nightmare and if the wind doesn't blow you don't any power. Same with Solar , a waste of money, if the sun doesn't shine, no power. You need to stick with baseline power coal generation, Natural gas and nuclear.</p>
<p>I think u should do what is most economical. Not political.</p>
<p>should not be forced on to the consumer unless it makes economical sense</p>
<p>Renewable energy... ahh the fashionable thing to do. Why not go more to natural gas, economical and abundant... and it does not require tax incentives to be viable. Let the free market system determine the viability of renewable energy. Mars is warming along with the earth. Perhaps the sun has something to do with climate change. What a novel idea.</p>

Renewable energy should not endanger anything. Today's wind mills are environmentally dangerous due to leaking and birds. Wind mills should be placed where they offer little risk to wildlife. Even cost saving light bulbs that were pushed contain materials that should be treated as hazardous waste but nobody is taking a strong effort to reclaim them. What concerns should there be with solar panels after they are no longer in use? Before jumping into the next new thing better understanding of the long term effects should be better understood.

Please consider the entire cost to the environment as well as to your customers. Don't give in.

Don't switch to energy sources that cost more.

The bill is way to high. Especially for transport and delivery when we have 2 electric plants in our county.

No objection as long as it doesn't increase the cost.

we would appreciate if the energy resources could be found in our Great State of Ohio, as our rates continually go up. We the customers need a break from high prices continually  
cost should be as low as gas or oil

Don't push the cost of transitioning to other power sources onto customers. It may backfire and cause customers to exodus to other companies. Making a transition one this is important, but alienating your customers when you're already a multi-billion dollar company is a very unwise move. But with that being said, moving towards the goal of 100% renewable energy is a very worthy cause and I applaud the effort no matter how big or small!

It comes down to costs.... If it cost me more, then I'm not for it. On the contrary, if I could utilize solar and get rid of the energy company, I would do that!!!

At what cost is this to me the customer. I know it will either increase your profits or shares but what does it do for me the consumer.

From my knowledge of renewable energy sources, they are not cost efficient to use. Also, they are not as good for the environment as many in the media and government would want us to think. Ask the many, many birds that are killed each year by wind turbines.

Not at this time

Keep the price of electric low.

Windmills and solar are a foolish waste of money. Burn the thousand years worth of coal, and natural gas that are in this country.

I think that this is a waste of money. Wind and solar are the most expensive forms of energy. Instead use the abundance of natural gas in the area to generate lower cost electric. Lower my rate instead of raising my rate for solar or wind produced electric. I am against any form of electricity generation if it comes at a higher cost to me.

my biggest concern is market price. If the price of renewable energy is greater than that of "non renewable," it's of no importance to me.

Only if the renewable energy is cheaper

I am currently using a service (Arcadia) that uses credits so that all my energy comes from renewable sources. We are willing to pay extra for thisâ€”it's that important to us.

Renewable energy is a great thing, but there are areas where AEP spends customer money without regard (paper energy usage reports) that could save paper and money that could be better spent, not at all, or instead on renewable energy.

Solar, wind and such are great. BUT, not worthy of spending excess amounts of money to have them.

<p>Unnecessary and not economically feasible at this time in my opinion. Until the state of the art can compete on equal footing with current methods and sources of energy generation...Don't waste your/my time!</p>
<p>Renewable energy is fraught with problems and really isn't mature enough to be of any significant benefit. All the while, it unnecessarily drives up prices. Deliberately shifting investments into a less reliable, less flexible, more expensive power source is not a wise course of action.</p>
<p>Generate power at lowest cost.</p>
<p>Like I answered to the first question cost is most important. I am all for all of the things that were listed as choices but if it is significantly more expensive it is not worth it to me</p>
<p>It feels like AEP is slow to modernize. This may be inaccurate, but you don't often communicate with me.</p>
<p>Wind and solar are overpriced, and unreliable. I hope that if you go down this ill-conceived route, it will be the shareholders, and not the customers, who are stuck with the expense.</p>
<p>It is good to look for better energy sources but not if we have to pay for you to do this I lived where they raised our rates to build a nuclear plant but it never happened and we never got our money back you are a very big company and help in lots of disasters which is good but not for use if you raise our rates to do this I'm on a fixed income I keep paying more for everything which is it making it hard for me to live.</p>
<p>unless it can be done for the same cost or less, STOP.</p>
<p>Use coal that's readily available, but plan ahead. You've cleaned it up greatly but you really need to stop letting them take the fly ash to spray on us!</p>
<p>Renewable energy in its current form is not helping reduce harmful emissions and is not anywhere near  "renewable" <input type="checkbox"/>. The investment at this point</p>
<p>Renewable energy on first glance appears to be a wonderful idea. However, it is more a PC flavor of the month being pushed as a solution to a described problem that has virtually no scientific basis. Renewables MAY become economically viable in the future but currently do little more than increase overall costs and destabilize the power grid. Those that call renewables "cheap energy" <input type="checkbox"/> ignore which I believe must be accounted for in the final cost of energy. Renewables sounds great but the reality is that they are unreliable and much more expensive. My hope is that those advocating large scale mandated renewables, have their entire personal electrical usage supplied solely by renewables.</p>
<p>stop stealing money from poor citizens</p>
<p>Renewable energy is TOO expensive.</p>
<p>Bring back clean-burning coal-fired electric generating plants - just as efficient, costs MUCH less, America's coal supply is almost limitless.</p>
<p>waste of resources raising our bills</p>
<p>Lower ele. Bills and not so many outages</p>
<p>We went solar because we are tired of getting raped by AEP</p>
<p>Renewable should be treated like a high cost trend. If the energy is truly better than what we have now the cost to customer should not be more.</p>
<p>Power sourcing should be cost effective (cost neutral). I would not be interested in paying higher prices for the sake of wind/solar.</p>

You are already charging too much for energy, please do not make investments that will cost your customers more.
I'm from Van Wert County, Ohio and the wind farms have been terrible and are very unpopular with our community. Please do not "push wind" on your customers at the expense of rural quality of life.
Wind production needs to provide a protection to prevent slaughtering birds no fracking!
I want AEP to wait until there is a renewable energy format that is economically feasible. Right now neither solar nor wind are reliable or cost effective. You should stick to natural gas or clean coal until such time as a renewal source is reliable and economical.
I want reliable and cheap power. Nothing else matters.
Wind energy has been demonstrated to have adverse health effects on people and animals. Wind energy is NOT an intelligent or reasonable alternative to the use of fossil fuels.
Stick with coal. Or do you not care about saving the consumer money?
Yeah they should put the two coal fired power plants back online.
Wind power kills birds and looks bad outside is novel appearance. Solar power is not efficient cost wise to my understanding.
NEED TO KEEP THINGS IN PERSPECTIVE ECONOMICALLY, COAL AND GAS ARE STILL A GOOD SOURCE OF ECONOMICAL POWER, THE WINDMILLS ARE HIGH RISK!!
I am tired of my AEP bill going up exponentially higher! I do not think I can ever afford wind or solar energy. Give people like me barely making it a break! I actually got NASA complete insulation in my house and keep my thermostat at 82! My bill still goes up! What can I do to lower my AEP bill!?? Also have new double pane windows! I need help!
Can anything be done to lower our electricity bills?
I do not want any of those large wind-mills near my home. They are loud and ugly
If it raises costs WHAT SO EVER I am against it. Why not invest in infrastructure before looking for other things to spend money on. Each outage take you longer and longer to respond, yet you have available resources for windmills and solar panels???
Wind Turbines are ugly and kill birds. It is too cloudy for solar in Ohio.
We have an abundance of fossil fuel in this country. Use it. Renewable is still in the talking stages & can't possibly compete with the sources of fossil fuel.
Wasted money.
Don't waste your money
I have read that the cost of transmitting wind-generated energy is quite high.
My bill is extremely high for a single mom of 4 to pay. Maybe my meter needs to be read more often
what a waste of money on tech that is not efficient enough for the commercial market. what is the problem with clean coal. it's proven, efficient and cost effective, not to mention Ohio has an abundance of it ,so does the rest of the country. Politics destroy's good tech for the wasteful benefit of "trying " to look "green".
WASTE OF MONEY
4.5 percent is pretty pathetic coming from a company based here in the 1st world
Perhaps investigate "cleaner" ways to use coal.

AEP is enjoying a monopoly around where I live so I don't believe they care about cost to consumers
Renewable energy sources are not a viable replacement for fossil fuel. In addition renewable energy projects usually require government subsidies (taxes).
Renewable energy cannot compete with coal or nuclear. Both in terms of price and energy output
Residents near wind turbines are strongly put off by the intense noise pollution stating the turbines sound like jet engines running frequently. Property values are dropping near these wind farms...let us explore various uses of wind power to find a more silent and effective "windmill".
Stop wasting money on renewables. Build nuclear.
Well first of all I really think AEP should focus more on their customers first, The bill is always high I feel like AEP rip people off with high monthly bills I don't understand why AEP charge so much I have check the meter and is running slow and I'm not the only one that think like this google it.
I love the smell of toxic exhaust fumes while walking to work. They smell so great. I could bathe in it.
I do not want any wind turbines in Central Ohio.
I still believe that a clean way to use coal should continue to be reserached
Wind turbines KILL birds, and solar panel farms require large amounts of land that cannot be used for other purposes. Not a fan of either.
Renewable energy programs are not cost effective in the future.
AEP SUCKS! I changed my address and did not receive a notice from collections until it appeared on my credit report I did not know it was delinquent. I would have paid the bill in full if I had known it existed. If you do not REMOVE NEGATIVE INFO after payment is received you will meet my attorney and I will be sueing for damages as I have a home loan application in process and if denied housing due to you lack of due diligence I will be seeking monetary damages.
[DELETED DUE TO PERSONAL IDENTIFIABLE INFORMATION]
I am opposed to politically motivated reasons to use this source or that. The only criteria should be what is the most reliable source that provides the most reliable power at the best price and value.
Stay on task
I don't mind if AEP invest in these, but I do not want to bare the cost way of an increased bill for you to make your investment off of my dime. I'd rather continue using the power I get now. Thank you
Right now, electric bills our way too high- higher than all other utilities - never know when electric is going to be out.
try keeping the cost down cause we're all POOR.
Lower my dame bill
Don't raise prices just to be "green". It has to balance.
Keep it inexpensive
Investing in renewable energy for political correctness is not in the best interests of your customers. Prices will go up because renewable sources cost more to install and more to operate.
Concerned if there is going to be an increase in cost per month.
I do not want my bill to raise at all 0 increase
we cant afford to put out any more money and I think that if aep is up grading they need to do it with there money in stead of charging the costumer

Lower costs, all the extras charges are getting out of control
Investments should be preceded by grid upgrades to insure efficient use of power. Also, when possible, investments should preference Ohio production/manufacturing/sale/installation.
Stick with COAL or gas more dependable.
Renewable energy is BS. Cost too much. Benefits over exaggerated
Not at all good for the environmentally friendly.
This is the second time this survey was emailed to me.
It's important for AEP to invest in the future, but there is absolutely no reason your *customers* should need to foot the bill through raised rates for your new-found greenness. Fix your in-house finances first, then invest where you want.
I would be concerned if AEP's electricity rates increased as corporate earnings increased while developing this renewable energy. Also, I am not interested in burdening the costs of developing alternative energy for other customers around the state.
If it makes my prices any higher not interested.
I support coal!
Please use the media to let us, the public know when and how you implement changes to increase your renewable resources. Thank you.
I'm against wind and solar for electric generation. Use the abundance of natural gas in the area. Lower my electric instead of raising the price of electric.
keep the lower prices keep it basic keep the lower prices keep the lower prices
I think it's too costly. Which means I'm going to pay for it. I don't think it's a good return on my dollar
I don't want to pay a penny extra for renewable energy. If coal is cheaper, burn it.
Renewable energy should only be pursued when it is competitive in the market place. Renewable energy as it is today is not a good option.
Don't waste the shareholders money on this crap. The only thing it does is makes environmentalists feel good. It won't reliably keep my welder running.
Get energy where it's lowest cost.
<b>AEP NEED NO RENEWABLE ENERGY IDEVELOPPEMENTS!!!</b>
My bill is always toooooo high.
will this result in yet another charge to the customer?
do not support
No need to push renewables. Keep the generation playing field level. Lowest cost generation first.
I do not want to purchase power generated by windmills in Ohio. I do not believe they are in our best interests. IT is a waste of valuable resources and encroaches on the property rights of Ohio citizens. It is a waste of taxpayer dollars to subsidize this and they aren't even made in the USA. .
I switched my electricity supply to the AEP renewable energy program. This took a good deal of research on my part. I think if there was a more clear and easy way to do this, more people would follow suite.

Burn coal. It's the most reliable and provide s. Many jobs. Remember the wind doesn't always blow and the sun doesn't always shine

The Important to the customer is to lower our bill.

Coal is abundant in Ohio and Midwest. Stay with coal for base generation and natural gas for on demand.

Wind is a joke. I live near turbines and on many hot humid days they do not turn. Wind is unreliable as is solar. More is spent promoting and paying out than is produced. Think twice before promoting more.

Industrial Wind Factories are nothing but a big scam and money grab on hard working tax payers. Stop the destruction of our communities, our environment and our very way of life.

The hell with your windmills!!

too expensive

Only make the investment if it will save consumers money in obtaining their electricity. I'm not interested in proving up industries that can't survive in a free market. Contact me if the reader is not familiar with a free market. I know many seem to be more and more with the concept, just kidding. Thanks for the opportunity to provide feedback.

non @ this time, thanks

I am not interested in seeing whatever AEP decides to do costs me more money. If solar panels are installed to bring renewable energy it should also cost less to the consumer.

Stop. It's unreliable and grossly inefficient: solar only works half the day at best; wind only generates . . . when the wind is blowing. Then there's the birds getting killed by the turbine blades, the infrasound pollution, and on top of that it's three times more expensive. I don't want to pay for that.

Go Bach to Ohio coal. AEP spent millions to meet EPA standards only to shutter up the plants. AEP needs to stand up to EPA. It is a waste of money to go into "renewable energy" when it has its own dangers and the EPA will keep changing the regs on it.

I have no interest in renewable energy if it's going to increase my electric bill.

Those types of energy are extremely expensive. Solar panels and so forth are outrageously priced. You pass on those expensive costs to the consumers which will cost customers much more. Stay affordable.

Too expensive now. You are just catering to the extreme left in this area. Lower your rates through our abundant existing resources.

DON'T RAISE PRICES TO DO IT

AEP should pay for their own investments and not expect the customer to pay more for renewable green energy that cost less to produce.

AEP rates are already excessive. Do not raise them further.

keep the cost down!!!! we pay TOO MUCH for our electric the way it is!!!!!!

For me the important issue is not the source of my home electricity but its price. At the moment solar energy is neither efficient or nor price competitive.

lower the cost of energy

Not interested because it is too expensive.

I don't feel it's necessary at this time. It's very expensive to do and the cost is passed on to the customer.
Not interested in renewable energy...
Cut cost instead of expansion. Added expense for something easily wiped out by other polluting countries like China and India.
Let people who want renewable energy pay the additional cost. Don't make everyone pay for something the only a segment of society wants.
dont waste the money
Use coal. It provides jobs it more reliable and it can be burnt clean and it is cheaper
I want the most affordable power possible.
If you're spending money, put it into upgrades that keep the system robust. Bury power lines. Shield major infrastructure from emp damage (both man made and solar).
I shouldnt have to pay a penny more to make some tree huggers feel better about turning on their lights or air conditioning. I appreciate the reliable service we have now and feel good that the reliability is due in no small part to our coal industry. Dont.mess with it.
Price is more important
I want the cheapest electricity possible, please DO NOT invest in renewable energy if it increases costs.
Only if it makes electricity cheaper. Don't increase my bill to make someone feel good.
Reduce the cost of our energy not increase it. Wind and solar energy are more expensive than fossil fuels. Man made global warming is not proven science and has been a big lie with false information. Invest in clean coal and other fossil fuels that will ultimately reduce energy costs.
Don't like it - coal is cheaper.
Do not do anything that is not already economical without government subsidy.
I cant afford any more money for extra bills I live on a limited income I cant even buy food and have no public assistance to help pay for anything
Keep rates as low as possible.
There is no need to use the inefficient renewable sources. We have plenty of natural gas. In the state. Wind turbines kill millions of birds across the country it's devastating the bird and bad population bad for our community
You are wasting your time, effort and money on solar and wind.
Please continue to provide the lowest cost, most efficient energy. Politically correct goals that are not economically sound investments do not benefit your customers. As renewable energy becomes economically competitive with other sources, then absolutely make those investments.
I honestly don't care if you do or don't do the renewable energy as long as you don't increase my bill. But you most likely will so I may just switch over to solar.
Take advantage of the fossil fuels ( Nat. Gas) available in this region and quit acting like you are pressed to find non-Fossil Energy Sources. If you did this we / all know you would be saving us unnecessary expense. Your all into the far Left, get off your butts and believe in Trump.
I am still an AEP customer but also switched to Arcadia Power so some of my electricity would be coming from renewable souses.
Do mot increase my bill.
stick with what works,
Too expensive

Way to expensive I wish there was another energy company
unreliable, inefficient, expensive, unsustainable
What your loyal customers want is lower electric bills. Renewable energy is expensive, and we don't want to pay for it. Stop investing in renewable energy!
<i>Until the technology improves, its not worth it.</i>
How can we answer when you have not told us what the cost will be to us? everything should have a cost/benefit component which you are not sharing.
Having seen this in numerous areas, it turns out to be a waste of time and money. I believe it is just to satisfy unfounded concerns by environmentalists. Our planet is NOT fragile! God doesn't make junk!
I do not want an increase of my bill because of renewable energy
I think a company should use their profits to improve or update their equipment and not the customers. stop the MONOPOLY.
I don't care about renewable sources. Want lowest utility bills possible however you make that happen please!

Natural Gas (\$/mmbtu) -Nominal \$'s

Year	PJM_AEP		Henry Hub	TCO Pool	Dominion South Point Pool	TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	CO <sub>2</sub>
	On-Peak	Off-Peak											
2018	29.41	23.82	3.22	2.94	2.69	3.17	3.27	2.73	0.26	0	0	0	0.00
2019	33.16	26.84	3.88	3.59	3.37	3.83	3.92	3.40	0.27	0	0	0	0.00
2020	37.89	29.96	4.59	4.26	4.05	4.52	4.62	4.17	0.27	0	0	0	0.00
2021	38.55	30.62	4.69	4.31	4.19	4.56	4.71	4.26	0.28	0	0	0	0.00
2022	39.82	31.46	4.82	4.41	4.25	4.67	4.85	4.48	0.29	0	0	0	0.00
2023	41.16	32.45	4.96	4.56	4.43	4.82	4.99	4.56	0.29	0	0	0	0.00
2024	42.49	33.48	5.12	4.68	4.54	4.95	5.15	4.67	0.30	0	0	0	0.00
2025	43.68	34.63	5.22	4.82	4.65	5.09	5.25	4.79	0.30	0	0	0	0.00
2026	44.87	35.80	5.32	4.98	4.72	5.21	5.35	4.88	0.31	0	0	0	0.00
2027	44.95	36.70	5.41	5.02	4.81	5.30	5.45	4.93	0.32	0	0	0	0.00
2028	55.71	47.74	5.99	5.58	5.36	5.86	6.02	5.48	0.32	0	0	0	13.61
2029	57.10	48.78	6.15	5.69	5.43	5.97	6.18	5.59	0.33	0	0	0	14.29
2030	60.49	51.28	6.71	6.29	5.97	6.28	6.51	5.91	0.33	0	0	0	15.00
2031	62.75	53.24	6.91	6.49	6.14	6.49	6.75	6.21	0.34	0	0	0	15.75
2032	64.95	55.20	7.12	6.62	6.29	6.93	7.15	6.50	0.35	0	0	0	17.37
2033	66.20	56.94	7.33	6.83	6.48	7.14	7.36	6.73	0.36	0	0	0	18.24
2034	67.56	59.03	7.55	7.04	6.67	7.35	7.59	6.96	0.37	0	0	0	19.15
2035	70.06	61.30	7.78	7.25	6.90	7.57	7.81	7.17	0.37	0	0	0	20.11
2036	72.40	62.64	8.01	7.47	7.13	7.79	8.05	7.36	0.38	0	0	0	21.11
2037	73.88	64.76	8.24	7.69	7.36	7.96	8.28	7.52	0.39	0	0	0	22.17
2038	77.24	67.58	8.47	7.86	7.59	8.19	8.52	7.73	0.40	0	0	0	23.27
2039	77.74	68.61	8.71	8.08	7.82	8.42	8.78	7.89	0.40	0	0	0	24.44
2040	80.16	70.97	8.93	8.31	8.05	8.65	9.01	8.12	0.41	0	0	0	25.66
2041	82.53	73.75	9.16	8.54	8.28	8.89	9.24	8.35	0.42	0	0	0	26.94
2042	83.56	75.48	9.40	8.78	8.52	9.13	9.48	8.59	0.43	0	0	0	28.29
2043	85.98	78.03	9.64	9.02	8.76	9.37	9.72	8.83	0.44	0	0	0	29.70
2044	88.10	80.39	9.88	9.26	9.00	9.61	9.96	9.07	0.45	0	0	0	31.19
2045	89.57	82.87	10.12	9.50	9.24	9.88	10.20	9.31	0.45	0	0	0	32.75
2046	91.38	85.44	10.38	9.76	9.50	10.12	10.46	9.57	0.46	0	0	0	34.39
2047	94.44	88.03	10.60	9.99	9.72	10.35	10.68	9.80	0.47	0	0	0	36.11
2048	95.50	90.34											

EXHIBIT  
4  
IGSF 6/26/20



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<https://www.wsj.com/articles/pg-e-fires-three-executives-over-contact-with-california-regulator-1410826821>

## BUSINESS

# PG&E Fires Three Executives Over Contact With California Regulator

Utility Company and State Say Email Exchanges About Judge Assigned to a Case Were Inappropriate

By *Cassandra Sweet*

Sept. 15, 2014 8:20 p.m. ET

Three PG&E Corp. PCG -8.71% ▼ executives have been fired in the wake of inappropriate email exchanges with California's utility regulator, the company and the state said Monday.

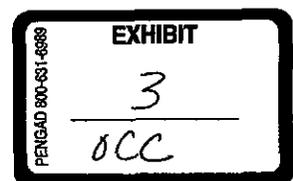
Brian Cherry, vice president of regulatory relations at Pacific Gas & Electric Co., was terminated after violating rules governing how companies communicate with California's Public Utilities Commission, the company said. Tom Bottorff, the company's senior vice president of regulatory affairs, and Trina Horner, vice president of regulatory proceedings, received copies of the communications and were also fired. None could be reached immediately for comment.

The PUC identified more than a dozen emails exchanged between Mr. Cherry and the regulator this past January. Several commissioners and employees of the agency were contacted, including PUC President Michael Peevey; Carol Brown, his chief of staff at the time and Commissioner Michel Florio.

In the emails, Mr. Cherry complained about an administrative law judge the PUC assigned to rule on a natural-gas rate case concerning energy prices passed along to consumers. He asked that a different judge be assigned to the case.

Mr. Peevey, who received one of the emails, recused himself from that case because of the inappropriate contact and asked Ms. Brown to resign from his staff over her responses to PG&E's inappropriate contact, which she did, the PUC said.

Mr. Florio, who sent an email to Mr. Cherry, said that at the time he wasn't aware the commission had a rule against communicating with utilities over judge assignments.



"I screwed up," he said in an interview. "We shouldn't have allowed it to happen."

Neither Mr. Peevey nor Ms. Brown could be reached for comment.

The commission posted some of the emails to its website and said it would review internal practices to prevent similar problems in the future. The PUC may also consider penalizing PG&E for the company's inappropriate communication.

In a filing to the Securities and Exchange Commission, PG&E said it is creating a new role of chief regulatory compliance officer, and it is hiring former U.S. Secretary of the Interior Ken Salazar to advise it on improving its interactions with regulators.

In addition to potential fines, PG&E may be required to put new procedures in place, which could further harm its reputation, the company said.

"As a company, we must be committed to complying with both the letter and the spirit of the law and PG&E's own code of conduct at all times," PG&E Chief Executive Tony Earley said.

The company discovered the inappropriate emails as part of an internal review after officials in San Bruno, Calif. accused the utility of having an inappropriately close relationship with regulators. San Bruno was the site of a deadly gas pipeline explosion in September 2010 that killed 8 people, injured dozens of others and damaged more than 100 homes.

Earlier this month, the PUC proposed fining PG&E \$1.4 billion for that blast.

**Write to Cassandra Sweet at [cassandra.sweet@wsj.com](mailto:cassandra.sweet@wsj.com)**

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An AEP Company

BOUNDLESS ENERGY

Legal Department

American Electric Power  
1 Riverside Plaza  
Columbus, OH 43215-2373  
AEP.com

December 13, 2017

Asim Z. Haque  
Chairman, Public Utilities Commission of Ohio  
Public Utilities Commission of Ohio  
180 East Broad Street  
Columbus Ohio 43215-3793

*Re: In the Matter of Ohio Power Company's Generation  
Transition Docket, Case No. 17-882-EL-UNC*

Steven T. Nourse  
Chief Ohio Regulatory  
Counsel  
(614) 716-1608 (P)  
(614) 716-2014 (F)  
stnourse@aep.com

Dear Chairman Haque:

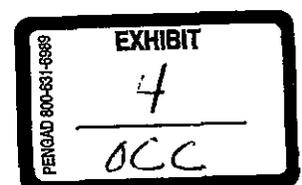
On behalf of Ohio Power Company (AEP Ohio), I am submitting the enclosed report entitled "Ohio Renewable Energy Manufacturing & Company Establishment Analysis" conducted by Navigant Consulting, Inc. Submittal of this report fulfills Paragraph III.D.12.e of the Joint Stipulation and Recommendation in Case Nos. 14-1693-EL-RDR and 14-1694-EL-AAM (PPA Rider Stipulation). The report will also be referenced in the Company's 2018 annual update filing, but the Company wanted to submit it now since it is already completed.

Thank you for your attention to this matter.

Respectfully Submitted,

//s/ Steven T. Nourse

cc: Parties of Record



# NAVIGANT

## Ohio Renewable Energy Manufacturing & Company Establishment Analysis

Prepared for:  
AEP Ohio



An **AEP** Company

## FINAL

**Submitted by:**  
Navigant Consulting, Inc.  
1375 Walnut St. #100  
Boulder, CO 80302

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December 13, 2017

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## DISCLAIMER

This report was prepared by Navigant Consulting, Inc. (Navigant) for AEP Ohio. The work presented in this report represents Navigant's professional judgment based on the information available at the time this report was prepared. Navigant is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. **NAVIGANT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED.** Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report.

## EXECUTIVE SUMMARY

### BACKGROUND

In PPA Stipulation Section III.D.12. e., the Public Utilities Commission of Ohio (PUCO) directed AEP Ohio to “perform an analysis about how to bring or encourage companies to establish renewable energy companies with headquarters and manufacturing plants in Ohio and how to transition the current power plant workforce to such job opportunities.”<sup>1</sup> AEP Ohio retained Navigant, an independent third party, to conduct this analysis. Navigant completed six tasks with the goal of providing actionable strategies for achieving the goals outlined in the stipulation.

Table E-1. Task Goals

Project Task	Task Goal
1. Initiate Project	Confirm project goals and define communication plans.
2. Develop Company Motivators	Catalog the reasons why renewable energy companies locate where they do and rank them in order of importance.
3. Define State Strategies	Characterize the different strategies used by states and discuss their relative success.
4. Assess in Ohio	Establish a baseline number and type of renewable energy companies already in Ohio.
5. Map Career Transitions	Define pathways for existing conventional power plant workers to move into the renewable energy industry as jobs decline in conventional power plants.
6. Develop Recommendations & Findings	Develop high-impact, feasible options for the state of Ohio to encourage renewable energy companies and manufacturers to set up headquarters in Ohio.

This report details the research and findings of Navigant’s analysis and provides a roadmap for encouraging renewable energy companies to establish in or locate to Ohio while also providing pathways for power plant workers to transition into these opportunities.

### RENEWABLE ENERGY COMPANY MOTIVATORS

Navigant began this study by determining the factors that drive renewable energy development and services companies and manufacturers to locate headquarters or manufacturing facilities in a certain area. Navigant developed a six-category framework that significantly affect different operational factors and ultimately influence locational decisions, ranking these locational motivators for both renewable companies focused on development and services and manufacturers. These factors serve as levers for states to pull to drive regional renewable energy company growth.

<sup>1</sup>Public Utilities Commission of Ohio, Opinion and Order, Case No. 14-1693-EL-RDR and Case No. 14-1694-EL-AAM, PPA Stipulation Section III.D.12.e.

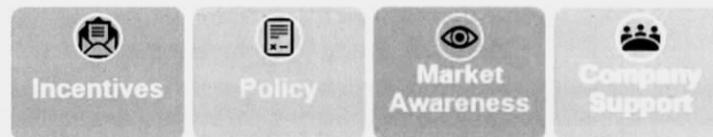
Figure E-1. Renewable Energy Company & Manufacturer Locational Motivators



## STATE STRATEGIES

Navigant characterized strategies used by states to target companies and manufacturers and discussed each strategies' relative success. This analysis resulted in four overarching themes.

Figure E-2. State Strategies Framework



Based on our analysis, Navigant focused on incentives and policy and created a scoring system to assess wind and solar strategies by state and determine whether there was a correlation between these strategies and the number of solar and wind jobs per state. From this analysis, the team verified that policies, such as RPS, Net Metering, third-party PPAs, and financial incentives, in addition to solar resource availability and high electric rates, play a large role in driving solar jobs at the state level. Meanwhile policies and financial incentives play a less significant role in the growth of wind jobs, due in large part to the types of wind jobs available.

## ASSESS OHIO

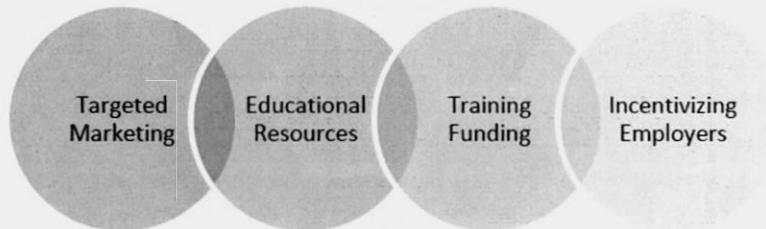
Navigant assessed the current state of jobs and companies in Ohio, aimed at establishing a baseline for the renewable energy companies in Ohio and helping Navigant target its findings and recommendations to allow for sustained renewable energy company and job growth. Our analysis found that many companies of different sizes and types are currently operating in Ohio.

## MAP CAREER TRANSITION

Navigant examined strategies for the state of Ohio to facilitate employee transition to renewable energy opportunities as they arise. Based on the research and resources available, Navigant developed a pathway for transitioning from a conventional power plant career to a renewable energy career. Navigant

identified four strategies that key stakeholders can enact. The strategies are intended to work in conjunction, utilizing different levers for helping conventional power plant workers transition.

**Figure E-3. Strategies for Facilitating Career Transition**



## FINDINGS & RECOMMENDATIONS

Navigant developed four guiding principles for implementing strategies to grow a localized renewable energy market, increasing the number of companies and jobs within the state. The guiding principles were: market stability, consistent programs, workforce preparation, and research and development. Using these principles, Navigant developed five actionable recommendations for the state and local governments to implement to drive renewable energy company and job growth. Table E-2 lists the recommendations.

**Table E-2. Study Recommendations**

Number	Recommendation
1	Publish multi-year state renewable energy procurement plan, led by the state or a state-wide body.
2	Expand JobsOhio to include: <ul style="list-style-type: none"> <li>• Renewable energy education platform providing career transition resources.</li> <li>• Concierge service to answer renewable energy questions.</li> </ul>
3	Remove permitting barriers.
4	Invest in Research & Development.
5	Continue to invest in roads and infrastructure.

## 1. INTRODUCTION

### 1.1 STUDY BACKGROUND

In PPA Stipulation Section III.D.12. e., the PUCO directed AEP Ohio to “perform an analysis about how to bring or encourage companies to establish renewable energy companies with headquarters and manufacturing plants in Ohio and how to transition the current power plant workforce to such job opportunities.”<sup>2</sup> AEP Ohio retained Navigant, an independent third party, to conduct this analysis.

This report lays out the findings from the study, providing an in-depth overview of why renewable energy companies establish in specific locations, strategies for attracting these companies, and how different stakeholders can participate in the transitioning of conventional power plant workers to renewable energy opportunities. Ultimately, the analysis serves as a roadmap for encouraging renewable energy companies, particularly in the wind and solar industry, to establish in Ohio and for training and connecting workers to renewable energy opportunities as they arise.

### 1.2 STUDY GOALS

To provide actionable recommendations, Navigant created a list of questions to guide the analysis. The questions centered on renewable energy company motivators, existing strategies for encouraging regional renewable energy development (and therefore driving regional company location), and pathways for transitioning conventional power plant workers to renewable energy careers. The list below provides these questions.

- What are the factors that drive companies to locate headquarters or manufacturing facilities?
- What strategies do other states use to encourage companies to locate in their state?
- What renewable energy companies currently have headquarters or manufacturing in Ohio?
- And what attracted these companies to locate operations in Ohio or to leave Ohio?
- How can the current power plant workforce transition to work in the renewable energy industry?
- What actions should Ohio take to encourage renewable energy companies to set up headquarters in Ohio?

Based on these questions, Navigant developed a framework of six tasks to explore and answer the questions outlined above, ultimately providing actionable strategies for AEP Ohio and the state of Ohio. Table 1-1 below provides an overview of Navigant’s framework.

**Table 1-1. Task Goals**

Project Task	Task Goal
1. Initiate Project	Confirm project goals and define communication plans.
2. Develop Company Motivators	Catalog the reasons why renewable energy companies locate where they do and rank them in order of importance.

<sup>2</sup> Public Utilities Commission of Ohio, Opinion and Order, Case No. 14-1693-EL-RDR and Case No. 14-1694-EL-AAM, PPA Stipulation Section III.D.12.e.

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3. Define State Strategies	Characterize the different strategies used by states and discuss their relative success.
4. Assess Ohio	Establish a baseline number and type of renewable energy companies already in Ohio.
5. Map Career Transitions	Define pathways for existing conventional power plant workers to move into the renewable energy industry as jobs decline in conventional power plants.
6. Develop Recommendations & Findings	Develop high-impact, feasible options for the state of Ohio to encourage renewable energy companies and manufacturers to set up headquarters in Ohio.

---

## 1.3 REPORT ORGANIZATION

Navigant organized the report to align to the study goals and tasks:

- **Section 2: Company Motivators** – Research and resulting framework for why companies locate where they do.
- **Section 3: State Strategies** – Outline and relative success rank of state strategies for encouraging regional growth or renewable energy companies.
- **Section 4: Assess Ohio** – Definition of solar and wind value chains and map of solar and wind companies located in Ohio.
- **Section 5: Map Career Transitions** – Pathway and strategies to help existing power plant workers transition to the renewable energy industry.
- **Section 6: Findings & Recommendations** – Actionable strategies for the state of Ohio to consider increasing the development of renewable energy companies in the State.

The report includes 2 appendices, which provide additional information:

- Case study key takeaways from renewable energy companies on locational decision-making and stakeholder recommendations.
- Resources for transitioning conventional power plant workers to renewable energy jobs, mentioned in Section 5, Renewable Energy Career Transitioning.

## 2. COMPANY MOTIVATORS

Navigant began this study by determining the factors that drive renewable energy development and services companies and manufacturers to locate headquarters or manufacturing facilities in a certain area, ranking these locational motivators. Navigant gained an understanding of locational motivators and how they align to various state strategies for the regional development of renewable energy manufacturers and companies. The findings ultimately resulted in valuable insight into how renewable energy companies may react to proposed strategies. Figure 2-1 illustrates the overarching locational motivators Navigant identified. This section explains the approach and key resources and provides details on the findings.

**Figure 2-1. Renewable Energy Company & Manufacturer Locational Motivators**



Source: Navigant 2017

### 2.1 APPROACH

Navigant used a four-step approach to identify, prioritize, and validate the top locational motivators for renewable energy companies and manufacturers. The steps include: conducting general research, brainstorming the initial list of drivers, prioritizing the drivers, and validating the prioritization through additional primary and secondary research. The first step involved examining national and global studies related to regional development as well as measures of “competitiveness” that influence market growth in a specific region. This step yielded a comprehensive catalog of drivers that influence companies and/or manufacturers picking one location over another. Navigant then translated this catalog into overarching categories, leveraging the team’s expertise in renewable energy and past Navigant studies. Following the finalization of the locational motivator categories, the team created a qualitative prioritization framework based on renewable energy industry specific studies validating the prioritization through industry interviews and additional market research. The list below details the key sources used throughout the process.

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- U.S. Government National Network for Manufacturing Innovation Report<sup>3</sup>
- World Economic Forum Studies<sup>4</sup>
- National Renewable Energy Laboratory (NREL) Studies<sup>5,6</sup>
- Deloitte's Global Manufacturing Competitiveness Index<sup>7</sup>
- Company Case Studies<sup>8</sup>
- Recent News Articles<sup>9, 10,11</sup>

## 2.2 FRAMEWORK

Navigant created a framework of locational motivators for renewable energy companies and manufacturers. The framework consists of six categories that significantly affect different operational factors and ultimately influence locational decisions. These factors serve as levers to pull to drive regional renewable energy company growth. Table 2-1 details the locational motivators framework for renewable energy companies and manufacturers.

*"Moved locations because we wanted to make this into a real business. To make an impact, we needed to be close to a large population."*  
– Dovetail Wind & Solar

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<sup>3</sup> President's Council of Advisors on Science and Technology, Accelerating US Advanced Manufacturing, October 2014,

[https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/amp20\\_report\\_final.pdf](https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/amp20_report_final.pdf)

<sup>4</sup> World Economic Forum, The Future of Manufacturing: Opportunities Drive Economic Growth, 2012, [http://www3.weforum.org/docs/WEF\\_MOB\\_FutureManufacturing\\_Report\\_2012.pdf](http://www3.weforum.org/docs/WEF_MOB_FutureManufacturing_Report_2012.pdf)

<sup>5</sup> NREL, Manufacturing Conditions in the Global Wind Industry, <https://www.nrel.gov/docs/fy14osti/60063.pdf>.

<sup>6</sup> NREL, Carbon Fiber Manufacturing Facility Siting, <https://www.nrel.gov/docs/fy17osti/66875.pdf>.

<sup>7</sup> Deloitte, 2016 Global Manufacturing Competitiveness Index, 2016,

<https://www2.deloitte.com/global/en/pages/manufacturing/articles/global-manufacturing-competitiveness-index.html>.

<sup>8</sup> See Appendix A for details.

<sup>9</sup> The Journal News, "Start-up Business for Water-Power Technology to Open in Hamilton", December 2013,

<http://www.journal-news.com/news/start-business-for-water-power-technology-open-hamilton/GSCQ3bLbOzaTrRGLDscYHM/>

<sup>10</sup> Toledo Blade, "Toledo Area Could Get Another Solar Plant with 600 Jobs", 2010,

<http://www.toledoblade.com/local/2010/10/15/Toledo-area-could-get-another-solar-plant-with-600-jobs.html>

<sup>11</sup> Smart Energy Decisions, "Renewable Energy Access Lures Facebook to Ohio", August 18, 2017,

[https://www.smartenergydecisions.com/blog/2017/08/18/renewable-energy-access-lures-facebook-to-ohio?contact\\_id=59160&inf\\_contact\\_key=f87cf785d4ce3888273549c39b9591175051586c7ca7f86891a0a3ada8f79751](https://www.smartenergydecisions.com/blog/2017/08/18/renewable-energy-access-lures-facebook-to-ohio?contact_id=59160&inf_contact_key=f87cf785d4ce3888273549c39b9591175051586c7ca7f86891a0a3ada8f79751)

**Table 2-1. Renewable Energy Company & Manufacturer Locational Motivators Framework**

Motivators	Description	Examples
<p>Renewable Energy Market</p> 	<p>The Renewable Energy Market encompasses the localized climate for building renewables, including policy, permitting, and financial factors. These factors can help reduce long term business and financial risks as well as improve the ease of project development.</p>	<ul style="list-style-type: none"> <li>• Project economics, including electric rates, renewable energy resource availability, and inexpensive land</li> <li>• Policy, including Renewable Portfolio Standards (RPS), Net Energy Metering (NEM), and Solar Renewable Energy Credits (RECs)</li> <li>• Supportive permitting and financing</li> </ul>
<p>Supportive Schemes</p> 	<p>Supportive Schemes include incentives for developing a renewable energy product. These schemes can tip the scales in favor of a location if they reduce costs or provide long-term advantages, such as low-cost, innovative R&amp;D opportunities.</p>	<ul style="list-style-type: none"> <li>• Investment in Research &amp; Development (R&amp;D)</li> <li>• Equipment / manufacturing incentives</li> <li>• Grants</li> </ul>
<p>Workforce</p> 	<p>Workforce incorporates various labor aspects, including worker preparedness, access to training or educational resources, and cost of labor.</p>	<ul style="list-style-type: none"> <li>• Education and training program accessibility</li> <li>• Specialized knowledge via universities</li> <li>• Inexpensive labor</li> </ul>
<p>Logistics</p> 	<p>Logistics encompass ease of access to a stable product or end-user market via transportation corridors or proximity.</p>	<ul style="list-style-type: none"> <li>• Infrastructure / distribution access</li> <li>• Proximity to stable market</li> </ul>
<p>Operating Expenses</p> 	<p>Operating expenses include the cost of doing business in a location.</p>	<ul style="list-style-type: none"> <li>• Inexpensive land</li> <li>• Electric rates</li> <li>• Facility rents</li> <li>• State and local taxes</li> </ul>
<p>Supply Chain</p> 	<p>Supply chain includes the entire product value chain.</p>	<ul style="list-style-type: none"> <li>• Supplier market</li> </ul>

Source: Navigant 2017

## 2.3 PRIORITIZATION

Using the framework described, Navigant investigated renewable energy-specific studies, recent company relocations, and firsthand case studies to prioritize each category. Navigant created two separate lists, one for general renewable energy companies and one for manufacturers of wind and

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*"We knew within a fifteen-mile radius where we wanted to be... which is very close to the I-70/75 highway crossroads." – Energy Optimizers, USA*

solar products, due to differing needs for these businesses. For example, manufacturers need to be located near transportation corridors to move products from different factories for assembly or installation. Meanwhile, renewable energy developers or service firms may prioritize a location near an end-user market to sell their product. The prioritized lists in Table 2-2 represent the most influential drivers in renewable energy company and manufacturer decision-making. This list provides a pathway for determining actionable strategies to entice companies to locate in a certain area.

**Table 2-2. Renewable Energy Company and Manufacturer Prioritized Locational Motivators**

Rank	Company Locational Motivators	Manufacturer Locational Motivators
1	Renewable Energy Market	Workforce
2	Supportive Schemes	Logistics
3	Workforce	Supply Chain
4	Logistics	Operating Expenses
5	Supply Chain	Supportive Schemes
6	Operating Expenses	Renewable Energy Market

Source: Navigant 2017

## 3. STATE STRATEGIES

Navigant characterized strategies used by states to target companies and manufacturers and discussed each strategies' relative success. Task 3 leverages the findings from Task 2 to identify specific and actionable levers for sustained renewable energy company and job growth with the aim of understanding possible high-value strategies. Given that many states and counties have been targeting renewable energy companies and jobs for the last 10 to 15 years, Navigant focused on gaining an understanding of how these strategies have influenced the number of renewable energy jobs and companies to-date.

This analysis resulted in four overarching themes defined in Figure 3-1. The following section provides additional details about the approach for developing this framework and the success of these strategies.

Figure 3-1. State Strategies Framework



Source: Navigant 2017

### 3.1 APPROACH

Navigant conducted a three-phase approach which involved researching existing literature, identifying strategies, and evaluating each strategies' success. The process began with conducting a literature search incorporating case study details, trade industry information, current initiatives, and information from the Database of State Incentives for Renewables and Efficiency (DSIRE).<sup>12</sup> Like the locational driver analysis, the research yielded a catalog of strategies employed by states to draw renewable energy companies and jobs to their state. Due to the volume of strategies, Navigant grouped these findings by similarity to get an overview of the types of strategies available. Finally, the team evaluated the success of each of the strategies by assigning scores to them at the state level. These scores were then compared against the number of wind and solar jobs in that respective state to test the legitimacy of the scoring. The entire analysis leveraged the sources in the list below.

- NREL Studies<sup>13</sup>
- The Solar Foundation, SolSmart Initiative Funded by the Department of Energy (DOE)<sup>14</sup>
- Database of State Incentives for Renewables & Efficiency (DSIRE)<sup>15</sup>

<sup>12</sup> NC Clean Energy Technology Center, Database of State Incentives for Renewables and Efficiency (DSIRE), <http://www.dsireusa.org/>.

<sup>13</sup> NREL, The Role of State Policy in Renewable Energy Development, July 2009, <https://www.nrel.gov/docs/fy09osti/45971.pdf>.

<sup>14</sup> The Solar Foundation, SolSmart Initiative, <https://www.thesolarfoundation.org/policy-research/soismart/>.

<sup>15</sup> NC Clean Energy Technology Center, Database of State Incentives for Renewables & Efficiency, <http://www.dsireusa.org/>.

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- The Solar Foundation 2016 Solar Job Census<sup>16</sup>
- American Wind Energy Association State Fact Sheets<sup>17</sup>
- Existing Navigant Studies<sup>18</sup>
- Energy Information Administration, Electric Rates<sup>19</sup>

## 3.2 FRAMEWORK

Navigant’s approach resulted in a four-category framework of strategies employed by states to incentivize companies and manufacturers to locate in and ultimately bring jobs to their state. This framework aims to explain strategies currently used, providing an overview of possibilities for the state of Ohio. Table 3-1 outlines the framework created.

Table 3-1. State Strategies Framework

Strategies	Description	Examples
 <p>Incentives</p>	<p>Incentive strategies encompass any method of reducing the cost of doing business.</p>	<ul style="list-style-type: none"> <li>• Tax credits</li> <li>• Rebates</li> <li>• Subsidies</li> <li>• Performance-based incentives</li> <li>• Grants</li> <li>• Loans</li> <li>• Employment Incentives</li> <li>• Renewable Portfolio Standards (RPS)</li> <li>• Net Metering (NEM)</li> </ul>
 <p>Policy</p>	<p>Policy strategies include regulations that increase market certainty, reducing the risk and improving the ease of doing business within the state.</p>	<ul style="list-style-type: none"> <li>• Renewable Energy Credits (RECS)</li> <li>• Green tariffs</li> <li>• Community development zones</li> <li>• Preferred or required local sourcing</li> </ul>

<sup>16</sup> The Solar Foundation, Solar Job Census 2016, <https://www.thesolarfoundation.org/national/>.

<sup>17</sup> American Wind Energy Association, US Wind Energy State Facts, <https://www.awea.org/resources/statefactsheets.aspx?itemnumber=890&navitemNumber=5067>.

<sup>18</sup> Navigant, Washington State Clean Energy Leadership Plan for the Washington Clean Energy Leadership Council, <http://www.efsec.wa.gov/Whistling%20Ridge/Adjudication/Intervenor's%20pre-filed%20testimony/Ex%2034-05.%20CELC%20extract.pdf>.

<sup>19</sup> Energy Information Administration, Table 5.6.A. Average Price of Electricity to Ultimate Customers by End-Use Sector, by State, July 2017 and 2016, July 2017,

[https://www.eia.gov/electricity/monthly/epm\\_table\\_grapher.php?t=epmt\\_5\\_6\\_a](https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a)

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## Market Awareness



Market awareness strategies encompass building a market for renewable energy by educating consumers, providing opportunities for projects (e.g. through project aggregation), and any other strategies that encourage end-users to partake in the industry.

- Market awareness education
- Choices for customers (market access)
- Local organizations/co-ops for project aggregation, policy lobbying, and market education
- Workforce training
- Incentives for industry development
- Employee search assistance
- Property search assistance
- Funding demonstration projects
- Focus on building research, technology transfer, and university capabilities

## Company Support



Customer support strategies include methods for supporting prospective renewable energy companies/employers. These strategies include funding as well as general assistance.

Source: Navigant 2017

### 3.3 STRATEGY EVALUATION

With the framework defined, Navigant focused on evaluating the success of the policy and incentive strategies, stemming from two recent reports from the National Renewable Energy Laboratory (NREL) and the Lawrence Berkeley National Laboratory (LBNL), industry-leading renewable energy research organizations. LBNL recently published its 2017 Annual Status

*“RPS policies continue to play a central role in supporting RE growth.”*  
- NREL

Report of US Renewable Portfolio Standards, which included an analysis of the historical impacts of RPS on renewables development, concluding that “roughly half of all growth in US renewable electricity (RE) generation and capacity since 2000 is associated with state RPS requirements.”<sup>20</sup> Likewise a 2014 report from NREL came to a similar conclusion, finding that “niche incentives, only when layered on top of high quality market access policies, can support distributed generation penetration in target markets.”<sup>21</sup> In short, the two reports support the idea that policies and incentives are the main drivers for renewable energy market growth, which in turn spurs renewable energy job growth.

Given this information, Navigant created a scoring system to assess wind and solar strategies by state and determine whether there was a correlation between these strategies and the number of solar and wind jobs per state. The solar scoring accounted for RPS, NEM, Solar Renewable Energy Credits (SRECs), third party PPAs, the number of financial incentives available as well as non-policy market factors, such as electric rates and solar resource availability. The wind scoring included RPS, the number of financial incentives, electric rates, and wind resource availability. Table 3-2 shows the scoring framework for all policies and incentives assessed.

<sup>20</sup> Lawrence Berkeley National Laboratory (LBNL), US Renewables Portfolio Standards: 2017 Annual Status Report Abstract, <https://emp.lbl.gov/publications/us-renewables-portfolio-standards-0>.

<sup>21</sup> National Renewable Energy Laboratory (NREL), “Are Incentives the Thing?”, December 2014, <https://www.nrel.gov/docs/fy15osti/63059.pdf>.

**Table 3-2. State Strategy Scoring Framework**

Categories	Scoring
RPS*	RPS Standards – 4 RPS Goals – 2 No RPS – 0
Net Metering**	Net Metering – 2 Other Rules – 1 No Net Metering – 0
SRECs**	SRECs – 2 SRECs Eligible – 1 No SRECs – 0
Third Party PPAs	Third party PPAs – 1 No Third party PPAs – 0 Status Unclear – 0
Financial Incentives	Many state incentives – 2 Some state incentives – 1 Few state incentives – 0
Electric Rates*	High Rates – 4 Medium Rates – 2 Low Rates – 0
Wind & Solar* Resources	High Resource – 4 Medium Resource – 2 Little Resource – 0

Source: Navigant 2017

\*Navigant applied extra weight to these categories given influence on wind or solar developments.

\*\* Only used in solar scoring framework

Navigant chose to add additional weights to RPS, electric rates, and wind and solar resource availability due to their significant influence on renewable energy development. For example, ample sunshine or wind resources reduce business risk while high electric rates improve the financials of developing these resources. Figure 3-2 shows the scoring calculations to assess state strategies for both wind and solar.

**Figure 3-2. State Strategy Scoring Calculations**

$$\text{Solar Strategy Score} = \text{RPS} + \text{Net Metering} + \text{SRECs} + \text{Third Party PPAs} + \text{Financial Incentives} + \text{Electric Rates} + \text{Solar Resources}$$

$$\text{Wind Strategy Score} = \text{RPS} + \text{Financial Incentives} + \text{Electric Rates} + \text{Wind Resources}$$

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## 3.3.1 Solar

The calculations resulted in a ranking of states according to their strategy score. To determine the success of these strategies, Navigant compared the rankings to the number of solar jobs in each state.<sup>22</sup> The table below shows the 10 states with the most jobs per capita and their associated Navigant strategy rank.

Table 3-3. Top 10 Solar Job States vs. Navigant Strategy Rank

Top 10 Solar Job States <sup>23</sup>	State	State Solar Jobs per Capita <sup>24</sup>	Navigant Strategy Framework State Rank <sup>25</sup>
1	California	100,050	1
2	Massachusetts	14,582	5
3	Texas	9,396	15
4	Nevada	8,371	13
5	Florida	8,260	28
6	New York	8,135	15
7	Arizona	7,310	5
8	North Carolina	7,112	5
9	New Jersey	6,056	4
10	Colorado	6,004	3

See footnotes for sources.

As shown above, nine of the top ten solar jobs states land within the top fifteen of Navigant's ranking. The only exception is Florida, which has a particularly strong solar resource and therefore, high number of jobs, despite having fewer policies and financial incentives than its peers. This reinforces the idea that policies and incentives drive market and job growth in the solar industry. In Figure 3-3, Navigant plotted the rankings against the number of jobs per capita per state for the entire country to demonstrate the correlation.

*State-level and national policies drive a large portion of business model decisions, particularly related to the location of regional offices and manufacturing. - First Solar*

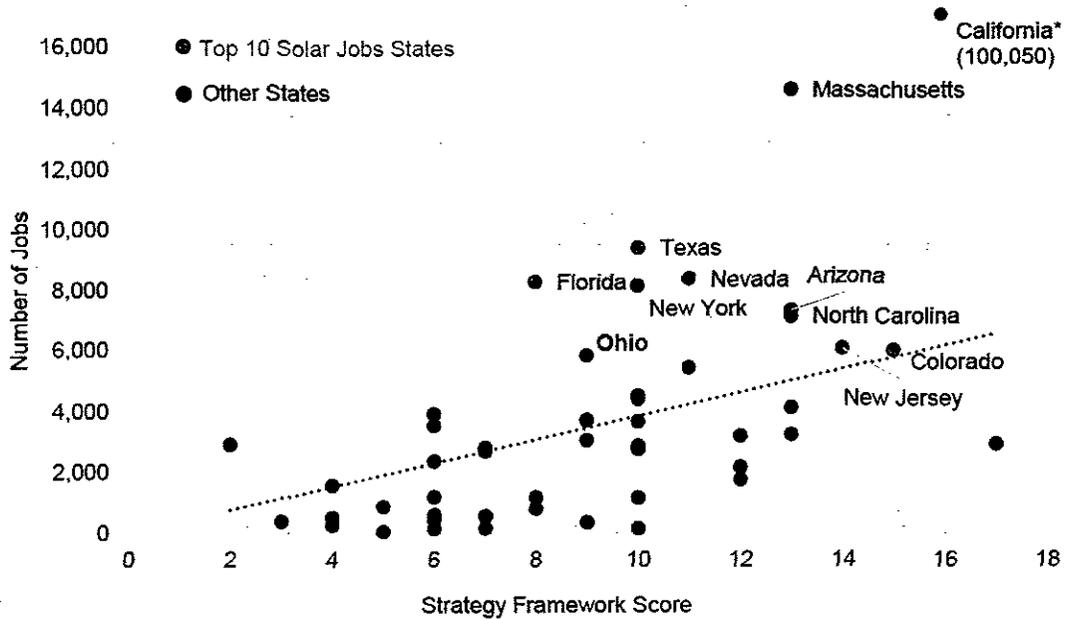
<sup>22</sup> Navigant extracted state jobs data from The Solar Foundation, The 2016 Solar Job Census, <https://www.thesolarfoundation.org/national/>.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

<sup>25</sup> Navigant analysis.

**Figure 3-3. Solar Jobs per Capita vs. Solar Strategies**



Source: Navigant 2017

\*Navigant removed California from the scatter plot and added separately due to the magnitude of jobs in California.

The plot shows that strong policies and incentives, high electric rates, and a robust solar resource correlates with a high number of solar jobs.

### 3.3.2 Wind

Similar to the solar analysis, Navigant compared the wind strategy score against the number of wind jobs per state. The table below shows the results of this comparison.

**Table 3-4. Top 10 Wind Job States vs. Navigant Strategy Rank**

Top 10 Wind Job States <sup>26</sup>	State	State Wind Jobs <sup>27</sup>	Navigant Strategy Framework State Rank <sup>28</sup>
1	Colorado	4,144	15
2	Texas	2,979	15
3	Iowa	1,929	15
4	Ohio	1,626	11
5	Illinois	1,482	15

<sup>26</sup> American Wind Energy Association, Economic Development Impact of Wind Projects prepared by Navigant.

<sup>27</sup> Ibid.

<sup>28</sup> Navigant analysis.

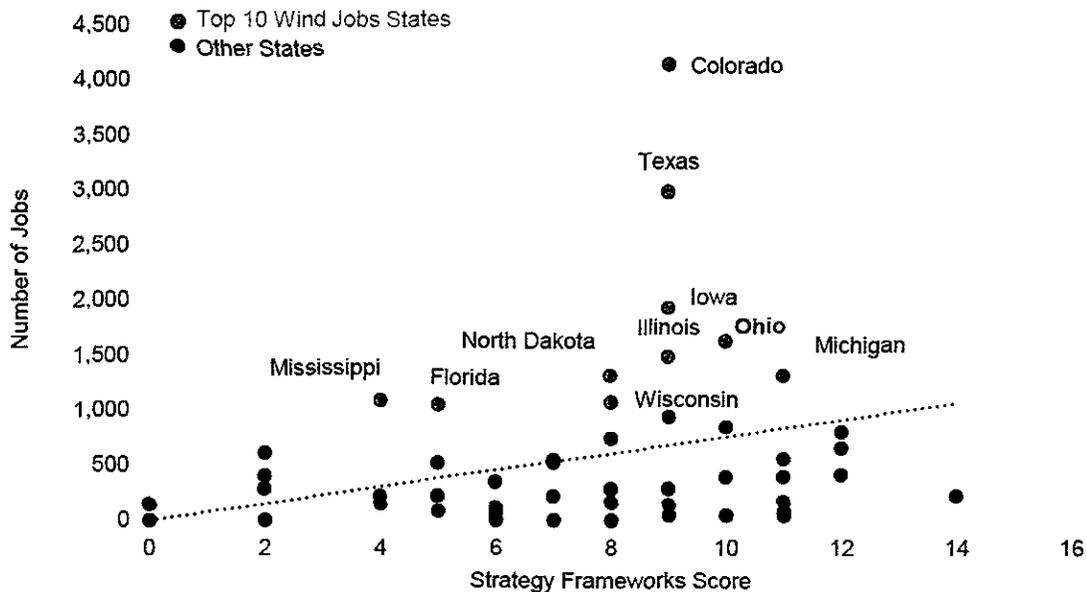
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6	North Dakota	1,313	23
7	Michigan	1,308	5
8	Mississippi	1,086	42
9	Wisconsin	1,068	23
10	Florida	1,041	38

See footnotes for sources.

Most of the top wind job states rank within the top fifteen on Navigant's strategy framework scale. The other states including North Dakota, Mississippi, Wisconsin, and Florida fall within the twenty-three to forty-two rank. Other factors, such as proximity to key transportation routes (Mississippi), significant wind resources (North Dakota and Wisconsin), and low state taxes (Florida) contribute to the high number of wind manufacturing jobs in states that do not have strong wind-related policies or incentives. In Figure 3-4, Navigant plotted the rankings against the number of jobs per capita per state to demonstrate the pattern.

**Figure 3-4. Wind Jobs per Capita vs. Wind Strategies**



Source: Navigant 2017

The plot above shows that only a loose correlation exists between strategies implemented and number of jobs. The correlation is likely not as strong, due to a variety of factors. One of these factors stems from the fact that a large portion of wind jobs are in manufacturing, jobs that are less

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driven by policy and incentives.<sup>29</sup> Instead they are driven by logistics, workforce preparedness, and supply chain, as outlined in Section 2.3 and Table 2-2.

## 3.4 KEY TAKEAWAYS

By identifying and quantifying the success of state strategies, Navigant further understood the levers and how they may affect the regional market. From this analysis, the team verified that

*When asked how the state could aid the industry, all case study participants noted the need for stable and supportive policies and incentives.*

policies, such as RPS, Net Metering, third-party PPAs, and financial incentives, in addition to solar resource availability and high electric rates, play a large role in driving solar jobs at the state level. Meanwhile policies and financial incentives play a less significant role in the growth of wind jobs, due in large part to the types of wind jobs available. This means that crafting strategies and recommendations to target the wind and solar industry will need to account for these differing factors.

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<sup>29</sup> According to AWEA, there were 21,000 jobs in wind manufacturing and 38,000 jobs in operations and development in 2016, meaning 35% of jobs are in manufacturing. Source: AWEA, US Wind Power Jobs Hit Record, Up 20 Percent in 2016, <https://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=8736>.

## 4. OHIO ASSESSMENT

After analyzing factors that may influence renewable energy market and job growth, Navigant assessed the current state of jobs and companies in Ohio, aimed at establishing a baseline for the renewable energy companies in Ohio.

### 4.1 APPROACH

The approach for the assessment consisted of outlining the value chain for the wind and solar industries, conducting research on companies currently in Ohio, charting companies to the value chain and plotting them on the map of Ohio.

To outline the value chains for wind and solar, the team leveraged Navigant's expertise and assessed the number of companies that fit into each portion of the value chain. This required gathering data on wind and solar companies by state from industry trade associations, including the Solar Energy Industry Association (SEIA)<sup>30</sup> and the American Wind Energy Association (AWEA).<sup>31</sup> Navigant also conducted additional research to find companies that may not have been covered by SEIA or AWEA's databases. Using the information gathered, Navigant compared the value chain to the companies in Ohio to determine if Ohio had any elements missing.

### 4.2 OHIO RENEWABLE ENERGY COMPANIES & MANUFACTURERS

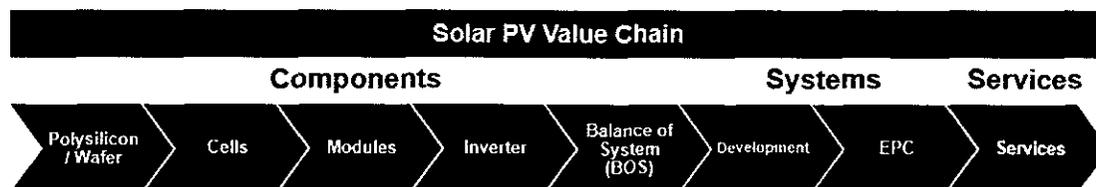
The approach yielded value chains for the solar and wind sectors and a map of the geographic distribution of companies in Ohio. The sections below describe these results.

#### 4.2.1 Solar Companies & Manufacturers

*"Potential to leverage local glass manufacturing and institutional research provided critical local ecosystems" – First Solar*

The solar value chain consists of manufactured components, system development processes, and downstream services. The manufactured components begin with raw materials, such as water and polysilicon, which companies then transform into cells and modules for the solar panels. The remaining components include the inverters and balance of systems (BOS), which incorporate wiring, switches and racking. Systems is the next element of the value chain, which includes the development of solar site as well as the Engineering, Procurement, and Construction (EPC) of the system. These processes involve acquiring land or a location for the project, obtaining the necessary permits, procuring an end-user or off-taker, and building the system. Once constructed, the system will require additional services including operations and maintenance, financing, etc. Figure 4-1 details the Solar PV Value Chain.

Figure 4-1. Solar PV Value Chain



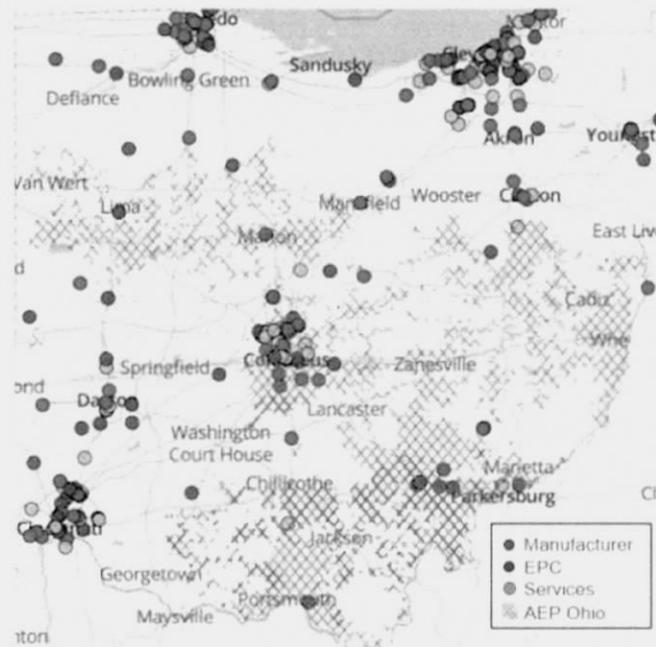
Source: Navigant 2017

<sup>30</sup> SEIA, National Solar Database.

<sup>31</sup> AWEA, Wind Farm & Manufacturer Map.

Navigant used SEIA's National Solar database to identify solar companies in Ohio. SEIA's database also consists of a map, showing the geographic distribution of companies by type. Navigant overlaid a layer with AEP Ohio's service territory on top of this map to determine if the companies fell within their service area. Figure 4-2 shows the map.

**Figure 4-2. Map of Solar PV Companies in Ohio**



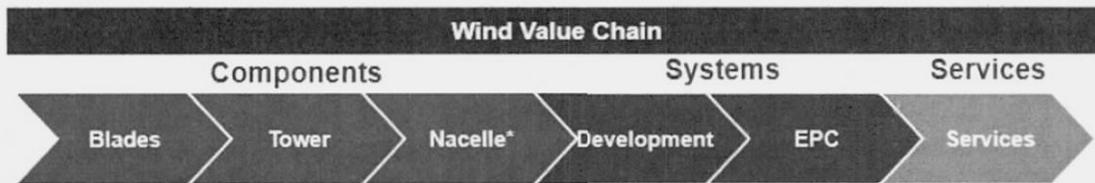
Source: SEIA, National Solar Database; Navigant, AEP Ohio Solar Territory Overlay

The map shows that Ohio has a variety of solar-focused companies across the state. These companies tend to be clustered within major cities, such as Toledo, Cleveland, Columbus, and Cincinnati. Clustering within cities is common for most markets. This often occurs due to the solar market potential (a larger population equates to more customers) as well as the ease of access to major transportation routes and skilled labor. Companies spotlighted in the case studies cited these factors as major influencers in the company's locational decisions. Appendix A provides the case study key takeaways.

#### 4.2.2 Wind Companies & Manufacturers

The wind value chain consists of manufacturing components, system development, and downstream services. The manufacturing components include three separate parts: the blades, the tower, and the nacelle, which includes the train, generator, and other electrical components. Next, the system development portion of the value chain involves the system assembly and EPC, including acquiring a system location, designing a system, procuring equipment, finding an off-taker, obtaining the necessary permits, and constructing the wind project. The turbines require routine upkeep and other maintenance activities, which downstream service companies support. Figure 4-3 details the wind value chain.

Figure 4-3. Wind Value Chain



\*Nacelle includes train, generator, and other electrical components  
 Source: Navigant 2017

Navigant gathered information regarding the wind companies currently in Ohio, using AWEA's Manufacturing Company database and conducting additional research. Navigant added the non-manufacturing wind companies to the map as well as AEP Ohio's service territory. Figure 4-4 shows the map.

Figure 4-4. Map of Wind Companies in Ohio and AEP Ohio Service Territory



Source: AWEA Wind Farm & Manufacturer Map; Navigant, AEP Ohio Service Territory Overlay; Green Energy Ohio, Renewable Energy Installers in Ohio

The map above illustrates that Ohio has wind manufacturers and developers sprinkled throughout the state. According to AWEA's database of wind manufacturers and wind farms, Ohio has more wind manufacturers than any other state.<sup>32</sup> The companies tend to be clustered in the following major cities: Cleveland, Dayton, and Cincinnati. Companies also exist in smaller numbers near Columbus and Toledo. The clusters around Cleveland, Cincinnati, and Dayton, may be due to existing manufacturing automotive manufacturing near Great Lakes cities, like Cleveland and access to major waterway transport routes. The latter is especially important for wind

<sup>32</sup> AWEA, Wind Farm & Manufacturer Map Database, <https://www.awea.org/AWEAWindFarmandFactoryMap>.

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manufacturers and developers given the size and weight of the turbines. For example, Cincinnati is near the Ohio River and at the junction of Interstates-71, 74, and 75, major transportation routes. Likewise, Toledo is located on Lake Erie and near Interstates-75 and 80.

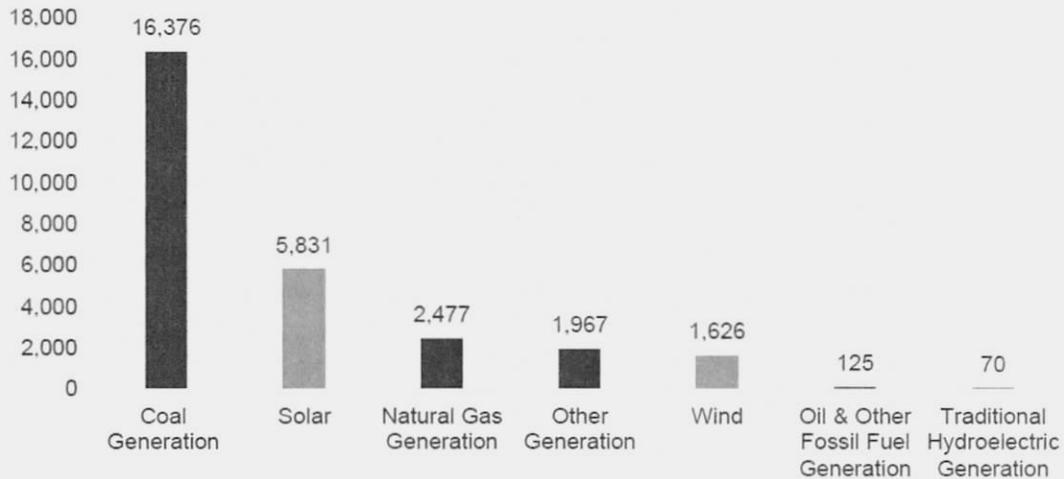
## 4.3 KEY TAKEAWAYS

Based on this assessment, Navigant concluded that Ohio currently has a thriving renewable energy market with a variety of different types of wind and solar companies. This market has likely resulted from Ohio's proximity to a strong Central and Midwest wind market and a strong solar market driven by policy and incentives in the state of Ohio and the Northeast. As the demand for renewable energy continues to grow, Ohio needs to continue to encourage companies to locate within the state.

## 5. CAREER TRANSITION

Navigant examined strategies to facilitate employee transition to renewable energy opportunities as they arise. According to a 2017 report from the US Department of Energy (DOE), traditional fossil fuel generation, specifically coal, makes up the largest electric power job segment in Ohio. Solar generation follows in second place and wind in fifth place, behind natural gas and other generation. Figure 5-1 shows the electric power job segments and their respective number of jobs.

**Figure 5-1. Ohio Electric Power Generation Employment by Sub Technology**



Source: *The Solar Job Census 2016*, The Solar Foundation, <https://solarstates.org/#state/ohio/counties/solar-jobs/2016>; *Economic Development Impact of Wind Projects*, Navigant report prepared for AWEA; *US Energy and Employment Report*, January 2017

As Ohio moves away from conventional power plants, existing workers will need to transition into other industries. The graphic above illustrates this point, showing the magnitude of the number of workers that may need assistance in this transition. Given their skillset and knowledge, it naturally makes sense that these workers may transition into other energy industry careers, especially in growing markets, such as wind and solar. This highlights the importance of developing pathways for these workers and assisting in the transition process. The goal of this portion of the study is to outline these pathways, identify resources to aid in the transition, and determine strategies to continue supporting this effort.

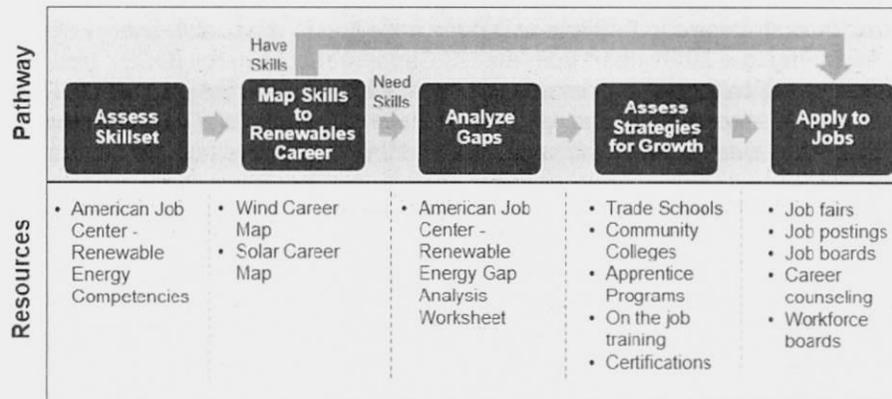
### 5.1 APPROACH

Navigant conducted secondary research on current programs and resources available from trade associations and federal, state, and local initiatives for facilitating transitions to the renewable energy industry. The team developed a pathway of steps for prospective employees to follow, outlining key resources for each step. Next, Navigant identified the roles key stakeholders, including states, utilities, individuals, and solar and wind companies may play throughout the process.

### 5.2 CAREER PATHWAY TRANSITION

Navigant developed a conventional power plant to renewable energy career transition pathway. Figure 5-2 gives an overview of that pathway, which consists of five steps: assess skillset, map skills to renewables career, analyze gaps, assess strategies for growth, and apply to jobs.

Figure 5-2. Career Transition Pathway



Resource links will be provided throughout the section as well as in Appendix B.  
Source: Navigant 2017

- **Assess skillset** – Includes inventorying skills acquired from past jobs. This process will give the transitioning employee an idea of his or her current abilities.
- **Map skills to renewables career** – There are several readily available tools for conducting the mapping, including the Interstate Renewable Energy Council's (IREC) Solar Career Map<sup>33</sup> and the DOE's Wind Career Map.<sup>34</sup> The American Job Center also provides competency models and worksheets related to renewable energy careers.<sup>35</sup> All the tools listed have interactive interfaces for users to explore job details, advancement pathways, lateral pathways, transition success factors, and additional resources.
- **Analyze Gaps** – Once a prospective employee understands his or her skills and the skills necessary for a career in renewables, he or she will need to analyze the gaps between the two. The American Job Center includes a "gap analysis worksheet" and an "identify credential competencies worksheet" to aid in this process.<sup>36</sup>
- **Assess Strategies for Growth** – The pathway user will need to assess opportunities for filling these gaps. Ideas for obtaining skills include attending community college courses, enrolling in an apprentice program, obtaining certifications, and seeking on-the-job training opportunities. The Solar Foundation's Solar Training Network provides an overview of these opportunities by state for those looking for careers in solar.<sup>37</sup>
- **Apply to Jobs** – Once the prospective employee has the necessary skills and knowledge, he or she can begin applying to jobs by leveraging job fairs, job postings, and job boards.

*"Only 34% of employer respondents indicated that they provide formal on-the-job training."*  
- The Solar Foundation 2017

<sup>33</sup> Interstate Renewable Energy Council (IREC), Solar Career Map, [irecsolarcareermap.org](http://irecsolarcareermap.org)

<sup>34</sup> DOE Office of Energy Efficiency & Renewable Energy, Wind Career Map, <https://energy.gov/eere/wind/wind-career-map>.

<sup>35</sup> American Job Center Competency Model Clearinghouse, Energy: Renewable Energy Competency Model, <https://www.careeronestop.org/competencymodel/competency-models/renewable-energy.aspx>.

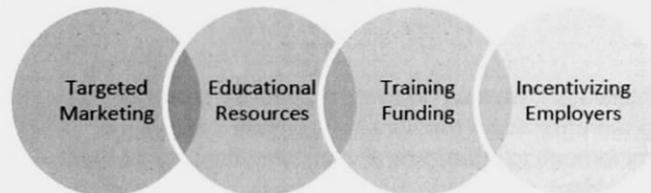
<sup>36</sup> American Job Center Competency Model Clearinghouse, Energy: Renewable Energy Competency Model – Download Model, <https://www.careeronestop.org/competencymodel/competency-models/pyramid-download.aspx?industry=renewable-energy>.

<sup>37</sup> The Solar Foundation, Solar Training Network, <http://www.solartrainingusa.org/>.

## 5.3 STRATEGIES FOR FACILITATING PATHWAY

As shown in Figure 5-3, Navigant identified four strategies that stakeholders can enact: conducting targeted marketing, providing educational resources to workers, funding training programs for workers, and incentivizing employers to create or host training programs. The strategies are intended to work in conjunction, helping conventional power plant workers transition.

Figure 5-3. Strategies for Facilitating Career Transition Pathway



- **Targeted marketing** uses strategic advertising channels to increase awareness about training and job opportunities. Often, employees do not know what resources are available and this strategy aims to bridge that gap by helping connect employees to resources. Specific targeted marketing ideas include offering specialized workshops and job fairs, creating user-friendly job boards, and building communication channels to ensure prospective workers can find relevant information.
- **Educational resources** involve developing informational pieces and coordinating educational opportunities. Examples of resources include: pamphlets, fliers, websites, workshops, and other materials. The Solar Training Network lists six solar trainers and workforce boards throughout the state of Ohio. If these trainers and boards are not located near a transitioning employee, it may be difficult to fill skills or knowledge gaps. Providing additional educational resources helps mitigate this issue.
- **Training funding** is important because if a transitioning worker does not have the adequate funding to attend a needed training course, it may be difficult to secure a job within the industry. By providing funding for training programs through scholarships, educational vouchers, grants, or subsidized training, employees stand a better chance of participating. This is especially important as conventional power plant jobs decline.
- **Incentivizing employers** to provide educational resources and training funding to transitioning workers by making industry knowledge and skills more accessible. Navigant's research revealed that employers often understand the need for solar training but do not provide training themselves.<sup>38</sup> The research also mentioned that employers often do not take advantage of incentive opportunities, such as federal funding, due to a lack of knowledge.<sup>39</sup> Therefore, providing more incentives and marketing to employers can aid in changing this culture.

*"79% of employers stated that there's a need for solar training."*  
-The Solar Foundation 2017

<sup>38</sup> The Solar Foundation, Solar Training and Hiring Insights, 2017, <http://www.solartrainingusa.org/wp-content/uploads/2016/10/Solar-Training-and-Hiring-Insights-2017-1.pdf>.

<sup>39</sup> Ibid.

## 6. FINDINGS AND RECOMMENDATIONS

After completing the analysis, Navigant revisited each individual task to synthesize the findings and provide action-oriented recommendations. This final task involved reviewing key sources, conducting an internal working sessions with key stakeholders, and analyzing programs for renewable energy in Ohio. These activities resulted in high-level guidelines for creating programs and detailed recommendations for Ohio. This section provides the details of these guidelines and recommendations.

### 6.1 FINDINGS

Upon reviewing the takeaways from each individual analysis, revisiting key sources, and reviewing the case study transcripts, Navigant created four guiding principles for implementing strategies. By applying these principles to their programs, stakeholders can ensure sustainable renewable energy company and job growth. Table 6-1 describes each of the four principles which guide Navigant’s recommendations in Section 6.2.

*“When they put the freeze on it (SB 310), [investors] said it was too risky to invest in Ohio.” – Dovetail Solar & Wind*

Table 6-1. Guiding Principles for Implementing Renewable Energy-Related Programs

Guiding Principle	Description
<p>Market Stability</p> 	<p>Renewable energy market growth depends on long-term policies. These policies reduce market risk for stakeholders and ensure a stable long-term market.</p>
<p>Consistent Programs</p> 	<p>Like market stability, companies regularly leverage and rely on state and utility programs (e.g. incentives) to expand operations. Short-term programs will only produce short-term jobs and company expansion; therefore, programs must be consistent in the long-term.</p>
<p>Workforce Preparation</p> 	<p>As the industry grows, market players will need an educated workforce to meet demand. For this reason, workforce preparation should be a focus of renewable energy policies and programs.</p>
<p>Research &amp; Development</p> 	<p>Continuous research and development (R&amp;D) will prepare the renewable energy industry in Ohio for change and enhance its market “competitiveness.”</p>

### 6.2 RECOMMENDATIONS

Based on the analyses and guiding principles, Navigant created five recommendations to drive renewable energy company establishment and job growth. More specifically, the implementation of

these recommendations will aid in creating a stable market, reducing barriers for prospective market entrants, and providing resources for companies and transitioning workers.

Since policies and programs can drive renewable energy market growth, Navigant identified several recommendations that target these areas. Table 6-2 below lists the recommendations identified.

**Table 6-2. Recommendations**

No.	Recommendation
1	Publish multi-year state renewable energy procurement plan, led by the state or a state-wide body
2	Expand JobsOhio to include: <ul style="list-style-type: none"> <li>• Renewable energy education platform providing career transition resources</li> <li>• Concierge service to answer renewable energy related questions</li> </ul>
3	Remove permitting barriers
4	Invest in Research & Development
5	Continue to invest in roads and infrastructure

These suggestions align to the broader findings in Section 6.1.

**1. Recommendation: Publish multi-year state renewable energy procurement plan.**

**Importance:** A multi-year renewable energy procurement plan helps companies understand the opportunity in Ohio by advertising Ohio’s commitment to procuring renewable energy. This commitment helps interested parties understand the long-term market need for renewables, reducing business risk. The publication may spur additional local market entrants, who want to bid into procurement opportunities and signals that Ohio is supportive of renewable energy development.

**Next Steps:** The state or a state-wide body should aggregate the plans and publish them in a central location for the public and more importantly, renewable energy companies to view. Trade associations and other communication channels should advertise the plans directly to renewable energy companies. The publication should include details about how companies can participate in the procurement process and where to go for more information.

**2. Recommendation: Expand JobsOhio to include renewable energy as an eligible industry. Include education tools and concierge services for prospective companies and workers.**

**Importance:** By expanding JobsOhio to include renewable energy as a targeted industry, the Ohio market can leverage valuable resources and incentives to spur growth. Companies will have access to long-term funding for research and development and operating expense reduction in addition to site selection resources. This centralized website shows the state’s commitment to encouraging further renewable energy company and job growth. By expanding the program’s services to incorporate concierge services, which provide information regarding the state’s renewable energy procurement plans, rate structures, and incentives, will reduce barriers to entering the Ohio renewable energy market. Finally, creating a component of the website that targets workers looking to transition into the renewable energy market can aid in connecting valuable labor resources to prospective companies, while also providing

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educational information to transitioning workers. Once more this improves the ease of doing business in Ohio and prepares the workforce for the growing demand in jobs. These suggestions align closely to the analysis findings in Section 3, which conclude that incentives, in conjunction with policies, contribute to localized renewable energy growth.

**Next Steps:** The implementation of this recommendation requires expanding the eligibility of the JobsOhio program to include the renewable energy industry. Since the state of Ohio runs the program, the government should set a directive for the incorporation of this industry to spur further growth. Program administrators should also collaborate with utility companies and the PUCO to further expand its concierge services to provide guidance to renewable energy developers, investors, companies and workers looking to transition to the industry.

### 3. Recommendation: Remove permitting barriers

**Importance:** This recommendation addresses the findings from Section 2, in which Navigant defined and prioritized company motivators. The analysis concluded that the number one driver of industry growth for general renewable energy companies is the Renewable Energy Market, which includes supportive permitting policies. By establishing permitting policies that reduce barriers, the state and local jurisdictions can reduce development costs and time for developers. Key industry stakeholders, including the DOE and NREL, have programs specifically aimed at streamlining permitting processes to encourage renewable energy growth, illustrating the importance of permitting. The DOE's SolSmart program incentivizes local governments to improve permitting processes by awarding special designations to cities that remove permitting obstacles. Cities must create a permit checklist, review current processes, and write a memo describing the existing barriers in zoning and permitting to receive the designation.<sup>40</sup> These actions align to the program goals, which include improving business prospects for solar developers and saving governments time and money.<sup>41</sup> Likewise, a recent study by NREL examined renewable energy permitting in Hawaii and concluded that improved processes for permitting, such as providing checklists and creating permitting application templates, would reduce project delays and improve the feasibility of projects.<sup>42</sup> These initiatives and studies underscore the significance of permitting in renewable energy development.

**Next Steps:** The state of Ohio as well as local jurisdictions should examine permitting processes to identify barriers, like the NREL report on Hawaii or the SolSmart initiative requirements. The study should focus on understanding how certain requirements affect companies in terms of timing, costs, and overall project feasibility. After identifying barriers, the state should implement targeted actions to improve the process. Actions may include creating a permitting checklist and guidelines, establishing application templates, reducing required paperwork, eliminating stringent permitting requirements, and instating mechanisms for expediting the permitting process.

### 4. Recommendation: Invest in Research & Development

**Importance:** Investing in research and development will help prepare the state for industry changes and improve its overall competitiveness. This principle and recommendation stems from the findings in Section 2, which included the lists of company locational drivers. Navigant identified research and development as a key supportive scheme that encourages companies

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<sup>40</sup> SolSmart, Program Guide, [https://static1.squarespace.com/static/56035ff7e4b01dadee1991a1/t/571feca54d088efedb7f66d6/1461709994244/SolSmart\\_ProgramGuide\\_web.pdf](https://static1.squarespace.com/static/56035ff7e4b01dadee1991a1/t/571feca54d088efedb7f66d6/1461709994244/SolSmart_ProgramGuide_web.pdf)

<sup>41</sup> SolSmart, "Why Participate?", <http://www.gosparc.org/home-2>

<sup>42</sup> NREL, "Renewable Energy Permitting Barriers in Hawaii: Experience from the Field", March 2013, <https://www.nrel.gov/docs/fy13osti/55630.pdf>.

# NAVIGANT

to locate in specific destinations and the case studies verified this recommendation. First Solar noted that it decided to locate its manufacturing facilities in Perrysburg, Ohio because R&D facilities and schemes already existed in the area.<sup>43</sup> First Solar also mentioned that this pattern exists in many other states, including California, New York, and Tennessee.<sup>44</sup> Other studies, such as the Deloitte Competitiveness Index, also rank R&D as a significant factor for manufacturing competitiveness. The firsthand accounts along with significant market research emphasize the importance of research and development in encouraging company establishment.

**Next Steps:** The state should stimulate the growth of renewable energy R&D by providing funding opportunities through loans, grants, and other incentives. The government should also look to leverage resources from local colleges and universities by advertising incentives directly to these entities, establishing targeted research programs dedicated to renewable energy, and helping connect universities and renewable energy firms.<sup>45</sup>

## 5. Recommendation: Continue to invest in roads and infrastructure

**Importance:** Since renewable energy development requires the transport of large equipment (e.g., turbines and panels), companies and in particular manufacturers locate near major transportation routes, corroborated by the findings of this study. The maps depicting the location of renewable energy companies in Ohio illustrate that companies not only tend to cluster around major cities but also near major transportation routes. A large portion of wind companies are located near Lake Erie, which allows for the transportation of turbines across the Atlantic to the Northeast and to states across the Great Lakes. Additionally, most of the case study participants stated access to transportation as one of their top three locational motivators, providing a firsthand account of its significance.

**Next Steps:** Ohio should continue funding its roads and transportation infrastructure. The state may also consider expanding transportation routes to cities with the potential for a robust renewable energy industry. This may require an in-depth geographic analysis of potential sites for transportation and infrastructure expansion.

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<sup>43</sup> Interview with First Solar, September 19, 2017.

<sup>44</sup> *Ibid.*

<sup>45</sup> Stark State College and The Timken Company provide an example of a public-private partnership between a local university and renewable energy company. The two partnered to create the Stark State College and the Timken Company Technology and Test Center, which focuses on creating wind turbine technology. More information can be found on Stark State College's website: <https://www.starkstate.edu/news/timken-stark-state-open-technology-test-center/>.

## APPENDIX A. CASE STUDY KEY TAKEAWAYS

Navigant conducted four case study interviews with renewable energy companies in Ohio. The companies include both wind and solar companies, one manufacturer, and renewable energy developers focused on different end-user segments. The table below provides information about these companies, including business type and renewable energy industry.

Table A-1. Case Study Participants

Company	Solar	Wind	AEP Territory	Ohio Business Type
SunEnergy1	✓		✓	Utility-scale solar developer. Projects in AEP Ohio Territory.
Dovetail Solar & Wind	✓	✓	✓	Residential, commercial, & utility-scale renewable energy developer.
Energy Optimizers USA	✓			Design and installation of solar PV and solar thermal systems for K-12 schools as well as energy efficiency services.
First Solar	✓			Manufacturing for corporate, community, & utility-scale solar developments.

Several key themes regarding locational drivers and recommendations emerged from the case studies. In terms of locational drivers, case study participants felt the following factors were the most influential: a stable and predictable market for renewables; skilled talent; and logistics. As for recommendations, the companies agreed that the state and local utilities should continue to provide renewable energy incentives and enact consistent policies.

The remaining portion of this appendix provides the key takeaways from the case study interviews.

## SUNENERGY1

### Company Background:

SunEnergy1 engineers, procures, constructs and operates utility-scale ground and roof-mounted solar projects. To-date, SunEnergy1 has constructed over 500MWs of solar and holds over 2,500 MWs of solar projects in its pipeline. The firm has projects located throughout the eastern United States.

### Locational Drivers:

- **Utility's Needs [for renewables]:** SunEnergy1 stated that the utility's needs influenced its project and operational locations in North Carolina.
- **Community Interest:** Similar to the Utility's needs, the company considered project locations based on the community's desire for solar.
- **County Involvement:** Counties may play a similar role to states and communities, providing incentives and driving the market through the permitting process.

### Recommendations:

- Incentivize solar further. SunEnergy1 noted that state incentives played a direct role in locating its operations in North Carolina.
- Select proven and well-vetted solar companies when procuring energy for a new project.

### Company Summary

**Company Type:** Development, Engineering, Procurement, Construction, and Operations for Solar

**HQ Location:** Mooresville, NC

**Other Locations:** Bethel, NC; Projects in OH, WV, VA, SC, and MD.

**No. of Employees:** 500, 1-5 in OH

### Top 3 Locational Drivers:

1. Utility's Needs
2. Community Interest
3. County Involvement

## DOVETAIL SOLAR & WIND

### Company Background:

Dovetail Solar & Wind primarily focuses on developing commercial and utility scale solar PV. Originally located in Athens, OH, Dovetail moved its headquarters to Cleveland to gain access to more customers and better talent. Today, the company continues to grow its operations and looks towards states and cities with supportive renewable energy policies for additional facilities.

### Locational Drivers:

- **Robust market for renewables:** Without a market for its product, a business cannot exist. Dovetail began in Athens and has since moved to urban areas with a larger population and market to build the business.
- **Access to talent:** Building renewables requires a certain skillset. Having access to a larger pool of talent, such as being close to a university, increases access.
- **Access to transportation corridors:** Ease of access and flow of materials makes it easier to conduct business.

### Recommendations:

- Help create a climate of stability for investors, businesses, and the overall market through consistent and supportive policy.
- Continue to work with the Public Utilities Commission to create consistent policies as well as ensuring that smaller companies have a role to play in the growing renewables market.

### Company Summary

**Company Type:** Solar & Wind Developer

**HQ Location:** Cleveland, OH

**Other Locations:** Columbus, Athens, & Cincinnati, OH; Brighton, MI

**No. of Employees:** 26

#### Top 3 Locational Drivers:

1. Utility's Needs
2. Community Interest
3. County Involvement

## ENERGY OPTIMIZERS, USA

### Company Background:

Energy Optimizers, USA provides comprehensive energy efficiency and renewable energy services. On the renewable energy side, Energy Optimizers designs and installs solar PV and solar thermal systems, primarily for K-12 schools.

### Locational Drivers:

- **State Policy:** Energy Optimizers, USA decided to locate in Ohio due to its well-established energy performance contracting legislation for education and governmental institutions. The company also cited the Alternative Energy Portfolio Standard (AEPS) passed in 2009 as a reason for locating in Ohio.
- **Strong Renewables Market:** Due to its specific market, the company sited local schools as a reason for locating in Ohio. Schools provide a strong training network to leverage.
- **Proximity to Transportation:** The firm wanted to be located within a fifteen-mile radius of the I-70 and I-75 highways to serve their customers.

### Recommendations:

- Promote and support renewable energy and energy efficiency programs. Additionally, incentive programs make the state more attractive.
- Provide a positive and supportive perspective of grid-tied renewable energy systems and rebate programs for energy efficiency.

### Company Summary

**Company Type:** Design and Construct Solar PV & Solar Thermal

**HQ Location:** Tipp City, OH

**Other Locations:** NA

**No. of Employees:** 22

#### Top 3 Locational Drivers:

1. State Policy
2. Strong Market
3. Proximity to Transportation

## FIRST SOLAR

### Company Background:

First Solar engages in solar module manufacturing, research and development, and technology innovation as well as project development, financing, and operations and maintenance for the utility-scale solar projects.

### Locational Drivers:

- **Supply Chain Ecosystem:** Surrounding market for R&D and technology innovation as well as high availability of quality materials played a large role in First Solar's decision to locate its manufacturing in Perrysburg.
- **Access to Markets:** Since First Solar is a major international solar PV module manufacturer, the company relies on access to markets through transportation, such as domestic trucking routes.
- **Skilled Labor Force:** A strong manufacturing labor force skilled in working with glass and electronics supported First Solar's decision to locate its manufacturing in Perrysburg.

### Recommendations:

- Create certainty through state-level policy. It is important for maintaining a sustainable solar PV manufacturing facility.
- Collaborate with key stakeholders to support existing local infrastructure and manufacturing through sustained renewable energy policies.

### Company Summary

**Company Type:** R&D, Manufacturing, Development, Financing, and O&M for Solar PV

**HQ Location:** Tempe, AZ

**Other Locations:** Perrysburg, OH; Houston, TX; Bridgewater, NJ; San Francisco, CA; Mexico, Malaysia

**No. of Employees:** 5,400; 760 in OH

#### Top 3 Locational Drivers:

4. Utility's Needs
5. Community Interest
6. County Involvement

## APPENDIX B. CAREER TRANSITION RESOURCES

While laying out pathways for existing conventional power plant workers to move into the renewable energy industry, Navigant conducted a thorough review of available resources. Appendix B lists those resources with the goal of providing these resources for prospective renewable energy workers. Section 5 of the report offers more details about the career transition pathway.

**Table B-1. Career Transition Resources for Prospective Workers**

Resource Name, Author, & Link	Description	Resource Type
American Job Center, Energy: Renewable Energy Competency Model and Worksheets <a href="https://www.careeronestop.org/competencymodel/competency-models/renewable-energy.aspx">https://www.careeronestop.org/competencymodel/competency-models/renewable-energy.aspx</a>	Model and associated worksheets that describe the skills and competencies necessary to work in renewable energy jobs. Worksheets include a gap analysis and credential competencies identification.	Wind & Solar Worksheets
Interstate Renewable Energy Council (IREC), Solar Career Map <a href="http://irecsolarcareemap.org/">http://irecsolarcareemap.org/</a>	Tool that allows users to identify and explore different career paths within the Solar Industry.	Solar Career Exploration
Department of Energy, Office of EERE, Wind Career Map <a href="https://energy.gov/eere/wind/wind-career-map">https://energy.gov/eere/wind/wind-career-map</a>	Tool that allows users to identify and explore different career paths within the Wind Industry.	Wind Career Exploration
The Solar Foundation, Solar Training & Hiring Insights 2017, Available Tools and Resources for the Solar Industry, By Category <a href="http://www.solartrainingusa.org/research/">http://www.solartrainingusa.org/research/</a>	Comprehensive survey of trends in solar training and hiring, including resources for prospective workers	Solar Career Tools & Training Resources
Department of Energy, Office of EERE, Wind Career Map Resource List <a href="https://energy.gov/eere/wind/wind-career-map-resource-list">https://energy.gov/eere/wind/wind-career-map-resource-list</a>	List of resources used to develop the Wind Career Map. Resources include a variety of career and training information for prospective employees.	Wind Career Tools & Training Resources

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**12/13/2017 2:46:04 PM**

**in**

**Case No(s). 17-0882-EL-UNC**

**Summary: Report - Ohio Renewable Energy Manufacturing & Company Establishment  
Analysis electronically filed by Mr. Steven T Nourse on behalf of Ohio Power Company**

**OHIO POWER COMPANY'S RESPONSE TO  
THE OFFICE OF THE OHIO CONSUMERS' COUNSEL'S  
DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR 18-1392-EL-RDR AND 18-1393-EL-ATA  
TWELFTH SET**

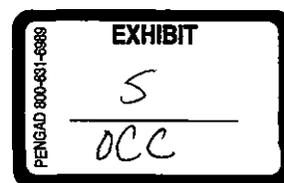
**INTERROGATORY**

- OCC-INT-12-131      Page 15 of 41 of Exhibit TH-1 states: "Navigant worked with AEP Ohio to randomly select and invite 120,000 residential non-PIPP customers, 20,000 residential PIPP customers, and 20,000 small C&I customers with email addresses to participate in the survey."
- a) For what percentage of all AEP Ohio non-PIPP customers does AEP Ohio not have an email addresses?
  - b) For what percentage of all AEP Ohio PIPP customers does AEP Ohio not have an email address?
  - c) For what percentage of all AEP Ohio small C&I customers does AEP Ohio not have an email address?

**RESPONSE**

- a. 38% of non-PIPP residential accounts do not have an email address associated
- b. 43% of PIPP residential accounts do not have an email address associated
- c. 65% of small C&I accounts do not have an email address associated

Prepared by:    Jon F. Williams





# Renewable Portfolio Standard / Rate Impacts 2nd Quarter 2018

*\*\* While every effort is made to assure accuracy, the information presented here does not supersede filed tariffs \*\**

Ohio's electric distribution utilities (EDUs) recover the costs of complying with the state's renewable portfolio standard (RPS) requirement through a rider frequently referred to as an alternative energy rider (AER).

The AERs are currently updated quarterly and they are bypassable, meaning that a customer who switches to a competitive retail electric service (CRES) provider would not pay the EDU's AER. Because the PUCO does not regulate the generation charges of CRES providers, this sheet does not attempt to estimate any RPS compliance costs charged to customers of CRES providers.

The EDU's AERs are designed to be a volumetric charge, so the actual bill impact depends on the volume of electricity for which a customer is charged.<sup>1</sup>

The table below shows the AER rates, by EDU, for the second quarter of 2018. The average monthly bill impact in the table is for residential customers, and assumes monthly usage of 750 KWHs. By clicking on the hyperlink in the source column, you can view the EDU's filing pertaining to its AER rate(s).

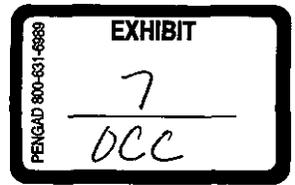
## 2nd Quarter 2018

EDU	Source	AER Rate (\$/KWH)	Avg. Monthly Bill Impact
Cleveland Electric Illuminating	<a href="#">AER Filing</a>	0.000576	\$0.43
Dayton Power & Light <sup>2</sup>	<a href="#">Revised Tariff Filing</a>	0.0000838	\$0.06
Duke Energy – Ohio	<a href="#">AER Filing</a>	0.000876	\$0.66
Ohio Edison Company	<a href="#">AER Filing</a>	0.000622	\$0.47

EDU	Source	AER Rate (\$/KWH)	Avg. Monthly Bill Impact
Ohio Power Company	<u>AER Filing</u>	0.0027545	\$2.07
Toledo Edison Company	<u>AER Filing</u>	0.000835	\$0.63

<sup>1</sup> A customer that consumes a larger volume of electricity (i.e., an industrial customer) would experience a larger average bill impact than would a residential customer with a relatively small electricity usage.

<sup>2</sup> Per 16-0395-EL-SSO, Dayton Power & Light's alternative energy component charge has been included as a component of the Standard Offer Rate instead of as a separate AER Tariff. The alternative energy component charge will be updated and reconciled on an annual basis. See Seventeenth Revised Tariff Sheet No. G10, effective November 1, 2017.



# Renewable Portfolio Standard / Rate Impacts 3rd Quarter 2018

*\*\* While every effort is made to assure accuracy, the information presented here does not supersede filed tariffs \*\**

Ohio's electric distribution utilities (EDUs) recover the costs of complying with the state's renewable portfolio standard (RPS) requirement through a rider frequently referred to as an alternative energy rider (AER).

The AERs are currently updated quarterly and they are bypassable, meaning that a customer who switches to a competitive retail electric service (CRES) provider would not pay the EDU's AER. Because the PUCO does not regulate the generation charges of CRES providers, this sheet does not attempt to estimate any RPS compliance costs charged to customers of CRES providers.

The EDU's AERs are designed to be a volumetric charge, so the actual bill impact depends on the volume of electricity for which a customer is charged.<sup>1</sup>

The table below shows the AER rates, by EDU, for the third quarter of 2018. The average monthly bill impact in the table is for residential customers, and assumes monthly usage of 750 kWh. By clicking on the hyperlink in the source column, you can view the EDU's filing pertaining to its AER rate(s).

## 3rd Quarter 2018

EDU	Source	AER Rate (\$/kWh)	Average Monthly Bill Impact
Cleveland Electric Illuminating	<a href="#">AER Filing</a>	0.0005160	\$0.39
Dayton Power & Light <sup>2</sup>	<a href="#">Revised Tariff Filing</a>	0.0001354	\$0.10
Duke Energy – Ohio	<a href="#">AER Filing</a>	0.0001080	\$0.08
Ohio Edison Company	<a href="#">AER Filing</a>	0.0005070	\$0.38

EDU	Source	AER Rate (\$/kWh)	Average Monthly Bill Impact
Ohio Power Company	<u>AER Filing</u>	0.0016577	\$1.24
Toledo Edison Company	<u>AER Filing</u>	0.0006750	\$0.51

<sup>1</sup> A customer that consumes a larger volume of electricity (i.e., an industrial customer) would experience a larger average bill impact than would a residential customer with a relatively small electricity usage.

<sup>2</sup> Per 16-0395-EL-SSO, Dayton Power & Light's alternative energy component charge has been included as a component of the Standard Offer Rate instead of as a separate AER Tariff. The alternative energy component charge will be updated and reconciled on an annual basis. See Eighteenth Revised Tariff Sheet No. G10, effective June 1, 2018.

**OHIO POWER COMPANY'S RESPONSE TO  
THE OFFICE OF THE OHIO CONSUMERS' COUNSEL'S  
DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR 18-1392-EL-RDR AND 18-1393-EL-ATA  
REVISED TWELFTH SET**

**INTERROGATORY**

OCC-INT-12-135      Please provide any analysis done by AEP Ohio or Navigant of the responses to the Voice of the Customer survey questions based on whether the customer owns or rents their home. (e.g., whether the customer's responses to questions 2 through 12 differed based on their response to question 13)

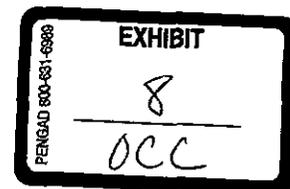
**RESPONSE**

Neither AEP Ohio nor Navigant has performed analysis of the Voice of the Customer survey responses based on whether the customer owns or rents their home.

Prepared by:    Trina Horner  
                          Jon Williams

**REVISED RESPONSE**

Prepared by:    Nicole Fry



**OHIO POWER COMPANY'S RESPONSE TO  
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REVISED TWELFTH SET**

**INTERROGATORY**

OCC-INT-12-136

Please provide any analysis done by AEP Ohio or Navigant of the responses to the Voice of the Customer survey questions based on the customer's age. (e.g., whether the customer's responses to questions 2 through 12 differed based on their age as reported in response to question 14).

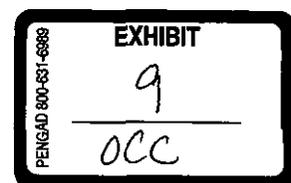
**RESPONSE**

Neither AEP Ohio nor Navigant has performed analysis of the Voice of the Customer survey responses based on the customer's age.

Prepared by: Trina Horner  
Jon Williams

**REVISED RESPONSE**

Prepared by: Nicole Fry



**OHIO POWER COMPANY'S RESPONSE TO  
THE OFFICE OF THE OHIO CONSUMERS' COUNSEL'S  
DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR 18-1392-EL-RDR AND 18-1393-EL-ATA  
REVISED TWELFTH SET**

**INTERROGATORY**

OCC-INT-12-137      Please provide any analysis done by AEP Ohio or Navigant of the responses to the Voice of the Customer survey questions based on the customer's approximate average electric bill. (e.g., whether the customer's responses to questions 2 through 12 differed based on their approximate average electric bill as reported in response to question 15)

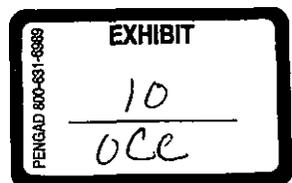
**RESPONSE**

Neither AEP Ohio nor Navigant has performed analysis of the Voice of the Customer survey responses based on the customer's approximate average electric bill.

Prepared by:    Trina Horner  
                          Jon Williams

**REVISED RESPONSE**

Prepared by:    Nicole Fry



**OHIO POWER COMPANY'S RESPONSE TO  
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REVISED TWELFTH SET**

**INTERROGATORY**

OCC-INT-12-138      Please provide any analysis done by AEP Ohio or Navigant of the responses to the Voice of the Customer survey questions based on the customer's total household income. (e.g., whether the customer's responses to questions 2 through 12 differed based on their total household income as reported in response to question 16)

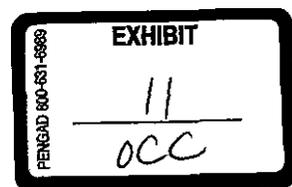
**RESPONSE**

Neither AEP Ohio nor Navigant has performed analysis of the Voice of the Customer survey responses based on the customer's total household income.

Prepared by:    Trina Horner  
                          Jon Williams

**REVISED RESPONSE**

Prepared by:    Nicole Fry



OHIO POWER COMPANY'S RESPONSE TO  
THE INDUSTRIAL ENERGY USERS-OHIO'S  
DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR, 18-1392-EL-RDR AND 18-1393-EL-ATA  
SIXTH SET

**INTERROGATORY**

IEU-INT-06-001

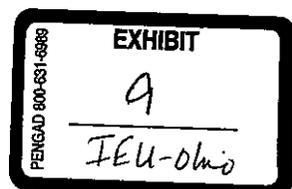
On page 14 of 41 in Exhibit TH-1 attached to the Horner testimony, Navigant found that 75 of AEP Ohio's C&I customers have made a commitment to or were identified in at least one of the organizations listed in Figure 5 of Exhibit TH-1. Of these companies:

- a. Identify the number of companies that have constructed or have announced plans to construct on-site solar generation?
- b. Identify the number of companies that have constructed or have announced plans to construct on-site wind generation.
- c. Identify the number of companies that have entered into or have announced plans to enter into a purchased power agreement for solar generation.
- d. Identify the number of companies that have entered into or have announced plans to enter into a purchased power agreement for wind generation.
- e. Identify the number of companies that have constructed or have announced plans to construct renewable generation other than wind or solar generation on site.
- f. Identify the number of companies that have entered into or have announced plans to enter into a purchased power agreement for renewable generation other than wind or solar generation.

**RESPONSE**

- a. The data provided to Navigant by AEP Ohio indicated that eight of the 75 referenced companies had constructed or planned to construct on-site solar distributed generation.
- b. The data provided to Navigant by AEP Ohio indicated that one of the 75 referenced companies had constructed or planned to construct on-site solar distributed generation.
- c. Navigant has no information responsive to this request.
- d. Navigant has no information responsive to this request.
- e. Navigant has no information responsive to this request.
- f. Navigant has no information responsive to this request.

Prepared by: Trina Horner



Does your company currently have goals related to carbon emissions?

Response	Count
Yes	14
No	11
Don't know	4

On a scale of 1 to 5, where 1 means "not at all committed" and 5 means "extremely committed", how committed is your firm to the carbon emission goals?

Response	Count
1: Not at all Committed	0
2	1
3	2
4	4
5: Extremely Committed	7

Does your company currently have goals related to the use or procurement of renewable power (e.g., solar, wind)?

Response	Count
Yes	13
No	14
Don't know	2

On a scale of 1 to 5, where 1 means "not at all committed" and 5 means "extremely committed", how committed is your company to their renewable power goals?

Response	Count
1: Not at all Committed	0
2	0
3	2
4	4
5: Extremely Committed	7

Presuming there was no significant difference in price, would you prefer that a portion of your renewable supply be based on local/regional projects that create jobs and economic impacts in Ohio?

Response	Count
Don't know	0
No, the location of the renew	4
Yes, I would prefer local/regio	9

Would your company be supportive of competitively-priced renewable power generated in Ohio as part of your electricity mix?

Response	Count
No	1
Don't know	4
Possibly, I am interested in le	15
Yes	9

On a scale of 1 to 5, where 1 means "not supportive" and 5 means "extremely supportive", how supportive would your company be for a utility-scale renewable project developed by AEP Ohio if it were competitively priced and approved by the Ohio regulatory authorities?

Response	Count
1: Not supportive	2
2: Skeptical but Undecided	1
3: Neutral	6
4: Supportive	18
5: Extremely Supportive	2

**OHIO POWER COMPANY'S RESPONSE TO  
INDUSTRIAL ENERGY USERS-OHIO'S DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR  
FIRST SET**

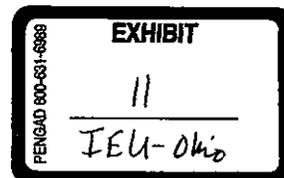
**REQUEST FOR PRODUCTION OF DOCUMENTS**

IEU-RPD-01-001      Provide a copy of the Long-Term North American Energy Market Forecast ("Fundamentals Forecast") referred to on page 2 of the testimony of Karl R. Bletzacker.

**RESPONSE**

Please see IEU-01-RPD-001\_Attachment\_1\_2018H2\_LTF\_Base\_Nominal\_2018\_08\_01.

Prepared by:    Karl R. Bletzacker



**OHIO POWER COMPANY'S RESPONSE TO  
INDUSTRIAL ENERGY USERS-OHIO'S DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR  
FIRST SET**

**REQUEST FOR PRODUCTION OF DOCUMENTS**

IEU-RPD-01-002      Provide a copy of each Long-Term North American Energy Market Forecast prepared by AEP Service Corp. from 2008 to 2018.

**RESPONSE**

Please see:

IEU-01-RPD-002 Attachment 1 Price\_Forecast\_2008\_Base.xls

IEU-01-RPD-002 Attachment 2 Price\_Forecast\_Base\_2H2009.xls

IEU-01-RPD-002 Attachment 3 2H2010\_Base.xls

IEU-01-RPD-002 Attachment 4 2H2011\_Base.xls

IEU-01-RPD-002 Attachment 5 2H2012\_Base.xlsx

IEU-01-RPD-002 Attachment 6 2H2013\_Base.xlsx

IEU-01-RPD-002 Attachment 7 1H2015\_Base.xls

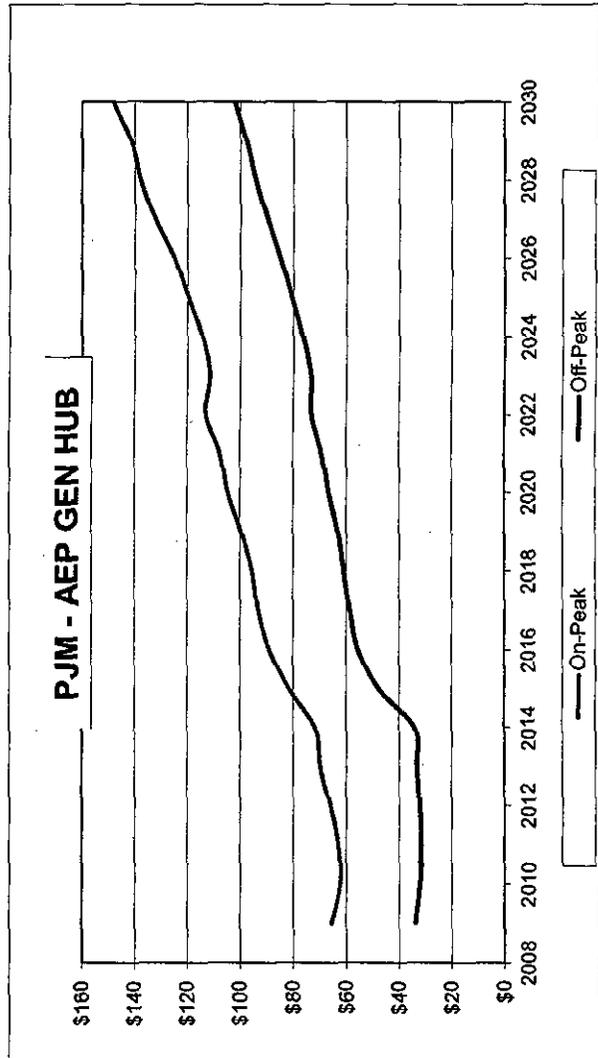
IEU-01-RPD-002 Attachment 8 2H2016\_Base.xlsx

Please note that a copy of the 2018 Long-Term Energy Market Forecast was provided in IEU-01-RPD-001.

No Long-Term Energy Market Forecasts were created in 2014 and 2017.

Prepared by:    Karl R. Bletzacker

Year	Power Prices (\$/MWh)											
	PJM - AEP GEN HUB		SPP		ERCOT North		ERCOT South		ERCOT West		CAPP	CAPP CSX-Rail
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak		
2009	65.24	33.68	68.04	46.00	58.17	47.41	58.86	48.70	57.14	46.70	89.04	90.90
2010	62.20	32.15	64.58	42.93	53.90	42.58	55.06	42.58	53.07	41.96	86.50	88.17
2011	62.85	31.49	65.77	44.57	54.65	43.20	55.96	45.46	53.67	42.61	76.16	76.81
2012	65.97	35.47	68.52	46.22	57.31	45.99	57.33	47.33	56.36	42.45	66.12	66.08
2013	69.73	33.20	71.20	48.86	57.07	44.97	59.86	49.53	55.82	43.99	64.08	63.96
2014	71.63	35.07	73.16	50.16	58.86	48.23	62.15	51.23	57.11	45.06	63.46	63.34
2015	81.45	47.57	79.54	57.63	65.53	54.44	69.01	59.02	63.74	52.43	64.84	64.71
2016	88.79	53.45	80.52	64.04	73.17	62.33	77.97	65.45	68.68	59.35	66.53	66.40
2017	93.01	58.59	89.85	65.99	73.84	64.54	77.60	67.82	70.87	60.70	68.27	68.14
2018	95.37	60.85	92.01	68.49	76.93	67.13	81.42	70.76	72.68	62.60	70.05	69.92
2019	99.48	63.15	95.99	71.75	84.32	70.21	87.90	73.28	75.56	65.10	71.86	71.73
2020	104.38	66.59	101.86	76.31	89.11	74.77	90.83	73.58	80.78	68.55	73.72	73.58
2021	107.52	69.22	104.38	78.01	88.03	77.46	94.05	82.25	83.29	71.63	75.62	75.48
2022	112.91	73.07	107.49	81.02	91.61	80.42	98.22	85.63	86.37	74.53	77.57	77.43
2023	111.41	73.27	105.70	79.26	88.68	78.43	95.84	82.66	83.87	73.36	79.55	79.42
2024	114.26	75.97	107.55	81.42	91.05	82.31	97.79	87.60	88.71	78.07	81.59	81.45
2025	119.60	80.62	112.04	85.26	98.07	86.29	106.47	91.76	92.11	81.54	83.67	83.52
2026	124.30	84.84	117.95	89.23	102.27	90.16	111.31	95.95	96.30	84.60	85.78	85.64
2027	132.10	89.75	123.97	93.90	109.01	95.17	117.44	100.13	100.65	88.62	87.93	87.78
2028	137.01	94.05	129.13	98.11	113.67	98.47	123.57	102.61	103.26	92.05	90.12	89.97
2029	141.31	97.66	133.51	102.59	118.78	102.97	128.42	108.73	109.71	96.73	92.36	92.21
2030	148.07	101.92	139.29	108.99	125.33	108.39	134.36	114.36	115.33	101.32	94.64	94.39



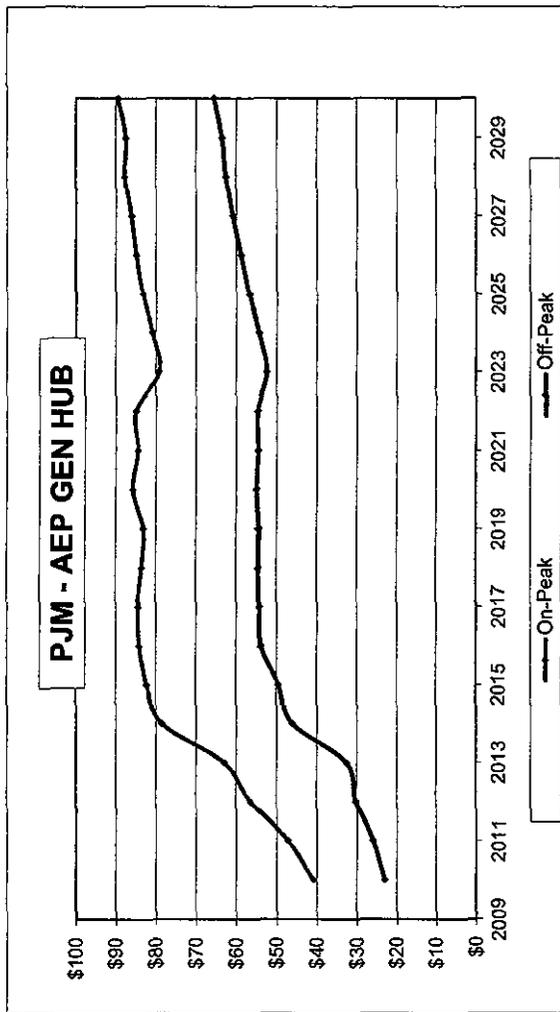
Coal (\$/ton) FOB										
CAPP Compliance	CAPP NYMEX	NAPP High Sulfur	NAPP Med Sulfur	I-Basin	PRB 8600	PRB 8400	Colorado	Henry Hub	TCO Pool	Initial South Point
100.45	78.97	78.74	97.63	77.18	15.03	13.03	70.00	7.48	7.75	7.86
96.26	77.52	75.19	81.29	70.19	16.40	13.88	67.91	6.99	7.27	7.37
87.37	71.42	70.18	82.29	62.36	16.95	14.83	55.12	6.98	7.25	7.36
70.77	65.53	61.26	69.74	55.56	17.38	15.28	43.02	7.14	7.41	7.52
67.89	63.96	57.49	60.79	49.73	17.77	15.60	40.06	7.30	7.58	7.68
67.32	63.91	59.09	60.55	47.10	17.43	15.37	39.93	7.47	7.75	7.85
68.90	64.71	53.94	57.50	46.35	17.43	15.27	38.25	8.31	8.58	8.69
70.72	66.20	54.92	58.66	47.09	17.71	15.61	38.99	8.93	9.21	9.32
72.56	68.14	56.24	59.95	48.09	18.08	15.90	39.88	9.18	9.46	9.56
74.43	69.82	57.56	61.36	49.10	18.36	16.26	40.82	9.45	9.71	9.82
76.27	71.73	58.91	62.80	50.13	18.85	16.63	41.77	9.69	9.97	10.07
78.15	73.58	60.28	64.26	51.17	19.24	17.00	42.76	10.46	10.74	10.84
80.08	75.48	61.69	65.76	52.24	19.64	17.39	43.74	10.79	11.06	11.17
82.05	77.23	63.13	67.23	53.23	20.05	17.76	44.76	11.12	11.40	11.51
84.07	79.42	64.59	68.85	54.43	20.46	18.17	45.80	10.35	10.63	10.73
86.13	81.15	66.08	70.43	55.68	20.89	18.57	46.88	10.79	11.07	11.17
88.23	83.52	67.60	72.06	56.69	21.31	18.98	47.93	11.25	11.53	11.64
90.37	85.64	69.12	73.70	57.97	21.76	19.39	49.03	11.70	11.99	12.10
92.55	87.78	70.70	75.37	59.00	22.18	19.81	50.13	12.17	12.47	12.59
94.77	89.97	72.39	77.06	60.17	22.61	20.23	51.26	12.65	12.97	13.09
97.03	92.21	73.91	78.78	61.37	23.08	20.66	52.41	13.17	13.49	13.61
99.34	94.49	75.56	80.53	62.58	23.56	21.08	53.58	13.69	14.03	14.16

Natural Gas (\$/mmbtu)				Emissions (\$/ton)			Uranium Fuel UO <sub>2</sub> (\$/mmbtu)	
TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	CO <sub>2</sub>	Uranium Fuel UO <sub>2</sub>
8.12	7.18	6.62	0.25	153	0	550	0.00	0.76
7.62	6.75	6.43	0.25	159	0	550	0.00	0.79
7.61	6.75	6.43	0.25	162	0	500	0.00	0.80
7.78	6.91	6.59	0.25	165	0	450	0.00	0.82
7.95	7.08	6.75	0.25	168	0	400	0.00	0.85
8.12	7.25	6.92	0.25	1500	1000	375	12.74	0.85
8.97	8.09	7.76	0.25	1850	1000	350	21.34	0.87
9.61	8.71	8.38	0.25	2175	1000	325	22.53	0.89
9.86	8.96	8.63	0.25	2500	1000	300	23.79	0.91
10.12	9.21	8.88	0.25	2544	1000	300	25.12	0.92
10.39	9.47	9.14	0.25	2589	1000	300	26.53	0.94
11.17	10.24	9.91	0.25	2636	1000	300	28.60	0.96
11.50	10.56	10.24	0.25	2681	1000	300	30.84	0.98
11.84	10.90	10.57	0.25	2732	1000	300	33.26	1.00
11.05	10.13	9.80	0.25	2781	1000	300	35.86	1.02
11.51	10.57	10.24	0.25	2831	1000	300	38.67	1.04
11.98	11.03	10.70	0.25	2882	1000	300	41.74	1.06
12.16	11.21	10.88	0.26	2933	1000	300	44.98	1.08
12.96	11.93	11.58	0.26	2984	1000	300	48.52	1.10
13.17	12.14	12.04	0.27	3036	1000	300	52.33	1.13
14.01	12.90	12.52	0.27	3089	1000	300	56.44	1.15
14.57	13.46	13.02	0.28					

		Heat Rates (mmbtu/MWh)					Capacity Prices (\$/MWh-day)		Renewable Energy Certificate (\$/MWh)		Inflation Factor	
		AEP GEN HUB - HR	SPP - HR	ERCOT North - HR	ERCOT South - HR	ERCOT West - HR						
		8.42	10.28	8.10	8.20	7.04	106.16	25.00	25.00		1.98%	
		8.58	10.10	8.02	8.12	6.97	124.19	25.00	30.00		1.91%	
		8.69	10.29	8.12	8.31	7.07	136.79	25.00	30.60		1.97%	
		8.92	10.16	8.02	8.32	7.01	188.52	25.00	31.21		1.88%	
		9.23	10.60	8.07	8.48	7.04	74.00	25.00	31.83		1.87%	
		9.28	10.68	8.12	8.59	7.05	89.58	25.00	32.47		1.84%	
		9.52	10.31	8.12	8.56	7.12	104.34	30.38	33.12		1.84%	
		9.67	10.38	8.21	8.63	7.16	118.29	33.24	33.78		1.80%	
		9.87	10.47	8.27	8.70	7.21	131.41	59.59	34.46		1.78%	
		9.88	10.51	8.33	8.75	7.23	149.50	76.22	35.15		1.77%	
		10.01	10.56	8.94	9.33	7.30	158.09	94.77	35.85		1.77%	
		9.77	10.57	8.67	8.86	7.25	172.42	114.60	36.57		1.81%	
		9.75	10.25	8.36	8.94	7.26	186.62	135.92	37.30		1.82%	
		9.96	10.22	8.43	9.03	7.31	200.72	158.73	38.04		1.80%	
		10.51	10.84	8.78	9.51	7.61	214.70	183.04	38.81		1.79%	
		10.35	10.56	8.98	9.55	7.63	228.57	208.62	39.58		1.80%	
		10.40	10.52	8.92	9.70	7.71	242.33	236.13	40.37		1.78%	
		10.43	10.65	8.94	9.75	7.73	256.97	264.93	41.18		1.77%	
		10.61	10.76	9.17	9.89	7.79	269.50	295.18	42.00		1.75%	
		10.69	10.78	9.19	10.01	7.81	311.88	326.95	42.82		1.75%	
		10.50	10.71	9.24	10.00	7.85	341.59	344.06	43.70		1.74%	
		10.59	10.76	9.39	10.10	7.91	377.65	350.05	44.58		1.72%	

Year *	PJM - AEP GEN HUB	SPP	ERCOT North	ERCOT South	ERCOT West
2010	40.80	37.87	32.15	30.38	30.86
2011	47.09	48.07	38.72	36.83	37.83
2012	56.39	58.35	46.22	44.40	44.66
2013	62.95	64.67	53.22	51.89	52.43
2014	78.55	77.74	68.52	67.00	66.15
2015	82.15	78.02	70.29	68.67	67.60
2016	84.05	79.59	73.98	72.45	71.25
2017	81.73	79.09	74.21	73.19	71.95
2018	83.44	77.68	73.85	73.05	71.38
2019	83.05	76.75	73.19	72.59	70.92
2020	85.65	78.35	76.32	75.60	73.75
2021	84.38	74.55	76.17	76.05	73.91
2022	84.90	77.67	75.81	74.74	73.81
2023	78.99	72.22	69.10	68.41	67.18
2024	80.86	72.20	71.83	70.77	69.66
2025	83.13	75.75	69.99	72.70	74.36
2026	84.78	77.79	76.01	74.78	74.04
2027	86.02	79.16	77.21	76.10	75.60
2028	87.59	81.19	78.97	78.08	77.22
2029	87.40	83.23	80.17	79.10	78.44
2030	89.34	85.57	81.68	80.98	80.06

Year *	PJM - AEP GEN HUB	SPP	ERCOT North	ERCOT South	ERCOT West
2010	40.80	37.87	32.15	30.38	30.86
2011	47.09	48.07	38.72	36.83	37.83
2012	56.39	58.35	46.22	44.40	44.66
2013	62.95	64.67	53.22	51.89	52.43
2014	78.55	77.74	68.52	67.00	66.15
2015	82.15	78.02	70.29	68.67	67.60
2016	84.05	79.59	73.98	72.45	71.25
2017	81.73	79.09	74.21	73.19	71.95
2018	83.44	77.68	73.85	73.05	71.38
2019	83.05	76.75	73.19	72.59	70.92
2020	85.65	78.35	76.32	75.60	73.75
2021	84.38	74.55	76.17	76.05	73.91
2022	84.90	77.67	75.81	74.74	73.81
2023	78.99	72.22	69.10	68.41	67.18
2024	80.86	72.20	71.83	70.77	69.66
2025	83.13	75.75	69.99	72.70	74.36
2026	84.78	77.79	76.01	74.78	74.04
2027	86.02	79.16	77.21	76.10	75.60
2028	87.59	81.19	78.97	78.08	77.22
2029	87.40	83.23	80.17	79.10	78.44
2030	89.34	85.57	81.68	80.98	80.06



Coal (\$/ton) FOB - Real (2008) \$'s				
	Henry Hub	TCO Pool	Dominion South Point Pool	Natural Gas
56.65	3.88	4.16	4.26	
60.19	5.62	5.89	5.99	
66.27	6.43	6.69	6.80	
65.88	7.53	7.79	7.89	
61.53	7.58	7.83	7.93	
60.86	7.61	7.86	7.96	
61.84	7.65	7.90	7.99	
61.82	7.69	7.93	8.03	
62.70	7.92	7.76	7.86	
62.77	8.00	8.23	8.32	
63.24	8.04	8.27	8.36	
63.72	8.09	8.31	8.40	
60.72	7.20	7.42	7.50	
63.75	7.32	7.54	7.62	
63.71	7.44	7.66	7.74	
63.97	7.50	7.70	7.78	
63.61	7.55	7.75	7.83	
63.93	7.60	7.80	7.88	
63.44	7.68	7.85	7.92	
60.40	7.70	7.90	7.97	

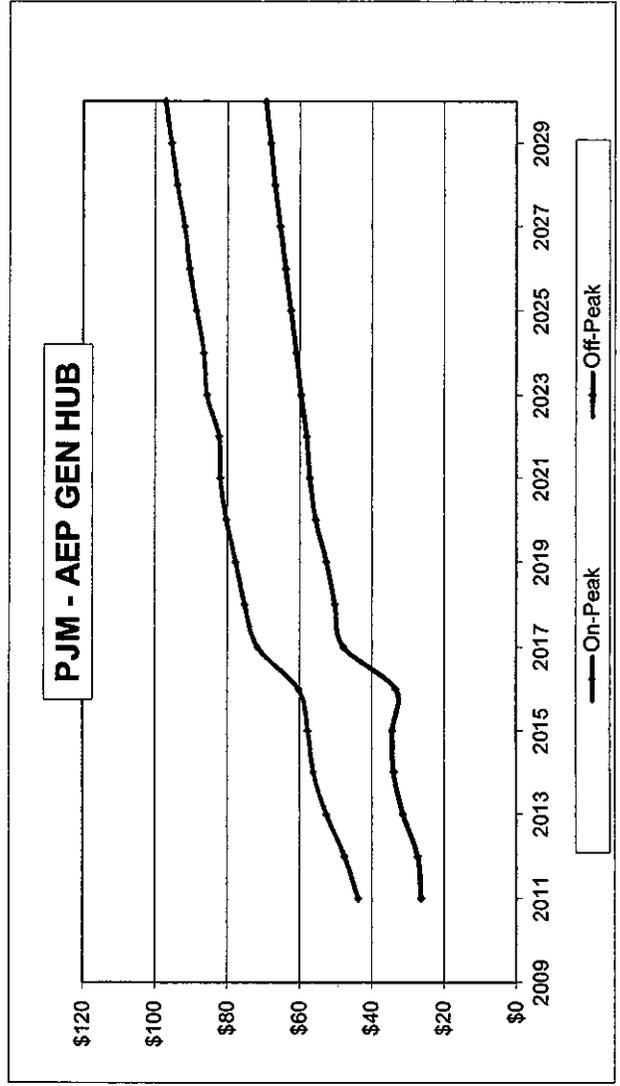
Coal (\$/ton) FOB - Real (2008) \$'s										
	CAPP Compliance	CAPP NYMEX	NAPP High Sulfur	NAPP Med Sulfur	Ill-Basin	PRB 8800	PRB 8400	Colorado		
56.65	53.69	48.27	53.20	44.65	9.85	8.62	44.33			
60.19	60.23	53.66	57.49	47.42	14.37	12.46	38.81			
66.27	63.24	53.66	57.49	47.42	14.37	12.46	38.81			
65.88	62.42	50.95	54.66	43.39	14.36	12.51	34.74			
61.53	59.06	50.95	54.66	43.39	14.36	12.51	34.74			
60.86	57.39	49.12	53.59	42.95	15.11	13.29	33.94			
61.84	57.30	49.12	53.59	42.95	15.11	13.29	33.94			
61.82	58.41	49.76	54.28	43.29	15.23	13.41	34.38			
62.70	58.97	50.37	54.92	43.61	15.34	13.52	34.80			
62.77	59.42	50.37	54.92	43.61	15.34	13.52	34.80			
63.24	60.24	50.38	55.61	43.92	15.45	13.63	35.22			
63.72	60.43	50.38	55.61	43.92	15.45	13.63	35.22			
60.72	60.52	50.33	55.56	43.77	15.40	13.58	35.19			
63.75	60.52	50.33	55.56	43.77	15.40	13.58	35.19			
63.71	60.55	50.82	55.44	43.57	15.33	13.52	35.11			
63.97	60.55	50.82	55.44	43.57	15.33	13.52	35.11			
63.61	60.51	50.66	55.27	43.33	15.24	13.45	35.00			
63.93	60.51	50.66	55.27	43.33	15.24	13.45	35.00			
63.44	60.40	50.45	55.04	43.04	15.14	13.36	34.86			

TCO Delivered				HSC Delivered		PEPL TX-OK		Swing Service Adder	
(\$/mmbtu) - Real (2008) \$'s				(\$/mmbtu) - Real (2008) \$'s		(\$/mmbtu) - Real (2008) \$'s		(\$/mmbtu) - Real (2008) \$'s	
SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	CO <sub>2</sub>	Uranium Fuel UO <sub>2</sub>	Real (2008) \$'s	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	CO <sub>2</sub>
74	459	148	0.00	0.76	4.45	3.63	3.32	0.25	
104	1279	482	0.00	0.78	5.28	4.18	3.57	0.24	
127	1097	427	0.00	0.78	6.21	5.41	5.09	0.24	
150	1004	373	15.84	0.78	7.03	6.22	5.91	0.24	
1262	744	315	23.39	0.78	8.15	7.33	7.02	0.23	
1826	718	261	22.57	0.79	8.21	7.41	7.12	0.23	
1846	692	252	21.78	0.79	8.25	7.46	7.16	0.22	
1822	668	243	21.01	0.79	8.28	7.50	7.22	0.22	
1636	645	234	20.64	0.80	8.10	7.35	7.05	0.21	
1556	633	230	26.04	0.80	8.58	7.81	7.54	0.21	
1484	633	230	29.35	0.80	8.61	7.86	7.59	0.21	
1251	633	230	31.78	0.80	8.66	7.91	7.64	0.20	
1099	633	230	34.13	0.80	7.74	7.02	6.76	0.20	
1053	633	230	36.38	0.81	7.85	7.15	6.89	0.20	
			39.23		7.98	7.27	7.02	0.19	
					8.02	7.33	7.08	0.19	
					8.07	7.38	7.14	0.19	
					8.11	7.44	7.20	0.18	
					8.16	7.49	7.26	0.18	
					8.21	7.55	7.32	0.18	

Heat Rates (mmbtu/MWh)				Capacity Prices (\$/MW-day) - Real (2008) \$'s			Renewable Energy Certificate (\$/MWh) - Real (2008) \$'s	Inflation Factor
SPP - HR	ERCOT North - HR	ERCOT South - HR	ERCOT West - HR	AEP GEN HUB	Hub Cap.	SPP Cap.		
11.52	8.84	8.36	6.97	142.22	24.66	0.00	0.30%	
11.58	8.69	8.26	7.19	133.99	24.77	9.66	1.20%	
11.68	8.67	8.32	7.32	53.68	24.13	9.66	1.60%	
11.21	9.48	9.26	8.30	98.97	207.24	9.66	1.70%	
11.18	9.69	9.48	8.16	105.12	225.13	9.67	1.80%	
11.34	10.18	9.95	8.91	117.10	241.40	9.67	1.80%	
11.19	10.15	9.95	8.93	125.62	251.48	9.67	1.80%	
10.91	10.02	9.89	8.82	133.31	251.48	9.67	1.80%	
11.04	9.94	9.83	8.81	146.19	251.48	9.67	1.80%	
10.89	9.88	9.80	8.81	153.37	251.48	9.67	1.80%	
10.28	9.71	9.57	8.70	241.45	251.48	9.67	1.80%	
10.52	10.05	9.88	8.92	228.00	251.48	9.15	1.80%	
10.63	10.19	10.04	9.05	216.90	251.48	9.15	1.80%	
10.86	10.32	10.12	9.19	208.18	251.48	8.40	1.80%	
11.14	10.51	10.34	9.42	201.70	251.48	8.40	1.80%	
11.24	10.65	10.48	9.65	197.69	251.48	8.09	1.80%	
11.43	10.72	10.60	9.68	195.85	251.48	7.70	1.80%	
11.35	10.62	10.42	9.67	196.43	251.48	7.36	1.80%	
11.46	10.97	10.87	9.96	199.34	251.48	7.02	1.80%	

12395 Btu/lb	12500 Btu/lb
71.62	72.00
78.91	79.50
81.41	82.00
83.89	84.51
86.10	86.72
87.29	87.93
75.52	76.15
73.52	74.18
75.27	75.95
77.02	77.42
78.83	79.24
80.68	81.10
82.15	82.58
83.64	84.08
85.14	85.59
86.66	87.12
88.19	88.66
89.74	90.22
91.31	91.80
92.90	93.40

Year	Power Prices (\$/MWh) -Nominal \$'s											
	PJM - AEP GEN HUB		SPP		ERCOT North		ERCOT South		ERCOT West			
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak		
2011	43.65	26.27	41.39	28.04	36.65	33.25	32.07	35.85	6.36			
2012	47.52	27.29	49.65	33.01	41.77	37.25	36.52	40.17	0.97			
2013	52.60	31.32	53.07	36.27	42.53	38.01	37.97	41.72	2.53			
2014	56.12	33.91	56.99	39.29	46.28	40.99	40.99	43.57	3.91			
2015	57.68	34.24	59.01	40.94	46.03	41.21	41.33	43.86	16.64			
2016	60.32	35.52	61.27	44.27	49.65	44.41	44.73	47.38	20.23			
2017	71.64	47.80	75.42	56.05	59.37	54.59	54.84	57.43	27.58			
2018	75.15	59.25	79.95	62.19	67.19	61.86	61.35	69.35	27.96			
2019	77.61	52.58	77.06	59.06	65.02	59.77	60.11	62.78	30.63			
2020	80.25	53.51	80.07	60.61	66.53	61.37	61.63	64.22	31.13			
2021	81.91	57.14	78.77	61.57	68.56	63.16	63.27	66.60	31.90			
2022	82.23	58.08	79.27	62.98	69.21	63.88	63.98	66.88	32.83			
2023	85.59	59.61	81.01	64.05	71.05	65.51	65.51	68.75	34.55			
2024	86.77	60.97	82.31	65.19	73.20	67.28	67.28	70.39	34.89			
2025	88.48	62.48	84.06	67.56	75.12	68.90	69.00	72.69	36.75			
2026	90.13	63.95	85.05	68.72	76.17	69.86	70.05	73.45	36.71			
2027	91.76	65.43	86.76	70.43	77.76	71.24	71.53	75.24	36.48			
2028	93.80	66.91	88.24	71.71	79.05	72.43	72.85	76.39	37.85			
2029	95.42	68.03	89.57	73.12	80.28	73.65	74.15	77.92	37.48			
2030	96.07	69.42	91.07	75.09	81.74	75.46	75.46	78.09	38.09			



Coal (\$/ton) FOB -Nominal \$'s											
12000 Btu/lb	12000 Btu/lb	12500 Btu/lb	13000 Btu/lb	11512 Btu/lb	8800 Btu/lb	8400 Btu/lb	11700 Btu/lb	12000 Btu/lb	12500 Btu/lb	13000 Btu/lb	11700 Btu/lb
1.2# SO2	1.67# SO2	6# SO2	4# SO2	4.3# SO2	0.8# SO2	0.8# SO2	0.9# SO2	0.8# SO2	0.8# SO2	0.8# SO2	0.9# SO2
CAPP Compliance	CAPP NYMEX	NAPP High Sulfur	NAPP Med Sulfur	I-Basin	PRB 8800	PRB 8400	Colorado	PRB 8400	PRB 8400	PRB 8400	Colorado
71.50	70.00	58.00	63.00	51.66	14.00	11.50	45.34				
78.00	76.50	65.00	66.00	52.00	14.25	12.00	47.29				
84.31	80.87	66.97	71.97	52.21	15.31	13.04	48.68				
88.15	83.02	66.67	73.67	53.55	15.90	13.93	46.68				
89.19	84.17	65.62	74.69	52.99	16.12	14.10	49.22				
77.78	72.35	58.11	65.88	49.50	16.05	14.04	42.23				
75.12	70.83	58.66	63.63	49.22	16.22	14.24	40.80				
76.81	72.01	57.92	64.99	51.96	16.62	14.55	42.07				
79.67	74.86	60.11	67.82	53.86	17.31	15.39	42.56				
81.44	76.61	61.42	68.73	54.78	17.88	15.72	43.46				
83.25	78.11	62.76	70.17	55.92	18.26	16.06	43.67				
84.70	79.85	63.94	71.46	56.79	18.54	16.32	45.07				
86.16	81.30	65.14	72.66	57.63	18.84	16.57	45.77				
87.63	82.76	66.35	74.06	58.57	19.13	16.83	46.48				
89.12	84.22	67.57	75.38	59.45	19.42	17.10	47.20				
90.62	85.72	68.80	76.72	60.36	19.71	17.36	47.91				
92.11	87.18	70.05	78.06	61.26	20.01	17.62	48.63				
93.68	88.76	71.31	79.43	62.18	20.31	17.89	49.37				
95.24	90.33	72.60	80.87	63.10	20.62	18.16	50.10				

Henry Hub	TCO Pool
4.21	4.34
4.87	4.97
5.14	5.21
5.44	5.49
5.65	5.67
6.12	6.14
6.30	6.32
6.64	6.66
6.98	7.00
7.14	7.16
7.40	7.42
7.60	7.51
7.75	7.77
8.07	8.08
8.32	8.33
8.49	8.51
8.66	8.68
8.84	8.85
9.01	9.03
9.19	9.21

Natural Gas (\$/mmbtu) -Nominal \$'s					Emissions (\$/ton) -Nominal \$'s		
Union South Point	TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer
4.35	4.64	4.11	3.98	0.25	485	45	
5.19	5.29	4.74	4.69	0.25	135	40	
5.22	5.53	5.01	4.89	0.25	0	0	
5.49	5.81	5.33	5.19	0.25	0	0	
5.70	5.99	5.55	5.40	0.25	0	0	
6.17	6.45	6.02	5.87	0.25	0	0	
6.35	6.66	6.20	6.05	0.25	0	0	
6.69	7.01	6.54	6.39	0.25	0	0	
7.03	7.35	6.88	6.73	0.25	0	0	
7.19	7.51	7.04	6.89	0.25	0	0	
7.45	7.78	7.30	7.15	0.25	0	0	
7.55	7.89	7.39	7.25	0.25	0	0	
7.80	8.14	7.65	7.50	0.25	0	0	
8.11	8.46	7.96	7.81	0.25	0	0	
8.37	8.72	8.21	8.07	0.25	0	0	
8.51	8.89	8.39	8.24	0.26	0	0	
8.71	9.07	8.56	8.41	0.26	0	0	
8.89	9.25	8.74	8.59	0.27	0	0	
9.06	9.42	8.91	8.76	0.27	0	0	
9.24	9.61	9.09	8.94	0.28	0	0	

Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s
0.79
0.80
0.82
0.84
0.85
0.89
0.91
0.92
0.94
0.96
0.98
1.00
1.02
1.04
1.06
1.08
1.10
1.13
1.15

(\$/metric tonne) - Nominal \$'s CO <sub>2</sub>	Heat Rates (mmbtu/MWh)								Capacity Prices (\$/MWh-day) - Nominal \$'s AEP GEN HUB Hub Cap. SPP Cap.			Renewable Energy Subsidies ** (\$/MWh) -Nominal \$'s
	AEP GEN HUB - HR	SPP - HR	ERCOT North - HR	ERCOT South - HR	ERCOT West - HR	HR	ERCOT	West - HR	AEP GEN HUB Hub Cap.	SPP Cap.	ERCOT	
0.00	10.10	10.43	8.95	8.27	7.77				136.79	25.00		31.00
0.00	10.15	10.91	8.52	8.30	7.58				55.44	25.00		46.00
0.00	10.21	10.97	8.32	8.29	7.34				23.03	25.00		46.00
0.00	11.38	12.51	9.61	9.58	8.65				26.14	25.00		46.00
18.74	11.07	11.06	9.42	9.35	8.58				25.00	25.00		46.00
19.84	11.05	10.83	9.31	9.22	8.46				70.90	342.16		42.00
20.94	10.65	10.46	9.16	9.05	8.35				134.40	346.95		42.60
22.05	10.59	10.34	9.10	9.01	8.31				167.78	351.80		43.20
22.33	10.59	10.25	9.03	8.93	8.29				199.63	356.73		43.70
22.62	10.56	10.26	9.00	8.90	8.22				260.01	361.37		44.10
23.51	10.65	10.46	9.16	9.05	8.35				258.86	366.06		44.60
23.82	10.59	10.34	9.10	9.01	8.31				286.09	370.92		45.20
24.13	10.59	10.25	9.03	8.93	8.29				311.63	363.05		45.70
24.45	10.59	10.25	9.03	8.93	8.29				335.89	352.85		46.30
24.77	10.56	10.26	9.00	8.90	8.22				357.30	346.46		46.80
25.07									377.28	344.03		47.30
									395.23	345.73		47.70
									400.70	351.72		48.20
									405.91	361.80		48.80
									410.78	376.77		49.00

\*\* Reporting PTC's and  
 REC's. PTC's expire  
 after 2015.

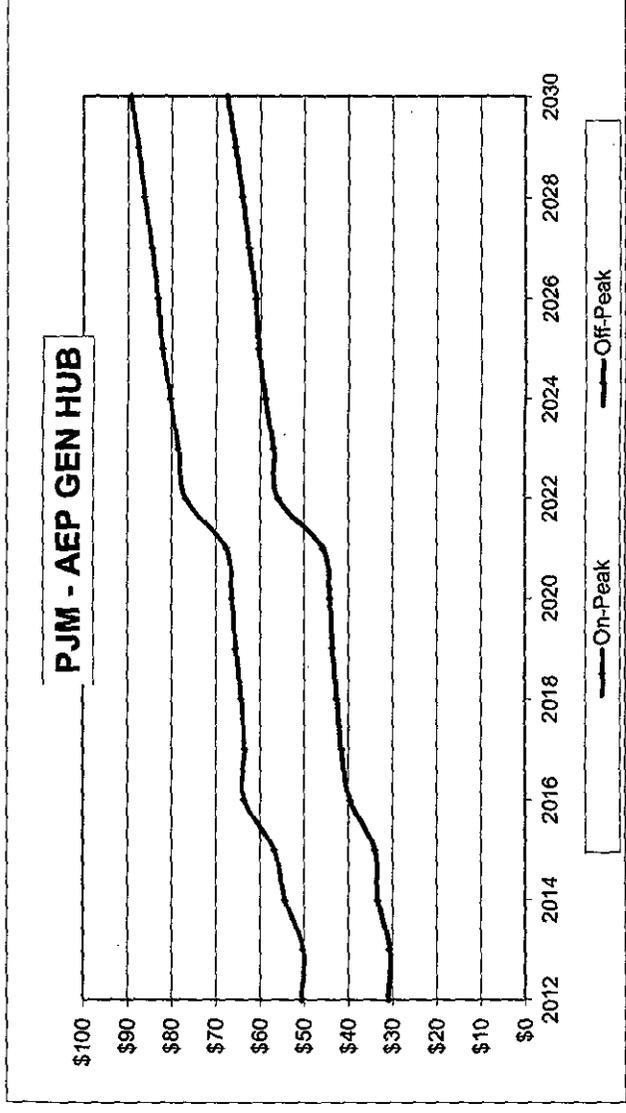






Year	Power Prices (\$/MWh) -Nominal \$'s											
	PJM - AEP GEN HUB		SPP		ERCOT North		ERCOT South		ERCOT West		12395 Btu/lb	
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	1.6# SO2	1.6# SO2
2012	50.57	30.92	47.39	32.63	35.55	33.92	35.57	34.04	34.61	32.96	79.97	80.00
2013	50.14	30.55	50.77	34.86	38.05	36.35	38.36	36.69	37.20	35.62	83.46	83.50
2014	54.24	33.26	55.73	39.00	41.21	39.11	41.57	39.40	40.34	38.18	84.83	85.00
2015	56.71	35.89	59.20	41.78	42.00	40.38	43.34	41.11	41.83	39.65	85.21	85.50
2016	63.56	39.57	64.97	46.15	47.20	44.66	47.93	45.49	46.35	43.90	85.52	85.91
2017	63.48	41.57	63.15	47.70	48.65	46.11	49.05	46.59	47.61	45.06	85.31	85.91
2018	64.18	42.57	66.64	48.97	50.16	47.49	50.54	47.85	49.07	46.37	86.94	87.55
2019	65.11	43.60	67.35	49.35	51.10	48.38	51.33	49.10	50.17	47.32	88.58	89.20
2020	66.33	44.18	66.87	48.80	51.27	48.75	51.41	48.82	50.05	47.47	90.22	90.85
2021	67.64	45.76	68.92	50.73	52.02	50.35	52.03	50.23	51.71	49.15	92.07	92.71
2022	76.79	55.93	75.69	59.13	60.56	57.81	60.64	57.78	59.20	56.38	91.66	92.30
2023	78.33	56.84	76.93	60.17	62.11	59.28	62.31	59.85	60.80	57.86	93.52	94.18
2024	80.34	58.85	78.76	62.40	64.32	61.32	64.28	61.13	62.89	59.79	95.41	96.08
2025	82.18	60.87	80.60	63.83	65.87	62.82	65.82	62.62	64.20	61.28	97.31	97.99
2026	83.23	61.06	81.13	64.33	66.80	63.88	66.86	63.73	65.36	62.33	99.24	99.94
2027	84.67	62.64	83.16	66.12	68.23	65.35	68.17	65.02	66.75	63.73	101.19	101.90
2028	86.25	64.05	84.15	67.56	69.41	66.58	69.30	66.21	67.88	64.94	103.18	103.90
2029	87.64	65.66	85.67	69.06	70.91	68.06	70.65	67.50	69.51	66.34	105.19	105.93
2030	89.34	67.49	86.60	70.45	71.74	68.94	71.47	68.36	70.13	67.20	107.24	107.99

12395 Btu/lb	1.6# SO2	1.6# SO2
CAPP	CAPP	CAPP CSX-Rail
79.97	80.00	80.00
83.46	83.50	83.50
84.83	85.00	85.00
85.21	85.50	85.50
85.52	85.91	85.91
85.31	85.91	85.91
86.94	87.55	87.55
88.58	89.20	89.20
90.22	90.85	90.85
92.07	92.71	92.71
91.66	92.30	92.30
93.52	94.18	94.18
95.41	96.08	96.08
97.31	97.99	97.99
99.24	99.94	99.94
101.19	101.90	101.90
103.18	103.90	103.90
105.19	105.93	105.93
107.24	107.99	107.99



Henry Hub	TCO Pool
4.48	4.58
4.94	5.01
5.38	5.42
5.52	5.53
5.99	6.00
6.13	6.14
6.32	6.34
6.46	6.47
6.52	6.53
6.75	6.77
7.07	7.08
7.26	7.28
7.51	7.52
7.75	7.76
7.85	7.86
8.04	8.06
8.22	8.24
8.41	8.42
8.52	8.54

Coal (\$/ton) FOB - Nominal \$'s	12000 Btu/lb	12500 Btu/lb	13000 Btu/lb	11512 Btu/lb	8800 Btu/lb	8400 Btu/lb	11700 Btu/lb
1.2# SO2	1.67# SO2	6# SO2	4# SO2	4.3# SO2	0.8# SO2	0.8# SO2	0.9# SO2
CAPP Compliance	CAPP NYMEX	NAPP High Sulfur	NAPP Med Sulfur	I-Basin	PRB-8800	PRB-8400	Colorado
82.00	79.50	56.75	70.00	52.47	15.75	12.85	41.50
85.00	83.00	58.00	68.00	54.33	17.50	14.49	43.91
86.33	83.83	60.00	72.00	56.34	17.40	14.84	45.82
85.33	83.83	64.72	74.77	58.07	17.72	15.56	47.58
86.43	84.35	67.18	77.59	59.74	18.57	16.31	48.93
88.06	85.97	69.71	78.90	60.76	19.07	16.75	49.72
89.69	87.53	71.18	80.44	62.21	19.96	17.55	51.75
91.52	89.32	72.57	82.10	63.30	20.32	17.95	52.73
92.97	90.73	73.87	83.89	64.90	20.89	18.36	53.83
94.85	92.56	75.81	85.60	65.91	21.30	18.70	54.69
96.71	94.41	76.91	87.28	67.22	21.84	19.21	55.96
98.66	96.28	78.48	89.08	68.59	22.33	19.63	57.06
100.60	98.19	80.04	90.87	69.97	22.84	20.09	58.17
102.57	100.10	81.65	92.68	71.36	23.30	20.50	59.28
104.57	102.00	83.27	94.50	72.84	23.75	20.91	60.39
106.61	104.04	84.92	96.33	74.36	24.20	21.32	61.50

Natural Gas (\$/mmbtu) - Nominal \$'s					Emissions (\$/ton) - Nominal \$'s		
Union South Point	TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer
4.59	4.89	4.35	4.24	0.25		650	1400
5.07	5.32	4.81	4.69	0.25		550	1100
5.42	5.75	5.26	5.13	0.25		450	800
5.67	5.88	5.42	5.27	0.25		450	800
6.03	6.33	5.88	5.73	0.25	Please see	450	800
6.18	6.43	6.02	5.88	0.25	State Price	250	550
6.37	6.68	6.22	6.07	0.25	(to the right)-->	125	250
6.57	6.82	6.35	6.21	0.25		200	75
6.56	6.88	6.41	6.26	0.25		0	0
6.80	7.12	6.65	6.59	0.25		0	0
7.11	7.44	6.96	6.81	0.25		0	0
7.31	7.62	7.16	7.00	0.25		0	0
7.56	7.89	7.40	7.26	0.25		0	0
7.79	8.13	7.61	7.49	0.25		0	0
7.90	8.24	7.74	7.60	0.26		0	0
8.09	8.43	7.94	7.79	0.26		0	0
8.27	8.62	8.12	7.97	0.27		0	0
8.45	8.80	8.30	8.15	0.27		0	0
8.57	8.92	8.42	8.27	0.28		0	0

Note: NOx prices apply only to those sites included in the Cross State Air Pollution All others are \$0 (zero).

(\$/metric tonne) - Nominal \$'s CO <sub>2</sub>	Heat Rates (mmBtu/MWh)							Capacity Prices (\$/MW-day) - Nominal \$'s			Renewable Energy Subsidies ** (\$/MWh) -Nominal \$'s
	AEP GEN HUB - HR	SPP - HR	ERCOT North - HR	ERCOT South - HR	ERCOT West - HR	Hub Cap.	SPP Cap.	AEP GEN HUB	Hub Cap.	SPP Cap.	
0.00	11.08	11.23	8.18	8.19	7.10			55.44	25.00		47.40
0.00	10.05	10.97	7.99	7.99	7.00			23.03	25.00		47.20
0.00	10.02	10.91	7.84	7.90	7.03			85.05	25.00		47.70
0.00	10.26	11.27	7.87	8.01	7.15			215.25	25.00		48.20
0.00	10.61	11.36	8.04	8.16	7.33			281.92	25.00		44.10
0.00	10.35	11.20	8.09	8.15	7.68			235.98	25.00		44.80
0.00	10.15	11.02	8.08	8.14	7.36			200.39	359.22		45.50
0.00	10.13	10.97	8.09	8.12	7.27			224.57	365.81		46.10
0.00	10.17	10.70	8.01	8.03	7.29			253.47	371.74		46.60
0.00	10.09	10.96	7.98	7.99	7.27			280.05	376.99		47.20
15.08	10.86	11.13	8.71	8.72	7.97			304.18	381.51		47.90
15.28	10.73	10.92	8.69	8.72	7.97			325.73	385.29		48.60
15.48	10.71	10.88	8.69	8.69	7.98			344.58	388.27		49.30
15.67	10.60	10.77	8.60	8.62	7.90			360.68	390.42		49.90
15.88	10.60	10.70	8.63	8.64	7.94			373.61	391.71		50.60
16.08	10.51	10.69	8.61	8.62	7.92			386.59	392.10		51.10
16.29	10.49	10.58	8.56	8.54	7.89			390.13	391.54		51.70
16.50	10.47	10.57	8.55	8.52	7.89			392.94	389.61		52.60
16.72	10.48	10.49	8.53	8.49	7.86			392.16	386.65		52.80

lates  
n Rule

\*\* Reporting PTC's and  
REC's. PTC's expire  
after 2015.

Inflation Factor
1.80%
1.70%
2.70%
2.40%
1.70%
1.50%
1.60%
1.50%
1.50%
1.50%
1.50%
1.50%
1.50%
1.50%
1.50%
1.40%

SO2 Prices by State	AL	AR	CT	DC	DE	FL	GA	IA	IL	IN	KS	KY
Year / Stat	2012	2000.00	0.00	0.00	0.00	0.00	2000.00	1300.00	1300.00	1300.00	2000.00	1300.00
	2013	3000.00	0.00	0.00	0.00	0.00	1300.00	900.00	900.00	900.00	1300.00	900.00
	2014	900.00	0.00	0.00	0.00	0.00	900.00	1800.00	1800.00	1800.00	900.00	1800.00
	2015	900.00	0.00	0.00	0.00	0.00	700.00	550.00	550.00	550.00	700.00	550.00
	2016	600.00	0.00	0.00	0.00	0.00	600.00	100.00	100.00	100.00	600.00	100.00
	2017	2000.00	0.00	0.00	0.00	0.00	2000.00	10.00	10.00	10.00	2000.00	10.00
	2018	150.00	0.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00	150.00	0.00
	2019	750.00	0.00	0.00	0.00	0.00	750.00	0.00	0.00	0.00	750.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2027	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NS
0.00	0.00	1300.00	0.00	1300.00	2000.00	1300.00	0.00	0.00	1300.00	0.00	2000.00	0.00	1300.00	0.00	0.00
0.00	0.00	1800.00	0.00	1800.00	900.00	1800.00	0.00	0.00	1800.00	0.00	900.00	0.00	1800.00	0.00	0.00
0.00	0.00	550.00	0.00	550.00	700.00	550.00	0.00	0.00	550.00	0.00	700.00	0.00	550.00	0.00	0.00
0.00	0.00	100.00	0.00	100.00	600.00	100.00	0.00	0.00	100.00	0.00	600.00	0.00	100.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



Power Prices (\$/MWh) - Nominal \$'s

Year	PJM - AEP GEN HUB		SPP		ERCOT North		ERCOT South		ERCOT West	
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
2013	34.37	23.40	34.02	23.50	30.71	29.33	30.96	29.60	29.94	28.53
2014	37.94	24.50	41.16	26.95	37.88	35.77	38.06	35.99	36.96	34.91
2015	48.38	28.52	47.93	30.98	41.67	39.60	41.81	39.73	40.66	38.60
2016	55.92	34.10	55.09	35.50	45.37	43.11	46.02	43.79	44.39	42.24
2017	58.33	37.38	55.91	37.99	46.97	44.72	47.52	45.26	45.95	43.75
2018	59.02	36.57	56.90	39.17	47.76	45.50	48.23	45.55	46.69	44.44
2019	59.69	39.25	58.35	41.11	48.47	46.09	48.68	46.28	47.29	44.89
2020	61.51	40.76	60.60	43.95	49.80	47.04	50.12	47.85	48.64	46.42
2021	64.04	42.25	64.14	45.34	52.21	50.02	52.58	50.23	51.01	48.75
2022	72.77	56.89	71.59	51.92	60.55	58.74	60.94	58.39	59.26	56.79
2023	74.33	54.86	73.41	55.90	61.42	58.99	61.78	59.22	60.11	57.60
2024	75.87	56.20	76.11	57.84	63.28	60.71	63.56	60.85	61.90	59.26
2025	77.51	57.24	78.77	59.67	64.72	62.29	65.13	62.49	63.37	60.84
2026	78.80	58.16	79.70	61.29	66.57	63.20	66.91	63.32	64.19	61.70
2027	80.60	59.05	82.49	63.15	67.33	64.82	67.65	64.89	65.91	63.28
2028	81.99	60.20	84.63	64.66	68.27	66.00	68.39	66.01	66.83	64.48
2029	83.65	61.45	86.60	66.55	69.88	67.52	70.21	67.49	68.43	65.91
2030	84.72	62.69	89.22	68.29	70.75	68.41	70.96	68.60	69.24	66.76
2031	86.04	64.20	91.67	70.46	72.40	70.04	72.58	69.85	70.89	68.35
2032	88.14	66.10	95.35	73.67	74.37	71.77	74.49	71.54	72.76	70.04
2033	90.15	68.50	97.29	75.30	75.34	73.20	75.53	72.91	73.78	71.44
2034	88.97	70.00	96.14	72.19	77.14	75.05	77.23	74.62	75.53	73.23
2035	91.25	71.70	94.28	74.87	78.90	76.72	78.98	76.30	77.27	74.87

12395 Btu/lb 1.6# SO2 CAPP	12500 Btu/lb 1.6# SO2 CAPP CSX-Rail	12000 Btu/lb 1.2# SO2 CAPP Compliance	12000 Btu/lb 1.67# SO2 CAPP NYMEX	Coal (\$/ton) FOB -Nominal \$'s			11512 Btu/lb 4.3# SO2 I-Basin	8800 Btu/lb 0.8# SO2 PRB 8800	8400 Btu/lb 0.8# SO2 PRB 8400
				12500 Btu/lb 6# SO2 NAPP High Sulfur	13000 Btu/lb 4# SO2 NAPP Med Sulfur	55.00			
63.46	64.00	75.00	62.85	55.00	58.65	49.45	11.25	10.10	
68.42	69.00	77.00	66.50	57.00	62.20	51.45	12.50	10.70	
72.39	73.00	78.00	71.00	59.00	64.90	53.45	13.50	11.35	
73.25	73.87	74.90	71.20	61.00	67.10	53.15	13.20	11.35	
74.60	75.23	72.60	71.90	71.14	69.49	53.95	13.44	11.75	
77.38	76.04	72.60	72.00	75.00	73.82	56.91	13.68	11.96	
81.77	82.46	72.60	72.10	79.83	79.15	60.65	14.42	12.45	
86.29	87.92	75.00	74.20	82.40	84.23	63.42	15.49	13.23	
86.35	87.08	76.20	74.80	83.50	83.42	63.56	15.44	13.19	
90.90	91.16	80.70	79.70	85.91	85.80	65.01	16.36	13.96	
94.43	95.23	84.80	83.30	88.34	91.73	67.85	16.97	14.49	
96.90	97.72	91.01	89.07	89.78	91.96	68.07	16.73	14.29	
99.97	100.82	92.49	93.10	88.63	91.75	68.27	16.68	14.24	
103.63	104.41	102.05	102.11	88.74	91.91	68.37	16.88	14.45	
105.71	106.61	106.91	104.97	89.30	91.16	68.47	17.14	14.62	
108.22	109.14	108.12	105.18	89.70	89.82	68.07	17.38	15.10	
112.66	113.61	115.22	113.28	89.90	91.81	68.57	17.89	15.42	
117.63	118.42	117.18	116.73	90.10	87.72	69.57	20.10	17.28	
119.98	121.00	119.15	120.25	91.10	94.98	69.77	22.48	19.54	
123.65	123.99	123.77	123.80	93.10	97.99	71.57	26.50	23.24	
126.16	127.23	127.51	129.25	97.39	101.99	73.82	30.05	26.38	
130.12	131.22	129.23	130.75	102.72	106.20	77.82	36.88	29.39	
133.27	134.40	134.21	132.27	105.59	108.36	80.81	32.80	28.78	

11700 Btu/lb	35.59
0.9# SO2	35.83
Colorado	38.27
	38.42
	39.10
	39.19
	39.39
	39.29
40.46	
40.56	
41.15	
41.55	
43.19	
43.33	
45.14	
46.41	
46.60	
47.12	
46.96	
47.00	
47.48	
48.26	
49.24	

Natural Gas (\$/mmbtu) -Nominal \$'s							
Henry Hub	TCO Pool	Union South Point I	TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder	
4.04	4.11	4.08	4.39	3.91	3.79	0.25	
5.05	5.10	5.06	5.40	4.92	4.80	0.25	
5.47	5.49	5.48	5.80	5.37	5.22	0.25	
5.83	5.85	5.84	6.17	5.73	5.58	0.25	
6.01	6.03	6.02	6.35	5.91	5.76	0.25	
6.12	6.14	6.13	6.46	6.02	5.87	0.25	
6.19	6.21	6.20	6.53	6.09	5.94	0.25	
6.23	6.25	6.24	6.76	6.33	6.18	0.25	
6.75	6.77	6.76	7.11	6.65	6.50	0.25	
7.16	7.20	7.19	7.54	7.08	6.93	0.25	
7.30	7.32	7.31	7.67	7.20	7.05	0.25	
7.51	7.52	7.52	7.99	7.49	7.26	0.25	
7.75	7.76	7.75	8.12	7.64	7.49	0.25	
7.85	7.86	7.86	8.23	7.74	7.60	0.26	
8.04	8.06	8.05	8.42	7.94	7.79	0.26	
8.22	8.24	8.23	8.61	8.12	7.97	0.27	
8.41	8.42	8.41	8.79	8.30	8.15	0.27	
8.52	8.54	8.53	8.91	8.42	8.27	0.28	
8.73	8.75	8.74	9.13	8.63	8.48	0.28	
8.94	8.96	8.95	9.34	8.84	8.69	0.28	
9.16	9.18	9.17	9.56	9.06	8.91	0.28	
9.39	9.41	9.40	9.69	9.29	9.14	0.28	
9.61	9.63	9.62	10.02	9.51	9.36	0.28	

Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s	Emissions (\$/ton) -Nominal \$'s				(\$/metric tonne) - Nominal \$'s CO2	Heat Rates (mmbtu/			
	SO2	NOx Annual	NOx Summer			AEP GEN HUB - HR	SPP - HR	ERCOT North - HR	
0.82	0	0	0	0	0.00	8.44	9.01		7.87
0.84	0	0	0	0	0.00	7.45	8.60		7.67
0.85	0	0	0	0	0.00	8.83	9.20		7.77
0.87	0	0	0	0	0.00	9.58	9.51		7.92
0.89	0	0	0	0	0.00	9.69	9.72		7.96
0.91	0	0	0	0	0.00	9.63	9.72		7.95
0.92	0	0	0	0	0.00	9.64	9.85		7.97
0.94	0	0	0	0	0.00	9.55	9.83		7.88
0.96	0	0	0	0	0.00	9.47	9.89		7.86
0.98	0	0	0	0	0.00	10.12	10.35		8.56
1.00	0	0	0	0	15.28	10.17	10.43		8.54
1.02	0	0	0	0	15.18	10.10	10.51		8.55
1.04	0	0	0	0	15.67	10.00	10.52		8.48
1.06	0	0	0	0	15.38	10.01	10.51		8.47
1.08	0	0	0	0	16.08	10.01	10.61		8.49
1.10	0	0	0	0	16.29	9.97	10.62		8.42
1.13	0	0	0	0	16.50	9.95	10.63		8.42
1.15	0	0	0	0	16.72	9.90	10.61		8.41
1.17	0	0	0	0	16.94	9.85	10.84		8.40
1.19	0	0	0	0	17.16	9.85	10.99		8.42
1.22	0	0	0	0	17.38	9.83	10.93		8.32
1.24	0	0	0	0	17.60	9.45	9.97		8.31
1.27	0	0	0	0	17.84	9.48	10.08		8.30

MWh)		Capacity Prices (\$/MW-day) - Nominal \$'s		
ERCOT South - HR	ERCOT West - HR	AEP GEN HUB	Hub Cap.	SPP Cap.
7.93	6.81	23.03	25.00	
7.71	6.85	85.05	25.00	
7.80	7.02	131.83	26.47	
8.05	7.21	91.30	38.73	
8.06	7.25	132.49	41.30	
8.03	7.27	199.74	49.16	
8.01	7.25	215.54	57.40	
7.93	7.18	201.74	65.93	
7.92	7.19	248.55	74.80	
8.62	7.65	265.99	84.07	
8.59	7.85	284.08	93.64	
8.59	7.86	302.52	105.63	
8.53	7.81	321.95	113.90	
8.57	7.83	341.74	121.53	
8.53	7.83	362.23	135.60	
8.46	7.77	385.42	147.06	
8.46	7.79	394.85	158.95	
8.43	7.77	403.15	171.26	
8.42	7.77	411.61	184.03	
8.46	7.80	426.26	197.23	
8.35	7.72	429.08	210.95	
8.32	7.70	438.09	224.92	
8.31	7.71	447.29	239.59	

Renewable Energy Subsidies ** (\$/MWh) Nominal \$'s	Inflation Factor
48.40	2.10%
48.60	2.10%
49.20	2.50%
45.40	2.60%
46.60	2.50%
47.60	2.30%
48.60	2.30%
49.50	2.30%
50.60	2.20%
51.70	2.30%
52.80	2.20%
53.90	2.20%
55.00	2.20%
56.10	2.20%
57.10	2.20%
58.10	2.10%
59.30	2.10%
60.70	2.10%
0.00	2.10%
0.00	2.10%
0.00	2.10%
0.00	2.10%

SO2 Prices by State		AL	AR	CT	DC	DE	FL	GA	IA	IL	IN	KS	KY
SO2 Prices													
2013		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2015		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2016		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2017		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2018		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2019		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2020		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2022		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2023		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2024		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2025		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2026		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2027		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2028		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2029		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2030		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
State Price		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00







Power Prices (\$/MWh) -Nominal \$'s

Year	PJM - AEP Gen Hub		SPP_Central		SPP_KSMO		ERCOT_NORTH		ERCOT_South		ERCOT	
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
2016	35.34	26.65	37.04	26.84	36.80	26.60	35.48	29.01	35.57	29.28	36.19	
2017	38.62	27.41	42.20	29.14	41.87	29.14	40.68	31.70	40.80	32.03	41.50	
2018	40.37	28.22	44.33	30.73	44.01	30.45	42.98	32.90	43.17	33.32	43.86	
2019	43.12	30.81	47.10	32.54	46.92	32.35	45.20	35.94	44.40	34.38	45.15	
2020	44.97	32.05	48.64	34.53	48.36	34.24	45.77	35.48	46.00	36.00	46.76	
2021	47.42	35.59	51.41	36.41	51.14	36.11	47.94	37.01	48.21	37.57	48.97	
2022	62.04	47.94	64.33	49.56	64.02	49.15	58.96	45.70	59.35	46.43	60.11	
2023	63.73	48.89	65.59	50.37	65.29	50.16	60.97	45.89	61.51	46.64	62.16	
2024	66.89	50.93	69.56	52.70	69.34	52.31	64.12	47.80	64.68	48.58	65.37	
2025	69.81	52.82	72.19	54.65	71.99	54.25	66.05	49.61	65.66	50.46	67.36	
2026	72.39	54.98	74.83	56.98	74.73	56.60	68.21	51.87	68.92	52.76	69.56	
2027	75.19	56.61	77.35	58.44	77.21	58.09	69.88	52.24	70.58	53.08	71.26	
2028	77.21	58.27	79.55	60.11	79.41	59.70	72.22	53.63	72.95	54.58	73.63	
2029	79.93	60.38	82.15	62.14	82.17	61.13	73.13	55.84	75.17	57.84	75.87	
2030	82.57	62.38	86.48	65.60	86.37	65.17	76.19	57.21	76.92	58.22	77.66	
2031	85.99	64.62	89.82	69.13	89.79	68.72	78.60	59.59	79.45	60.72	80.06	
2032	88.74	66.97	95.25	72.48	95.07	72.01	80.69	61.28	81.54	62.40	82.18	
2033	92.42	70.20	96.97	75.82	98.71	73.06	82.66	63.45	83.58	64.64	84.20	
2034	93.33	71.58	100.67	77.56	100.52	77.07	85.17	66.08	86.21	67.31	86.74	
2035	95.81	73.02	103.10	79.87	102.96	79.87	87.41	67.23	88.18	68.48	88.70	
2036	99.04	76.49	106.30	82.36	106.01	81.77	89.88	69.25	90.99	70.60	91.42	
2037	101.38	78.90	108.11	84.24	107.95	83.75	92.09	70.88	93.35	72.30	93.65	
2038	104.70	81.50	111.18	86.72	111.07	86.17	94.23	72.69	95.60	74.17	95.87	
2039	105.73	83.47	111.13	88.23	111.95	87.63	96.59	74.77	98.18	76.32	98.27	
2040	108.64	85.64	114.82	90.53	114.64	89.90	99.00	76.32	100.60	77.90	100.68	
2041	110.08	87.49	116.57	92.30	116.09	91.68	101.20	78.02	103.02	79.24	102.87	
2042	112.43	89.33	119.32	94.70	119.09	94.03	103.09	79.73	105.11	81.53	104.79	
2043	114.41	91.67	121.59	97.08	121.33	96.41	105.30	81.57	107.94	83.35	107.07	
2044	115.92	93.50	123.81	99.43	123.61	98.72	107.62	83.98	109.92	85.94	109.33	
2045	116.58	95.27	127.28	102.00	127.15	101.67	109.47	85.44	111.79	87.46	111.20	
2046	121.34	98.43	128.64	103.83	128.39	103.09	111.38	86.97	113.89	89.08	113.16	

		Coal (\$/ton) FOB - Nominal \$'s										
		12395 Btu/lb	12500 Btu/lb	12000 Btu/lb	12000 Btu/lb	12000 Btu/lb	12500 Btu/lb	13000 Btu/lb	11512 Btu/lb	8800 Btu/lb		
		1.6# SO2	1.6# SO2	1.2# SO2	1.67# SO2	6# SO2	4# SO2	4# SO2	4.3# SO2	0.8# SO2		
		CAPP	CAPP CSX-Rail	CAPP Compliance	CAPP NYMEX	NAPP High Sulfur	NAPP Med Sulfur	NAPP	I-Basin	PRB 8800		
	29.50	65.50	66.05	70.85	65.85	55.18	61.51	40.00	15.05			
	32.28	67.85	68.40	72.69	66.04	52.89	62.25	42.25	16.11			
	33.52	68.58	69.16	74.26	68.32	58.19	64.64	43.56	17.28			
	34.69	69.76	70.34	75.86	70.50	61.31	67.89	45.92	18.81			
	36.23	73.14	73.76	80.39	73.96	64.64	71.34	48.60	21.38			
	37.79	75.82	76.26	83.12	76.47	65.22	73.05	50.19	22.86			
	46.54	79.42	80.09	87.31	80.32	70.39	77.32	53.49	23.49			
	48.67	81.24	82.35	89.75	82.57	70.85	77.80	51.01	24.62			
	50.55	84.77	85.49	93.21	85.76	77.93	85.17	55.88	22.51			
	52.84	87.16	88.27	96.59	88.38	80.21	87.53	56.30	24.10			
	53.12	90.36	91.13	99.37	91.42	83.64	91.11	57.53	26.99			
	54.67	93.80	94.39	102.30	94.90	85.30	92.66	57.91	25.82			
	57.44	97.98	98.81	107.77	99.15	87.26	94.87	59.93	26.60			
	58.34	100.66	101.25	110.72	101.50	89.52	97.24	64.10	30.95			
	60.75	104.34	105.23	114.78	105.60	90.46	98.19	65.72	30.05			
	62.44	108.46	109.38	119.31	109.76	94.06	101.94	69.56	35.56			
	63.72	111.30	112.20	122.21	112.21	97.32	105.34	71.69	38.63			
	67.37	114.29	115.26	125.73	115.67	99.66	107.77	78.16	41.10			
	68.57	117.95	118.83	129.69	118.91	103.14	111.39	80.21	46.37			
	70.58	120.82	121.85	132.93	122.29	105.72	114.17	82.24	47.53			
	72.26	123.54	124.53	136.26	125.32	108.16	117.05	84.30	48.72			
	74.14	126.94	128.02	139.66	128.48	111.07	119.95	86.41	49.93			
	76.25	130.11	131.22	143.13	131.70	113.85	122.89	88.57	51.18			
	77.82	133.37	134.50	146.73	134.99	116.69	126.02	90.78	52.46			
	79.55	136.00	137.30	150.10	136.39	119.61	129.17	93.05	53.77			
	81.32	140.12	141.31	154.16	141.82	122.60	132.40	95.38	55.12			
	83.49	143.22	144.53	158.39	144.39	125.85	135.05	97.28	56.22			
	85.59	145.78	147.01	160.38	147.55	127.56	137.75	99.23	57.34			
	87.09	148.95	150.25	163.59	150.50	130.11	140.51	101.21	58.19			
	88.70	151.67	152.95	166.86	153.51	132.71	143.32	103.24	59.66			

Γ West	29.50
Off-Peak	32.28
	33.52
	34.69
	36.23
	37.79
	46.54
	48.67
	50.55
	52.84
	53.12
	54.67
	57.44
	58.34
	60.75
	62.44
	63.72
	67.37
	68.57
	70.58
	72.26
	74.14
	76.25
	77.82
	79.55
	81.32
	83.49
	85.59
	87.09
	88.70

8400 Btu/lb	11700 Btu/lb
0.8# SO2	0.9# SO2
PRB 8400	Colorado
11.50	34.86
12.30	36.81
13.56	37.16
14.74	39.42
16.80	42.50
17.97	44.26
18.47	48.46
18.88	48.16
17.60	50.15
18.94	53.33
21.26	53.59
20.19	56.24
20.73	59.61
21.40	65.56
23.52	68.73
26.64	69.19
27.87	70.19
30.21	72.54
32.02	75.69
35.36	79.69
37.27	81.68
38.20	86.72
39.16	85.81
40.16	87.96
41.14	90.16
42.17	92.40
43.22	94.72
44.09	96.62
44.97	98.55
45.87	100.52
46.78	102.53

**Natural Gas (\$/mmbtu) -Nominal \$'s**

Henry Hub	TCO Pool	Dominion South Point Pool	TCO Deliv	HSC	PEPL TX-OK	Swing Service Adder
4.34	4.13	3.83	4.39	4.42	4.25	0.25
5.09	4.94	4.62	5.08	5.18	5.01	0.25
5.40	5.10	4.95	5.37	5.49	5.30	0.25
5.50	5.16	5.22	5.46	5.59	5.39	0.25
5.60	5.29	5.23	5.56	5.69	5.48	0.25
5.82	5.49	5.40	5.77	5.91	5.75	0.25
6.28	5.98	5.87	6.28	6.37	6.20	0.25
6.60	6.30	6.20	6.59	6.69	6.52	0.25
6.80	6.47	6.40	6.77	6.88	6.68	0.25
6.99	6.62	6.62	6.92	7.05	6.86	0.25
7.13	6.76	6.79	7.06	7.22	6.97	0.26
7.30	6.92	6.96	7.28	7.39	7.19	0.26
7.47	7.09	7.14	7.40	7.56	7.30	0.27
7.65	7.26	7.33	7.57	7.74	7.47	0.27
7.83	7.44	7.49	7.76	7.91	7.66	0.28
8.00	7.61	7.68	7.93	8.09	7.85	0.28
8.19	7.79	7.87	8.12	8.28	8.04	0.28
8.39	7.99	8.07	8.32	8.45	8.26	0.28
8.59	8.20	8.28	8.53	8.68	8.47	0.28
8.80	8.38	8.50	8.72	8.89	8.69	0.28
9.02	8.63	8.71	8.97	9.11	8.89	0.28
9.24	8.88	8.92	9.20	9.32	9.09	0.28
9.45	9.08	9.12	9.43	9.53	9.30	0.28
9.69	9.31	9.31	9.66	9.75	9.49	0.28
9.87	9.52	9.52	9.89	9.96	9.69	0.28
10.08	9.72	9.73	10.10	10.17	9.90	0.28
10.29	9.95	9.94	10.31	10.38	10.11	0.28
10.50	10.16	10.15	10.53	10.59	10.32	0.28
10.71	10.37	10.36	10.74	10.80	10.53	0.28
10.92	10.57	10.57	10.96	11.00	10.73	0.28
11.13	10.79	10.78	11.17	11.22	10.95	0.28

Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s	Emissions (\$/ton) -Nominal \$'s				Heat Rates (mmbtu/MW)			
	SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	Nominal \$'s CO <sub>2</sub>	AEP GEN HUB - HR	SPP_Central - HR	ERCOT North - HR	
0.87	0	0	0	0.00	8.59	8.76	8.05	8.05
0.89	0	0	0	0.00	8.05	8.15	7.88	7.88
0.91	0	0	0	0.00	7.95	8.39	7.85	7.85
0.92	0	0	0	0.00	8.35	8.75	7.92	7.92
0.94	0	0	0	0.00	8.52	8.90	8.06	8.06
0.96	0	0	0	0.00	8.66	8.97	8.13	8.13
0.98	0	0	0	15.00	10.40	10.40	9.28	9.28
1.00	0	0	0	15.22	10.15	10.25	9.14	9.14
1.02	0	0	0	15.58	10.36	10.44	9.33	9.33
1.04	0	0	0	16.00	10.57	10.66	9.39	9.39
1.06	0	0	0	16.19	10.73	10.75	9.47	9.47
1.08	0	0	0	16.21	10.97	10.88	9.49	9.49
1.10	0	0	0	16.84	10.92	10.93	9.57	9.57
1.13	0	0	0	17.17	11.03	11.10	9.63	9.63
1.15	0	0	0	17.50	11.11	11.31	9.64	9.64
1.17	0	0	0	17.83	11.24	11.60	9.74	9.74
1.19	0	0	0	18.19	11.41	11.88	9.77	9.77
1.22	0	0	0	18.21	11.59	12.00	9.76	9.76
1.24	0	0	0	18.88	11.40	11.92	9.82	9.82
1.27	0	0	0	19.21	11.75	11.89	9.81	9.81
1.29	0	0	0	19.60	11.50	11.99	9.89	9.89
1.32	0	0	0	19.93	11.81	11.93	9.89	9.89
1.35	0	0	0	20.33	11.56	11.98	9.90	9.90
1.37	0	0	0	20.69	11.77	11.83	9.92	9.92
1.40	0	0	0	21.08	11.41	11.86	9.95	9.95
1.43	0	0	0	21.38	11.91	11.78	9.97	9.97
1.46	0	0	0	21.86	11.31	11.81	9.95	9.95
1.49	0	0	0	22.20	11.26	11.80	9.96	9.96
1.52	0	0	0	22.66	11.19	11.77	9.98	9.98
1.55	0	0	0	23.08	11.31	11.97	9.99	9.99
1.58	0	0	0	23.50	11.26	11.76	9.94	9.94



Inflation Factor
0.70%
2.50%
2.60%
2.70%
2.60%
2.30%
2.20%
2.20%
2.10%
2.10%
2.00%
2.00%
2.00%
2.00%
2.00%
1.90%
1.90%
2.00%
2.00%
1.90%
1.90%
1.90%
1.80%
1.80%
1.80%

Year	Power Prices (\$/MWh) -Nominal \$'s											
	PJM_AEP		SPP_Central		SPP_KSMO		ERCOT_NORTH		ERCOT_South			
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
2016	23.40	18.73	23.20	18.64	23.16	18.50	21.36	19.37	21.56	19.48		
2017	27.33	22.31	23.35	22.20	29.17	22.09	27.37	25.06	28.39	25.53		
2018	36.54	26.35	39.07	26.28	38.72	26.03	41.02	31.87	41.61	32.54		
2019	40.33	29.63	42.9	29.37	42.08	29.69	43.15	34.21	43.75	34.95		
2020	42.24	32.05	44.90	32.13	44.53	31.83	44.32	35.54	44.87	36.36		
2021	43.60	33.09	45.03	33.3	45.88	32.97	45.07	36.82	45.18	37.55		
2022	45.02	34.04	48.83	35.15	48.49	34.84	46.83	37.97	47.24	38.60		
2023	46.43	34.71	50.17	35.59	49.82	35.27	48.14	37.93	48.47	38.53		
2024	50.16	38.61	54.39	39.72	54.08	39.38	51.80	41.92	52.10	42.44		
2025	53.35	42.09	57.68	42.78	56.92	42.40	54.28	45.01	54.66	45.60		
2026	56.95	45.47	61.51	46.97	61.12	46.57	57.60	49.15	58.08	49.76		
2027	60.59	49.07	65.56	50.68	64.92	49.94	60.99	52.03	61.61	52.57		
2028	64.14	52.52	69.58	54.27	69.07	53.79	64.11	55.29	64.85	55.92		
2029	68.42	56.41	73.06	58.12	74.19	57.61	67.67	59.35	68.67	60.11		
2030	74.09	60.39	80.30	62.86	79.69	62.30	71.19	62.50	72.42	63.37		
2031	78.97	65.34	85.52	68.08	84.34	67.43	76.10	66.81	77.50	67.88		
2032	82.54	69.79	88.79	72.13	88.18	71.52	83.33	70.99	84.77	72.12		
2033	85.19	72.77	91.20	74.35	90.33	74.22	84.10	73.00	85.76	74.28		
2034	86.67	75.01	93.33	77.65	92.74	77.06	87.96	75.67	89.61	77.06		
2035	89.65	77.65	96.45	79.94	95.30	79.30	90.24	77.69	92.14	79.09		
2036	91.58	79.32	97.14	81.07	96.38	80.38	95.22	79.48	96.98	80.88		
2037	93.47	81.44	99.21	83.20	98.36	82.47	98.97	81.45	100.66	82.86		
2038	96.25	83.64	101.43	84.88	100.60	84.20	96.37	82.61	98.09	84.07		
2039	97.07	85.16	102.43	86.16	101.53	85.63	98.76	84.61	100.38	86.08		
2040	98.09	86.73	103.07	87.79	102.19	87.11	99.05	85.92	100.67	87.37		
2041	100.75	88.99	105.62	89.73	104.55	89.09	100.30	87.51	102.14	89.02		
2042	102.34	91.05	106.85	91.48	105.95	90.90	103.24	89.38	104.84	90.92		
2043	103.39	93.02	108.03	93.13	107.22	92.67	105.13	91.34	106.74	92.93		
2044	106.15	95.25	109.45	94.89	108.56	94.56	107.47	93.46	109.04	95.00		
2045	108.05	97.32	111.35	97.37	110.39	97.12	109.2	95.68	110.80	97.28		
2046	109.68	99.85	112.65	99.20	111.69	99.01	109.17	97.38	110.64	99.03		

ERCOT_West		Coal (\$/ton) FOB - Nominal \$'s										
On-Peak	Off-Peak	12395 Btu/lb 1.6# SO2 CAPP	12500 Btu/lb 1.6# SO2 CAPP CSX-Rail	12000 Btu/lb 1.2# SO2 CAPP Compliance	12000 Btu/lb 1.67# SO2 CAPP NYMEX	12500 Btu/lb 6# SO2 NAPP High Sulfur	13000 Btu/lb 4# SO2 NAPP Med Sulfur	11512 Btu/lb 4.3# SO2 I-Basin				
20.56	18.60	35.45	35.75	45.94	45.00	34.91	40.30	32.32				
27.02	24.22	42.61	43.00	49.69	49.76	40.35	46.02	37.98				
40.17	30.98	47.50	47.90	51.94	51.00	46.25	52.26	40.01				
42.36	33.26	50.52	51.00	59.57	59.68	50.72	57.63	43.07				
43.43	34.59	65.55	66.10	69.21	68.37	55.19	62.80	46.14				
44.75	35.85	69.44	70.02	73.35	72.59	59.59	68.13	46.05				
45.89	36.97	73.55	74.18	77.74	77.01	55.81	63.45	45.97				
47.19	38.92	77.92	78.68	82.20	81.76	50.18	68.78	45.88				
50.81	40.86	79.49	80.16	82.98	86.37	60.77	68.60	49.82				
55.25	45.90	79.86	80.54	88.09	88.40	62.12	71.39	51.75				
56.54	47.99	82.33	83.02	85.84	91.83	63.82	71.77	51.02				
59.91	50.84	86.75	87.43	90.98	94.32	69.74	74.80	52.74				
63.02	54.07	89.10	89.85	91.47	97.73	66.69	74.75	52.14				
66.53	58.09	91.57	92.29	94.06	100.97	68.52	76.66	51.19				
70.12	61.21	93.98	94.77	95.69	103.06	65.86	73.90	53.44				
75.03	63.42	103.22	104.10	104.38	102.70	71.82	80.11	55.52				
82.23	69.62	105.18	106.07	106.81	113.01	78.66	87.19	58.75				
88.07	74.61	107.52	108.43	108.97	116.09	82.72	91.29	60.85				
86.88	74.24	112.56	113.52	117.02	121.07	84.47	93.23	62.12				
89.68	76.25	116.12	119.12	119.57	125.75	85.70	94.51	64.30				
94.17	78.02	120.37	121.39	122.69	130.38	88.59	97.51	67.19				
97.92	79.97	123.56	124.60	122.56	133.09	88.91	97.94	66.36				
95.30	81.10	126.03	127.10	125.31	140.85	90.69	99.80	67.68				
91.67	83.07	123.55	128.64	127.34	143.67	92.50	101.19	69.04				
97.96	84.37	131.12	132.23	130.37	146.54	94.35	103.83	70.42				
99.74	85.94	133.74	134.88	132.98	149.47	96.23	105.91	71.83				
102.19	87.80	136.42	137.57	135.64	152.46	98.16	108.03	73.26				
104.11	89.77	139.16	140.02	138.95	155.81	100.13	110.19	74.73				
106.45	91.89	141.93	143.13	141.12	158.62	102.13	112.39	76.22				
108.17	94.11	144.77	145.99	143.94	161.79	104.17	114.64	77.75				
108.15	95.82	147.66	148.91	146.82	165.03	106.26	116.93	79.30				

8800 Btu/lb 0.8# SO2 PRB 8800	8400 Btu/lb 0.8# SO2 PRB 8400	10.00	11700 Btu/lb 0.9# SO2 Colorado	23.59
11.33	10.00			23.59
12.78	10.44			29.48
20.31	15.96			41.60
22.32	17.55			31.25
21.38	16.72			39.55
25.64	20.20			40.77
25.27	19.69			42.03
28.55	22.34			43.33
33.78	26.48			44.66
39.05	30.42			46.03
45.15	35.41			47.45
47.44	37.20			49.13
49.84	39.08			51.11
52.36	41.06			53.17
54.48	42.72			55.32
56.68	44.44			57.56

**Natural Gas (\$/mmbtu) -Nominal \$'s**

Henry Hub	TCO Pool	Dominion South Point Pool	TCO Deliv	HSC	PEPL TX-OK
2.15	2.00	1.47	2.22	2.23	2.04
4.89	4.52	4.12	4.79	4.98	4.78
5.26	4.94	4.89	5.21	5.35	5.14
5.53	5.23	5.12	5.51	5.62	5.45
5.90	5.57	5.51	5.86	5.99	5.78
6.40	6.02	6.06	6.32	6.48	6.24
6.93	6.54	6.60	6.84	7.02	6.75
7.51	7.12	7.18	7.44	7.60	7.34
8.14	7.74	7.82	8.07	8.22	7.99
8.68	8.29	8.37	8.63	8.77	8.56
9.12	8.73	8.81	9.07	9.21	8.99
9.53	9.16	9.20	9.51	9.61	9.38
9.95	9.61	9.60	9.97	10.04	9.77
10.39	10.05	10.04	10.42	10.48	10.21
10.86	10.51	10.50	10.89	10.94	10.67
11.34	10.99	10.99	11.38	11.43	11.16

Swing Service Adder	Uranium Fuel UO2 (\$/mmbtu) - Nominal \$'s	Emissions (\$/ton) -Nominal \$'s				AEP GEN HUB - HR
		SO <sub>2</sub>	NO <sub>x</sub> Annual	NO <sub>x</sub> Summer	CO <sub>2</sub> - Nominal \$'s	
0.25	0.87	0	0	0	0.00	11.76
0.25	0.89	0	0	0	0.00	9.56
0.25	0.91	0	0	0	0.00	8.10
0.25	0.92	0	0	0	0.00	8.39
0.25	0.94	0	0	0	0.00	8.55
0.25	0.96	0	0	0	0.00	8.62
0.25	0.98	0	0	0	0.00	8.62
0.26	0.97	0	0	0	0.00	8.68
0.25	1.02	0	0	0	2.92	9.00
0.25	1.04	0	0	0	5.85	9.26
0.26	1.06	0	0	0	8.77	9.47
0.26	1.08	0	0	0	11.69	9.66
0.27	1.10	0	0	0	14.62	9.83
0.27	1.13	0	0	0	17.52	10.05
0.28	1.15	0	0	0	20.46	10.42
0.28	1.17	0	0	0	23.39	10.66
0.28	1.19	0	0	0	26.31	10.68
0.28	1.22	0	0	0	29.24	10.66
0.28	1.24	0	0	0	27.31	10.47
0.28	1.27	0	0	0	27.89	10.59
0.28	1.29	0	0	0	28.34	10.51
0.28	1.32	0	0	0	28.86	10.47
0.28	1.35	0	0	0	29.39	10.53
0.28	1.37	0	0	0	29.93	10.35
0.28	1.40	0	0	0	30.48	10.21
0.28	1.43	0	0	0	31.02	10.26
0.28	1.46	0	0	0	31.61	10.19
0.28	1.49	0	0	0	32.19	10.11
0.28	1.52	0	0	0	32.78	10.10
0.28	1.55	0	0	0	33.38	10.06
0.28	1.58	0	0	0	33.99	9.97

Heat Rates (mmbtu/MWh)				
SPP_Central - HR	ERCOT_North - HR	ERCOT_South - HR	ERCOT_West - HR	HR
11.41	9.58	9.67	9.30	9.30
8.20	8.25	8.37	8.43	8.43
8.76	8.30	8.40	8.36	8.36
8.98	8.35	8.42	8.35	8.35
9.42	8.66	8.72	8.70	8.70
9.88	8.90	8.98	8.98	8.98
10.33	9.15	9.26	9.23	9.23
10.96	9.38	9.55	9.45	9.45
11.15	10.15	10.33	10.23	10.23
10.94	10.03	10.22	10.08	10.08
10.83	10.36	10.55	10.43	10.43
10.84	10.04	10.22	10.05	10.05
10.56	9.86	10.02	9.84	9.84
10.48	9.87	10.03	9.85	9.85
10.26	9.81	9.95	9.78	9.78
10.10	9.55	9.68	9.51	9.51

Capacity Prices (\$/MW-day) -Nominal \$'s	
AEP GEN HUB Hub Cap.	SPP_Central/KSMO Cap.
134.83	178.49
159.24	171.85
56.25	167.78
25.00	166.72
25.00	167.64
25.00	169.74
25.00	173.08
25.00	177.57
36.23	183.45
50.11	190.81
66.46	199.72
85.40	210.27
107.08	222.55
131.64	236.65
159.07	252.42
189.62	270.18
228.65	290.30
261.18	312.64
302.37	337.33
347.06	364.11
395.68	393.41
448.40	425.33
505.42	460.01
566.92	497.57
632.47	537.61
702.76	580.70
777.99	626.98
810.09	676.58

Renewable Energy Subsidies ** (\$/MWh) -Nominal \$'s	Inflation Factor
15.50	0.70%
35.20	2.60%
18.80	2.60%
18.80	2.20%
18.80	2.10%
18.70	2.10%
19.30	2.00%
18.90	2.00%
19.20	2.00%
0.00	2.00%
0.00	1.90%
0.00	2.00%
0.00	2.00%
0.00	1.90%
0.00	1.90%
0.00	1.90%
0.00	1.80%
0.00	1.80%

Year	Power Prices (\$/MWh) - Nominal \$'s											
	FJM_AEP		SPP_Central		SPP_KSMO		ERCOT_NORTH		ERCOT_South			
	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
2018	29.41	23.82	29.05	23.41	29.00	23.23	27.86	25.15	28.03	25.43		
2019	33.16	26.64	32.89	26.16	32.76	25.96	32.12	29.62	32.33	29.72		
2020	37.83	29.96	37.99	29.25	37.78	29.01	37.05	33.91	37.28	34.07		
2021	38.55	30.62	39.11	30.28	38.90	30.63	38.11	35.00	38.26	35.13		
2022	39.82	31.46	40.68	31.32	40.49	31.08	39.18	35.96	39.31	36.04		
2023	41.16	32.45	42.24	32.43	42.04	32.19	40.17	36.74	40.36	36.88		
2024	42.40	33.48	44.12	34.19	43.84	33.88	41.89	38.22	42.03	38.35		
2025	43.83	34.93	45.27	35.15	44.92	34.63	42.74	38.70	42.69	39.21		
2026	44.37	35.50	46.55	36.30	46.19	35.97	43.06	39.58	43.67	40.21		
2027	44.95	36.70	47.27	37.25	46.84	36.93	43.63	40.04	44.45	40.78		
2028	55.71	47.74	58.67	49.18	58.21	48.73	54.90	50.72	55.89	51.68		
2029	57.10	48.76	59.97	50.25	59.23	49.30	56.39	52.04	57.38	53.03		
2030	60.49	51.28	63.23	52.56	62.68	52.06	59.79	54.60	60.93	55.67		
2031	62.75	53.24	65.74	54.61	64.83	54.09	63.21	56.54	64.53	57.76		
2032	64.35	55.20	66.80	56.68	66.23	56.13	66.64	58.17	67.99	59.44		
2033	66.20	56.94	68.01	57.95	67.56	57.33	68.59	59.68	67.03	61.04		
2034	67.56	59.03	69.72	60.38	69.04	59.84	66.81	61.51	68.21	62.77		
2035	70.09	61.60	72.36	62.73	71.36	62.19	69.33	63.65	70.93	65.01		
2036	72.40	62.54	74.76	63.88	74.07	63.28	72.79	65.60	74.28	66.98		
2037	73.83	64.76	76.22	65.93	75.43	65.33	77.33	67.92	79.06	69.18		
2038	77.24	67.58	79.28	68.49	78.50	67.88	76.36	69.67	77.83	71.04		
2039	77.74	68.61	79.70	69.53	78.93	68.94	76.83	71.37	80.22	73.07		
2040	80.16	70.97	82.00	71.76	81.19	71.11	81.05	74.12	82.41	75.33		
2041	82.53	73.75	84.32	73.34	83.39	73.69	82.91	76.05	84.11	77.10		
2042	83.56	75.48	85.05	75.68	84.23	75.06	85.14	78.22	85.98	78.98		
2043	85.98	78.06	87.82	78.19	86.96	77.39	86.69	80.58	90.56	81.45		
2044	88.10	80.39	89.93	80.33	89.06	79.73	90.08	82.70	91.01	83.54		
2045	89.57	82.37	91.47	82.30	90.3	82.12	91.3	85.01	95.92	85.88		
2046	91.83	85.44	93.53	84.94	92.63	84.48	95.08	87.39	95.86	88.03		
2047	94.41	88.33	95.83	87.23	94.93	86.35	97.62	90.13	98.30	90.53		
2048	95.50	90.34	97.38	89.70	96.48	89.36	99.78	92.49	100.39	92.82		

ERCOT - West		Coal (\$/ton) FOB - Nominal \$'s										
On-Peak	Off-Peak	12395 Btu/lb 1.6# SO2 CAPP	12500 Btu/lb 1.6# SO2 CAPP CSX-Rail	12000 Btu/lb 1.2# SO2 CAPP Compliance	12000 Btu/lb 1.07# SO2 CAPP NYMEX	12500 Btu/lb 6# SO2 NAPP High Sulfur	13000 Btu/lb 4# SO2 NAPP Med Sulfur	11512 Btu/lb 4.3# SO2 I-Basin				
27.01	24.35	55.82	56.39	54.93	53.99	40.40	44.28	35.69				
31.22	28.65	53.29	53.89	52.17	51.59	39.26	44.54	35.67				
36.08	32.99	50.92	51.43	50.17	49.23	38.75	46.86	36.36				
37.13	34.02	51.09	52.52	50.22	50.28	39.20	47.92	37.27				
38.18	34.98	53.02	53.56	52.21	51.27	39.05	46.83	37.67				
39.31	35.83	54.16	54.79	53.32	52.36	37.63	47.33	38.24				
41.31	37.41	56.10	56.67	55.20	54.26	38.77	48.37	38.92				
41.96	38.26	56.34	56.93	57.38	56.44	40.43	49.56	39.83				
42.93	39.20	61.44	62.06	60.38	59.44	43.35	51.37	41.23				
43.72	39.82	64.65	65.27	63.50	62.56	45.84	54.24	43.50				
55.02	50.62	66.43	67.10	65.22	64.28	46.87	54.03	44.08				
56.26	51.88	67.58	68.26	66.39	65.46	46.79	53.68	44.29				
60.08	54.60	67.65	68.33	66.40	65.46	44.65	53.16	44.34				
63.86	58.38	67.98	68.65	66.72	65.78	45.12	54.31	44.40				
67.35	58.58	67.24	67.92	66.00	65.06	41.97	51.05	44.55				
68.30	60.18	68.22	69.22	67.25	66.31	41.02	50.82	43.93				
67.58	61.99	68.87	69.56	67.58	66.64	37.93	52.18	42.20				
70.14	64.51	70.13	70.84	68.80	67.99	37.80	48.20	40.92				
73.91	66.41	71.49	72.21	70.12	69.18	38.53	48.14	41.03				
78.88	68.77	72.44	73.17	70.94	70.10	39.50	45.85	41.06				
77.67	70.73	73.06	73.80	71.65	70.71	40.15	46.01	41.39				
80.18	72.97	76.17	76.93	73.69	72.75	40.99	48.57	40.05				
82.48	75.28	78.48	79.27	76.91	75.96	41.82	43.89	40.32				
84.48	77.36	80.13	80.97	78.56	77.59	42.56	44.68	41.03				
86.78	79.58	81.61	82.43	79.96	78.99	43.35	45.48	41.76				
91.18	82.16	83.97	84.81	81.40	80.43	44.13	45.30	42.52				
91.97	84.36	84.57	85.42	82.87	81.86	44.92	47.14	43.28				
97.12	87.09	86.39	87.26	84.36	83.39	45.79	47.99	44.06				
97.09	89.22	87.64	88.53	85.88	84.83	46.56	48.85	44.85				
99.66	91.98	89.22	90.12	87.42	86.45	47.39	49.76	45.66				
101.90	94.47	90.82	91.74	89.00	87.91	48.25	50.62	46.48				

8800 Btu/lb 0.8# SO2 PRB 8800	8400 Btu/lb 0.8# SO2 PRB 8400	11700 Btu/lb 0.9# SO2 Colorado
12.18	12.02	35.02
11.84	11.81	33.95
11.89	10.84	34.64
12.18	11.02	35.99
12.32	11.13	37.39
12.36	11.16	36.67
12.68	11.49	37.22
12.91	11.72	34.16
13.15	12.07	36.59
13.34	12.25	37.02
13.19	12.06	48.52
13.32	12.18	52.21
13.42	12.26	52.13
13.10	12.00	39.05
13.81	12.28	49.21
13.80	12.45	49.76
13.49	12.81	50.29
13.59	13.08	50.63
13.85	13.34	51.42
14.42	13.07	47.39
16.44	14.22	49.38
16.96	14.12	50.16
16.98	14.49	51.44
17.25	14.72	52.33
17.56	14.99	53.32
17.87	15.26	54.28
18.20	15.53	55.26
18.52	15.81	56.25
18.86	16.09	57.26
19.20	16.38	58.29
19.54	16.68	59.34

Natural Gas (\$/mmbtu) -Nominal \$'s						
Henry Hub	TCO Pool	Dominion South Point Pool	TCO Deliv	HSC	PEPL TX-OK	
3.22	2.94	2.68	3.17	3.27	2.73	
3.88	3.59	3.37	3.83	3.92	3.40	
4.59	4.26	4.05	4.52	4.62	4.17	
4.69	4.36	4.19	4.56	4.71	4.26	
4.82	4.41	4.25	4.67	4.85	4.43	
4.96	4.56	4.39	4.82	4.99	4.56	
5.12	4.68	4.54	4.95	5.15	4.67	
5.22	4.82	4.65	5.09	5.25	4.79	
5.32	4.93	4.72	5.21	5.35	4.88	
5.41	5.02	4.81	5.30	5.45	4.93	
5.99	5.58	5.35	5.86	6.02	5.48	
6.15	5.69	5.45	5.97	6.18	5.59	
6.48	5.99	5.72	6.28	6.51	5.91	
6.71	6.29	5.97	6.59	6.75	6.21	
6.91	6.43	6.14	6.73	6.95	6.35	
7.12	6.62	6.29	6.93	7.15	6.50	
7.33	6.83	6.46	7.14	7.36	6.73	
7.52	7.02	6.67	7.35	7.59	6.96	
7.78	7.25	6.90	7.57	7.81	7.17	
8.01	7.47	7.13	7.79	8.05	7.36	
8.24	7.63	7.36	7.96	8.28	7.52	
8.47	7.86	7.59	8.19	8.52	7.73	
8.71	8.08	7.82	8.42	8.78	7.89	
8.93	8.31	8.05	8.65	9.01	8.12	
9.16	8.54	8.28	8.89	9.24	8.35	
9.40	8.78	8.52	9.13	9.48	8.59	
9.64	9.02	8.76	9.37	9.72	8.83	
9.88	9.26	9.00	9.61	9.96	9.07	
10.12	9.50	9.24	9.86	10.20	9.31	
10.36	9.76	9.50	10.12	10.46	9.57	
10.60	9.99	9.72	10.35	10.68	9.80	

Swing Service Adder	Uranium Fuel/UO2 (\$/mmbtu) Nominal \$'s	Emissions (\$/ton) - Nominal \$'s				(\$/short ton) Nominal \$'s CO2	AEP GEN HUB - HR
		SO2	NOx Annual	NOx Summer			
0.26	0.91	0	0	0	0.00	10.11	
0.27	0.92	0	0	0	0.00	9.29	
0.27	0.94	0	0	0	0.00	8.91	
0.28	0.96	0	0	0	0.00	8.98	
0.29	0.98	0	0	0	0.00	9.05	
0.29	1.00	0	0	0	0.00	9.05	
0.30	1.02	0	0	0	0.00	9.08	
0.30	1.04	0	0	0	0.00	9.09	
0.31	1.06	0	0	0	0.00	9.02	
0.32	1.08	0	0	0	0.00	8.97	
0.32	1.10	0	0	0	13.61	10.02	
0.33	1.13	0	0	0	14.29	10.09	
0.33	1.15	0	0	0	15.00	10.13	
0.34	1.17	0	0	0	15.75	10.00	
0.35	1.19	0	0	0	16.54	10.03	
0.35	1.22	0	0	0	17.37	10.01	
0.36	1.24	0	0	0	18.24	9.91	
0.37	1.27	0	0	0	19.15	9.98	
0.37	1.29	0	0	0	20.11	10.01	
0.38	1.32	0	0	0	21.11	9.91	
0.39	1.35	0	0	0	22.17	10.16	
0.40	1.37	0	0	0	23.27	9.91	
0.40	1.40	0	0	0	24.44	9.95	
0.41	1.43	0	0	0	25.66	9.96	
0.42	1.46	0	0	0	26.94	9.81	
0.43	1.49	0	0	0	28.29	9.81	
0.44	1.52	0	0	0	29.70	9.79	
0.45	1.55	0	0	0	31.19	9.60	
0.45	1.58	0	0	0	32.75	9.68	
0.46	1.61	0	0	0	34.39	9.70	
0.47	1.64	0	0	0	36.11	9.58	

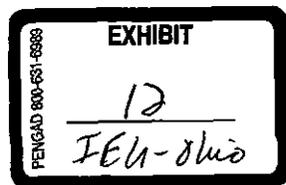
Heat Rates (mmbtu/MWh)					
SPP_Central - HR	ERCOT_North - HR	ERCOT_South - HR	ERCOT_West - HR	HR	HR
10.74	8.56	8.61	8.59		
9.15	8.03	8.08	8.02		
9.23	8.09	8.12	8.21		
9.49	8.15	8.17	8.39		
9.59	8.06	8.18	8.28		
10.76	9.13	9.30	9.42		
10.78	9.20	9.37	9.60		
10.58	9.18	9.39	9.59		
10.41	9.09	9.28	9.48		
10.48	9.33	9.52	9.80		
10.60	9.24	9.42	9.79		
10.44	9.24	9.40	9.83		
10.23	9.22	9.32	9.79		
10.23	9.28	9.38	9.84		
10.08	9.33	9.41	9.87		
9.97	9.35	9.41	9.86		

Capacity Prices (\$/MW-day) - Nominal \$'s	
AEP GEN HUB Hub Cap.	SPP_Central/KSMO Cap.
158.14	25.00
88.27	25.00
30.12	25.00
58.73	25.00
88.88	25.00
120.92	54.50
154.77	95.65
190.13	138.18
227.28	182.16
266.26	227.52
307.11	274.21
328.56	298.33
350.55	322.79
373.06	347.59
396.10	372.72
443.83	423.92
493.75	476.25
510.82	502.80
520.07	520.07

Renewable Energy Subsidies - (\$/MWh) - Nominal \$'s	Inflation Factor
	2.42%
	2.24%
	1.98%
	2.00%
	2.01%
	1.98%
	1.98%
	2.00%
	1.95%
	1.91%
	1.89%
	1.90%
	1.91%
	1.97%
	1.98%
	1.92%
	1.90%
	1.81%
	1.81%

Henry Hub Excerpts from Fundametal Forecasts

Source of information	ieu-01-rpd-002_attachment_1_price_forecast_2008_base.xls	ieu-01-rpd-002_attachment_2_price_forecast_base_2h2009.xls	ieu-01-rpd-002_attachment_3_2h2010_base.xls	ieu-01-rpd-002_attachment_4_2h2011_base.xls	ieu-01-rpd-002_attachment_6_2h2013_base.xls	ieu-01-rpd-002_attachment_7_1h2015_base.xls	ieu-01-rpd-002_attachment_8_2h2016_base.xls	ieu-01-rpd-001_attachment_1_2018h2_ltf_base_nominal_2018_08_01.xlsx
Year	Henry Hub	Henry Hub	Henry Hub	Henry Hub	Henry Hub	Henry Hub	Henry Hub	Henry Hub
2009	7.48							
2010	6.99	3.88						
2011	6.98	4.71	4.21					
2012	7.14	5.62	4.87	4.48				
2013	7.30	6.43	5.14	4.94	4.04			
2014	7.47	7.53	5.44	5.38	5.06			
2015	8.31	7.58	5.65	5.52	5.47			
2016	8.93	7.61	6.32	5.99	5.83	4.34	2.15	
2017	9.18	7.65	6.30	6.13	6.01	5.09	3.22	
2018	9.43	7.69	6.64	6.92	6.12	5.40	4.89	3.22
2019	9.69	7.52	6.98	6.46	6.19	5.50	5.13	3.88
2020	10.46	8.00	7.44	6.52	6.43	5.60	5.26	4.59
2021	10.79	8.04	7.40	6.75	6.75	5.82	5.39	4.69
2022	11.12	8.09	7.50	7.07	7.18	6.28	5.53	4.82
2023	10.35	7.20	7.75	7.26	7.30	6.60	5.67	4.96
2024	10.79	7.32	8.07	7.51	7.51	6.80	5.90	5.12
2025	11.25	7.44	8.32	7.75	7.75	6.96	6.14	5.22
2026	11.70	7.50	8.49	7.85	7.85	7.13	6.40	5.32
2027	12.17	7.55	8.66	8.04	8.04	7.30	6.66	5.41
2028	12.66	7.60	8.84	8.22	8.22	7.47	6.93	5.99
2029	13.17	7.65	9.01	8.41	8.41	7.65	7.21	6.15
2030	13.69	7.70	9.19	8.52	8.52	7.83	7.51	6.48
2031					8.73	8.00	7.82	6.71
2032					8.94	8.19	8.14	6.91
2033					9.16	8.39	8.41	7.12
2034					9.39	8.59	8.68	7.33
2035					9.61	8.80	8.93	7.55
2036						9.02	9.12	7.78
2037						9.24	9.32	8.01
2038						9.45	9.53	8.24
2039						9.66	9.74	8.47
2040						9.87	9.95	8.71
2041						10.08	10.17	8.93
2042						10.29	10.39	9.16
2043						10.50	10.62	9.40
2044						10.71	10.86	9.64
2045						10.92	11.10	9.88
2046						11.13	11.34	10.12
2047								10.38
2048								10.60



**OHIO POWER COMPANY'S RESPONSE TO  
THE OFFICE OF THE OHIO CONSUMERS' COUNSEL'S  
DISCOVERY REQUEST  
PUCO CASE NO. 18-501-EL-FOR 18-1392-EL-RDR AND 18-1393-EL-ATA  
REVISED THIRD SET**

**INTERROGATORY**

OCC-RPD-03-010 Please provide a copy of the emails or other types of correspondence sent to residential PIPP customers, residential non-PIPP customers, and commercial customers who were selected by Navigant to receive the survey.

**RESPONSE**

See OCC-RPD-03-010 Attachment 1, which is a template of the initial invitation and reminder letters for the survey to residential and C&I customers.

Prepared by: Trina Horner

**REVISED RESPONSE**

Prepared by: Nicole Fry



**RESIDENTIAL INVITE**



An **AEP** Company

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**BOUNDLESS ENERGY™**

**Subject Line:** AEP Ohio Requests Your Valuable Feedback on Utility-Sourced Renewable Generation  
**Sender:** AEP Ohio

Dear Valued Customer:

AEP Ohio is looking to make investments to increase the percentage of electricity from wind and solar. We are seeking input from our customers regarding utility-sourced renewable generation to inform our strategy.

Please click on the link below to share your anonymous feedback through a brief online survey:  
Take the Survey <[REDACTED]>

Or copy and paste the URL below into your internet browser:  
[REDACTED]

The survey will take approximately 5 minutes to complete. If you cannot complete the survey all at one time or you accidentally exit the survey mid-course, you can resume the survey where you left off by clicking on the link from this email or hitting the back button.

Thank you in advance for taking the time to share your feedback!

Sincerely,  
Julie Sloat  
President and Chief Operating Officer  
AEP Ohio

Follow the link to opt out of future emails:  
Click here to unsubscribe [REDACTED]

**SMALL C&I INVITE**



An **AEP** Company

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**BOUNDLESS ENERGY™**

**Subject Line:** AEP Ohio Requests Your Valuable Feedback on Utility-Sourced Renewable Generation  
**Sender:** AEP Ohio

Dear Valued Customer:

AEP Ohio is looking to make investments to increase the percentage of electricity from wind and solar. We are seeking input from our customers regarding utility-sourced renewable generation to inform our strategy.

Please click on the link below to share your anonymous feedback through a brief online survey:  
Take the Survey <link>

Or copy and paste the URL below into your internet browser:  
www link

The survey will take approximately 5 minutes to complete. If you cannot complete the survey all at one time or you accidentally exit the survey mid-course, you can resume the survey where you left off by clicking on the link from this email or hitting the back button.

This survey is being administered by Navigant on behalf of AEP Ohio. If you have questions or difficulty with the survey, please contact Jane Hummer at 303-728-2506 or jane.hummer@navigant.com.

Thank you in advance for taking the time to share your feedback!

Sincerely,  
Julie Sloat  
President and Chief Operating Officer  
AEP Ohio

REMINDER EMAIL TEXT



An **AEP** Company

**BOUNDLESS ENERGY™**

**Subject Line:** [REDACTED]: AEP Ohio Requests Your Valuable Feedback on Utility-Sourced Renewable Generation  
**Sender:** AEP Ohio

Dear Valued Customer:

AEP Ohio is looking to make investments to increase the percentage of electricity from wind and solar. We are seeking input from our customers regarding utility-sourced renewable generation to inform our strategy.

Please click on the link below to share your anonymous feedback through a brief online survey:  
Take the Survey <link>

Or copy and paste the URL below into your internet browser:  
www link

The survey will take approximately 5 minutes to complete. If you cannot complete the survey all at one time or you accidentally exit the survey mid-course, you can resume the survey where you left off by clicking on the link from this email or hitting the back button.

Thank you in advance for taking the time to share your feedback! [REDACTED]

Sincerely,

Julie Sloat  
President and Chief Operating Officer  
AEP Ohio