Plainsandeastern

From: Luis Contreras <doccontreras@gmail.com>
Sent: Wednesday, June 24, 2015 7:52 PM
To: Plainsandeastern
Subject: P&E Clean Line Part 2: 30 percent chance of minor success
Attachments: The P&E Clean Line project has a 30 percent chance of minor success.pdf

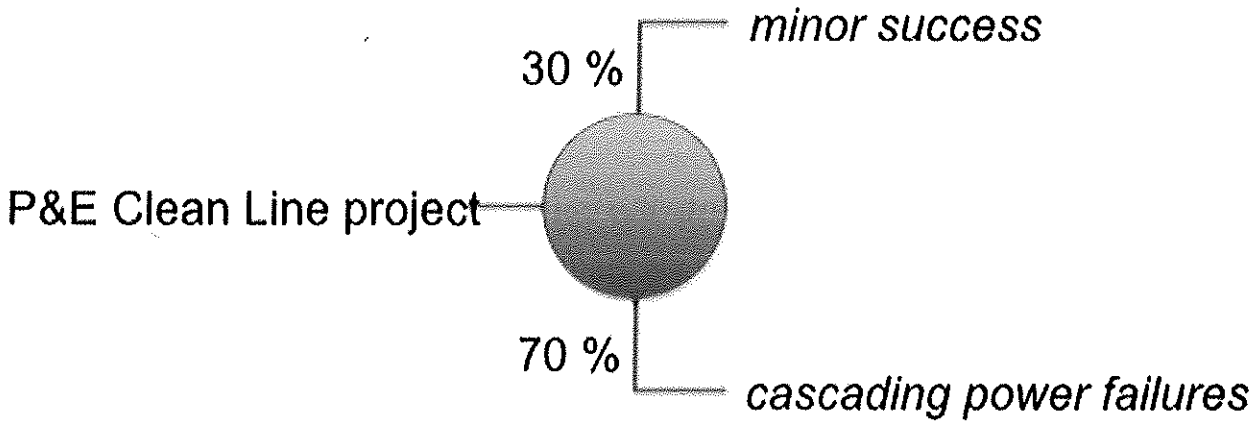
June 24, 2015

P&E Clean Line part 2: Project Management Feasibility Analysis

Dear Dr. Moniz,

Is the P&E Clean Line project plan feasible? The short answer is NO.

From a project management perspective, ignoring the technical issues, there is a 30 percent chance of minor success. It is all about time and money. This project is based on if and when, using OPM. There is no firm game plan, only empty promises. Nothing is real.



Why would DOE choose to participate on a **ten-year**, $20 Billion **high-risk**, high-cost, low-value project?

Respectfully,

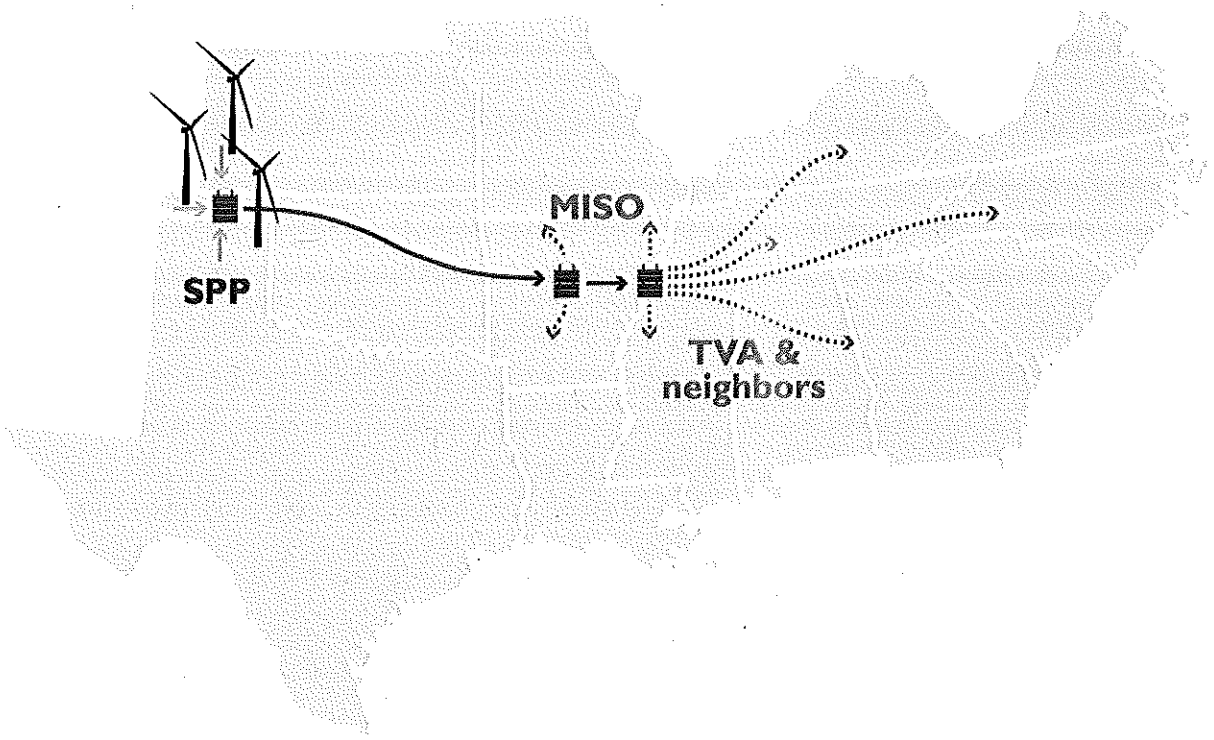
Dr. Luis Contreras
Eureka Springs, AR

Smoke and Mirrors

The revised Application Part 2 Budget, and Proposed Schedule, shown in Appendices 6-D and 10-K makes two misleading claims:

- The total cost of the project excluding wind farms is $2 Billion
- The lead-time for the project is 2 years; in-service date 2018

The core issue is the "project" is undefined. The end-end project is:



To provide service to Arkansas and Eastern states, *all* the tasks are needed: wind farm construction, system interconnections, SPP and MISO dispatching procedures for intermittent power, upgrades to the Entergy, TVA and TVA "neighbors" transmission systems, etc. Many are missing from the P&E project plan.

The Arkansas Converter included in the cost estimate at $100 Million is grossly underestimated, suggesting *there are no plans to build it.*

This intermediate Converter Station requires *additional functionality* than end of the line converters. It would require *custom* features to tap 500 MW from the 4,000 MW incoming DC line, and convert them to 500 MW AC interconnected with the MISO / Entergy transmission grid. The actual amount needed by Arkansas depends on the load and varies from minute to minute. Simply sending the rest to TVA is not enough.

Appendix 6-D Project Cost Estimates

Plains & Eastern Clean Line
Project Cost Estimate ($mm)

LINE CONSTRUCTION	**Miles**	**Cost**
Line Segment - OK	427	$ 853
Line Segment - AR	277	553
Line Segment - TN	16	33
HVDC CONVERTERS		
Oklahoma Converter Station		300
Arkansas Converter Station		100
Tennessee Converter Station		300
OTHER		
Development Cost		55
Nonrefundable System Upgrade Cost (SPS)		30
Nonrefundable System Upgrade Cost (TVA)		38
Refundable System Upgrade Cost (TVA)		196
TOTAL (excluding refundable upgrades)		$ 2,262
TOTAL (including refundable upgrades)		$ 2,458

The Shelby TVA Interconnection System Impact Study (ISIS), Appendix 10-C is for the *unidirectional delivery of a maximum of 3,500 MW.*

ISIS clearly states a different process would be used for anything over 3,500 MW. P&E is responsible for the cost of the TVA system projects identified in ISIS (redacted). After TVA receives a request from P&E, the time to perform these upgrades is **eight years**. Additional projects

are needed to protect the next tier of transmission, from intermittent, variable frequency wind power. The time for these projects is at least two years. The total cost of ISIS is not included in the P&E Budget. The 10-year critical path is ignored in the P&E schedule.

If the P&E line were approved in 2017, an optimistic in-service date would be 2027. This makes the P&E project irrelevant.

Appendix 10-C TVA Shelby Interconnection System Impact Study (ISIS)

EXECUTIVE SUMMARY

The Tennessee Valley Authority (TVA) conducted an Interconnection System Impact Study (ISIS) at the request of Clean Line to interconnect a High Voltage Direct Current (HVDC) transmission line with the maximum capability of delivering 3500 MW to the TVA system in Shelby County, Tennessee (see Appendix B).

Clean Line's interconnection request is for the unidirectional delivery of up to 3,500 MW of power into the TVA system. It has been accepted under TVA's Large Generator Interconnection Procedures (LGIP) based on the stated purpose of the interconnection request to deliver power from generating facilities connected to the Clean Line Project into the TVA system. If Clean Line expands the project to provide for bi-directional flows of power though the Clean Line Project, then (1) additional studies by TVA will be required and (2) the LGIP will no longer be the appropriate process for the interconnection of the Clean Line Project to the TVA system.

The objective of the ISIS is to identify all Adverse System Impacts on TVA's transmission system in order to maintain system reliability as a result of the Interconnection Request. The ISIS will also determine the facility additions, modifications, and upgrades that are needed to maintain a reliable interconnection.

In addition to identifying all Adverse System Impacts on the TVA transmission system, TVA monitors TVA customers and neighboring transmission systems for impacts. Entergy and MLGW have been identified as Affected Systems that are impacted as a result of the Clean Line HVDC interconnection. TVA will hold Clean Line's Interconnection Right contingent upon the completion of an Affected System Impact Study by all identified Affected Systems and the mitigation of any impacts identified by those Affected System Impact Studies.

The cost and lead-time needed to perform the ISIS projects is shown (redacted) on the next page.

The system improvements are required to protect grid reliability.

The study identified a need for the following system improvements:

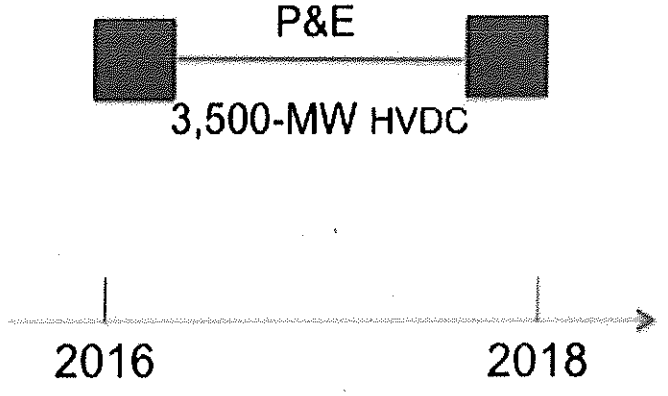
Direct Assignment Facilities	Cost Estimate ($k)
Interconnect the HVDC lines and create a double-breaker arrangement by adding 3 bays[4], 10 breakers, 16 switches, line relays, and interchange metering at the [redacted] substation	[redacted]
Network Upgrades	
Construct [redacted] transmission line (37 miles)	[redacted]
Convert [redacted] switchyard to a double breaker arrangement (required for switchyard expansion) and construct a double breaker bay at [redacted]	[redacted]
Upgrade three [redacted] transmission lines	[redacted]
Upgrade twenty-seven [redacted] transmission lines (354.2 miles)	[redacted]
Total	[redacted]

Notes:

1. Costs based on planning level estimates (± 50%).
2. Estimated project completion time is 8 years after TVA receives authorization to begin work and the completion of the Facilities Study.
3. Clean Line will be responsible for any generation re-dispatch cost incurred by TVA as a result of the construction of any of the facilities associated with this Clean Line interconnection project. Estimated re-dispatch cost will be determined during the Facilities Study when more detailed outage schedules are developed.

- Why would P&E hide the upgrade cost provided by TVA?
- Why would P&E hide the 10 years lead-time for the ISIS upgrades?

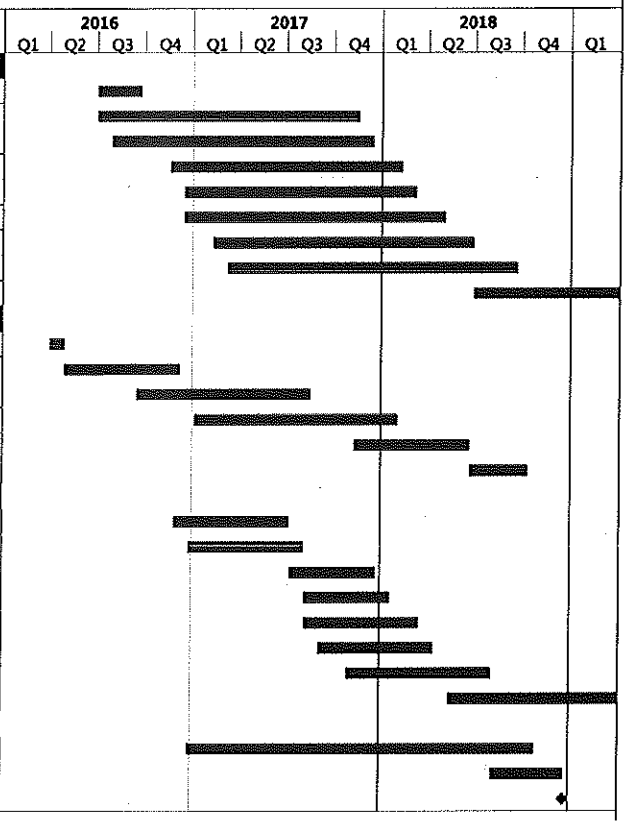
Without these elements, the Proposed Project Schedule is meaningless. All it describes is the middle of the project. The front-end and back-end are the most expensive and complex tasks; they will not "just happen" given the uncertainty and duration of the project.



The two-year project schedule in Appendix 10-K is unfeasible.

Plains & Eastern Clean Line Proposed Construction Schedule Last Updated: Jan 7, 2015

Activity Description	Duration
1. HVDC Transmission Line	**760d**
T-Line construction mobilization	3 mons
Right-of-way surveys, clearing, erosion control and site prep	18 mons
Materials delivered to laydown yard	18 mons
Access road construction	16 mons
Foundation excavation and installation	16 mons
Materials delivered to erection site	18 mons
Structure framing and erection	18 mons
Conductor and optical ground wire stringing and clipping	20 mons
Clean up and restoration	12 mons
2. AC/DC Converter Station	**660d**
Converter station construction mobilization	1 mon
Converter station site preparation	8 mons
Converter station civil works and building construction	12 mons
Electrical equipment installation	14 mons
Control and protection equipment installation	8 mons
Site finishing	4 mons
3. AC Transmission Lines	**620d**
Right-of-way surveys, clearing, erosion control and site prep	8 mons
Materials delivered to laydown yard	8 mons
Access road construction	6 mons
Foundation excavation and installation	6 mons
Materials delivered to erection site	8 mons
Structure framing and erection	8 mons
Conductor and optical ground wire stringing and clipping	10 mons
Clean up and restoration	12 mons
4. General	**520d**
Wind generation construction*	24 mons
Commissioning	5 mons
Energization	0 days



System testing is not included in the above schedule, and no allowance is given for delays. Resource management is ignored, for example most of the work is scheduled for 2017 with no indication of resource availability. The schedule only shows the order of the tasks and the expected duration.

"The best-laid plans of mice and men often go awry."

Would you bet $2 Billion on this project?

Here are some of the missing details:

Number of turbines

5,000 2-MW turbines are needed to generate 3,500 MW, with a capacity factor of 35 percent:

MW	number of turbines	Name plate	Capacity Factor	MW
2	5000	10,000	0.35	3500

Purchase and installation cost

The purchase and installation cost to generate 3,500 MW is $18 Billion:

Number of Turbines	Initial cost Millions	Total cost Millions
5,000	3.6	18,000

Additional expenses:

1. AC transmission lines to connect 5,000 turbines from the wind farms to the OK Guymon Converter Station
2. Cost of 250,000 acres of land

turbines	Acres/turbine	Acres
5,000	50	250,000

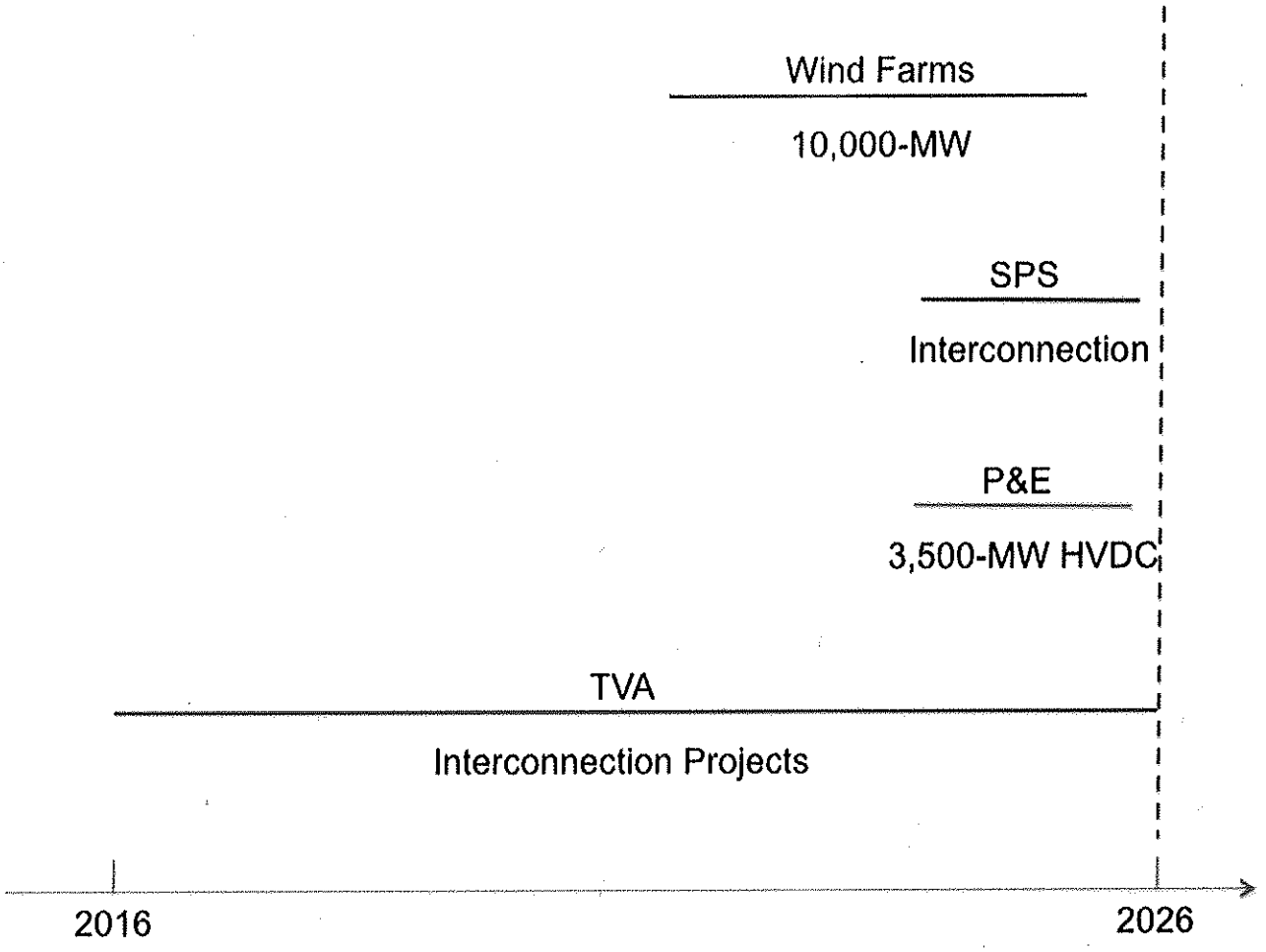
3. MISO interconnection for TVA

The partial cost to deliver 3,500 MW to TVA is over $20 Billion

Wind Farms	$18
P&E line	$2
TVA Interconnection	

The option to provide 500 MW to Arkansas is not included.

Here is a more realistic high-level 10-year Project Schedule



The optimistic project in-service date is 2026 at a cost of $20+ Billion

Risks associated with third party investors

Wind Farms: 5,000 turbines on 250,000 acres of land and transmission infrastructure to Guymon would be needed to provide 3,500 MW of power

SPP / SPS Interconnection: SPP has other transmission expansion plans; no one knows what the SPP footprint will look like in 2023. Increased transmission capacity from other AC transmission lines may be available making the P&E Line obsolete.

P&E HVDC Line: Over $2 Billion funds are required to pay the line in full and all the interconnection upgrades. With no revenues expected for ten years, and the threat of Distributed Solar rooftop and community generation using micro-grids with a new grid architecture Other People's Money (OPM) will be hard to find. There is no indication National Grid will invest $2 Billion on this line.

Shelby TVA interconnection: The ten-year interconnection system upgrade projects should have been a known requirement by P&E.

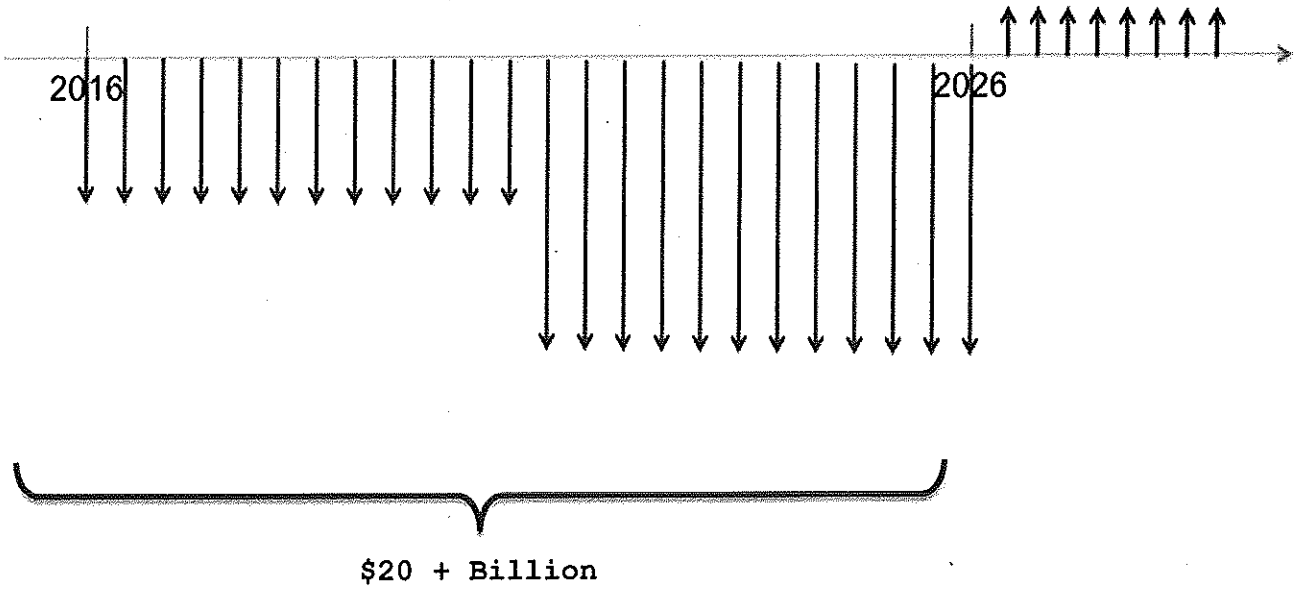
Clean Line is not a HVDC transmission company: Drawing lines on a map, or having inside connections with DOE, does not provide hands-on experience to qualify as a transmission utility. Dancing, riding a bicycle, and many other activities require trial and error over time. For all we know, this ten year $20 Billion project would be the first attempt by Clean Line. P&E is an old project using old concepts and old technology, designed by a wind generator promoter and a former DOE employee.

TVA will not buy P&E power: With no buyers at the end of the line, there are no revenues. Any potential investor would need power purchase agreements for 4,000 MW of power. What started with the 2009 "TVA Memorandum of Understanding" has developed into demands to get TVA buying power, as per the Southern Alliance for Clean Energy 4/17/15 post, "Is TVA Undervaluing Wind Energy?"

> *"TVA's customers should be outraged that the utility's Draft IRP suggests that the nation's largest public utility is not only failing to take a clear look at wind power, in 9 of its 25 planning cases, TVA forecasts that it could even roll back its recent wind acquisitions and eliminate wind power in its energy portfolio by the year 2033."*

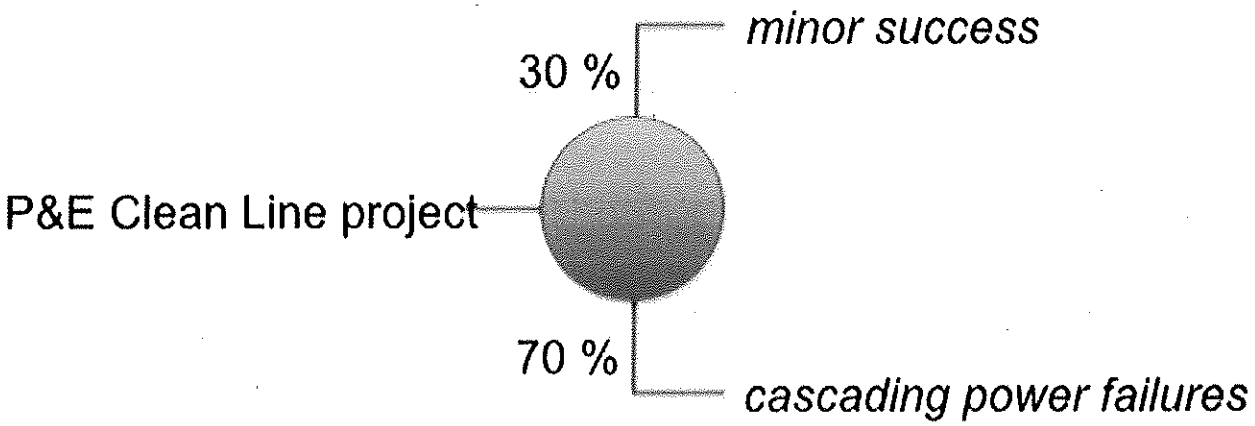
The TVA Board of Directors will not be intimidated.

Here is what the *cash flow* for the project looks like:



Conclusions

On the plus side: 30 percent of minor success



30 percent is a good estimate of the probability of completing the project on time, by 2026 at around $20 Billion.

Here are the main risk factors for the P&E Clean Line project:

- The project schedule is incomplete; it ignores the eight plus years to perform the TVA Interconnection projects.
- The optimistic in-service date starting in 2016 is 2026. It would take ten years before the first kWh is sold.
- This is a $20 Billion project; the $2 Billion tag price has no basis.
- Someone needs to buy wind power. The financial model is based on high revenues from the use of the HVDC line.
- With an in-service date of 2028 there would be no revenues for ten years. Where is Clean Line going to find investors for the line?
- Where is Clean Line going to find third party investors for the 5,000 wind turbines?

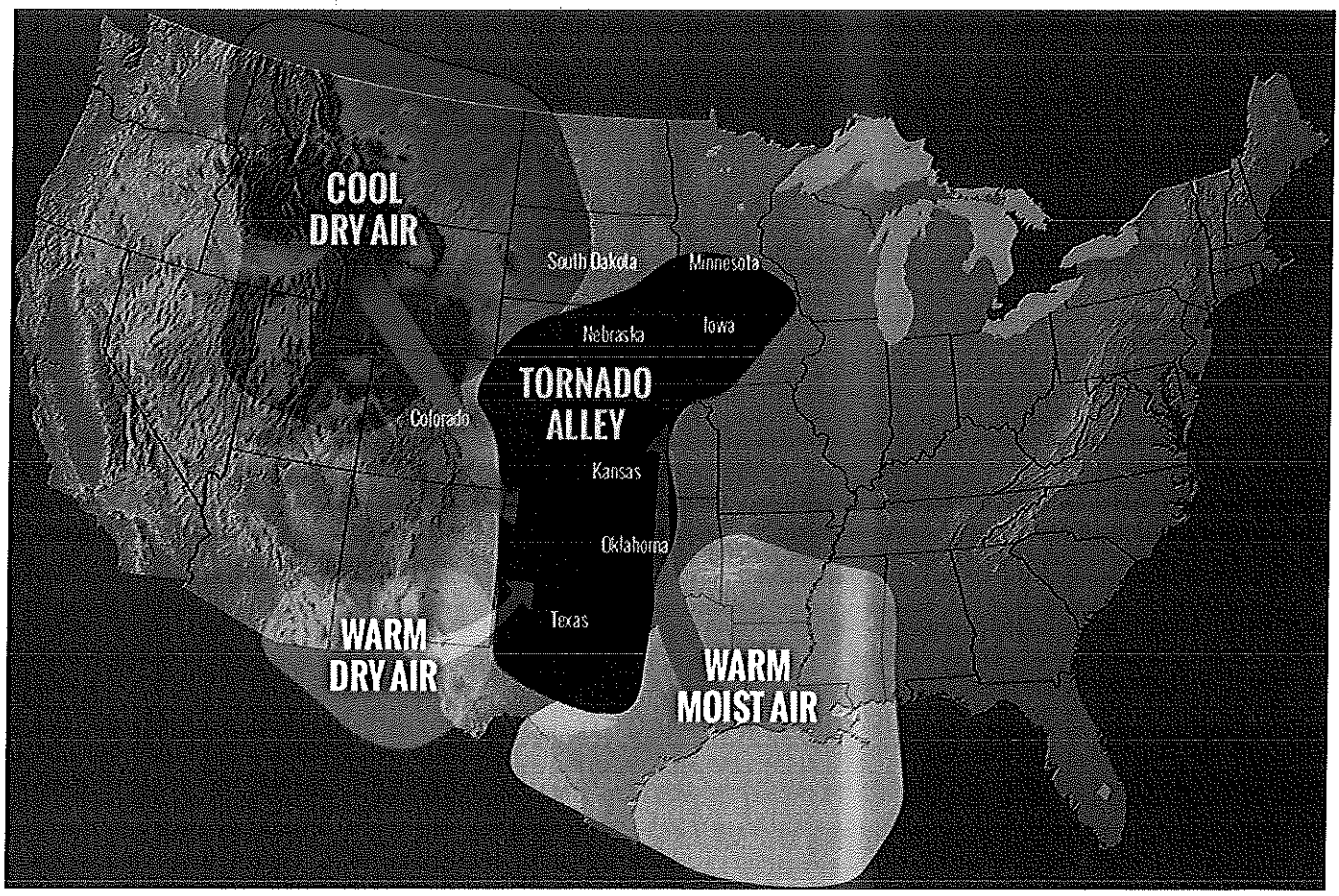
The down side: 70 percent chance of cascading power outages

Let's assume all goes well, no new transmission is available between now and 2023 (creating a demand for long haul transmission), a new TVA Board decides P&E wind power is the least-cost alternative, and buyers show up. Here are some of the relevant questions:

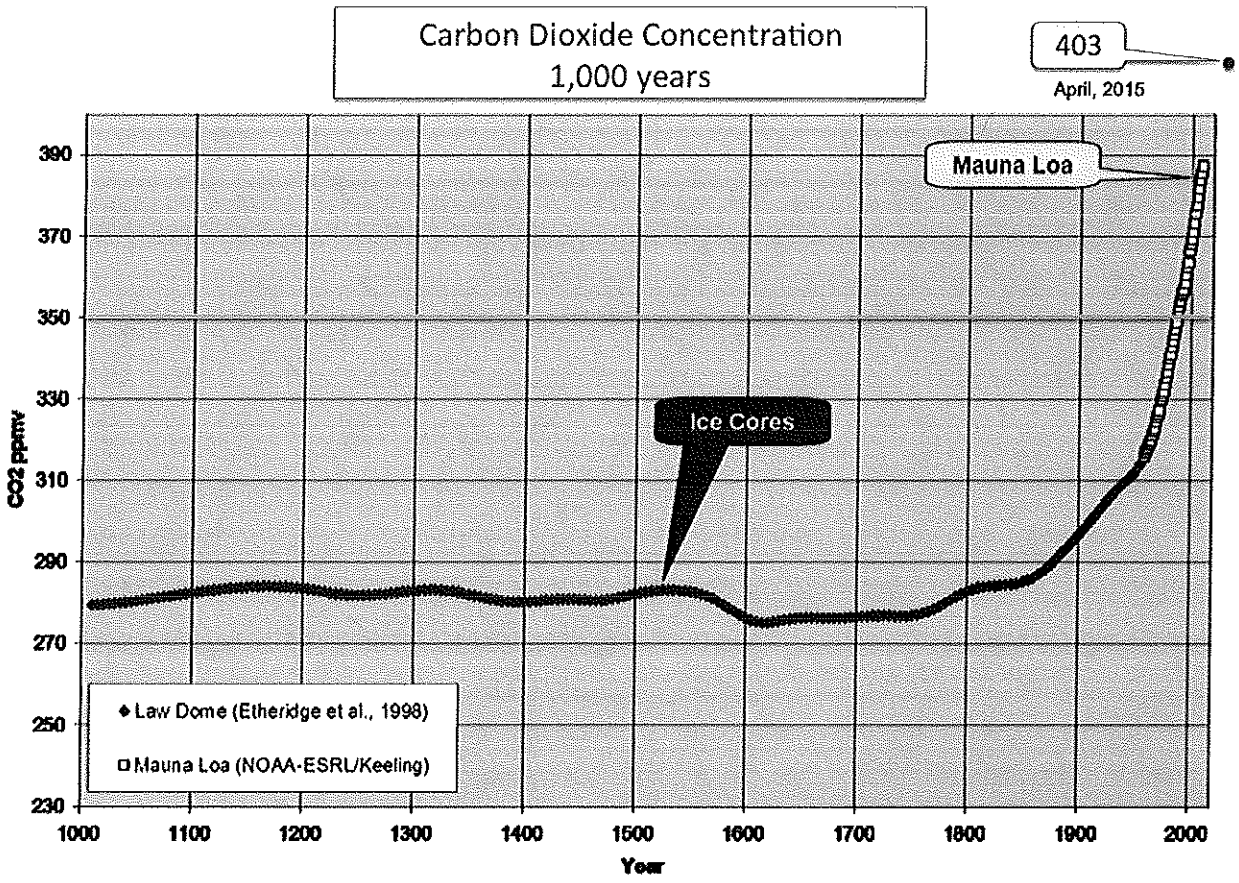
- What could go wrong?
- What are the probabilities associate with negative outcomes?
- What would be the impact on the grid?
- What are the chances of detecting a power fault in time?

P&E is a high-risk venture

Senator Lamar Alexander's letter dated June 11, 2015 to DOE, posted on the comments for Part 2, describes the **high-risk**, high-cost and low-value of wind power for TVA, distribution utilities, and end customers. In addition to having wind farms far, far away from the load, Texas, Oklahoma and Kansas are known as Tornado Alley.



This map is for 2015. It does not show the "new normal" severe weather due to high concentration of carbon dioxide in the atmosphere, over 400 ppm in volume. For decades, Climate Change had been taboo based on the idea: *if no one talks about it nothing will happen.* Unfortunately, our planet ignores Oklahoma senator James Inhofe, Senate environment committee chair despite famously calling global warming "the greatest hoax ever perpetrated on the American people." His June 11 message: "God is still up there, Pope Francis should mind his own business."



In my opinion, Senator Alexander is right. One EF5 Tornado would take down the wind farms and the wires P&E so badly wants to build.

Disclaimer: I am greatly concerned with our survival and support offshore wind and *distributed* solar generation, superior energy alternatives, and no HV transmission required. The "all of the above" strategy is slow and unaffordable. Why not use the best?

References

Republicans' leading climate denier tells the pope to butt out of climate debate

June 11, 2015

http://www.theguardian.com/environment/2015/jun/11/james-inhofe-republican-climate-denier-pope-francis

Tornado Season is Upon Us

March 18, 2015

http://www.aaffordableauto.com/blog/tornado-season-is-upon-us/

Tornadoes can strike at any time of year. March is traditionally the start of tornado season in the United States. According to the National Weather Service, the peak season is mid March through early July.

An average of 1,200 tornadoes touch down in the United States each year, most of which form during tornado season. Because these storms kill about 70 Americans annually and injure some 1,500 others, disaster experts urge families to be prepared, especially those who live in "Tornado Alley". Tornado Alley is defined as the area of the Central Plains from Texas to Nebraska. This is where most tornadoes form each season and where the majority of the damage is done. In fact, Texas has the highest number of tornadoes, with an average of 124 each year.

The Necessary Pain of Trial-and-Error

Trial-and-error is one of the most useful forms of learning

http://www.theemotionmachine.com/the-necessary-pain-of-trial-and-error

TVA Memorandum of Understanding, 2009

http://www.plainsandeasterncleanline.com/sites/plains_eastern/media/docs/TVA_MOU-Amdt1.pdf

Is TVA Undervaluing Wind Energy?

Southern Alliance for Clean Energy

April 17, 2015

http://blog.cleanenergy.org/2015/04/17/tvawind/

Much of the country is currently experiencing a "wind rush" - 23,000 new jobs were created in the wind industry just last year. Wind power's low price is driving utilities to snap up gigawatts of wind energy. But for TVA, it seems like the winds may be a bit stagnant.

As our executive director Stephen Smith discussed recently, TVA's Draft 2015 Integrated Resource Plan (IRP) "continues to view clean energy through a blurred lens." The exercise depends on inputs (such as cost and performance data for various power plant types, including wind farms) to develop outputs and recommendations. Some of TVA's most important assumptions for the cost and performance of wind power aren't just blurred - they are fairly opaque.

So even though wind power is plentiful and arguably the cheapest energy supply resource available, *TVA's customers should be outraged that the utility's Draft IRP suggests that the nation's largest public utility is not only failing to take a clear look at wind power, in 9 of its 25 planning cases, TVA forecasts that it could even roll back its recent wind acquisitions and eliminate wind power in its energy portfolio by the year 2033.*