

Plainsandean

From: Luis Contreras <docontreras@gmail.com>
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To: Plainsandean
Subject: P&E Clean Line part 2: Arkansas Converter Station Technical Issues
Attachments: The Mythical Arkansas Converter Station.pdf

June 10, 2015

P&E Clean Line part 2: Arkansas Converter Station Technical Issues

Dear Dr. Moniz,

The TVA Interconnection study for the P&E Clean Line project is incomplete. It ignores the complex transmission issues of the Arkansas Converter Station.

The lack of technical information on the Arkansas Station suggests there are no plans at all to provide service to Arkansas. The Converter is shown as an option, but the Arkansas Public Service Commission denied P&E Clean Line approval and the Arkansas Congressional Delegation opposes interstate transmission.

Why would DOE choose to participate in this project and open Pandora's Box?

Respectfully,

Dr. Luis Contreras
Eureka Springs, AR

The Arkansas Converter Station is briefly mentioned in the application as an afterthought. It seems providing electric service to Arkansas was not in the original plan.

I Updated Project Description

The Plains & Eastern Project is an approximately 720-mile, ± 600 kilovolt ("kV") overhead, high voltage direct current ("HVDC") electric transmission line and associated facilities. The Project has the capacity to deliver approximately 3,500 megawatts ("MW") primarily from renewable energy generation facilities in the Oklahoma and Texas Panhandle regions to the Tennessee Valley Authority ("TVA") in Tennessee and to other load serving entities in the Mid-South and southeastern United States via an interconnection with TVA. The facilities associated with the HVDC electric transmission line include alternating current ("AC")/ direct current ("DC") converter stations located southeast of Guymon in Texas County, Oklahoma, and northeast of Memphis in Shelby County, Tennessee, as well as an AC collection system located in the Oklahoma and Texas Panhandle regions. An intermediate converter station located in Pope County or Conway County, Arkansas, with the capacity to deliver an additional 500 MW via an interconnection with MISO in Arkansas, is also under consideration by DOE as part of its review of the Project pursuant to the National Environmental Policy Act ("NEPA"). Clean Line strongly supports the inclusion of the Arkansas converter station in the Project and intends to build the Arkansas converter station in parallel with the other Project facilities. In addition to being responsive to scoping comments received from Arkansas stakeholders, Clean Line believes that inclusion of the Arkansas converter station adds flexibility in the delivery of wind energy and increases the benefits of the Project to Arkansas. A high-level overview map of the Project is shown below.

What precisely does "Clean Line intends to build the Arkansas Converter Station in parallel with other Project facilities?" Where are the funds coming from? What permits have been requested and granted for the Converter? Where are the interconnection studies showing compatibility with MISO and the Arkansas transmission infrastructure? If Arkansas service is an "option" for the project, who decides when and if it will be built?

Is Clean Line saying Arkansas service would be decided by DOE's Southwestern Power Administration? Would that be a new Non-NEPA Part 3 process to be defined?

1.1 Proposed HVDC Transmission Line

The Project will transmit energy from the Oklahoma and Texas Panhandle regions via a ± 600 kV HVDC overhead electric transmission line to the Mid-South and Southeast. HVDC transmission technology includes the ability for bi-directional power flow, or the flow of power in either direction through the converters. Under normal operating conditions for the Project, power will flow from the wind farms (directly connected to the Oklahoma converter station via the AC collection system) in an eastward direction with deliveries of energy into Arkansas (an alternative under consideration by DOE) and Tennessee.

Same questions, this explains nothing. What is it meant by "an alternative under consideration by DOE?"

The Project includes interconnections with the electric grids operated by the Southwest Power Pool ("SPP"), Midcontinent Independent System Operator ("MISO") and TVA. The predominant flow of power will be eastward from SPP in western Oklahoma to MISO in Arkansas and TVA in Tennessee. Because of its unique characteristics as a direct current transmission line, the Project also can be utilized to help stabilize the regional electric grids by coordinating with neighboring control areas to change the direction of power flow in sub-second intervals, if necessary. In these rare conditions, power could be allowed to flow from the Project into the SPP electric grid located in western Oklahoma. This temporary power flow into the electric grid in Oklahoma could come from various sources, including: (1) power generated from the wind farms connected through the AC collection system, or (2) power flowing temporarily from Arkansas or Tennessee westward into Oklahoma.

The predominant power flow will be from SPP in OK to Miso in Arkansas, and TVA in TN? Is then the Arkansas Converter a done deal?

Changing the direction of power flow is excluded in the TVA Interconnection Study, Appendix 10-C, where it clearly states the conditional interconnection approval would be void.

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 through 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 statements "if Clean Line expands the project to provide for bi-directional flows ... (1) additional studies by TVA will be required and (2) the LGIP will no longer be the appropriate process" LGIP is TVA's Large Generator Interconnection Procedures.

Is Clean Line ignoring the results of the TVA study, Appendix 10-C?

1.4 Converter Stations

The Project proposal includes a converter station located southeast of Guymon in Texas County, Oklahoma. This converter station will primarily will convert from AC to DC the energy collected from generation sources by the AC Collection System. Energy will be transmitted over the HVDC line to converter stations in Tennessee and Arkansas.

Each converter station will be similar to a typical AC substation, but with additional equipment to convert between AC and DC. Ancillary facilities such as communications equipment and cooling equipment will be required at each converter station. Each converter station will include a DC switchyard, DC smoothing reactors, DC filters, valve halls (which contain the power electronics for converting AC to DC and vice versa), AC switchyard, AC filter banks, AC circuit breakers and disconnect switches, and transformers. In addition, AC transmission lines will connect each converter station to the existing grid. Based on interconnection studies performed to date, the interconnection with the electric grid in Oklahoma will be at 345 kV, and the interconnection with the electric grids in Arkansas and Tennessee will be at 500 kV.

It seems all Clean Line knows is the Arkansas Converter Station interconnection would be at 500 kV. The essential details are missing:

- There is only one transmission line from OK to Arkansas
- 500 MW will get-off the line and service Arkansas?
- 3,500 MW continue on the transmission line from Arkansas to TN?

The mythical Arkansas Station sounds like an off ramp on a highway, except electrons don't know where they need to go ... and when not needed, they have to come back and change again ...



If we use a pipeline analogy, a "T" connector would send some flow to Arkansas and let the rest continue to TN using valves and pipes of different diameter.



But electrons don't flow like water. Maybe this is one of the pieces of the puzzle no one really understands. Is a team of ABB German engineers designing a magic black box?

Surprisingly in the revised Application, the Arkansas Converter Station has an estimated cost of \$100 Million, while the end point converters are \$300 Million each. Whatever the secret sauce, the Arkansas station would cost a lot more than \$100 Million.

But wait, section 1.4.3 has the details:

1.4.3 Arkansas Converter Station

The Arkansas converter station is discussed in Section 2.4.3.1 of the Draft EIS.

During the NEPA scoping period, DOE received comments expressing concern that Arkansas will not have an interconnection to the Project. Based on these comments, DOE requested that Clean Line evaluate the feasibility of an additional converter station in Arkansas. The Arkansas converter station would be an intermediate converter station and will not replace the Oklahoma or Tennessee converter stations. Based on Clean Line's feasibility evaluation, the Arkansas converter station would be sited in either Pope County or Conway County, Arkansas. Clean Line's preliminary design and environmental studies support the location of the Arkansas converter station in Pope County.

The Arkansas converter station would have a capacity of 500 MW and have land requirements similar to the Oklahoma and Tennessee converter stations. With the implementation of this alternative, the delivery capability of the Project would be increased to 4,000 MW.

The interconnection between the converter station and the MISO system in Arkansas would include a 500 kV AC transmission line approximately 6 miles long to an interconnection point along the existing Arkansas Nuclear One-Pleasant Hill 500 kV AC transmission line by way of a direct tap or small switchyard. The interconnection facilities would be located within a small switching/tap station of approximately 5 acres in size.

OK, so now we know the proposed location of the mythical Converter Station ... but not much else.

References

ABB built two converter stations for this 3,000 MW ± 500 kV HVDC power transmission system, which is owned by China's State Grid Corporation. The 890-kilometer power link began commercial operations in 2003. Below is a picture of one of the converter stations



<http://new.abb.com/systems/hvdc/references/three-gorges---changzhou>