



# **Generation Interconnection**

## **Queue Project AE1-052**

### **William 138 kV**

## **Feasibility Study Report**

**Capacity : 10 MW / Energy : 0 MW**

**(Revised)**

January, 2019

## General

Interconnection Customer has proposed to modify existing project facility, Queue #K19, with a battery storage generating facility located in Tucker County, Pennsylvania. The total capability of the combined facilities, K19 and AE1-052, will remain unchanged. The Maximum Facility Output (MFO) will stay at 66.0 MW and PJM recognizes 18.1 MW of this output as Capacity Interconnection Rights (CIR).

The proposed in-service date for this project is September 1, 2020. **This study does not imply a Monongahela Power Company (Transmission Owner or Mon Power) commitment to this in-service date.**

## Point of Interconnection

The Point of Interconnection (POI) remains unchanged as in the prior queue request #K19. The AE1-052 facility will interconnect with the Mon Power system by direct injection into the William Substation.

## Network Impacts

The Queue Project AE1-052 was evaluated as a 0 MW (Capacity 10.0 MW) injection at William 138 kV substation in the APS area (FirstEnergy, Mon Power zone). Project AE1-052 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-052 was studied with a commercial probability of 53%. Potential network impacts were as follows:

## Summer Peak Analysis - 2022

### Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

### Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/DC	MW IMPACT
83044	235385	01PARSNS	AP	235362	01LOUGHL	AP	1	AP-P2-4-MP-138-	breaker	179	125.84	129.2	DC	6.02

								200						
83020	235427	01WILLIM	AP	235385	01PARSNS	AP	1	AP-P2-4-MP-138-200	breaker	179	130.64	134	DC	6.02

**Contribution to Previously Identified Overloads**

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

**Short Circuit**

None. (No overdutied circuit breakers identified)

## Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
83488	235385	01PARSNS	AP	235362	01LOUGHL	AP	1	AP-P2-2-MP-138-101-A	operation	179	116.34	119.69	DC	6
83447	235427	01WILLIM	AP	235385	01PARSNS	AP	1	AP-P2-2-MP-138-101-A	operation	179	121.14	124.49	DC	6

## System Reinforcements

### Short Circuit

None.

### Stability and Reactive Power Requirement

Will be determined at a later study stages.

## Summer Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

ID	Index	Facility	Upgrade Description	Cost
83044	1	01PARSNS 138.0 kV - 01LOUGHL 138.0 kV Ckt 1	Description : Reconfigure Albright Substation Time Estimate : 34.0 Months Cost : \$15,215,600	\$15,215,600
83020	2	01WILLIM 138.0 kV - 01PARSNS 138.0 kV Ckt 1		
		TOTAL COST		\$15,215,600

## **Appendix 3: Flowgate Details**

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

**INDEX 1: Contingency ID #83044**

**OPTION 1 POI**

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/DC	MW IMPACT
83044	235385	01PARSNS	AP	235362	01LOUGHL	AP	1	AP-P2-4-MP-138-200	breaker	179	125.84	129.2	DC	6.02

**INDEX 1: Contingency ID #83044 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
314539	3UNCAMP	0.97
314541	3WATKINS	0.29
314557	3BETHELC	0.61
314566	3CRESWEL	1.91
314574	6EVERETS	7.37
314578	3HORNRTN	1.36
314582	3KELFORD	2.53
314589	3MURPHYS	0.06
314594	6PLYMOTH	0.77
314603	3SCOT NK	1.85
314617	3TUNIS	0.62
314620	6CASHIE	0.83
314648	6SUNBURY	0.35
314651	6WINFALL	0.84
315292	1DOMTR78	1.62
315293	1DOMTR9	1.32
315294	1DOMTR10	2.4
900672	V4-068 E	0.18
901082	W1-029 E	20.89
907092	X1-038 E	2.43
913392	Y1-086 E	0.84
916041	Z1-036 C	0.68
916042	Z1-036 E	26.28
917122	Z2-027 E	0.44
917331	Z2-043 C	0.29
917332	Z2-043 E	0.72
917511	Z2-088 C OP1	1.98
917512	Z2-088 E OP1	4.94
918491	AA1-063AC OP	0.88
918492	AA1-063AE OP	2.41
918511	AA1-065 C OP	1.64
918512	AA1-065 E OP	4.68
918531	AA1-067 C	0.52
918532	AA1-067 E	1.3
918561	AA1-072 C	0.04
918562	AA1-072 E	0.12
919692	AA2-053 E	1.95
920042	AA2-088 E OP	5.05

**INDEX 1: Contingency ID #83044 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
920672	AA2-174 E	0.23
920691	AA2-178 C	1.32
920692	AA2-178 E	3.28
923801	AB2-015 C O1	3.58
923802	AB2-015 E O1	2.94
923832	AB2-022 E	0.48
923911	AB2-031 C O1	0.8
923912	AB2-031 E O1	0.39
923941	AB2-035 C	0.26
923942	AB2-035 E	0.11
923992	AB2-040 E O1	2.15
924391	AB2-088 C	0.33
924392	AB2-088 E	0.16
924491	AB2-098 C	1.01
924492	AB2-098 E	0.43
924501	AB2-099 C	0.48
924502	AB2-099 E	0.2
924511	AB2-100 C	3.7
924512	AB2-100 E	1.82
925121	AB2-169 C	1.48
925122	AB2-169 E	7.72
925171	AB2-174 C O1	2.42
925172	AB2-174 E O1	2.19
925281	AB2-186 C	0.32
925282	AB2-186 E	0.14
925291	AB2-188 C O1	1.88
925292	AB2-188 E O1	0.85
926071	AC1-086 C	9.2
926072	AC1-086 E	4.19
926201	AC1-098 C	2.82
926202	AC1-098 E	1.68
926211	AC1-099 C	0.95
926212	AC1-099 E	0.56
927021	AC1-189 C	12.44
927022	AC1-189 E	6.2
927141	AC1-208 C	3.27
927142	AC1-208 E	1.45
930862	AB1-132 E O1	2.68

**INDEX 1: Contingency ID #83044 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
931232	AB1-173 E	0.38
931242	AB1-173AE	0.38
932631	AC2-084 C	4.02
932632	AC2-084 E	1.98
933991	AD1-023 C	12.66
933992	AD1-023 E	6.89
934201	AD1-047 C	2.86
934202	AD1-047 E	1.91
934521	AD1-076 C	50.61
934522	AD1-076 E	25.77
936401	AD2-051 C O1	7.69
936402	AD2-051 E O1	3.3
936701	AD2-089 C	5.51
936702	AD2-089 E	3.67
936711	AD2-090 C O1	3.2
936712	AD2-090 E O1	2.13
937571	AD2-169 C	3.72
937572	AD2-169 E	2.48
938171	AE1-026 C1 O	27.52
938172	AE1-026 C2 O	3.98
938173	AE1-026 E O1	8.31
938221	AE1-035 C	2.38
938222	AE1-035 E	1.17
938531	AE1-072 C O1	5.6
938532	AE1-072 E O1	2.92
AC1-133	AC1-133	20.6
BAYOU	BAYOU	2.27
BIG_CAJUN1	BIG_CAJUN1	3.6
BIG_CAJUN2	BIG_CAJUN2	7.23
BLUEG	BLUEG	6.13
CALDERWOOD	CALDERWOOD	1.33
CANNELTON	CANNELTON	0.42
CATAWBA	CATAWBA	1.29
CBM-N	CBM-N	0.18
CHEOAH	CHEOAH	1.24
CHILHOWEE	CHILHOWEE	0.43

**Index 2: Contingency ID #83020**

**OPTION 1 POI**

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
83020	235427	01WILLIM	AP	235385	01PARSNS	AP	1	AP-P2-4-MP-138-200	breaker	179	130.64	134	DC	6.02

Contingency Name	Contingency Defintion
AP-P2-4-MP-138-200	CONTINGENCY 'DVP_P1-3: 6CAROLNA-TX#4' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
314189	6PAPERMILL	12.14
314229	6MT RD221	0.24
314236	6NRTHEST	0.37
314539	3UNCAMP	4.2
314541	3WATKINS	1.18
314566	3CRESWEL	4.13
314572	3EMPORIA	0.68
314582	3KELFORD	5.71
314594	6PLYMOTH	1.45
314617	3TUNIS	1.4
314620	6CASHIE	1.42
314648	6SUNBURY	1.57
314651	6WINFALL	3.11
315053	1BELMED1	31.58
315054	1BELMED2	31.58
315055	1BELMED3	26.21
315058	1CHESTF3	33.54
315059	1CHESTF4	54.37
315060	1CHESTF5	19.82
315061	1CHESTG7	7.77
315062	1CHESTS7	3.53
315063	1CHESTG8	7.62
315064	1CHESTS8	3.92
315067	1DARBY 1	5.07
315068	1DARBY 2	5.07
315069	1DARBY 3	5.09
315070	1DARBY 4	5.1
315073	1STONECA	12.83
315074	1HOPCGN1	15.47
315075	1HOPCGN2	15.27
315083	1SPRUNCA	19.12
315084	1SPRUNCB	19.12
315085	1SPRUNCC	14.17
315086	1SPRUNCD	14.17
315090	1YORKTN1	53.33
315091	1YORKTN2	55.34
315233	1SURRY 2	49.49
900672	V4-068 E	0.5
901082	W1-029 E	81.45
907092	X1-038 E	10.5

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
913392	Y1-086 E	3.92
916042	Z1-036 E	79.93
916192	Z1-068 E	3.4
916302	Z1-086 E	14.67
917122	Z2-027 E	1.89
917332	Z2-043 E	1.62
918492	AA1-063AE OP	6.5
918512	AA1-065 E OP	7.35
918562	AA1-072 E	0.27
919152	AA1-139 E	11.53
919692	AA2-053 E	6.06
920042	AA2-088 E OP	17.76
920672	AA2-174 E	0.7
920692	AA2-178 E	7.08
923801	AB2-015 C O1	14.87
923802	AB2-015 E O1	12.2
923832	AB2-022 E	2.21
923842	AB2-024 E	2.04
923852	AB2-025 E	1.86
923911	AB2-031 C O1	3.64
923912	AB2-031 E O1	1.79
923992	AB2-040 E O1	9.77
924241	AB2-068 O1	428.52
924501	AB2-099 C	0.97
924502	AB2-099 E	0.42
924511	AB2-100 C	19.07
924512	AB2-100 E	9.39
924812	AB2-134 E O1	22.6
925051	AB2-160 C O1	9.9
925052	AB2-160 E O1	16.16
925061	AB2-161 C O1	6.07
925062	AB2-161 E O1	9.91
925122	AB2-169 E	9.66
925171	AB2-174 C O1	11.43
925172	AB2-174 E O1	10.34
925281	AB2-186 C	1.08
925282	AB2-186 E	0.46
925291	AB2-188 C O1	4.07
925292	AB2-188 E O1	1.83
925331	AB2-190 C	37.15

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
925332	AB2-190 E	15.92
925522	AC1-027 E	2.07
925861	AC1-065 C	6.03
925862	AC1-065 E	9.85
926071	AC1-086 C	33.59
926072	AC1-086 E	15.29
926291	AC1-107 O1	646.82
926411	AC1-112 C	0.66
926412	AC1-112 E	2.15
926662	AC1-147 E	2.4
926751	AC1-161 C O1	55.62
926752	AC1-161 E O1	23.74
926781	AC1-164 C	77.77
926782	AC1-164 E	34.94
927041	AC1-191 C O1	17.05
927042	AC1-191 E O1	8.5
927221	AC1-216 C O1	18.16
927222	AC1-216 E O1	14.28
930121	AB1-027 C	0.85
930122	AB1-027 E	2.12
930862	AB1-132 E O1	9.77
931232	AB1-173 E	1.71
931242	AB1-173AE	1.71
932041	AC2-012 C	18.51
932042	AC2-012 E	30.2
932501	AC2-070 C	0.56
932502	AC2-070 E	1.34
932532	AC2-073 E	2.16
932581	AC2-078 C O1	7.33
932582	AC2-078 E O1	11.96
932591	AC2-079 C O1	10.28
932592	AC2-079 E O1	16.78
932831	AC2-110 C	2.41
932832	AC2-110 E	3.94
933061	AC2-130	4.51
933071	AC2-131 1	3.06
933081	AC2-131 2	1.39
933111	AC2-132 1	1.61
933121	AC2-132 2	0.82
933261	AC2-137 C	0.69

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
933262	AC2-137 E	2.58
933291	AC2-141 C	55.62
933292	AC2-141 E	23.74
933732	AC2-196 E	2.15
933991	AD1-023 C	22.21
933992	AD1-023 E	12.09
934011	AD1-025 C	31.22
934012	AD1-025 E	18.49
934061	AD1-033 C	13.58
934062	AD1-033 E	9.05
934141	AD1-041 C	9.42
934142	AD1-041 E	6.28
934201	AD1-047 C	13.02
934202	AD1-047 E	8.68
934211	AD1-048 C	0.79
934212	AD1-048 E	2.32
934392	AD1-063 E	1.93
934521	AD1-076 C	92.51
934522	AD1-076 E	47.11
934571	AD1-082 C	13.84
934572	AD1-082 E	7.89
935112	AD1-144 E	1.71
935161	AD1-151 C O1	29.86
935162	AD1-151 E O1	19.9
935212	AD1-156 E	2.53
936041	AD2-007	3.31
936051	AD2-008 C	5.43
936052	AD2-008 E	11.83
936151	AD2-021	0.45
936241	AD2-030 C	4.05
936242	AD2-030 E	2.07
936301	AD2-039 C	2.41
936302	AD2-039 E	3.94
936391	AD2-049 C	3.31
936392	AD2-049 E	3.31
936401	AD2-051 C O1	14.46
936402	AD2-051 E O1	6.21
936661	AD2-085 C	6.17
936662	AD2-085 E	10.07
936711	AD2-090 C O1	12.28

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
936712	AD2-090 E O1	8.19
937221	AD2-160 C O1	10.54
937222	AD2-160 E O1	5.52
937251	AD2-164	8.91
937541	AD2-215 C	3.16
937542	AD2-215 E	1.68
937571	AD2-169 C	16.22
937572	AD2-169 E	10.81
938031	AE1-004 C	2.41
938032	AE1-004 E	3.94
938171	AE1-026 C1 O	47.17
938172	AE1-026 C2 O	6.82
938173	AE1-026 E O1	14.24
938181	AE1-027 C	4.22
938182	AE1-027 E	2.23
938191	AE1-028 C	2.45
938192	AE1-028 E	1.42
938221	AE1-035 C	3.73
938222	AE1-035 E	1.84
938461	AE1-065 C O1	51.47
938462	AE1-065 E O1	207.68
938471	AE1-066 C O1	52.89
938472	AE1-066 E O1	206.25
938481	AE1-067 C O1	48.1
938482	AE1-067 E O1	211.05
938491	AE1-068 C O1	93.36
938492	AE1-068 E O1	51.56
938501	AE1-069 C O1	73.23
938502	AE1-069 E O1	41.86
938531	AE1-072 C O1	31.51
938532	AE1-072 E O1	16.42
938551	AE1-074 C	4.28
938552	AE1-074 E	2.16
AA2-074	AA2-074	8.69
AB2-013	AB2-013	8.03
AE1-033	AE1-033	8.36
AE1-042	AE1-042	17.02
CARR	CARR	2.56
CBM-S1	CBM-S1	27.06
CBM-S2	CBM-S2	26.23

**INDEX 2: Contingency ID #83020 (Continued)**

<b>Bus #</b>	<b>Bus</b>	<b>MW Impact</b>
<b>CBM-W1</b>	CBM-W1	28.53
<b>CBM-W2</b>	CBM-W2	177.84
<b>CIN</b>	CIN	13.31
<b>CPLE</b>	CPLE	12.78
<b>G-007</b>	G-007	8.64
<b>IPL</b>	IPL	8.38
<b>LGEE</b>	LGEE	3.92
<b>MEC</b>	MEC	28.27
<b>MECS</b>	MECS	12.01
<b>O-066</b>	O-066	28.78
<b>RENSSELAER</b>	RENSSELAER	2.03
<b>WEC</b>	WEC	3.49
<b>Z1-043</b>	Z1-043	13.76