



# PI-2024-19 Provisional Interconnection Study Report

Xcel Energy  
September 26, 2025

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## Table of Contents

1.0	Executive Summary .....	3
2.0	Introduction .....	4
3.0	Study Scope .....	5
3.1	Power Flow and Stability Analysis Criteria .....	5
3.2	Short-Circuit Analysis Criteria (Breaker Duty) .....	5
3.3	Benchmark Case Modeling .....	5
3.4	Study Case Modeling .....	5
3.5	Short-Circuit Modeling .....	6
3.6	Voltage and Reactive Power Capability Evaluation .....	6
3.7	Power Flow Analysis Results .....	9
3.8	Stability Analysis Results .....	14
3.9	Short-Circuit (Breaker Duty) Analysis Results .....	17
3.10	Affected Systems .....	17
4.0	Cost Estimates .....	17
4.1	Schedule .....	21
5.0	Conclusion .....	23
6.0	Contingent Facilities .....	24
7.0	Preliminary One-Line Diagram and General Arrangement for PI-2024-19 .....	25
8.0	Appendices .....	27

## List of Figures

Figure 1: Point of Interconnection of PI-2024-19 .....	4
Figure 2: Preliminary One-Line of PI-2024-19 with a tap on Goose Creek – Canal Crossing 345 kV line .....	25
Figure 3: Preliminary General Arrangement for PI-2024-19 with a tap on Goose Creek – Canal Crossing 345 kV line .....	26

## List of Tables

Table 1 – Reactive Capability Evaluation for PI-2024-19 .....	8
Table 2 – System Intact Thermal Overloads .....	10
Table 3 – Single Contingency Thermal Overloads .....	10
Table 4 – Multiple Contingency Thermal Overloads .....	12
Table 5 – Multiple Contingency Voltage Violations .....	13
Table 7 – Stability Analysis Results .....	15
Table 8 – Transmission Provider’s Interconnection Facilities .....	18
Table 9 – Station Network Upgrades .....	19
Table 10 – Proposed Milestones for PI-2024-19 .....	21

## 1.0 Executive Summary

This Provisional Interconnection Service (PIS)<sup>1</sup> Study has been prepared in accordance with the Xcel Energy Open Access Transmission Tariff and the executed Provisional Interconnection Study Agreement between the Interconnection Customer (IC) and the Transmission Provider (TP) – Public Service Company of Colorado (PSCo). This PI request has been given the queue number as PI-2024-19 and associated with the 5RSC-2024-29 Generation Interconnection Request (GIR).

The PI request is for a 553.5 MW Wind Generating Facility (GF) with a Point of Interconnection (POI) at a new switching station on the Goose Creek – Canal Crossing 345 kV line. The GF will be connected to the POI via a 45-mile-long generator tie.

The total estimated cost of the PSCo transmission system improvements required for PI-2024-19 to qualify for Provisional Interconnection service is **\$31.906** million.

The initial maximum permissible output allowed for the Generating Facility is 521.5 MW at the POI. The output amount of the Generating Facility in the PLGIA<sup>2</sup> will be reviewed quarterly and updated, if there are changes to the system conditions assumed in this analysis.

Security: PI-2024-19 is a request for Energy Resource Interconnection Service (ERIS). For ERIS requests, security shall estimate the risk associated with the Network Upgrades and the Interconnection Facilities and is assumed to be a minimum of \$5 million.

The Interconnection Customer assumes all risks and liabilities with respect to changes between the PLGIA and the LGIA<sup>3</sup>, including changes in output limits and Interconnection Facilities, Network Upgrades, Distribution Upgrades, and/or System Protection Facilities cost responsibility.

The Provisional Interconnection Service in and of itself does not convey transmission service.

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<sup>1</sup> **Provisional Interconnection Service (PIS)** shall mean an Interconnection Service provided by Transmission Provider associated with interconnecting the Interconnection Customer's Generating Facility to Transmission Provider's Transmission System and enabling that Transmission System to receive electric energy and capacity from the Generating Facility at the Point of Interconnection, pursuant to the terms of the Provisional Large Generator Interconnection Agreement and, if applicable, the Tariff.

<sup>2</sup> **Provisional Large Generator Interconnection Agreement (PLGIA)** shall mean the interconnection agreement for Provisional Interconnection Service established between Transmission Provider and/or the Transmission Owner and the Interconnection Customer. The pro forma agreement is provided in Appendix 8 and takes the form of the Large Generator Interconnection Agreement, modified for provisional purposes.

<sup>3</sup> **Large Generator Interconnection Agreement (LGIA)** shall mean the form of interconnection agreement applicable to an Interconnection Request pertaining to a Large Generating Facility that is included in the Transmission Provider's Tariff.

## 2.0 Introduction

This PI request is for a 553.5 MW Wind Generating Facility located in Washington County, Colorado. The requested amount for Provisional Interconnection Service at the POI is 521.5 MW. The Study will evaluate the impacts on the PSCo transmission system and Affected Systems by modeling the Generating Facility at the nameplate amount minus any losses for the interconnection facilities.

- The POI of this project is at a new 345 kV switching station by tapping the Goose Creek – Canal Crossing 345 kV line
- The Commercial Operation Date (COD) to be studied for PI-2024-19 is May 18, 2027

The geographical location of the transmission system near the POI is shown in Figure 1.

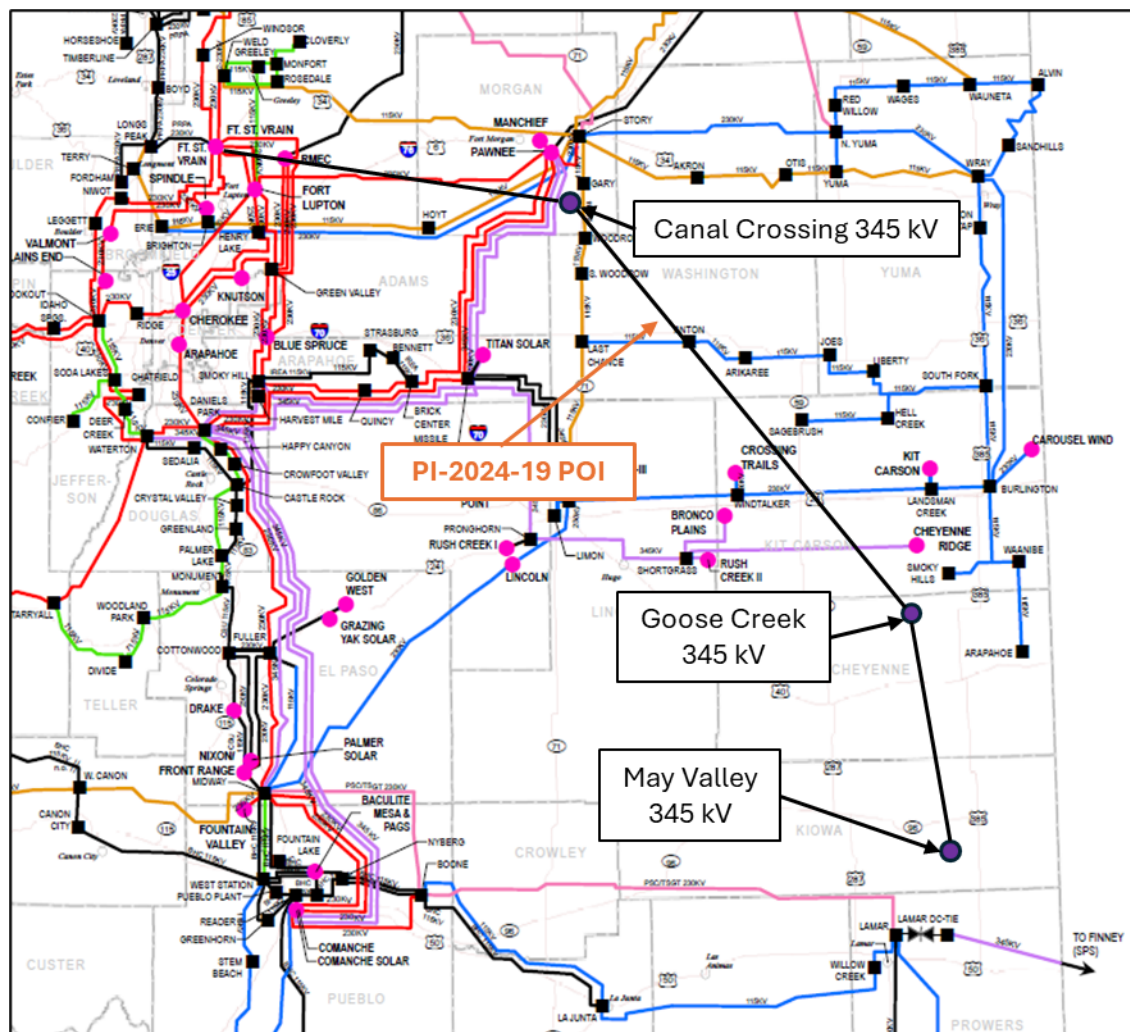


Figure 1: Point of Interconnection of PI-2024-19

### **3.0 Study Scope**

The Study Scope includes Power Flow (thermal and voltage) analysis, Stability analysis, Voltage and Reactive Capability analysis, Short-Circuit analysis, and Cost Estimates for Interconnection Facilities and Station Network Upgrades. The study also identifies the Contingent Facilities associated with the Provisional Interconnection service.

#### **3.1 Power Flow and Stability Analysis Criteria**

The Power Flow and Stability Analysis criteria used for this study follow the guidelines set forth in the TPL-001-WECC-CRT-4 under requirement WR1.

#### **3.2 Short-Circuit Analysis Criteria (Breaker Duty)**

Fault Current after PI addition should not exceed 100% of the Breaker Duty rating. PSCo can only perform breaker duty analysis on the PSCo Transmission System. Before the PI goes in-service the Affected Systems may choose to perform a breaker duty analysis to identify breaker duty violations on their system.

#### **3.3 Benchmark Case Modeling**

The Benchmark Case was created from the Base Case (2024HS3) as described in Chapter 3 of the BPM by changing the study pocket generation dispatch to reflect heavy generation in the Western Slope study pocket.

#### **3.4 Study Case Modeling**

The PI-2024-19 is a 553.5 MW Wind Generating Facility that can deliver 521.5 MW of net output at the Point of Interconnection.

- Machine Model – One hundred and twenty-three (123) VESTAS V163-4.5 MW Wind turbine generators (WTG) rated at 4.5 MW each and connected to 123 pad-mounted transformers rated at 5.3 MVA each.
- Length of gen-tie – 45 miles
- Number of main step-up transformer, voltage and rating – Four (4) 345/34.5/13.8 kV GSU rated 94/125/156 MVA
- System Protection – Four (4) breakers on the high side of the main GSUs

### **3.5 Short-Circuit Modeling**

All connected generating facilities were assumed capable of producing maximum fault current. As such, all generators were modeled at full capacity, whether NRIS or ERIS is requested. Generation is modeled as a separate generating resource in CAPE and included at full capacity in the short circuit study, regardless of any limitations to the output that would be imposed otherwise.

### **3.6 Voltage and Reactive Power Capability Evaluation**

Per Section 4.1.1.1 of the BPM, the following voltage regulation and reactive power capability requirements are applicable to non-synchronous generators:

- Xcel Energy's OATT requires all non-synchronous generator Interconnection Customers to provide dynamic reactive power within the power factor range of 0.95 leading to 0.95 lagging at the high side of the generator substation. Furthermore, Xcel Energy requires every Generating Facility to have dynamic voltage control capability to assist in maintaining the POI voltage schedule specified by the Transmission Operator.
- It is the responsibility of the Interconnection Customer to determine the type (switched shunt capacitors and/or switched shunt reactors, etc.), the size (MVar), and the locations (on the Interconnection Customer's facility) of any additional static reactive power compensation needed within the generating plant in order to have adequate reactive capability to meet the +/- 0.95 power factor at the high side of the main step-up transformer.
- It is the responsibility of the Interconnection Customer to compensate their generation tie-line to ensure minimal reactive power flow under no load conditions.

The PI-2024-19 GIR is modeled as follows:

Wind Generator:  $P_{max} = 553.5$  MW,  $P_{min} = 0$  MW,  $Q_{max} = 313.7$  MVar,  $Q_{min} = -196.8$  MVar

The summary for the Voltage and Reactive Power Capability Evaluation for PI-2024-19 is:

- The GIR is capable of meeting  $\pm 0.95$  power factor at the high side of the main step-up transformer.

- The GIR is capable of meeting  $\pm 0.95$  power factor at its terminals while meeting the interconnection service request.
- The reactive power exchange and voltage change across the gen-tie are acceptable under no load conditions.
- Note during the 0.95 lagging power factor test, the generator terminal bus voltage exceeds 1.05 p.u. voltage.
- Note during the 0.95 leading and lagging power factor test, the project is unable to meet the requested power amount at POI. It is deficient by 2.5 MW at POI for lagging power factor test and by 3.0 MW at POI for leading power factor test.

The Voltage and Reactive Power Capability tests performed for PI-2024-19 are summarized in Table 1.



**Table 1 – Reactive Capability Evaluation for PI-2024-19**

Generator Terminals					High Side of Main Transformer				POI			
Pgen (MW)	Qgen (Mvar)	Qmax (Mvar)	Qmin (Mvar)	V (p.u.)	P (MW)	Q (Mvar)	V (p.u.)	PF	P (MW)	Q (Mvar)	V (p.u.)	PF
553.5	303.0	313.7	-196.8	1.056	527.1	181.5	1.049	0.9455	519.0	96.2	0.99	0.9833
553.5	-55.0	313.7	-196.8	0.963	527.1	-176.1	0.987	-0.9485	518.5	-271.8	1.05	-0.8857
0.0	-4.6	313.7	-196.8	1.022	0.0	-4.0	1.024	0.0000	0.0	9.1	1.023	0.0000

### 3.7 Power Flow Analysis Results

Contingency analysis was performed on the East study pocket Study Case. The following results were obtained from the power flow contingency analysis:

- System Intact analysis showed the thermal overloads listed in Table 2. No voltage violations attributable to PI-2024-19 were observed.
  - Results of the system intact analysis showed no overloads or voltage violations attributable to the Study GIR. When the re-dispatched Study Case loading was less than the Benchmark Case loading, the thermal violation is considered to be alleviated for the purposes of this study.
- Single Contingency analysis showed the thermal overloads listed in Table 3. No voltage violations attributable to PI-2024-19 were observed.
  - Results of the single contingency analysis showed no overloads or voltage violations attributable to the Study GIR.
- Multiple Contingency analysis showed the thermal overloads listed in Table 4. Voltage violations are shown in Table 5.
  - Results of the multiple contingency analysis showed no overloads or voltage violations attributable to the Study GIR.

For the power factor test, the GIR is capable of meeting  $\pm 0.95$  power factor at the high side of the main step-up transformer. During the 0.95 lagging power factor test, the generator terminal bus voltage exceeds 1.05 p.u. voltage. Also, during the 0.95 leading and lagging power factor test, the project is unable to meet the requested power amount at POI. It is deficient by 2.5 MW at POI for lagging power factor test and by 3.0 MW at POI for leading power factor test.

**Table 2 – System Intact Thermal Overloads**

Ref. No.	Monitored Facility	Contingency Name	kV	Areas	Rate Cont (MVA)	Benchmark Case Loading (%)	Study Case Loading (%)	Loading Difference (%)	Re-dispatched Case Loading (%)
1	Story (73192) - Pawnee (70311) 230 kV CKT 1	Base Case	230	73/70	581	84	101	18	100

**Table 3 – Single Contingency Thermal Overloads**

Ref. No.	Monitored Facility	Contingency Name	kV	Areas	Contingency Rating (MVA)	Benchmark Case Loading (%)	Study Case Loading (%)	Loading Difference (%)	Re-dispatched Study Case Load (%)
1	Story (73192) - Pawnee (70311) 230 kV CKT 1	Line_144_SGL_345_001	230	73/70	581	124	153	29	100
2	Harrison_P1 (70215) – Leetsdale_2 (70282) 115 kV CKT 1	Line_077_SGL_115_085	115	70	141	134	135	1	109
3	Buckley2 (70046) – Smoky Hill (70396) 230 kV CKT 1	Line_126_SGL_230_048	230	70	478	123	125	2	87
4	Buckley2 (70046) – Tollgate (70491) 230 kV CKT 1	Line_126_SGL_230_048	230	70	484	121	124	3	86
5	Ft Lupton (70192) – Pawnee (70311) 230 kV CKT 1	Line_144_SGL_345_001	230	70	478	104	119	15	87
6	Capitol HL (70087) – Denver TM 1 (70148) 115 kV CKT 1	Line_041_SGL_115_044	115	70	131	116	118	2	89

Ref. No.	Monitored Facility	Contingency Name	kV	Areas	Contingency Rating (MVA)	Benchmark Case Loading (%)	Study Case Loading (%)	Loading Difference (%)	Re-dispatched Study Case Load (%)
7	Smoky Hill (70599) – Missile Site (70624) 345 kV CKT 1	DanielsPark-Missile-1_P1-2_13	345	70	1686	92	108	16	87
8	Smoky Hill 345/230 kV (70599/70396) Transformer T4	Line_145_SGL_345_001	230	70	560	95	107	12	86
9	Smoky Hill 345/230 kV (70599/70396) Transformer T5	Line_145_SGL_345_001	230	70	560	95	107	12	86
10	Efmorg Tap (73305) – Fm West (73379) 115 kV CKT 1	Line_144_SGL_345_001	115	73	121	97	106	9	84
11	Jewell2 (70239) – Tollgate (70491) 230 kV CKT 1	Line_126_SGL_230_048	230	70	484	102	105	3	66
12	Smoky Hill N (70395) – Strasbrg Cr (70416) 115 kV CKT 1	Line_089_SGL_230_011	115	70	118	95	103	8	46
13	Beaver Ck (73020) – Brush Tap (73031) 115 kV CKT 1	Line_144_SGL_345_001	115	73	163	97	103	6	85
14	Daniel Park (70139) – Missile Site (70623) 230 kV CKT 1	Line_144_SGL_345_001	230	70	747	88	103	15	83
15	Brush Tap (73031) – Efmorg Tap (73305) 115 kV CKT 1	Line_144_SGL_345_001	115	73	163	95	101	6	83

**Table 4 – Multiple Contingency Thermal Overloads**

Ref. No.	Monitored Facility	Contingency Name	kV	Areas	Contingency Rating (MVA)	Benchmark Case Loading (%)	Study Case Loading (%)	Loading Difference (%)
1	Buckley (70046) - Smoky Hill (70396) 230 kV CKT 1	BF_064c: Greenwood Bus Tie	230	70	478	149	153	4
2	Buckley (70046) - Tollgate (70491) 230 kV CKT 1	BF_064c: Greenwood Bus Tie	230	70	484	147	151	4
3	Jewell (70239) - Tollgate (70491) 230 kV CKT 1	BF_064c: Greenwood Bus Tie	230	70	484	128	132	4
4	Story (73192) - Pawnee (70311) 230 kV CKT 1	BF_057b: Ft Lupton 5522 stuck	230	73/70	581	107	129	22
5	Jewell (70239) - Leetsdale (70260) 230 kV CKT 1	BF_064c: Greenwood Bus Tie	230	70	478	118	122	4
6	Capitol HL (70087) – Denver TM 1 (70148) 115 kV CKT 1	BF_033x: Cherokee – Argo line	115	70	131	116	118	2
7	Havana (70217) – Chambers (70538) 115 kV CKT 1	BF_031i: Chambers 9236 stuck	115	70	159	103	104	1
8	Clark (70112) - Jordan (70241) 230 kV CKT 1	P7_58	230	70	331	132	136	4
9	Smoky Hill (70599) – Missile Site (70624) 345 kV CKT 1	P7_61	345	70	1686	113	133	20
10	Capitol HL (70087) – Denver TM 1 (70148) 115 kV CKT 1	P7_11	115	70	131	124	126	2
11	Meadow Hls (70283) – Orchard (70313) 230 kV CKT 1	P7_58	230	70	546	98	100	2

Ref. No.	Monitored Facility	Contingency Name	kV	Areas	Contingency Rating (MVA)	Benchmark Case Loading (%)	Study Case Loading (%)	Loading Difference (%)
12	Jewell (70239) - Leetsdale (70260) 230 kV CKT 1	P7_101	230	70	478	97	100	3

**Table 5 – Multiple Contingency Voltage Violations**

Ref. No.	Bus Name	Bus Number	Base kV	Area	Contingency Name	Benchmark Case Bus Voltage (p.u.)	Study Case Bus Voltage (p.u.)	Voltage Difference (p.u.)
1	DANIEL_PK	70138	115	70	BF_045d (Daniels Park 7038)	0.8317	0.8177	-0.0140
2	HAPPY_CNYN	70115	115	70	BF_045d (Daniels Park 7038)	0.8350	0.8211	-0.0139
3	CROWFT_VLY	70117	115	70	BF_045d (Daniels Park 7038)	0.8401	0.8263	-0.0138
4	CASTLRCK_TP2	70021	115	70	BF_045d (Daniels Park 7038)	0.8464	0.8327	-0.0137
5	CITADEL_CR	71502	115	70	BF_045d (Daniels Park 7038)	0.8512	0.8377	-0.0135
6	WOLFSBRG_CR	70519	115	70	BF_045d (Daniels Park 7038)	0.8822	0.8694	-0.0128
7	MEADOWS_CR	70575	115	70	BF_045d (Daniels Park 7038)	0.8935	0.8810	-0.0125
8	PLUM_CK_CR	70514	115	70	BF_045d (Daniels Park 7038)	0.9013	0.8890	-0.0123

### **3.8 Stability Analysis Results**

The following results were obtained for the disturbances analyzed for PI-2024-19:

- ✓ No machines lost synchronism with the system.
- ✓ No voltage drop violations were observed.
- ✓ Machine rotor angles displayed positive damping.

The results of the contingency analysis are shown in Table 7. The stability plots are shown in Appendix A in Section 8.0 of this report.

**Table 6 – Stability Analysis Results**

Ref. No.	Fault Location	Fault Category	Outage(s)	Clearing Time (Cycles)	Post-Fault Voltage Recovery	Angular Stability
1	No Fault	P0	Flat Run	-	Stable	Stable
2	Goose Creek 345 kV	P1	May Valley - Goose Creek 345 kV CKT 1	4	Stable	Stable
3	Goose Creek 345 kV	P1	Goose Creek - Canal Crossing 345 kV CKT 1	4	Stable	Stable
4	Goose Creek 345 kV	P1	Goose Creek - Shortgrass 345 kV CKT 1	4	Stable	Stable
5	Goose Creek 345 kV	P1	Goose Creek - Cheyenne Ridge 345 kV CKT 1 Cheyenne Ridge Wind Generation	4	Stable	Stable
6	Canal Crossing 345 kV	P1	Missile Site - Canal Crossing 345 kV CKT 1	4	Stable	Stable
7	Canal Crossing 345 kV	P1	Pawnee - Canal Crossing 345 kV CKT 1	4	Stable	Stable
8	PI-2024-19 POI 345 kV	P1	Goose Creek - PI-2024-19 345 kV CKT 2	4	Stable	Stable
9	PI-2024-19 POI 345 kV	P1	Canal Crossing - PI-2024-19 345 kV CKT 2	4	Stable	Stable
10	PI-2024-19 POI 345 kV	P1	PI-2024-19 Generation and Load	4	Stable	Stable
11	Goose Creek 345 kV	P4	(BF -034) Goose Creek - Cheyenne Ridge 345 kV CKT 1 Cheyenne Ridge Wind Generation	12	Stable	Stable
12	Pawnee 345 kV	P7	(P7-159) Pawnee - Canal Crossing 345kV CKT 1 Pawnee - Canal Crossing 345kV CKT 2	4	Stable	Stable
13	Canal Crossing 345 kV	P7	(P7-160) Goose Creek - Canal Crossing 345 kV CKT 1 Canal Crossing - PI-2024-19 345 kV CKT 2 Goose Creek - PI-2024-19 345 kV CKT 2 PI-2024-19 Generation and Load	4	Stable	Stable
14	May Valley 345 kV	P7	(P7-163) May Valley - Goose Creek 345 kV CKT 1 May Valley - Goose Creek 345 kV CKT 2	4	Stable	Stable



15	Missile Site 345 kV	P7	(P7-165) Missile Site - Canal Crossing 345 kV CKT 1 Missile Site - Canal Crossing 345 kV CKT 2	4	Stable	Stable
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### **3.9 Short-Circuit (Breaker Duty) Analysis Results**

A study was completed to determine whether any over-dutied breakers resulted when several Provisional Interconnections (PIs) were added to the PSCo transmission system in the order of their Commercial Operation Date (COD). If the addition of the interconnection resulted in a requirement that one or more breakers be replaced in the PSCo transmission system, it was considered that that customer would not be able to connect under a provisional interconnection agreement and it was removed from the study.

Taken into consideration were any existing plans for breaker replacement by PSCo. Breakers that had already been assigned to projects were not considered as needing replacement by the interconnection customer.

The Short Circuit study on the PSCo transmission system did not identify any circuit breakers that became over-dutied because of adding the PI-2024-19. The fault currents at the POI for can be made available upon request by the Customer.

### **3.10 Affected Systems**

No Affected Systems were identified.

## **4.0 Cost Estimates**

The total estimated cost of the required upgrades for PI-2024-19 to interconnect for Provisional Interconnection Service by tapping the Goose Creek – Canal Crossing 345 kV line is **\$31.906** million.

- **Cost of Transmission Provider's Interconnection Facilities (TPIF) is \$3.336 million** (Table 8)
- **Cost of Station Network Upgrades is \$28.570 million** (Table 9)
- **Cost of System Network Upgrades is \$0**

The list of improvements required to accommodate the Provisional Interconnection Service of PI-2024-19 are given in Table 8, and Table 9.

**Table 7 – Transmission Provider’s Interconnection Facilities**

<b>Element</b>	<b>Description</b>	<b>Cost Est. (Million)</b>
PSCo’s new PI-2024-19 345 kV switching station	Interconnection of PI-2024-19 (5RSC-2024-29) at the new 345 kV switching station. The new equipment includes: <ul style="list-style-type: none"> <li>• (1) 345 kV single bay dead end structure</li> <li>• (3) 345 kV Surge arresters</li> <li>• (1) 345 kV 3000 A disconnect switch</li> <li>• (3) 345 kV 1-phase CT's for metering</li> <li>• (3) 345 kV CCVTs</li> <li>• Associated electrical equipment, bus, wiring and grounding</li> <li>• Associated foundations and structures</li> <li>• Associated transmission line communications, fiber, relaying</li> </ul>	\$3.086
PSCo’s new PI-2024-19 345 kV switching station	Transmission Provider's dead-end structure at the Point of Change of Ownership (PCO) outside the switching station fence line and transmission line into new switching station from the PCO. Single span, dead end structure, 3 conductors, insulators, hardware, jumpers and labor.	\$0.250
<b>Total Cost Estimate for Interconnection Customer-Funded, PSCo-Owned Interconnection Facilities</b>		<b>\$3.336</b>

**Table 8 – Station Network Upgrades**

<b>Element</b>	<b>Description</b>	<b>Cost Est. (Million)</b>
PSCo's new PI-2024-19 345 kV switching station	Install new PI-2024-19 345 kV switching station tapping the Grosse Creek – Canal Crossing 345 kV line. The new equipment includes: <ul style="list-style-type: none"> <li>• (3) 345 kV deadend structures</li> <li>• (3) 345 kV 3000 A circuit breakers</li> <li>• (8) 345 kV 3000 A disconnect switches</li> <li>• (6) 345 kV CCVTs</li> <li>• (2) 345 kV SSVTs</li> <li>• (6) 345 kV Surge Arresters</li> <li>• (2) single phase 345 kV wave traps and line tuner</li> <li>• (1) Electrical Equipment Enclosure (EEE)</li> <li>• Site grading and fencing</li> <li>• Associated electrical equipment, bus, wiring and grounding</li> <li>• Station controls and wiring</li> <li>• Associated foundations and structures</li> </ul>	\$24.058
PSCo's new PI-2024-19 345 kV switching station	Install required communication in the EEE at the new 345 kV switching station	\$0.865
PSCo's Canal Crossing 345 kV switching station	Remote end upgrade at Canal Crossing 345 kV switching station, removal of wave traps and line tuners and update to line protection	\$0.597
PSCo's Goose Creek 345 kV switching station	Remote end upgrade at Goose Creek 345 kV switching station, removal of wave traps and line tuners and update to line protection	\$0.597
PSCo's Goose to PI-2024-19	Install (2) new steel monopole corner deadend structures and (1) new steel monopole in-line structure for conductor and OPGW into the new 345 kV switching station	\$1.096
PSCo's Canal Crossing to PI-2024-19	Removal of (1) steel monopole, hardware, insulators, OPGW, and conductor and install (2) new steel monopole corner deadend structures and (1) new steel monopole in-line structure for conductor and OPGW into the new 345 kV switching station	\$1.107
PSCo's new PI-2024-19, 345 kV switching station	Siting and Land Rights land acquisition and permitting with land purchase costs included at fair market value	\$0.250
<b>Total Cost Estimate for PSCo-Funded, PSCo-Owned Interconnection Facilities</b>		<b>\$28.570</b>

PSCo has developed cost estimates for Transmission Provider's Interconnection Facilities and Network/Infrastructure Upgrades required for the interconnection of PI-2024-19 for Provisional Interconnection Service. The estimated costs provided in this report are based upon the following assumptions:

- The estimated costs are in 2025 dollars with escalation and contingencies applied.
- Allowances for Funds Used During Construction (AFUDC) is not included.
- The estimated costs include all applicable labor and overheads associated with the siting, engineering, design, and construction of these new PSCo facilities.
- Land for new switching station can be acquired at fair market value.
- The estimated costs do not include the cost for any Customer owned equipment and associated design and engineering.
- Labor is estimated for straight time only—no overtime included.
- PSCo (or its Contractor) will perform all construction, wiring, testing, and commissioning for PSCo owned and maintained facilities.

The customer requirements include:

- Customer will facilitate PSCo's fee simple ownership of the property required for the new switching station, approximately 15 acres, to interconnect the PI-2024-19 project at the requested POI on the Goose Creek – Canal Crossing 345 kV line.
- Interconnection Customer will install two (2) redundant fiber optic circuits (one primary circuit with a redundant backup) into the Transmission Provider's switching station as part of its interconnection facilities construction scope.
- Power Quality Metering (PQM) will be required on the Customer's generation tie-line terminating into the POI.
- The Customer will coordinate with the Transmission Provider to include the PCO structure into the Interconnection Customer's permitting for the generation tie line.

- The Customer will be required to design, procure, install, own, operate and maintain a Remote Terminal (RTU) at their Customer substation. PSCo will be provided with indications, readings and data from the Customer's RTU.
- The Interconnection Customer will comply with the most current version of the *Interconnection Guidelines for Transmission Interconnected Producer-Owned Generation Greater Than 20 MW*, as amended from time to time, and available at: [Interconnection | Transmission | Corporate | Xcel Energy](#)

#### 4.1 Schedule

This section provides proposed milestones for the interconnection of PI-2024-19 to the Transmission Provider's Transmission System. The customer did not provide a back-feed date (In-Service Date for Transmission Provider Interconnection Facilities and Station Network Upgrades required for interconnection) for the Provisional Interconnection; therefore, it was estimated at February 18, 2027, three months prior to the requested Commercial Operation Date of May 18, 2027. This is not attainable by the Transmission Provider, based upon the current schedule developed for this interconnection request. The Transmission Provider proposes the milestones provided below in Table 10.

**Table 9 – Proposed Milestones for PI-2024-19**

Milestone	Responsible Party	Estimated Completion Date
PLGIA Execution	Interconnection Customer and Transmission Provider	October, 2025
In-Service Date for Transmission Provider Interconnection Facilities and Station Network Upgrades required for interconnection	Transmission Provider	January 9, 2029
In-Service Date & Energization of Interconnection Customer's Interconnection Facilities	Interconnection Customer	January 9, 2029
Initial Synchronization Date	Interconnection Customer	January 22, 2029
Begin trial operation & testing	Interconnection Customer and Transmission Provider	January 29, 2029

Commercial Operation Date	Interconnection Customer	April 30, 2029
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Some schedule elements are outside of the Transmission Provider's control and could impact the overall schedule. The following schedule assumptions provide the basis for the schedule milestones:

- Construction permitting (if required) for new facilities will be completed within 24 months of LGIA execution.
- The Transmission Provider is currently experiencing continued increases to material lead times which could impact the schedule milestones. The schedule milestones are based upon material lead times known at this time.
- Availability of line outages to interconnect new facilities to the transmission system.
- A Certificate of Public Convenience and Necessity (CPCN) will likely be required for the construction of the Interconnection Facilities and Station Network Upgrades. The expected time to obtain a CPCN approval is 18 months, which could impact the start of construction for the interconnection facilities.

## 5.0 Conclusion

The total estimated cost of the PSCo transmission system improvements required for PI-2024-19 to qualify for Provisional Interconnection Service is **\$31.906 million**.

Based on the Power Flow and Stability analyses, the initial maximum permissible output of PI-2024-19 Generating Facility is 521.5 MW at the Point of Interconnection. The output amount of the Generating Facility in the PLGIA<sup>4</sup> will be reviewed quarterly and updated, if there are changes to the system conditions assumed in this analysis.

The Short-Circuit analysis (breaker duty) on the PSCo transmission system has identified no over-duty breaker.

Security: PI-2024-19 is a request for Energy Resource Interconnection Service (ERIS). For ERIS requests, security shall estimate the risk associated with the Network Upgrades and the Interconnection Facilities and is assumed to be a minimum of \$5 million.

The Provisional Interconnection Service in and of itself does not convey transmission service.

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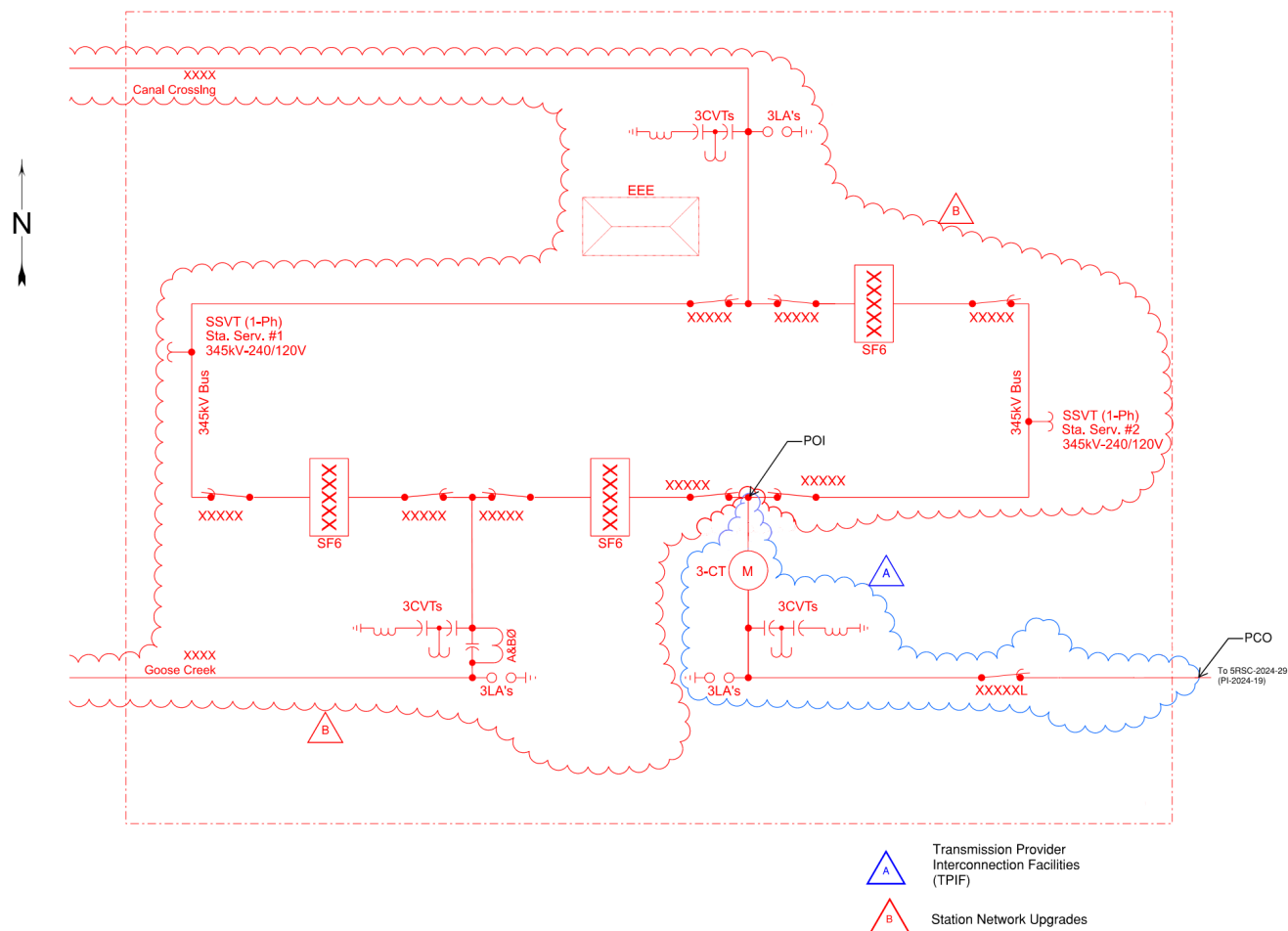
<sup>4</sup> **Provisional Large Generator Interconnection Agreement (PLGIA)** shall mean the interconnection agreement for Provisional Interconnection Service established between Transmission Provider and/or the Transmission Owner and the Interconnection Customer. The pro forma agreement is provided in Appendix 8 and takes the form of the Large Generator Interconnection Agreement, modified for provisional purposes.



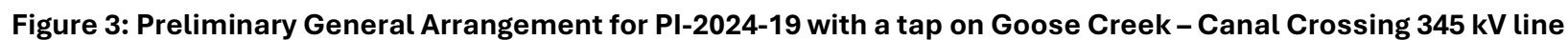
## **6.0 Contingent Facilities**

Contingent Facilities identified for PI-2024-19 include the TPIF and Station Network Upgrades identified in Table 8 and Table 9, respectively.


## 7.0 Preliminary One-Line Diagram and General Arrangement for PI-2024-19



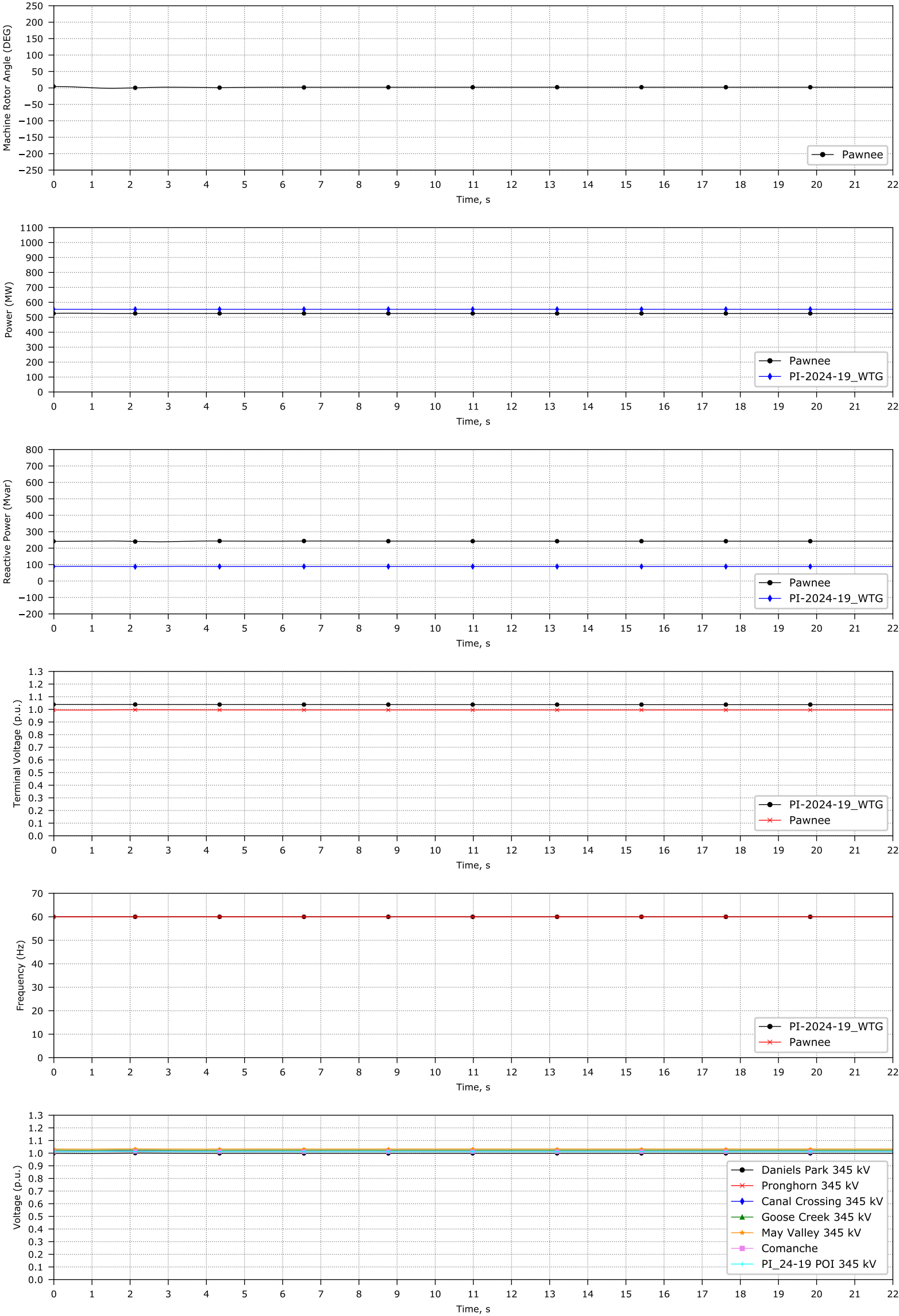
**Figure 2: Preliminary One-Line of PI-2024-19 with a tap on Goose Creek – Canal Crossing 345 kV line**



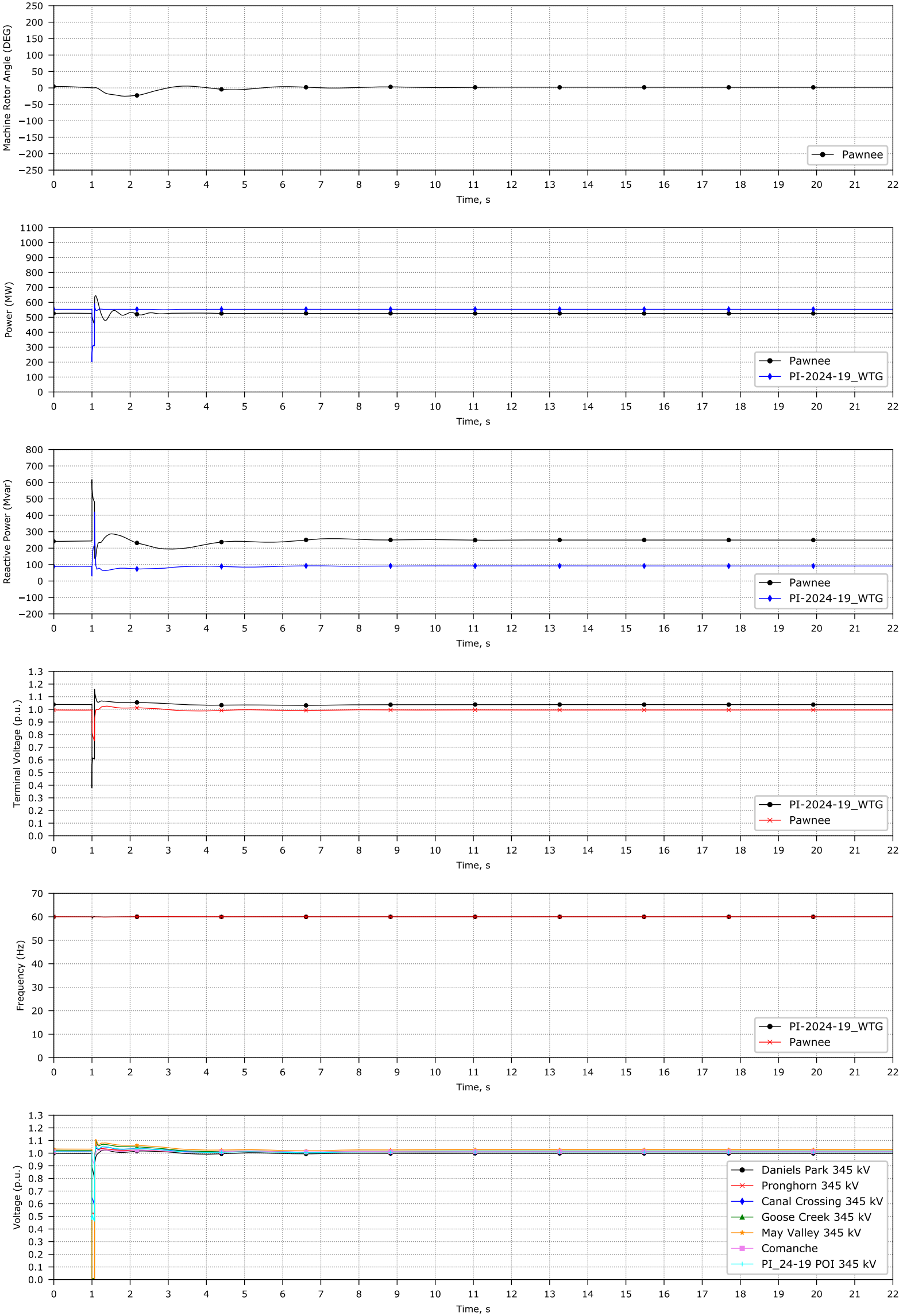
**8.0 Appendices**

Appendix A: Stability Plots	 PI-2024-19_Transien t_Stability_Plots.pdf
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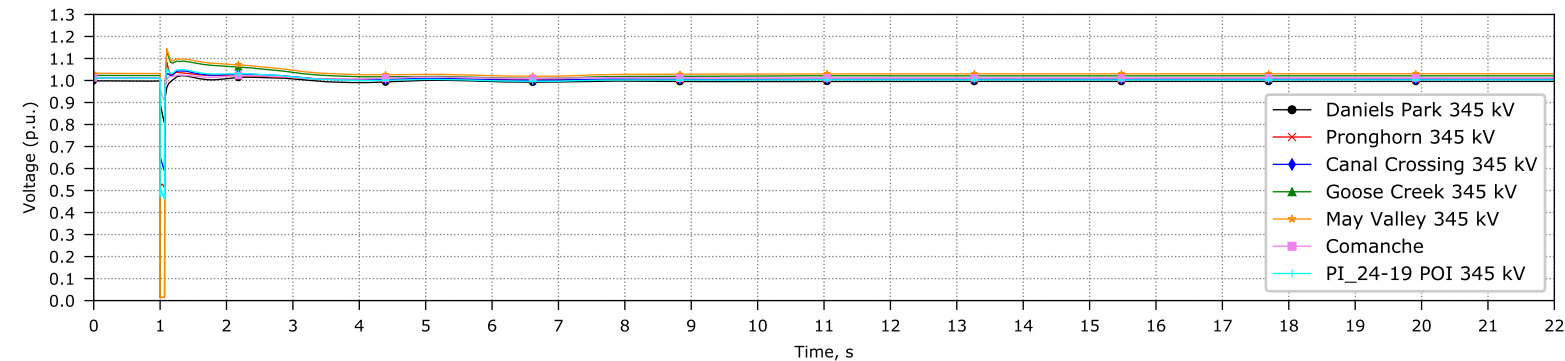
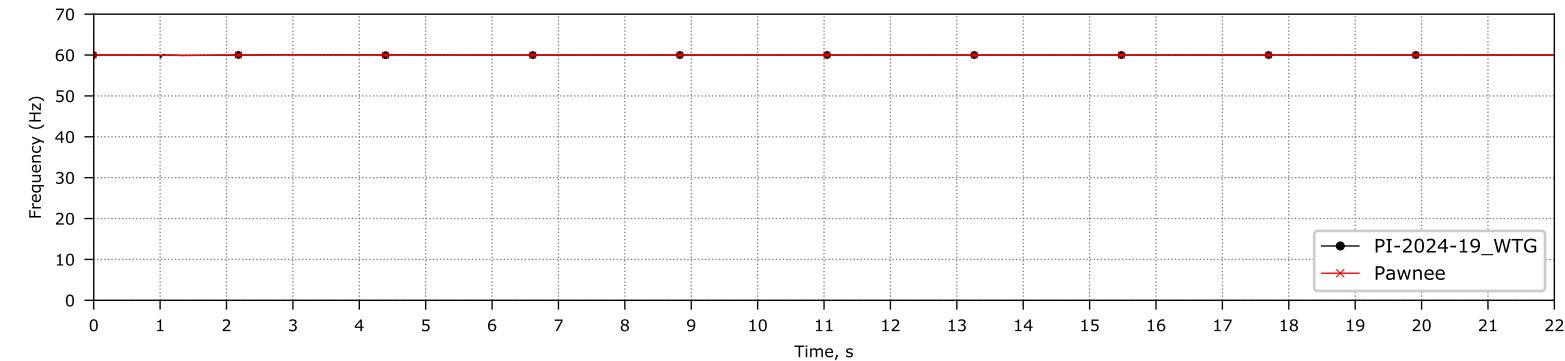
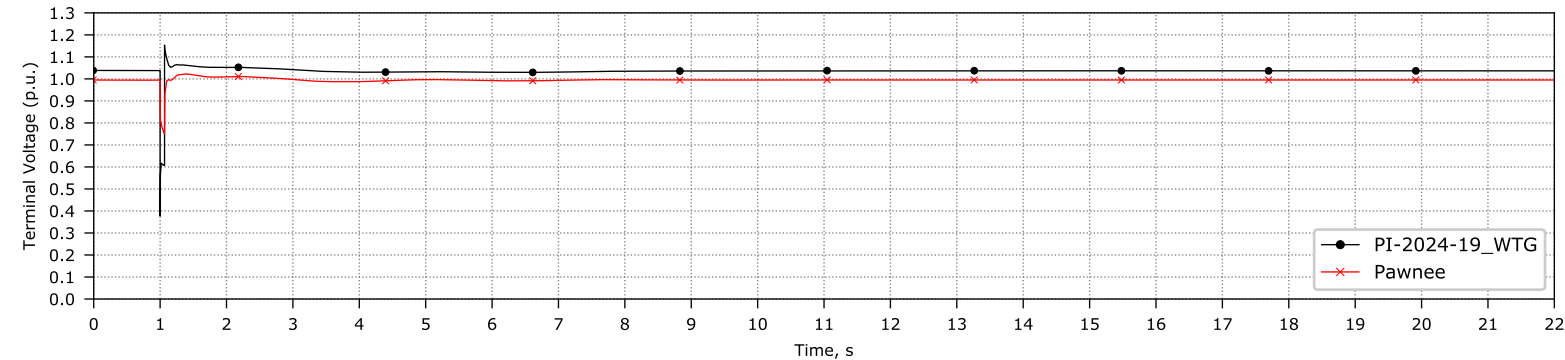
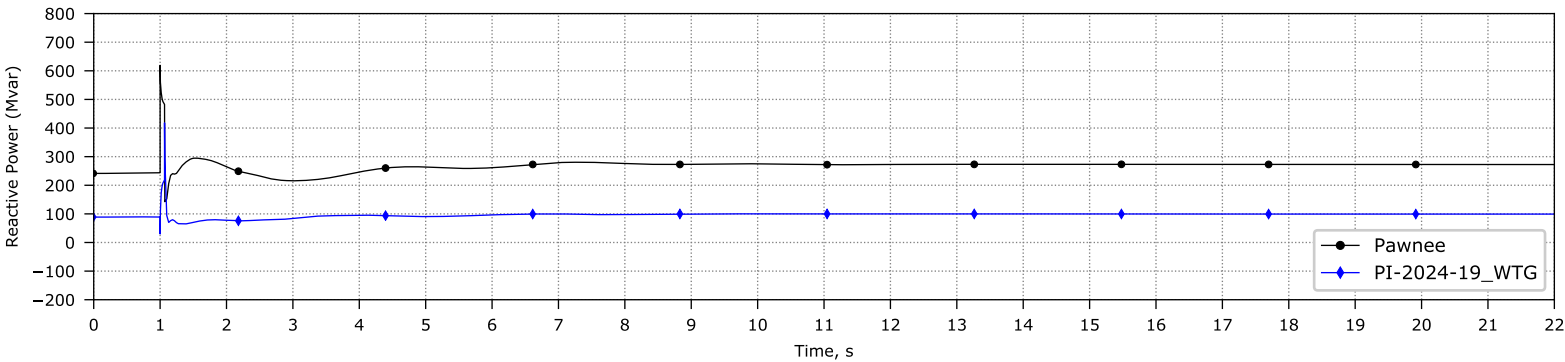
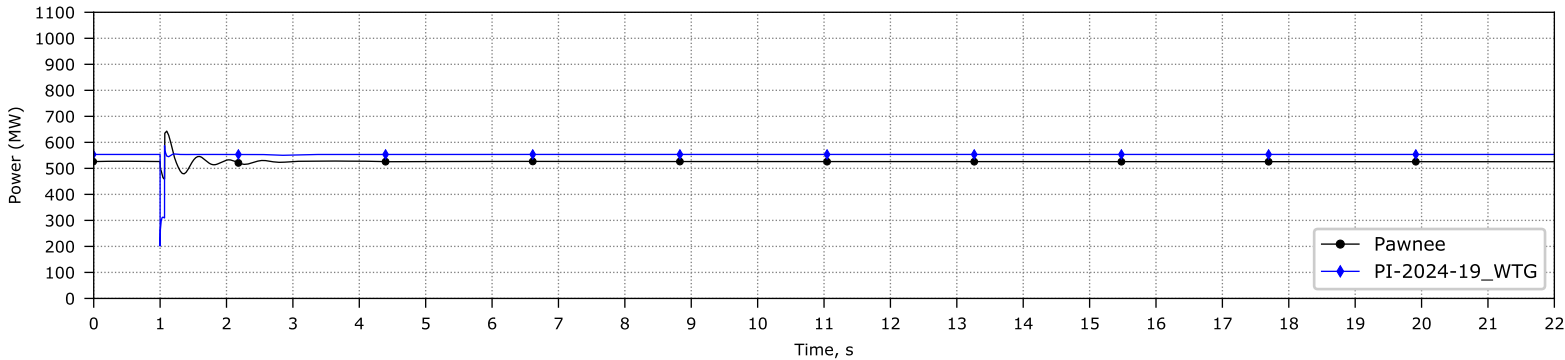
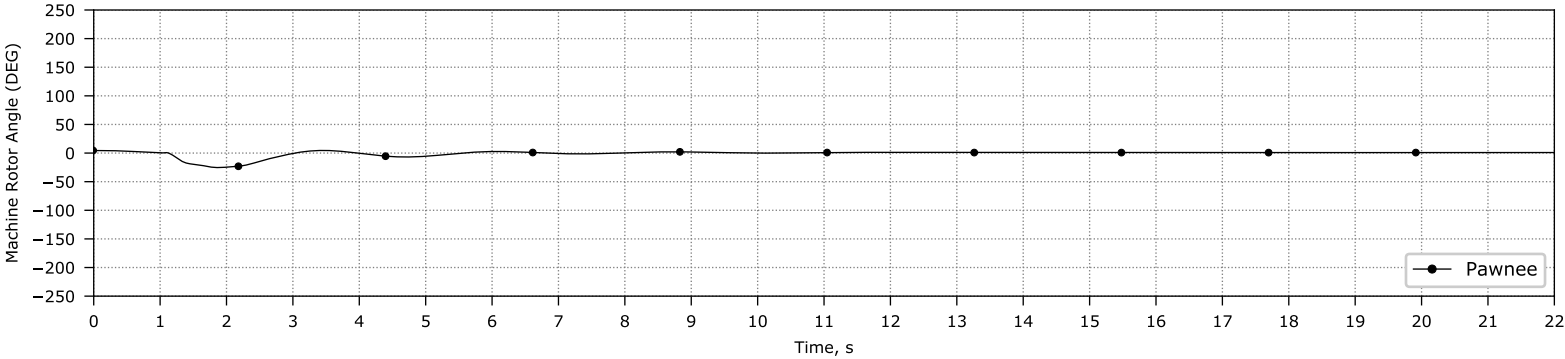
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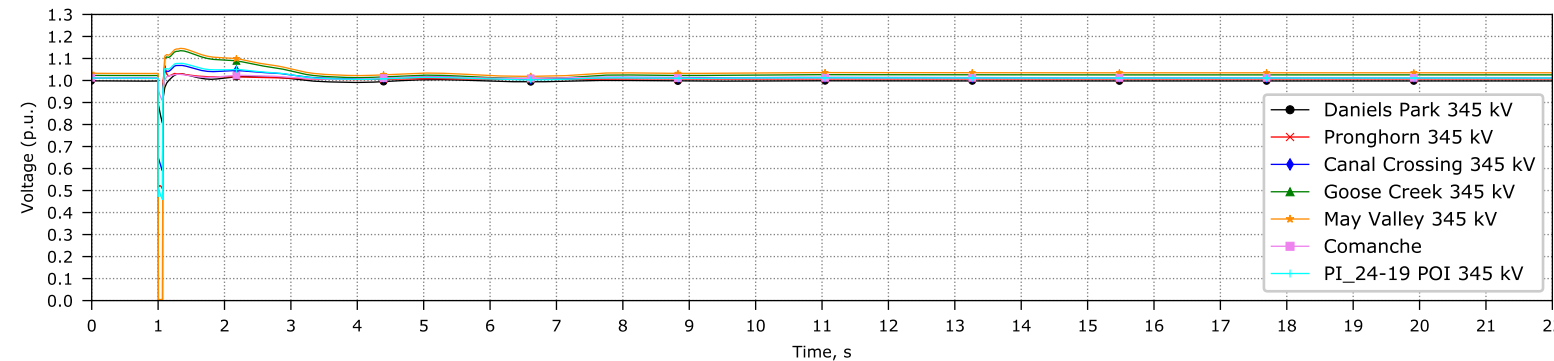
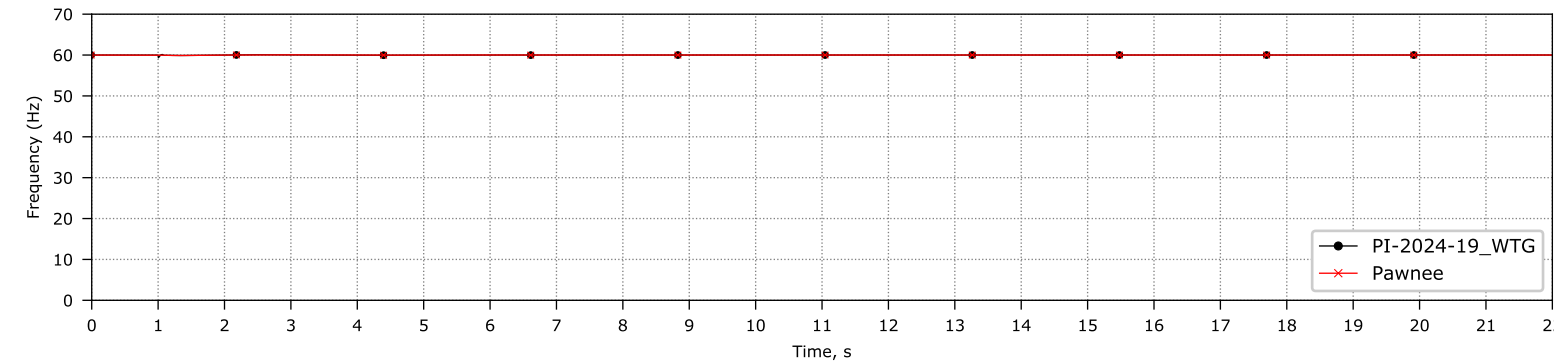
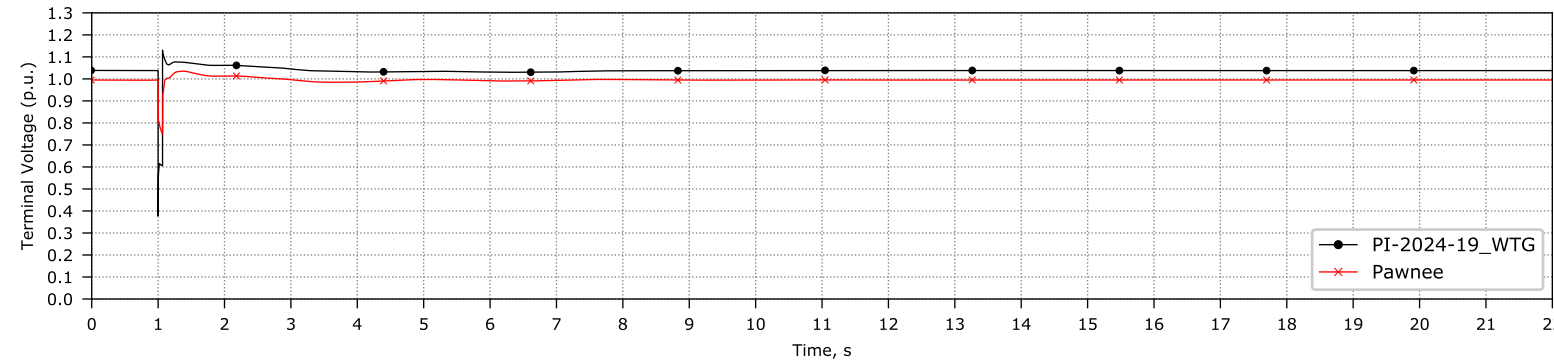
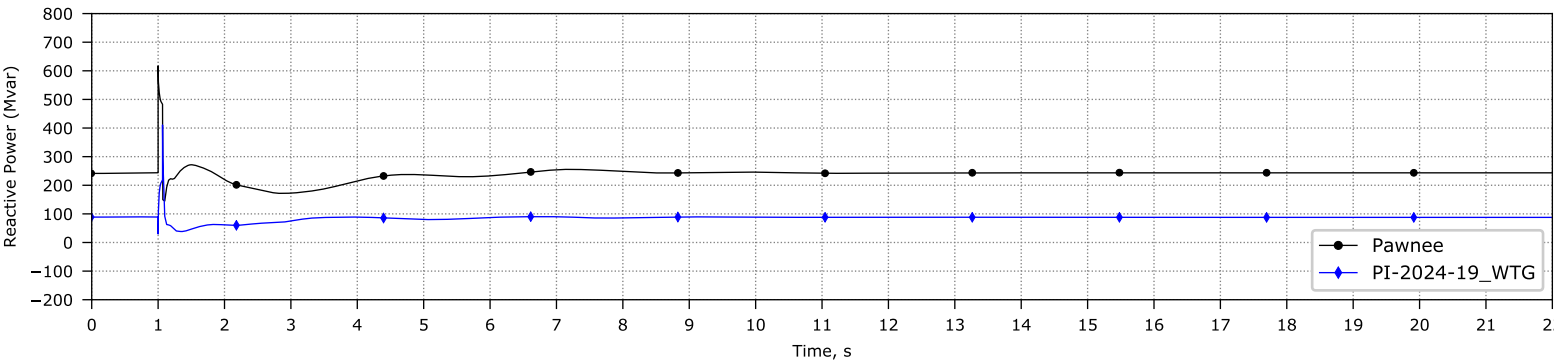
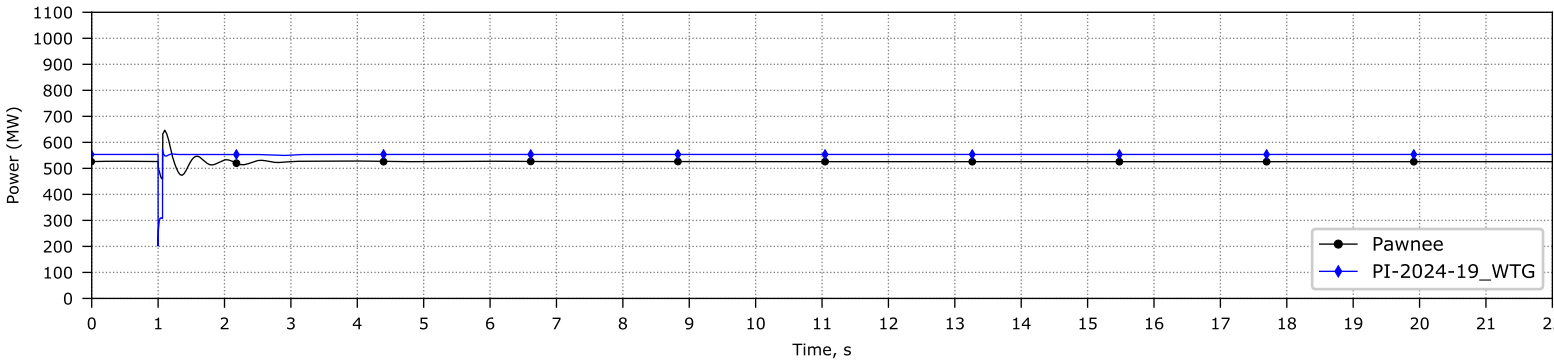
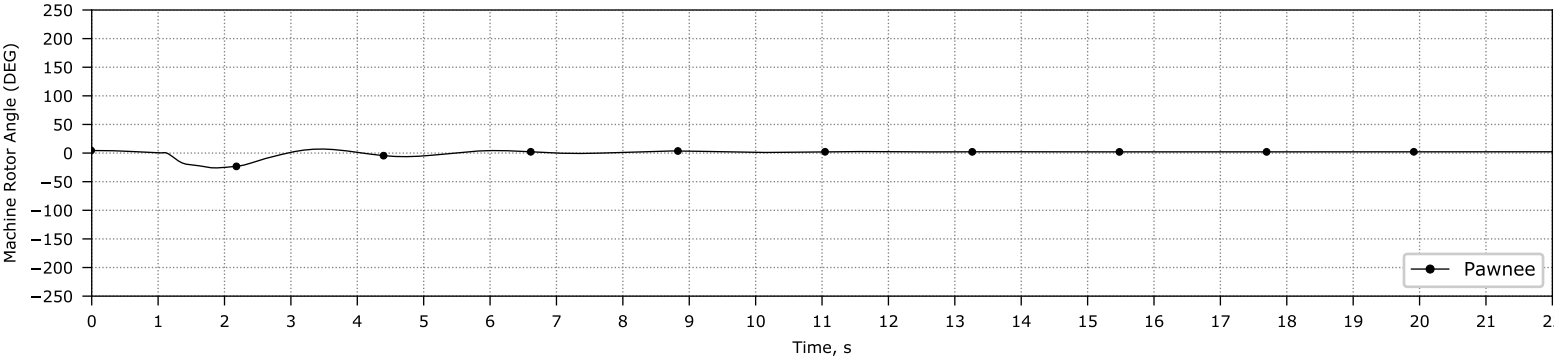
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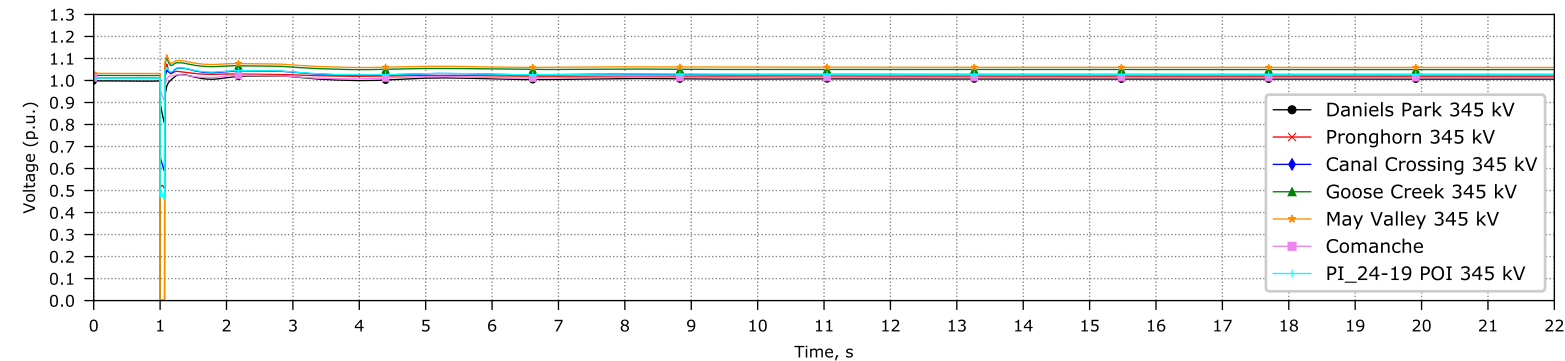
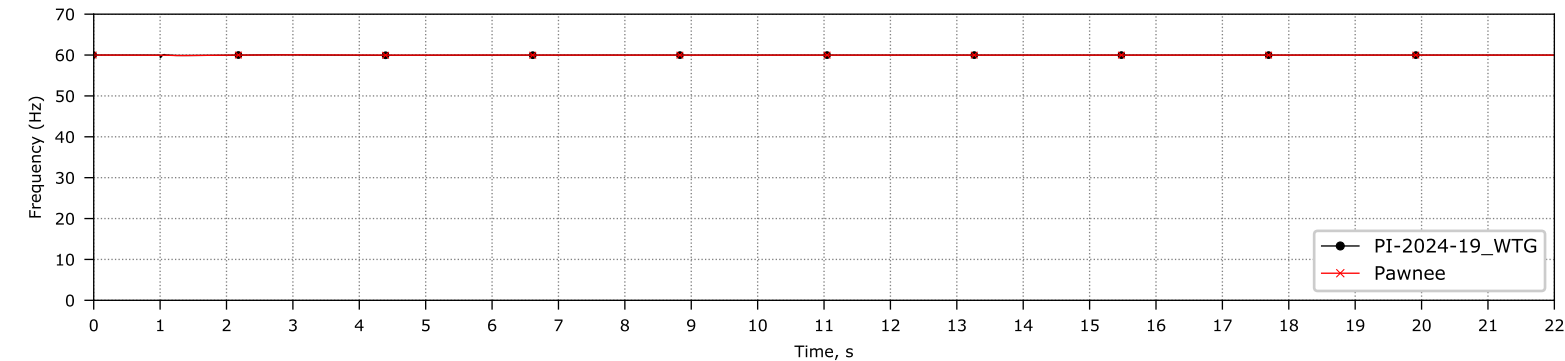
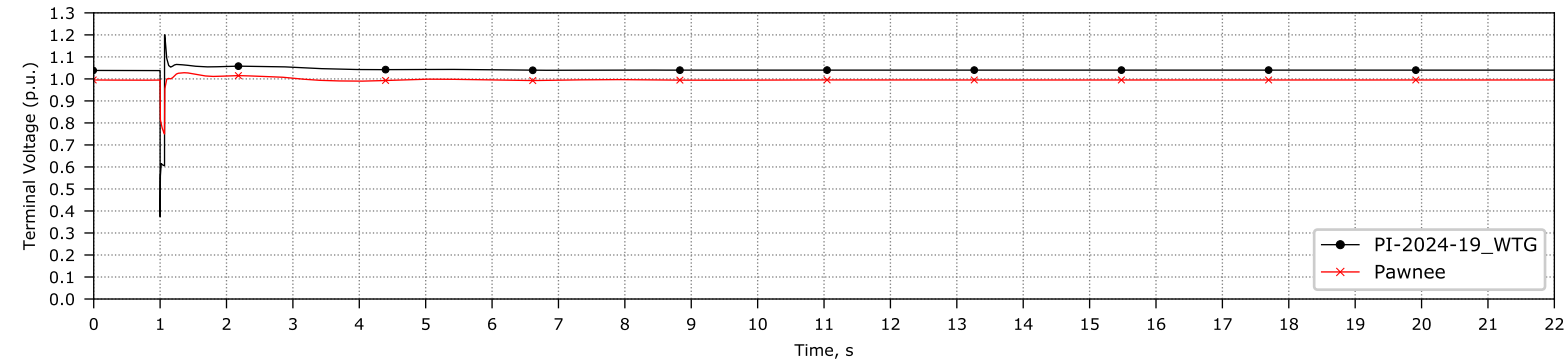
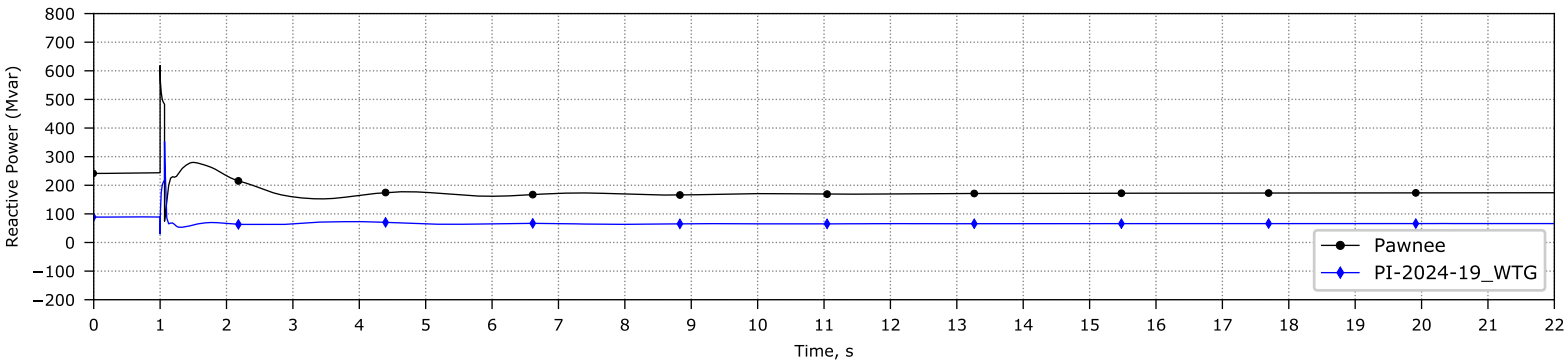
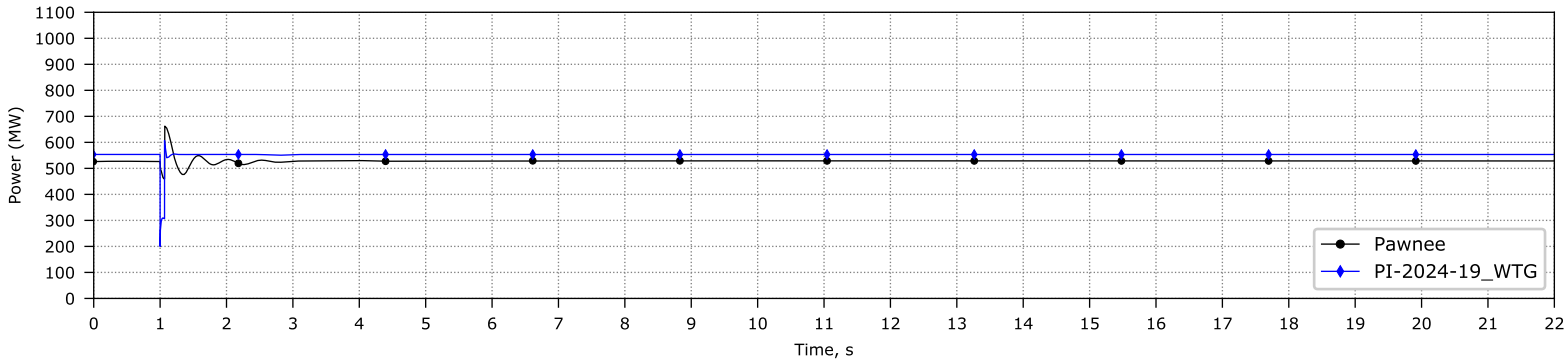
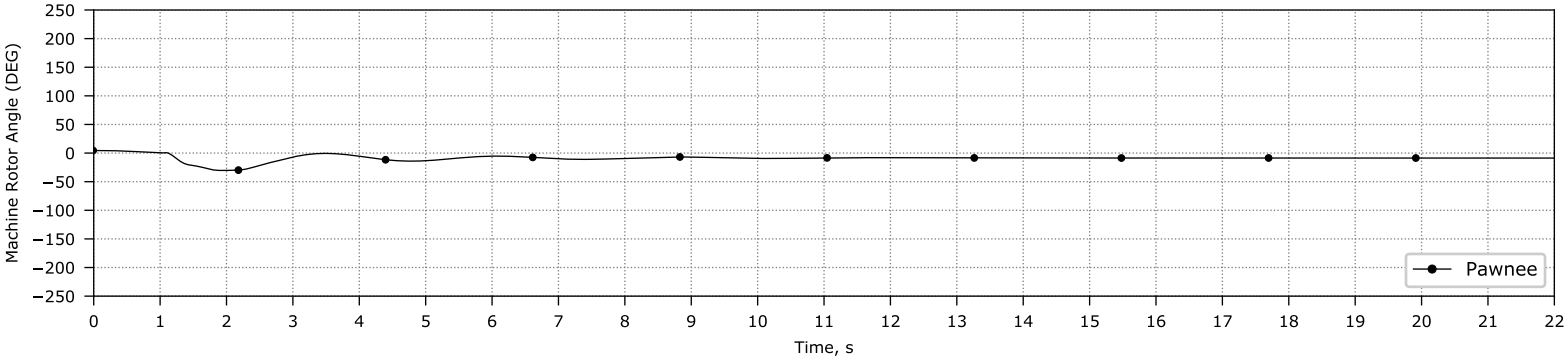


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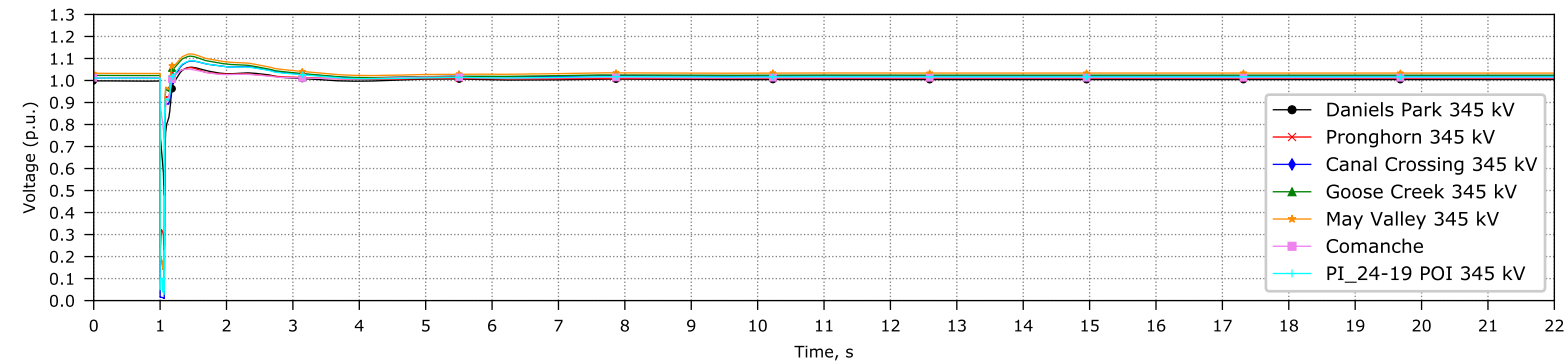
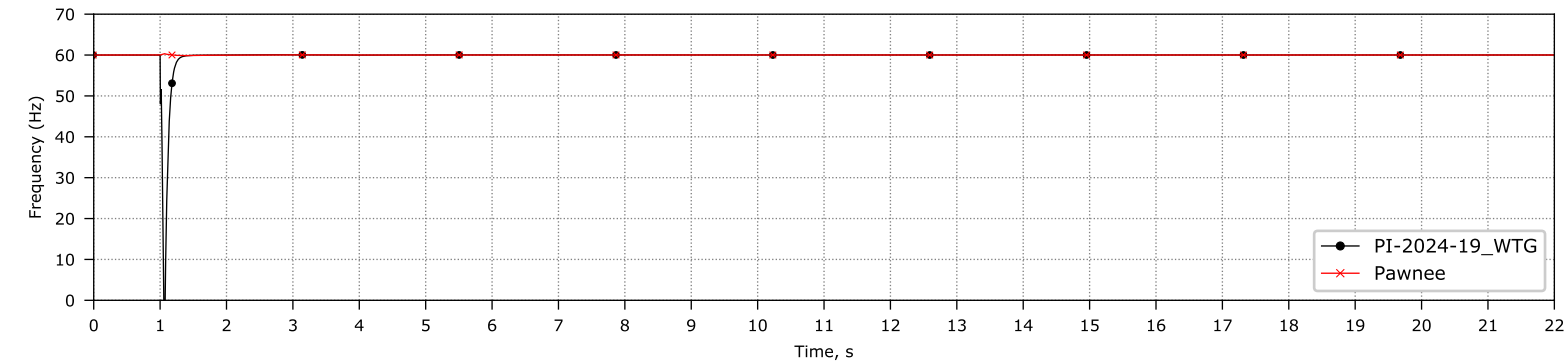
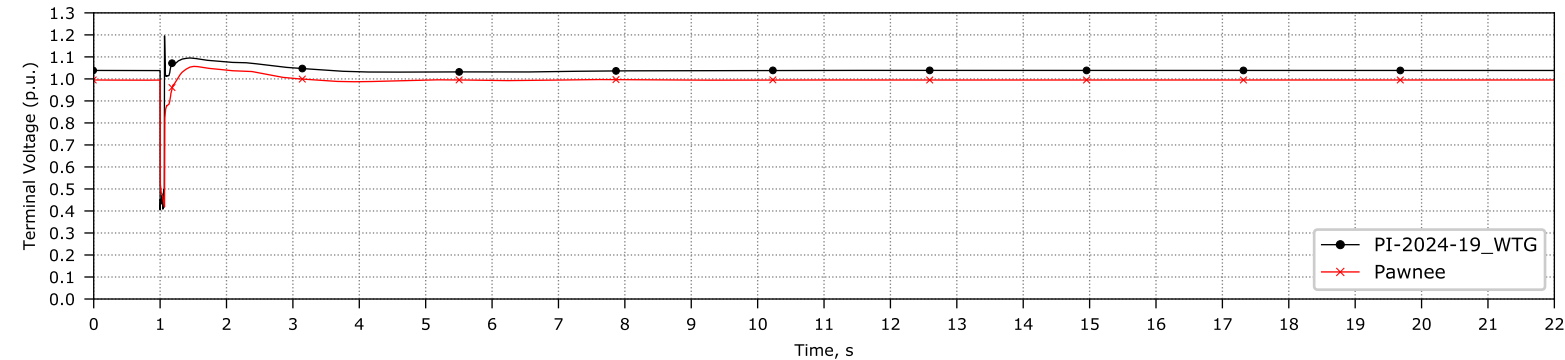
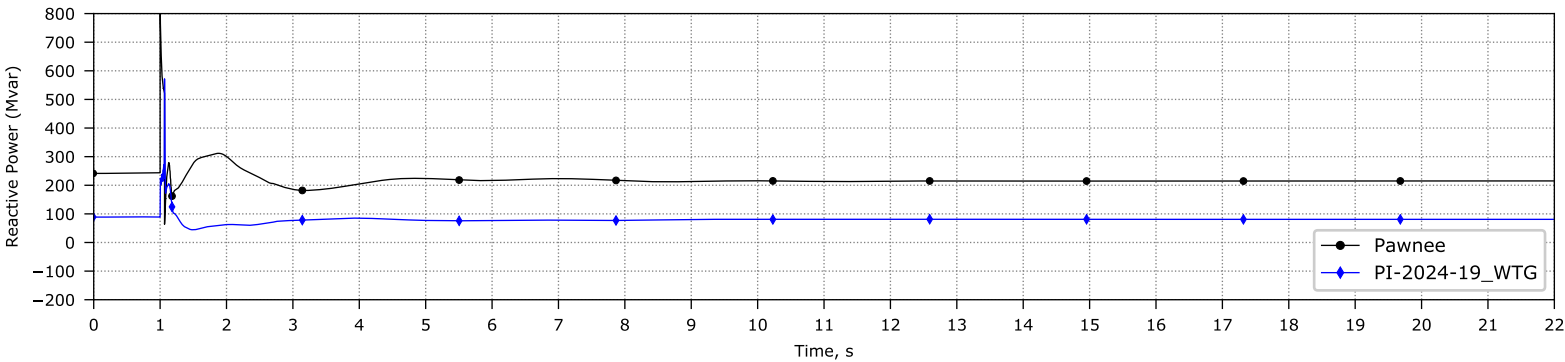
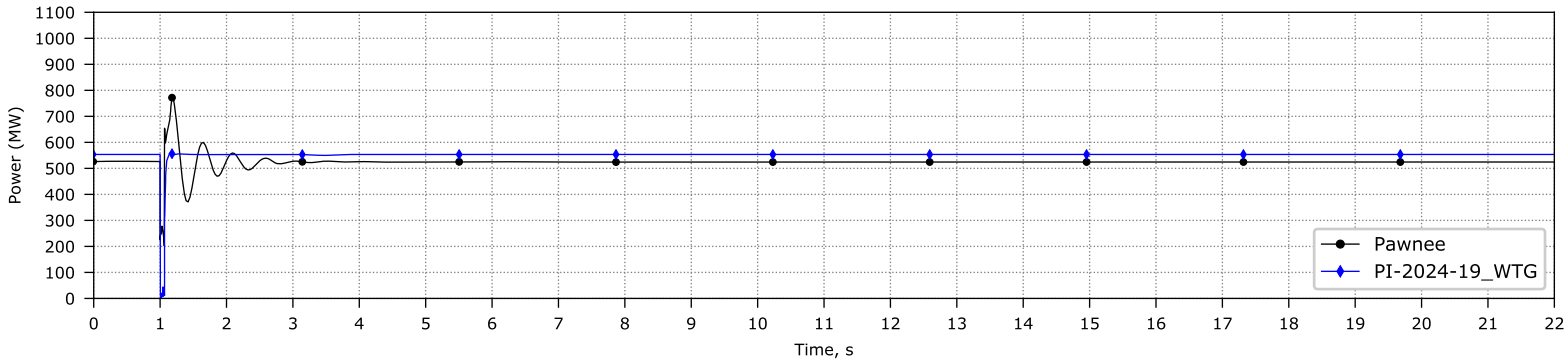
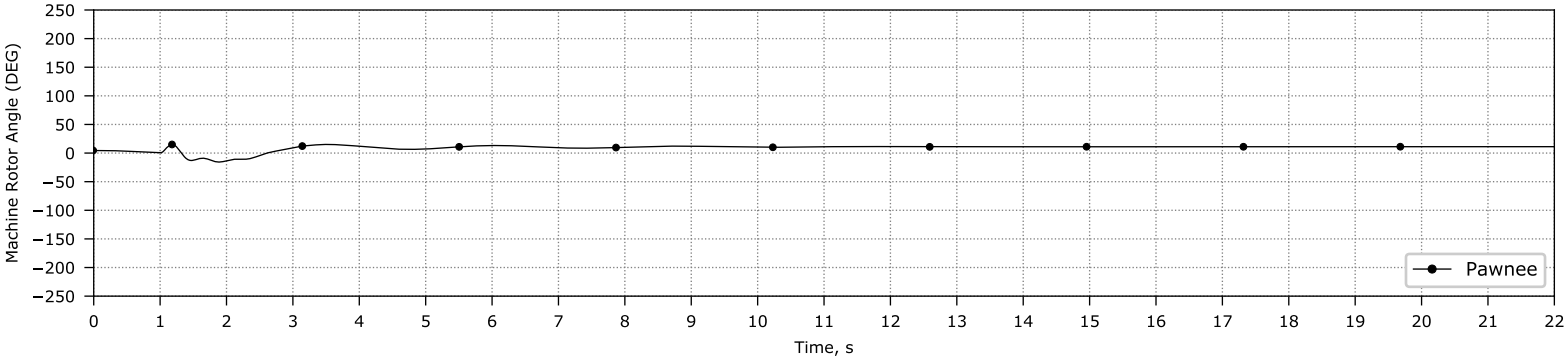




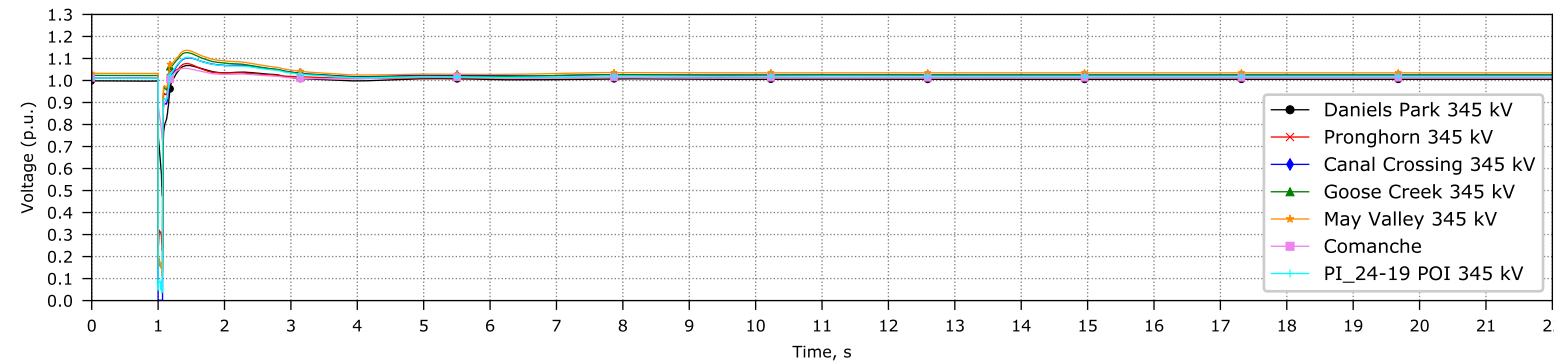
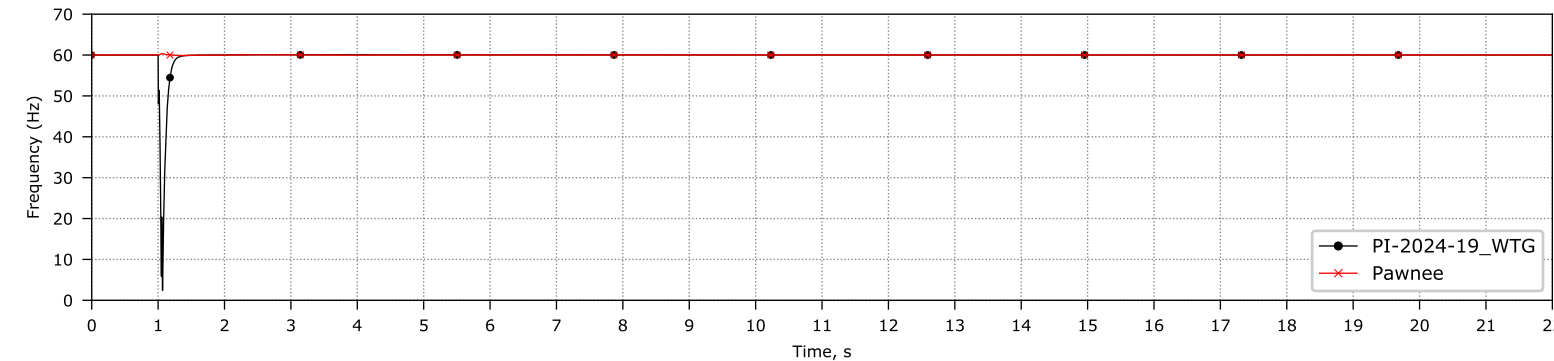
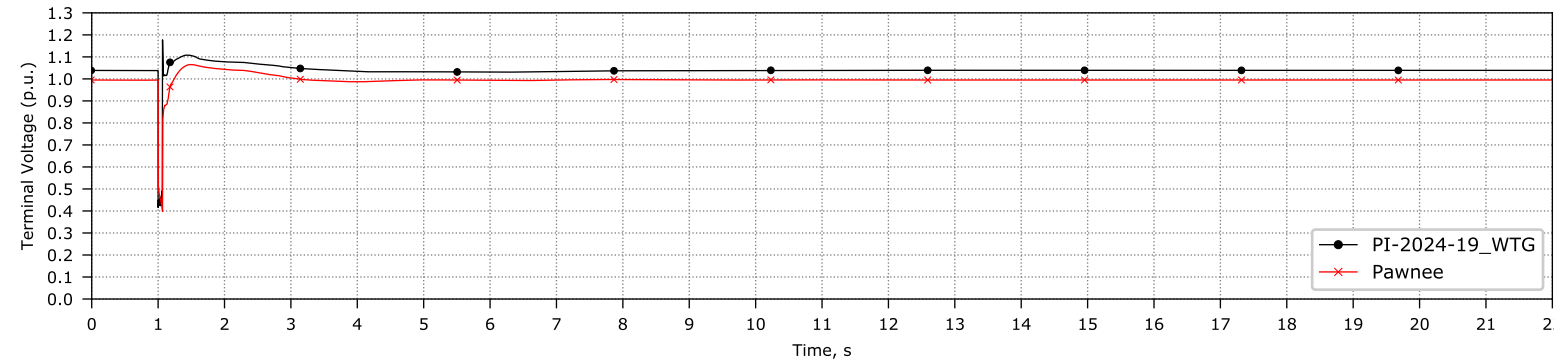
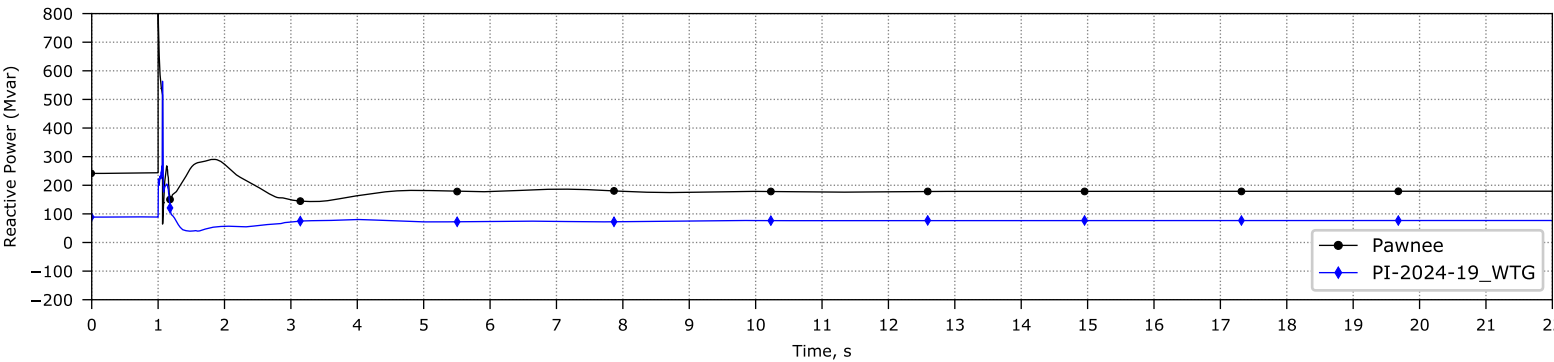
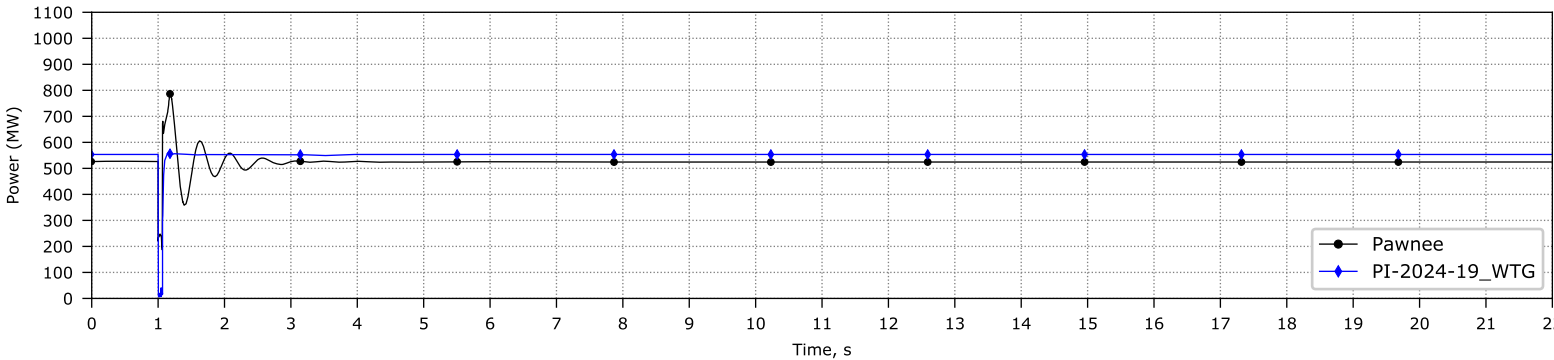
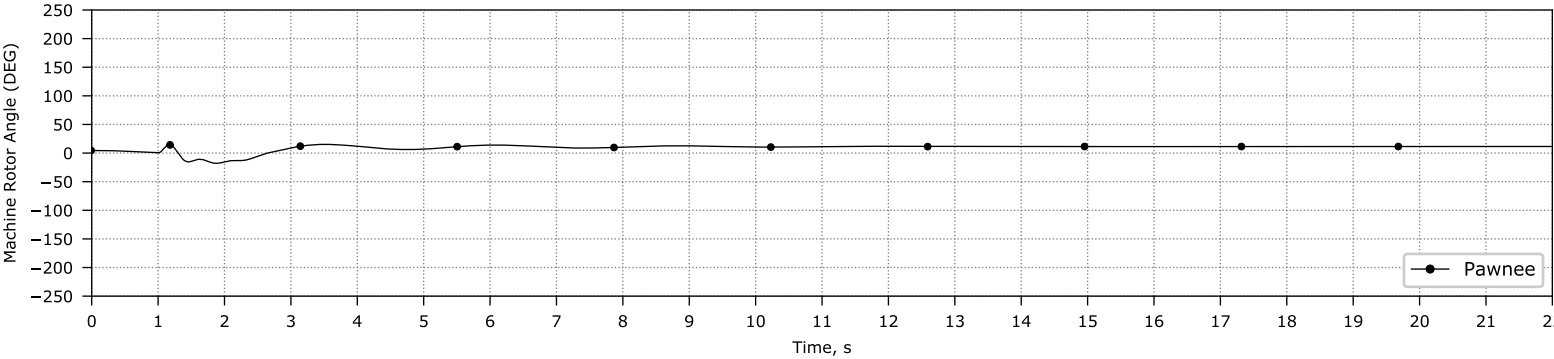
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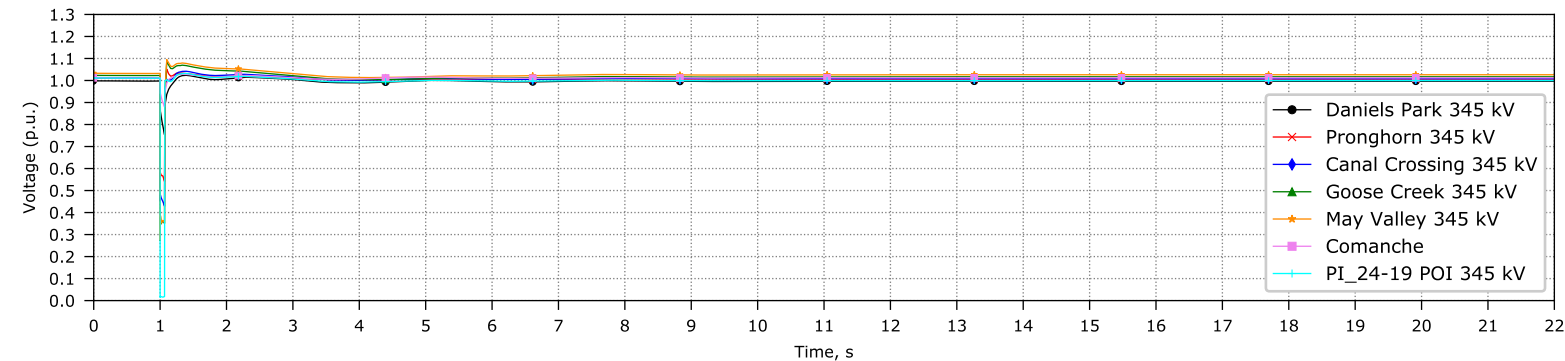
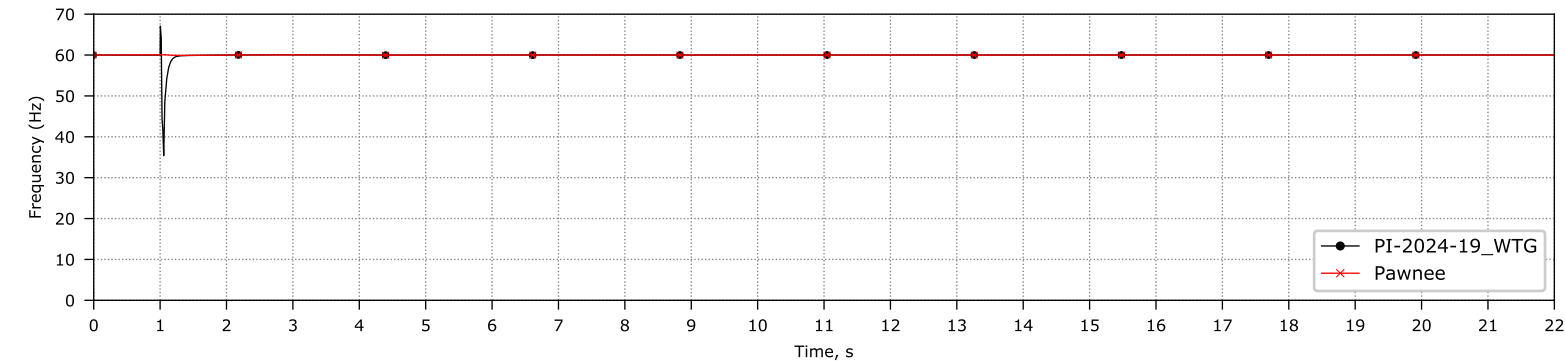
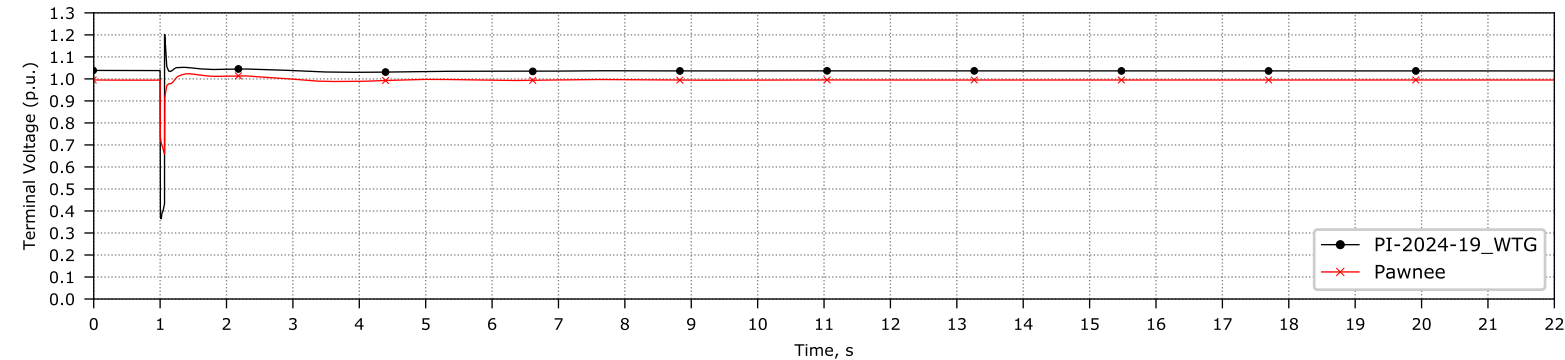
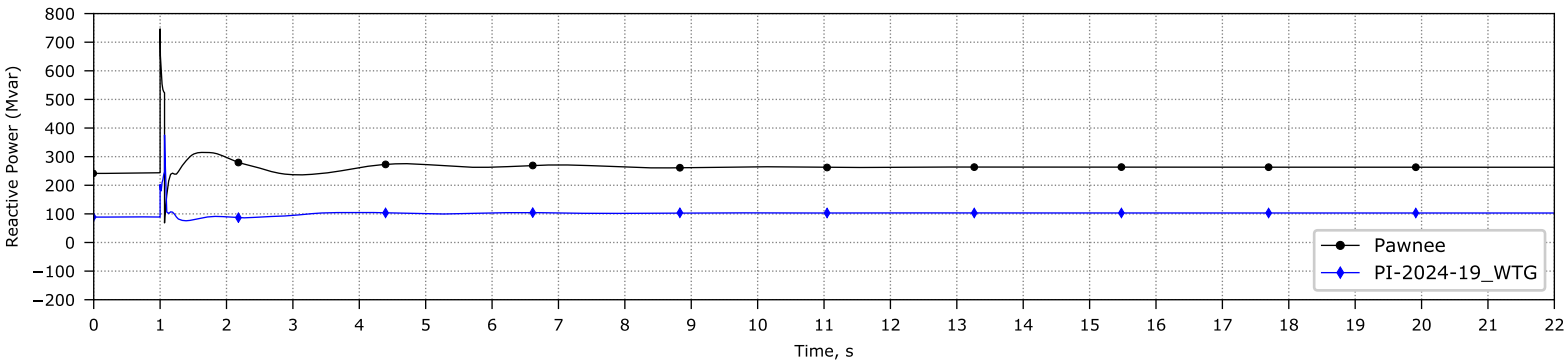
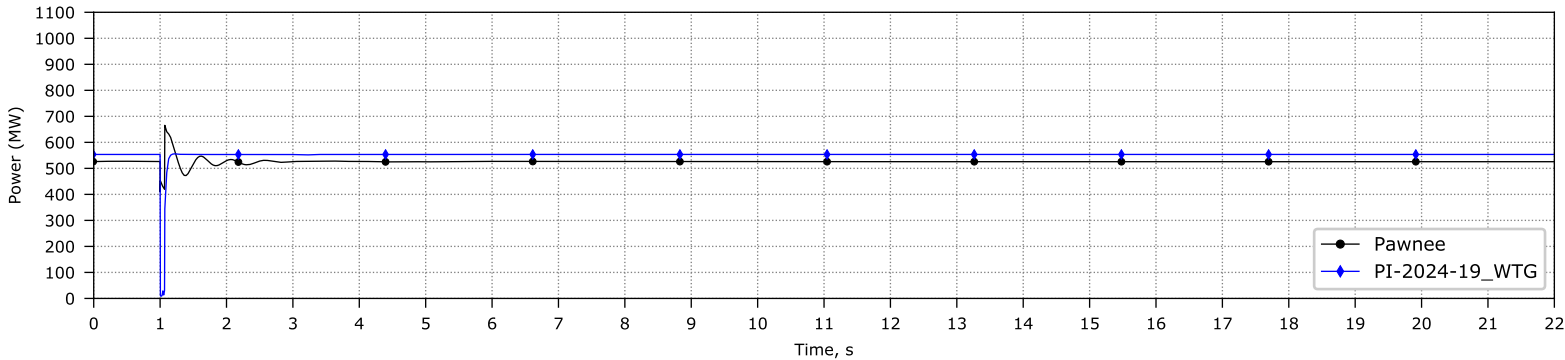
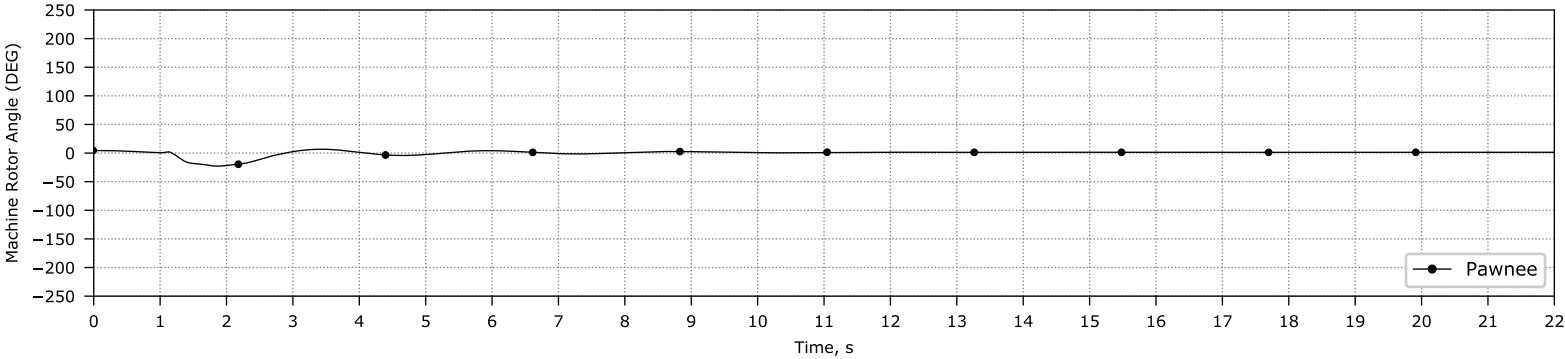
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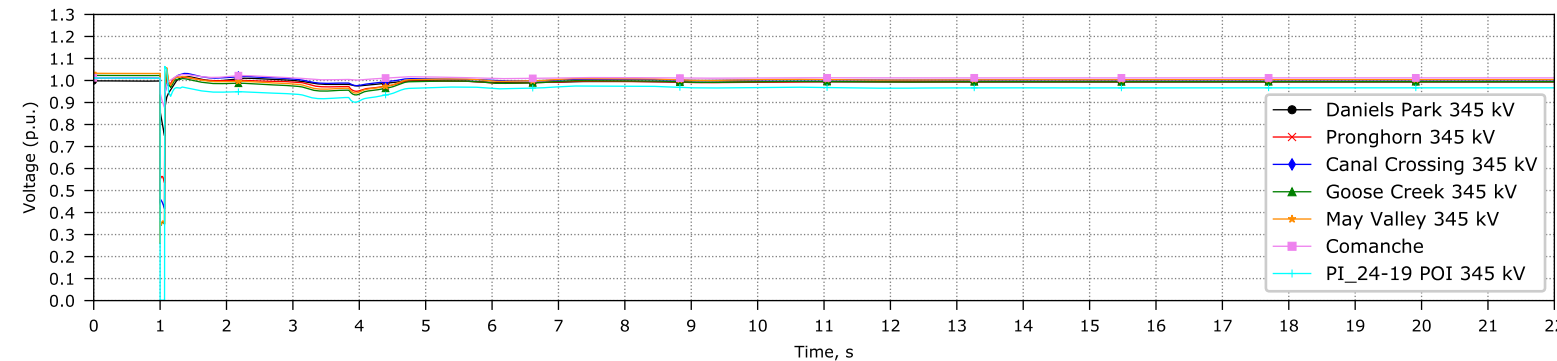
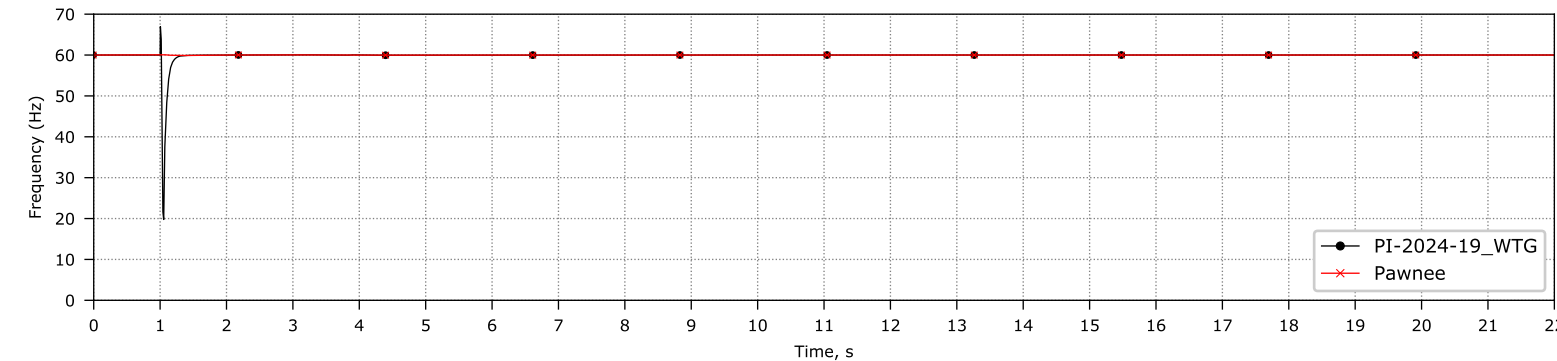
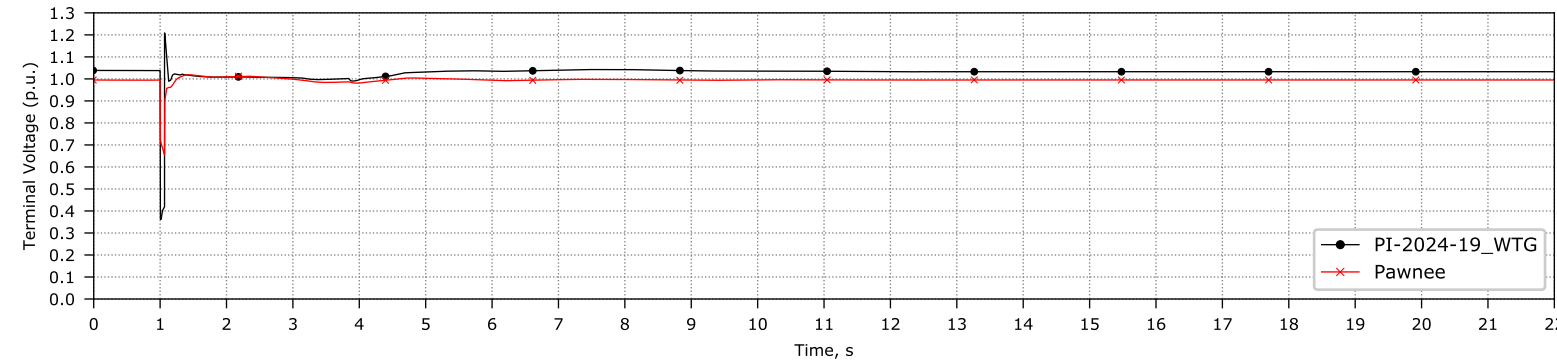
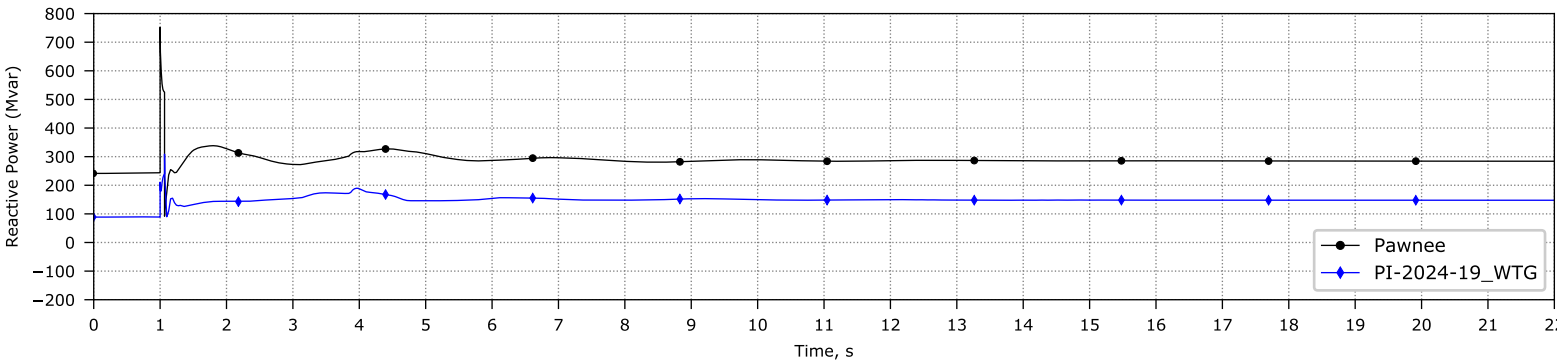
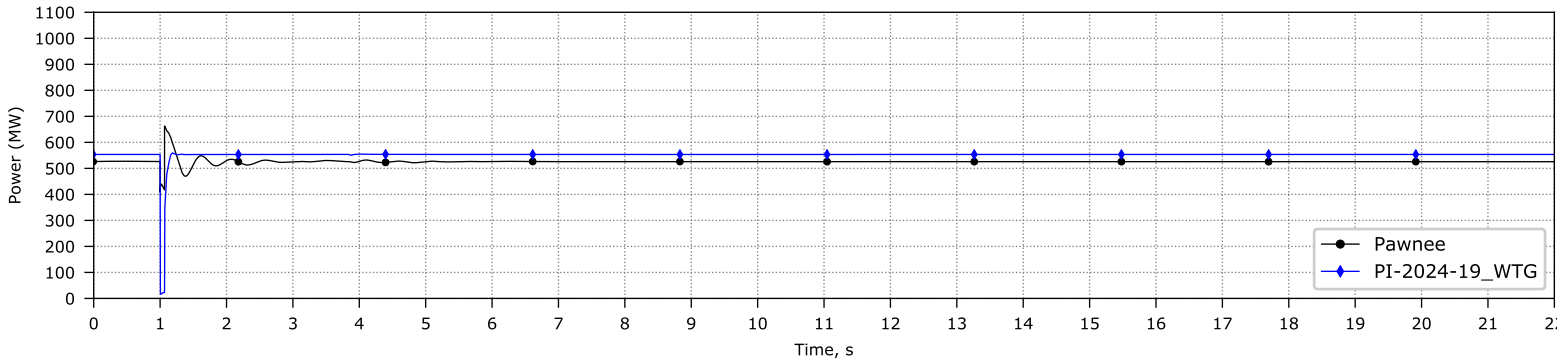
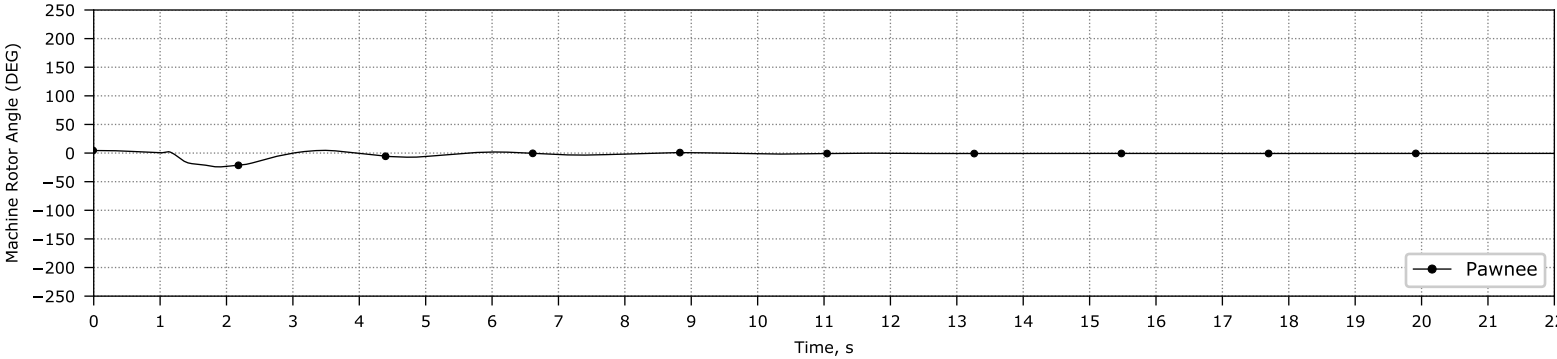
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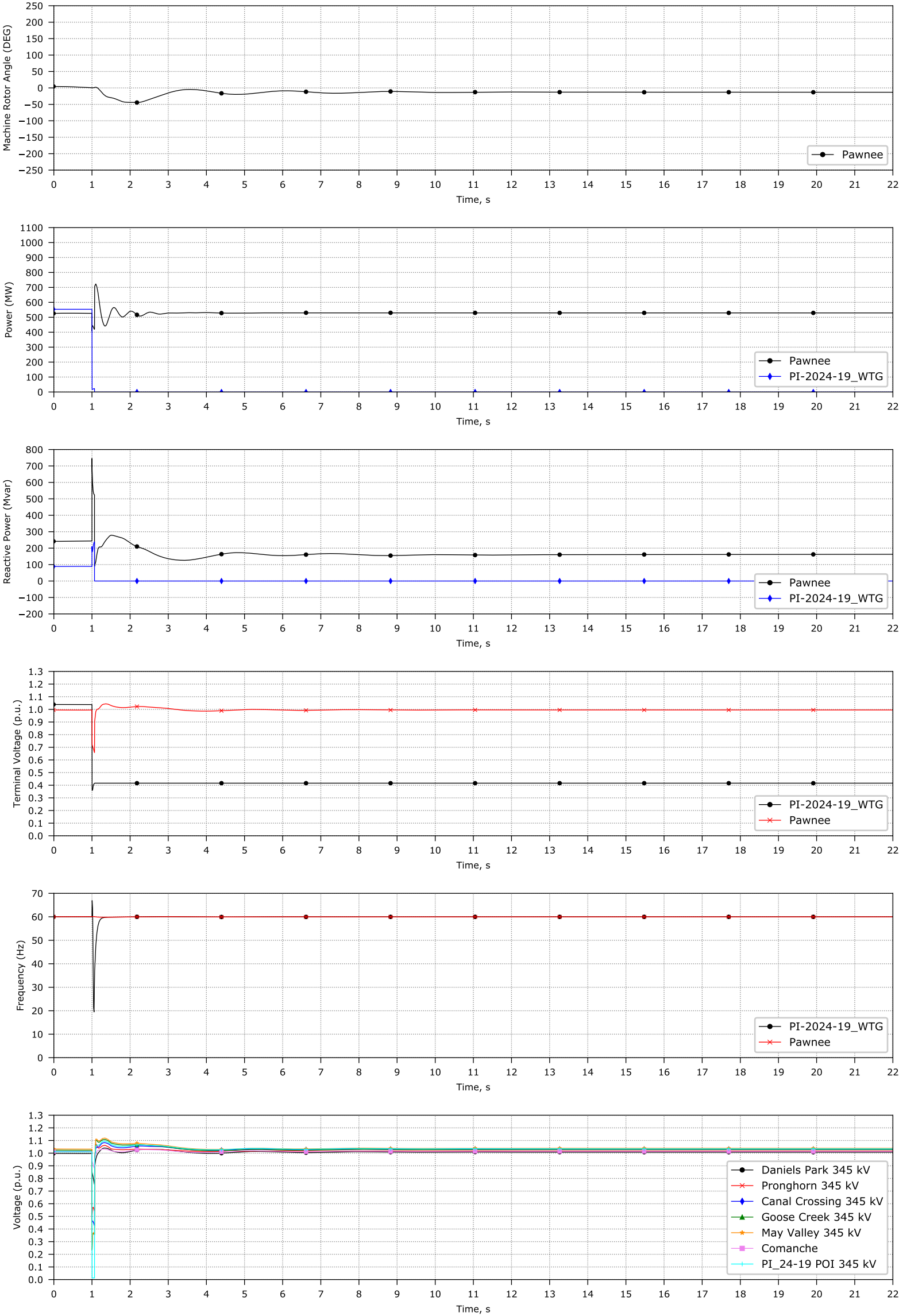
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