

Renewables Monitoring with PI and Predictive Analytics at Southern Power

Keith Dickey

Who is Southern Power?



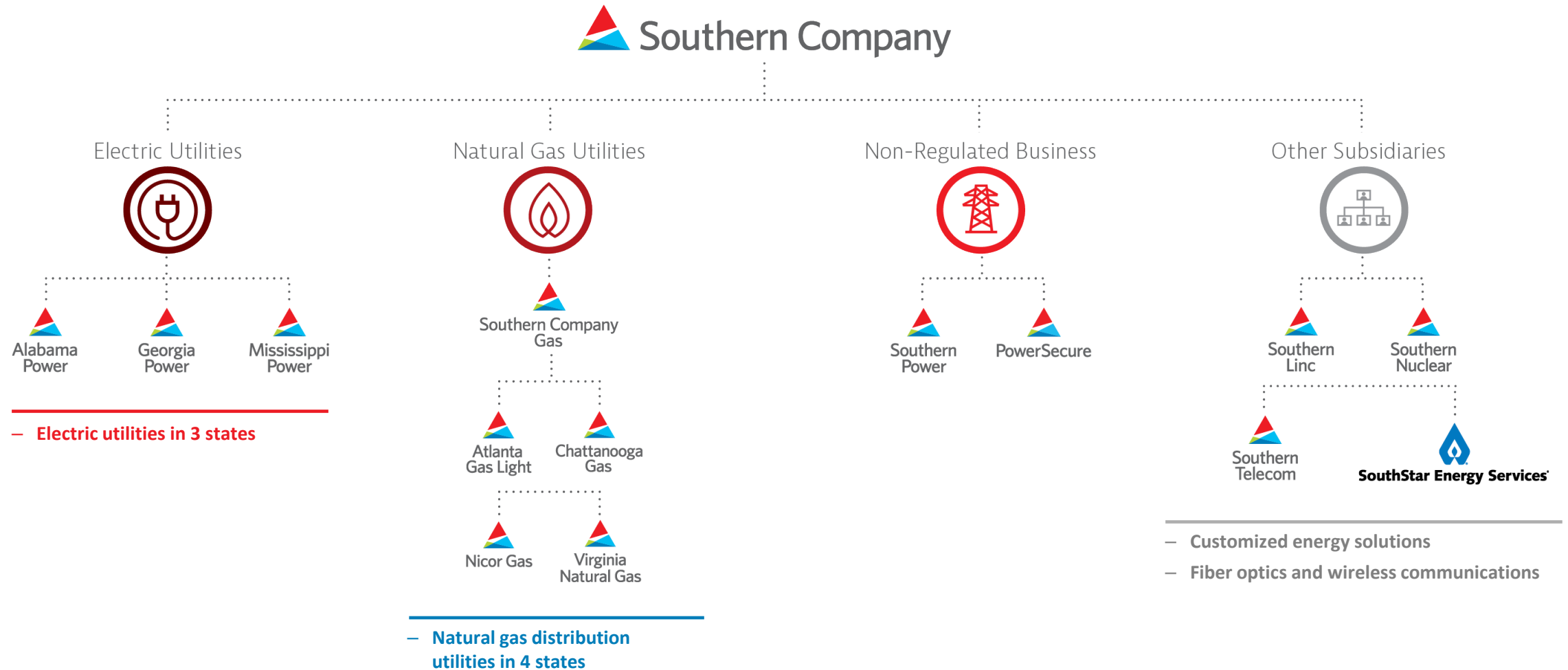
Southern Power is a leading U.S. wholesale energy provider meeting the electricity needs of municipalities, electric cooperatives, investor-owned utilities, and commercial and industrial customers.

We help **build the future of energy** as America's premier wholesale energy partner by investing in clean energy solutions for the customers we serve.

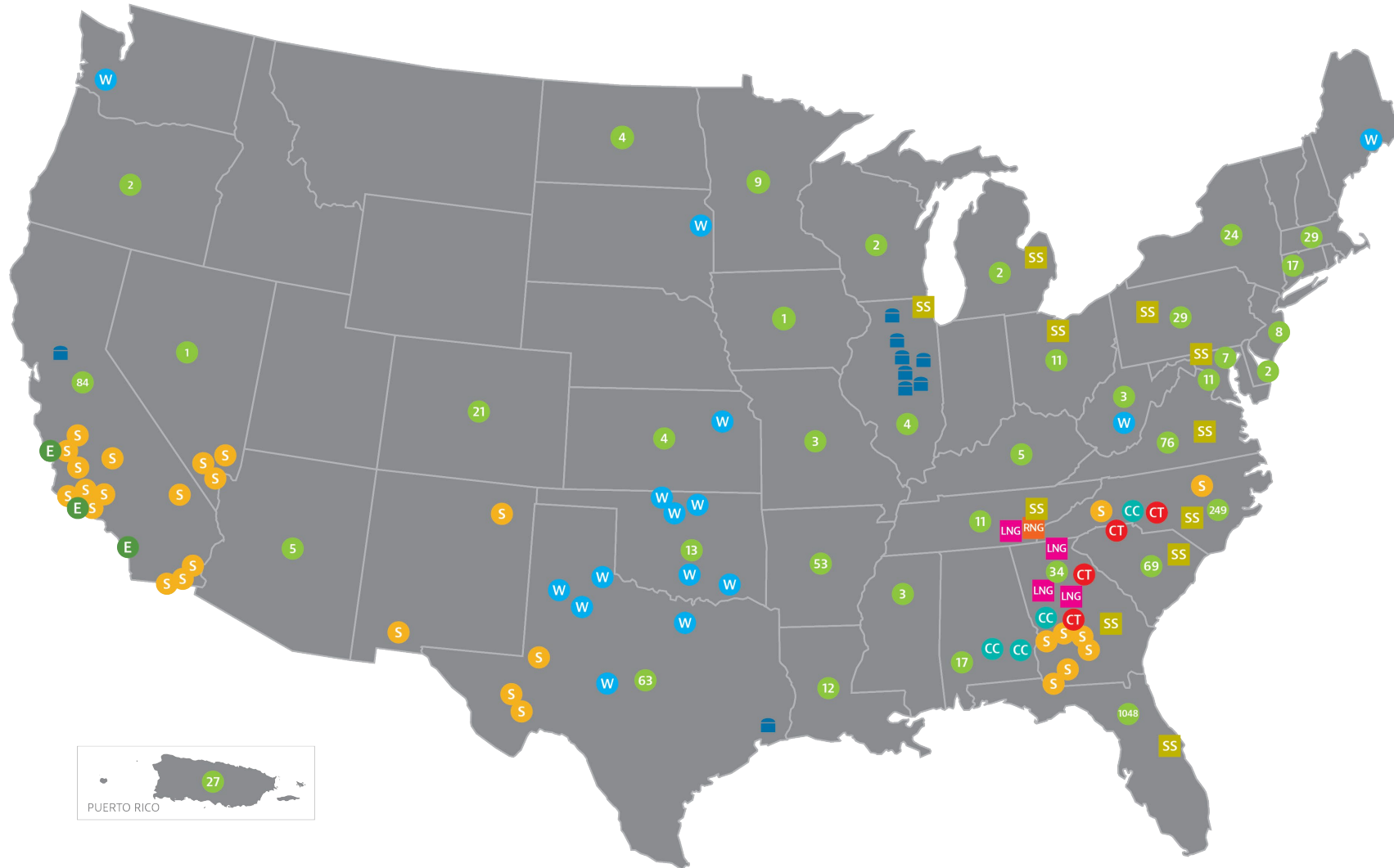
Surpassing **12,500 MW** of owned generation capacity, we represent the largest renewable and gas-fired fleet in the Southern Company system.

Our family of companies

We support U.S. customers and businesses nationwide



Southern Company System Footprint



Southern Power

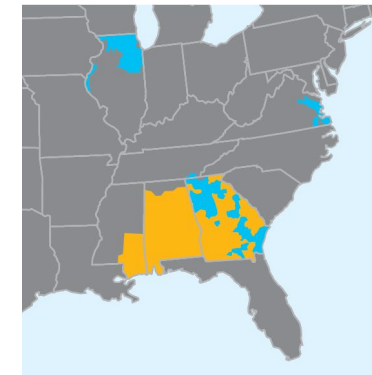
- CC Combined-cycle facility
- CT Peaking facility
- S Solar facility
- W Wind facility
- E Energy storage

Southern Company Gas

- LNG LNG facilities
- SS SouthStar
- Natural gas storage
- RNG Renewable natural gas

PowerSecure

- # Owned and/or managed sites per state



Service territories

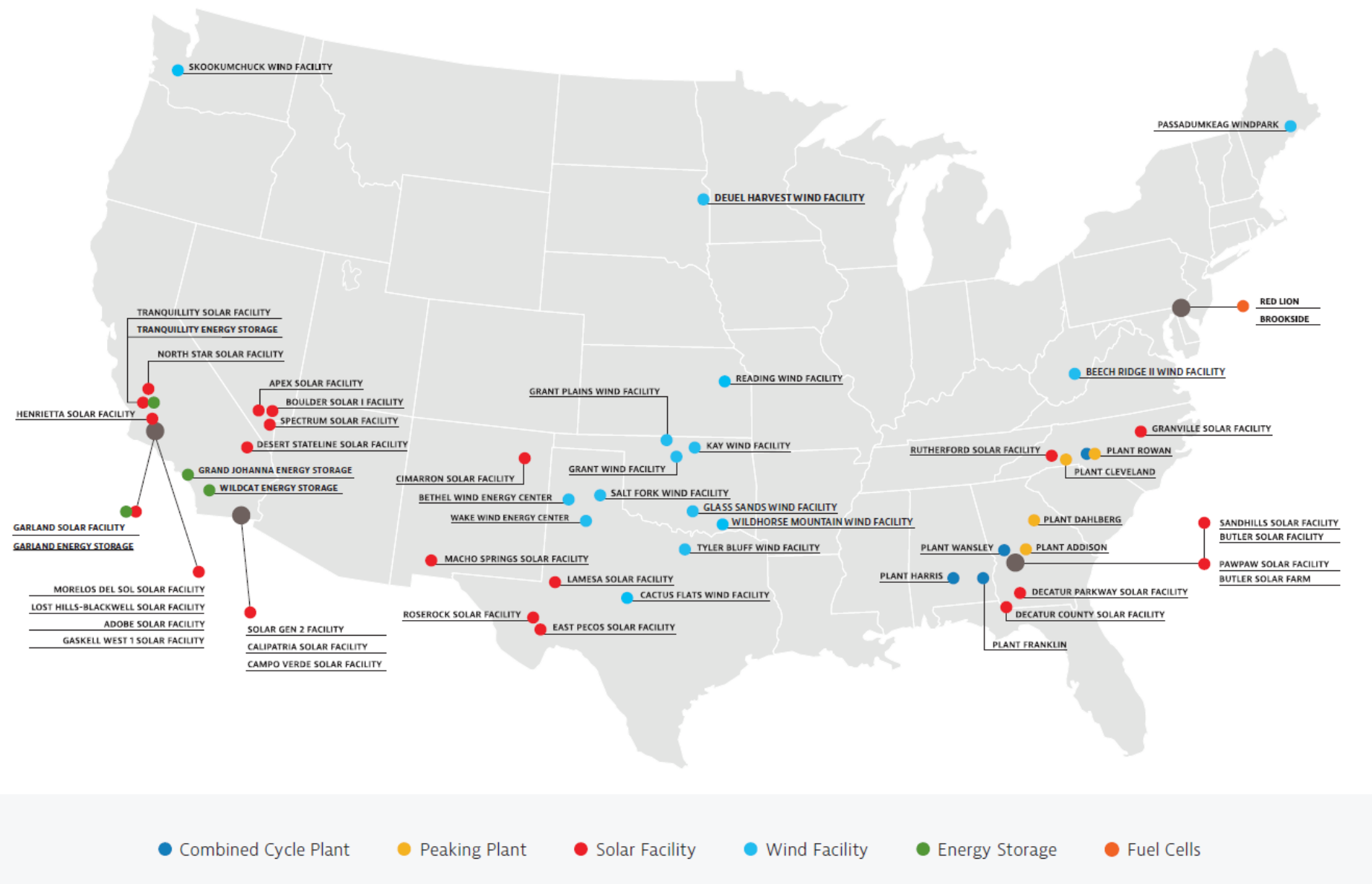
- Electric
- Gas



Gas pipelines

- Southern Natural Gas
- Southern Company Gas

Southern Power Generating Plants




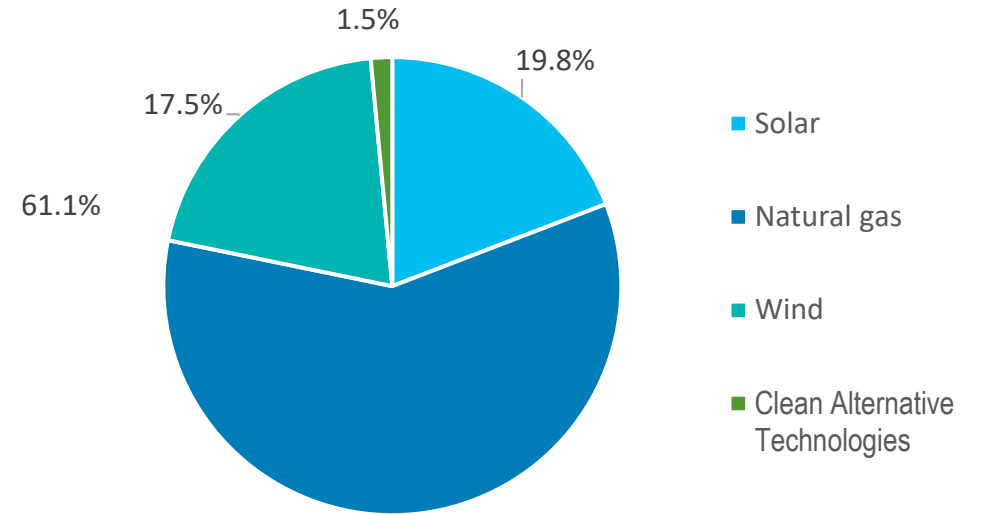
By the Numbers

12,502 total megawatts

4,930 MW renewable energy

Operations in 14 states


More than 500 employees



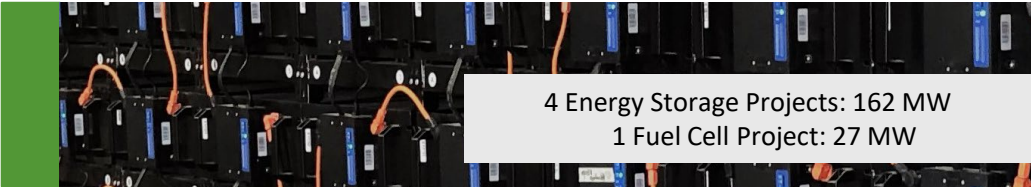
15 Wind Facilities: 2,535 MW



28 Solar Facilities: 2,395 MW



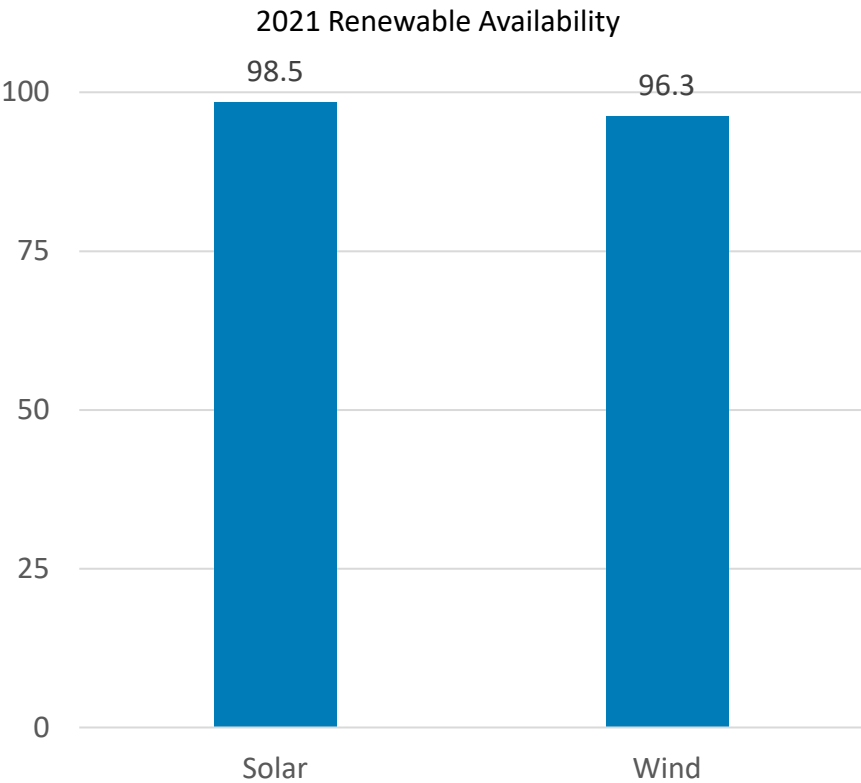
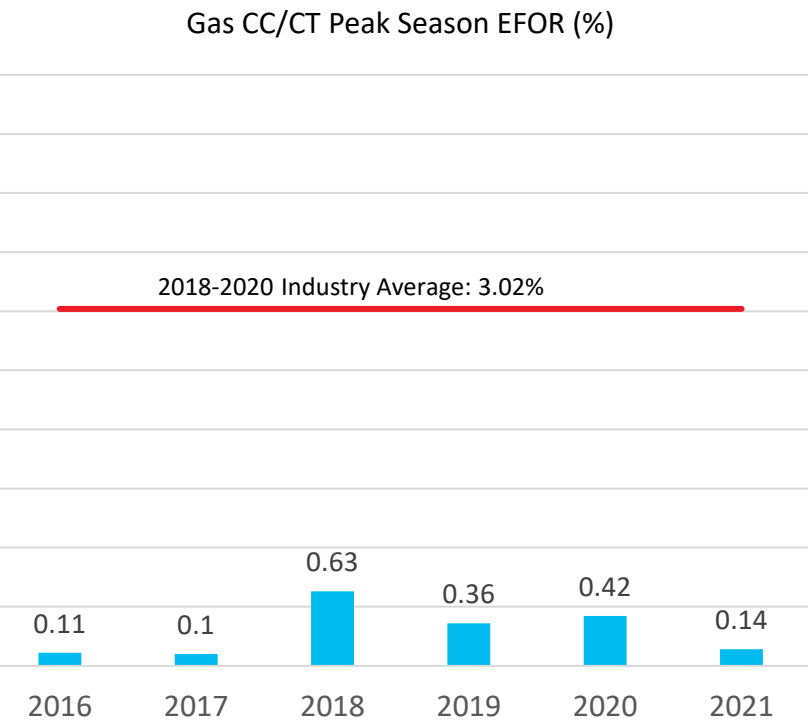
7 Natural Gas Facilities: 7,380 MW



4 Energy Storage Projects: 162 MW
1 Fuel Cell Project: 27 MW

Superior Operational Performance

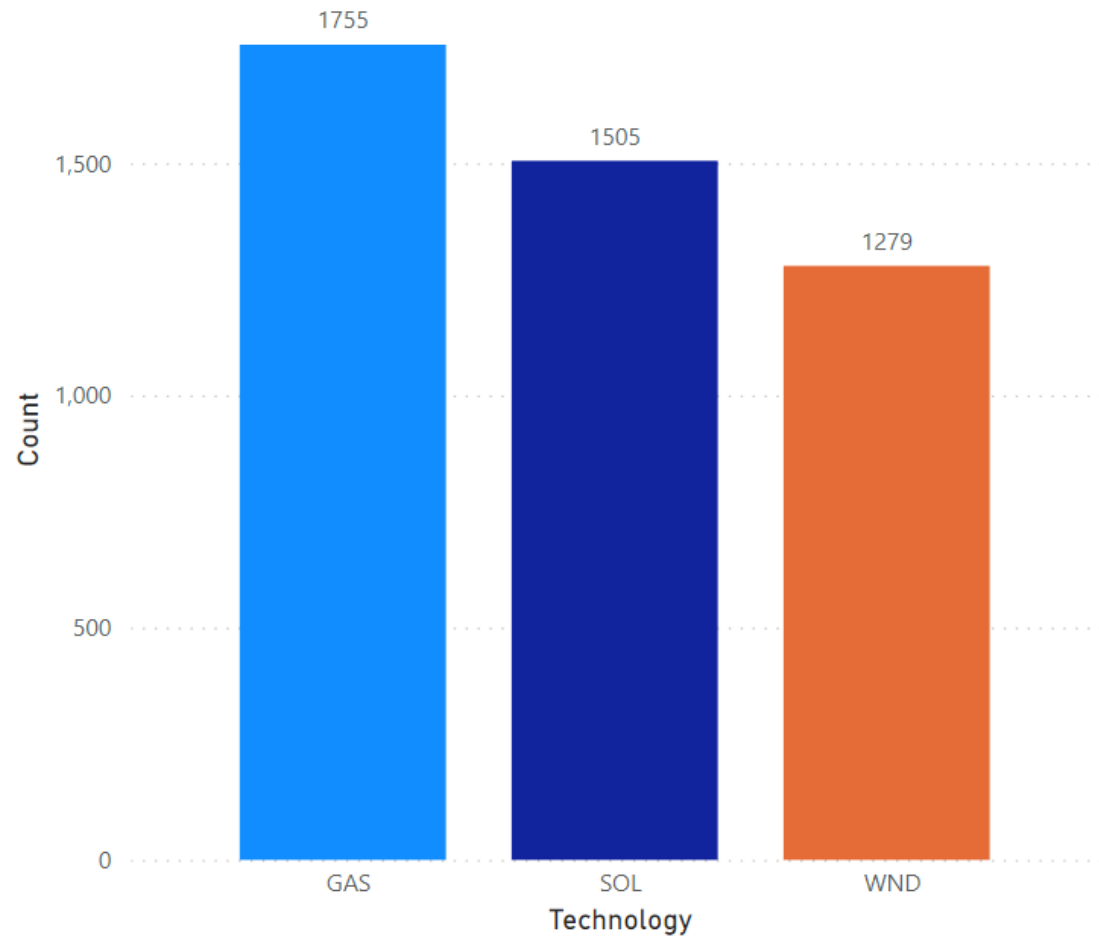
Delivering on key operating performance metrics illustrates our commitment to operational excellence and helps to ensure contractual commitments to customers are met



Models in AVEVA Predictive Analytics

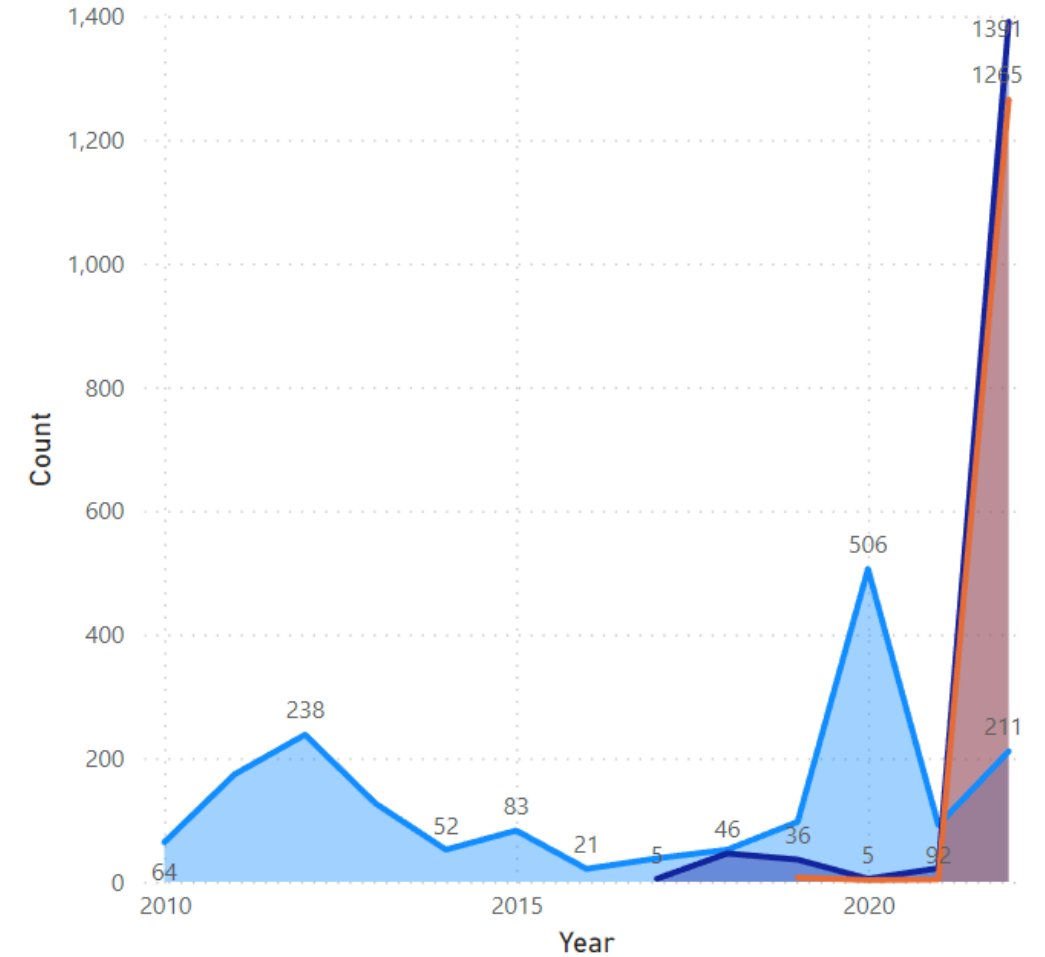
Deployed Model Count

Technology ● GAS ● SOL ● WND



Model Created Date

Technology ● GAS ● SOL ● WND



Automated Model Builder

Project Loader Configuration

STEP 1: ENTER CONFIGURATION SETTINGS

Choose Mapping File

Mapping File Selected:

RTS Name (Default):

Asset Folder Name (Default):

Training Set Name:

Start Time (mm/dd/yyyy hh:mm:ss):

End Time (mm/dd/yyyy hh:mm:ss):

Training Data Frequency (s):

Outlier Scale (0-100):

Deploy Profile? ☒

Profile Name:

Create JSON Files

STEP 2: CREATE PROJECTS

Choose Folder Containing JSON Files

JSON Folder Selected:

Create Projects

Status: Ready

Open Project

Project Find Project:

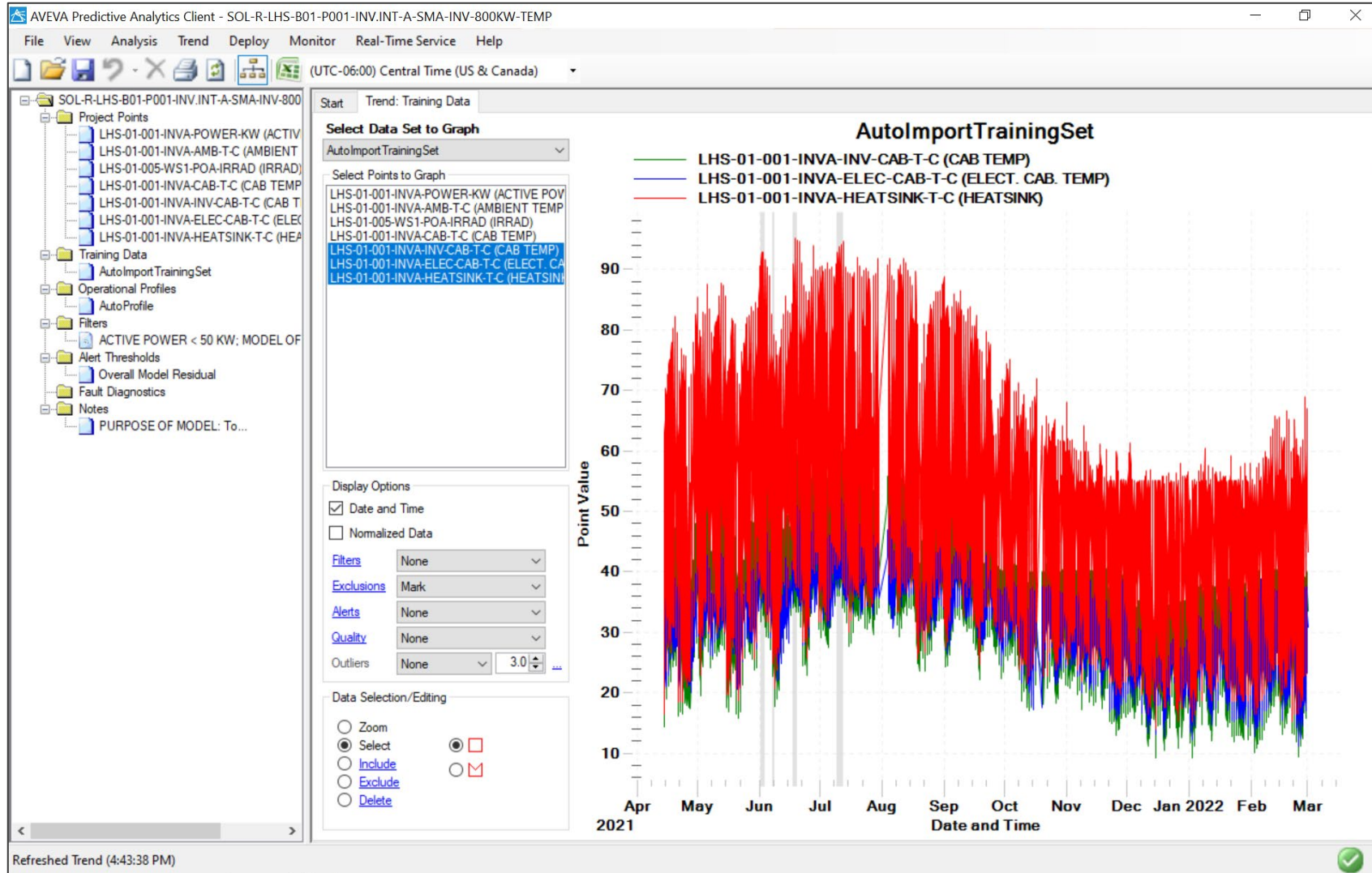
Select a project to open from the list below, or click "New..." to create a new project.

Asset	Project	Created Date	Last Accessed Date	Deployed
Butler Solar I	SOL-R-LHS-B01-P003-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 7:57 AM	5/23/2022 10:28 AM	Deployed
Calipatria	SOL-R-LHS-B01-P013-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:05 AM	3/8/2022 9:23 AM	Deployed
Campo Verde	SOL-R-LHS-B01-P013-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 8:05 AM	3/8/2022 9:22 AM	Deployed
Cimarron	SOL-R-LHS-B01-P012-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:04 AM	3/8/2022 9:21 AM	Deployed
Decatur Park	SOL-R-LHS-B01-P012-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 8:04 AM	3/8/2022 9:20 AM	Deployed
East Pecos	SOL-R-LHS-B01-P011-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:04 AM	3/8/2022 9:19 AM	Deployed
Garland A	SOL-R-LHS-B01-P011-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 8:03 AM	3/8/2022 9:18 AM	Deployed
Garland B	SOL-R-LHS-B01-P010-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:03 AM	3/8/2022 9:14 AM	Deployed
Gaskell	SOL-R-LHS-B01-P010-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 8:02 AM	3/8/2022 9:13 AM	Deployed
Granville	SOL-R-LHS-B01-P009-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:02 AM	3/8/2022 9:12 AM	Deployed
Henrietta	SOL-R-LHS-B01-P009-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 8:02 AM	3/8/2022 9:11 AM	Deployed
Lamesa	SOL-R-LHS-B01-P008-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:01 AM	3/8/2022 8:55 AM	Deployed
Lost Hills	SOL-R-LHS-B01-P007-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:00 AM	3/8/2022 8:54 AM	Deployed
Macho Springs	SOL-R-LHS-B01-P006-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 8:00 AM	3/8/2022 8:52 AM	Deployed
Morelos	SOL-R-LHS-B01-P005-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 7:59 AM	3/8/2022 8:48 AM	Deployed
North Star	SOL-R-LHS-B01-P005-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 7:59 AM	3/8/2022 8:25 AM	Deployed
Paw Paw	SOL-R-LHS-B01-P004-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 7:58 AM	3/8/2022 8:22 AM	Deployed
Roserock	SOL-R-LHS-B01-P002-INV-INT-B-SMA-INV-800KW-TEMP	3/8/2022 7:57 AM	3/8/2022 8:17 AM	Deployed
Rutherford	SOL-R-LHS-B01-P003-INV-INT-A-SMA-INV-800KW-TEMP	3/8/2022 7:56 AM	3/8/2022 8:16 AM	Deployed
Sandhills				
SG2 Alhambra				
SG2 Arkansas				
SG2 Sonora				
Spectrum				
Stateline				

Show Sub-Projects

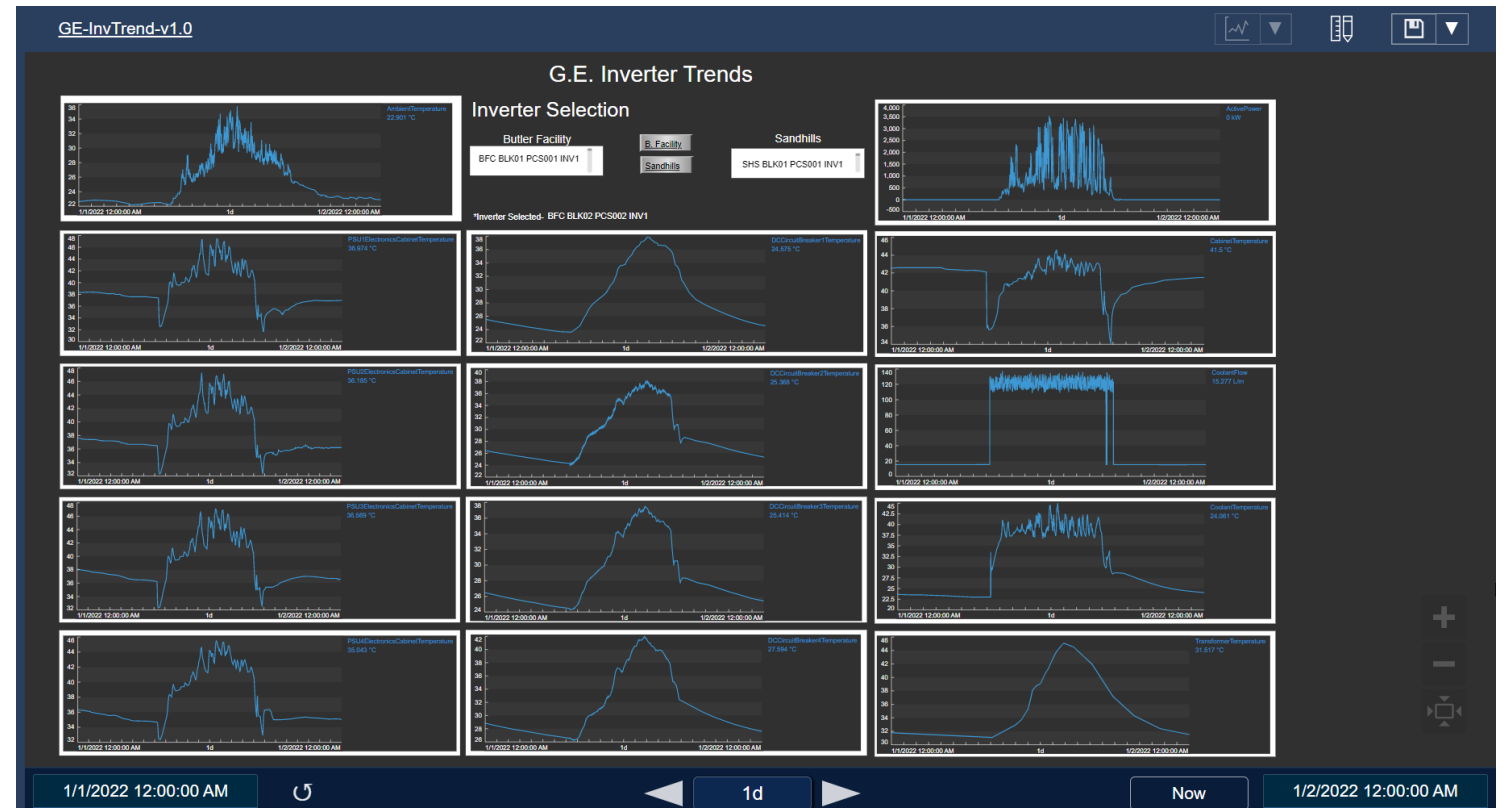
New Project... Open Cancel

Automated Model Builder



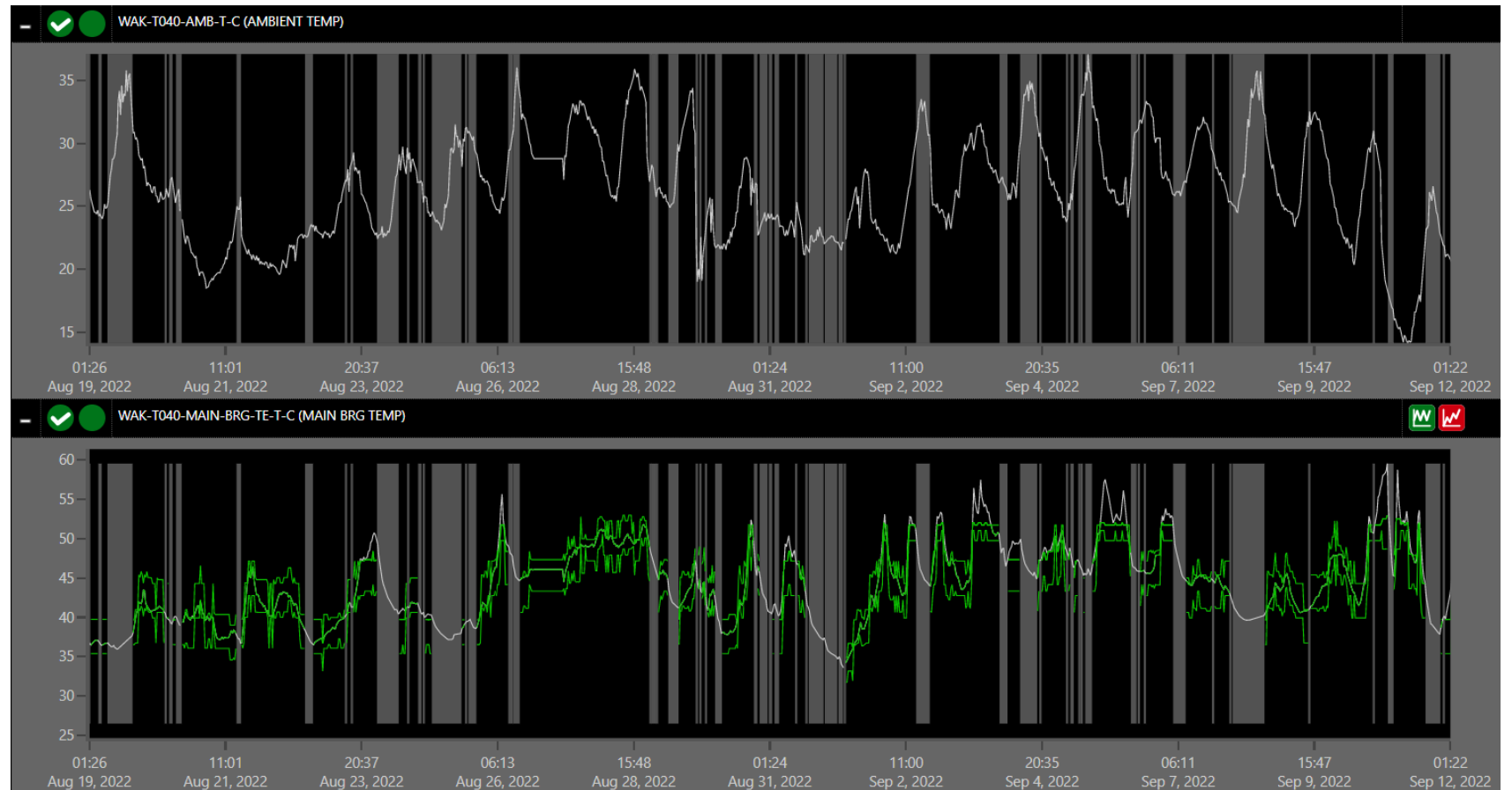
Solar Monitoring Strategy

- Inverter Temperatures
- GSU Bushings
- Medium Voltage Transformers

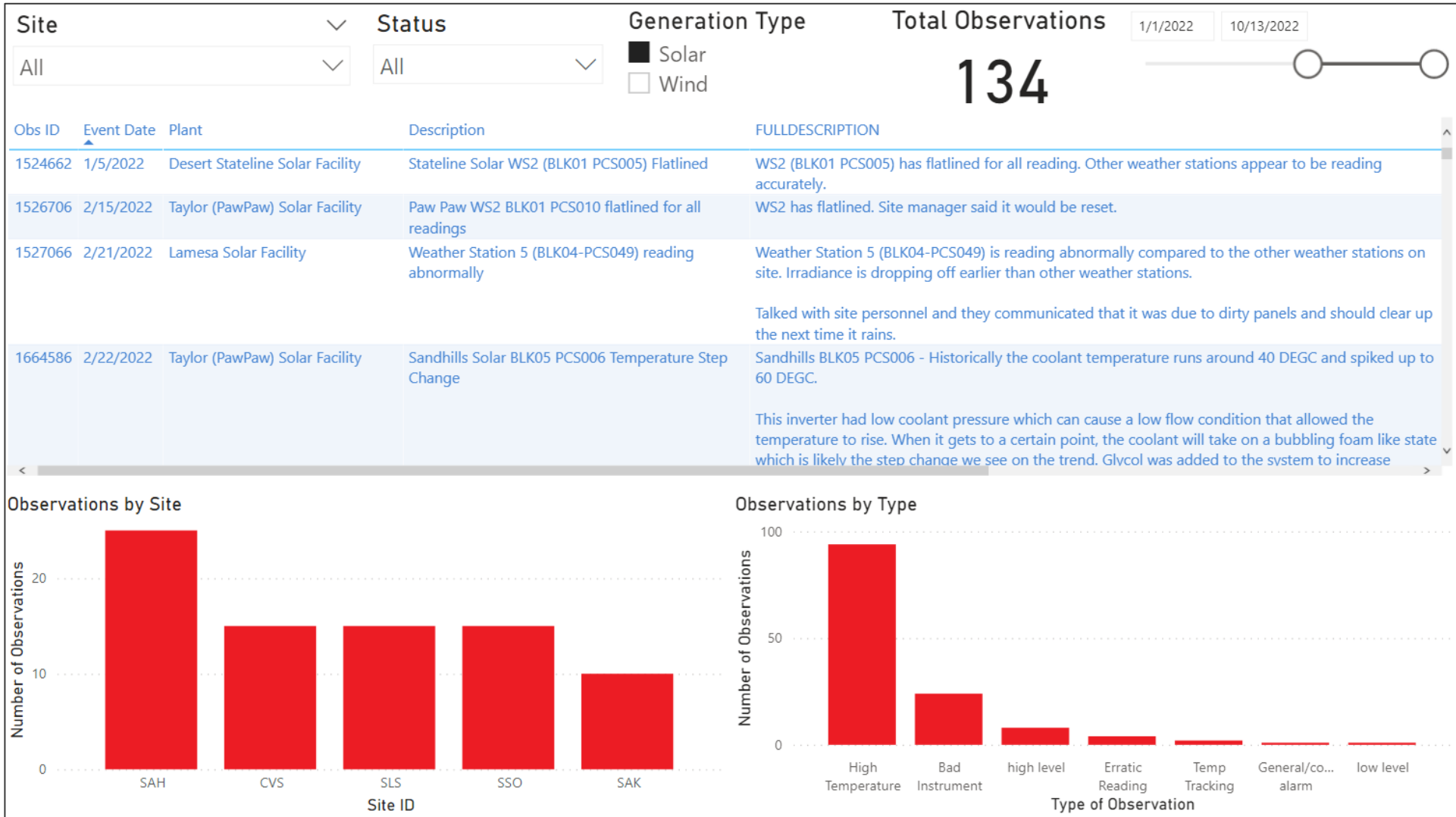


Wind Monitoring Strategy

- Drive Train Temperatures
- GSU Bushings
- CMS for Drive Trains

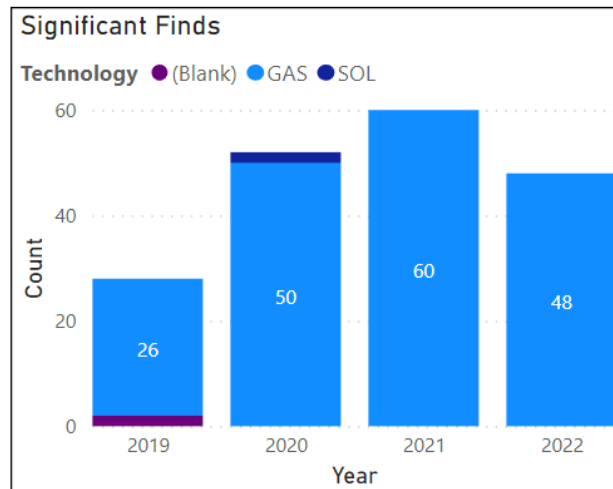
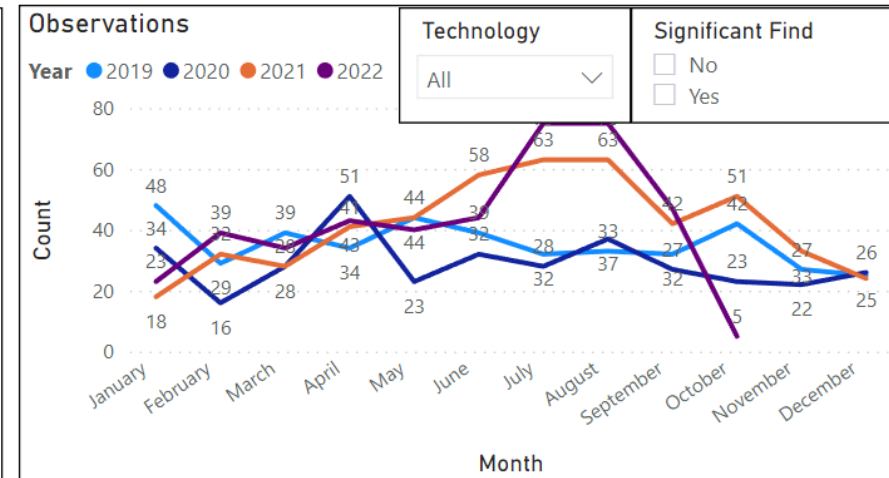
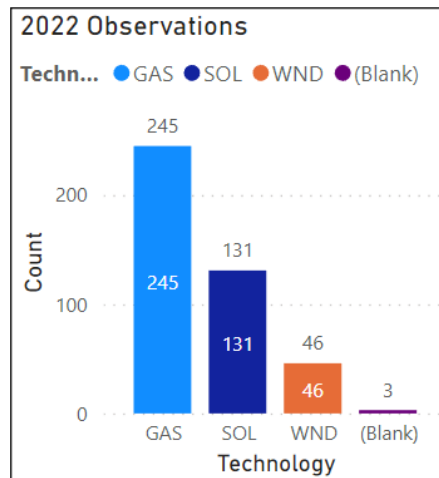
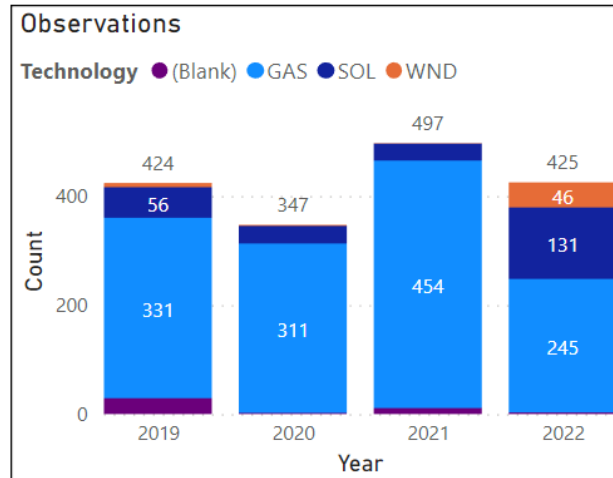


AVEVA Predictive Analytics with BI



AVEVA Predictive Analytics with BI

SPORT-OT - Finds



Event Date	Model Name	Description
9/9/2021	GAS-R-WAN-6-A-0-W-HP-HRSG-DRUM-LVL	6A HP Drum #3 Transmitter Deviation
9/9/2019	GAS-R-HAR-2-B-0-W-LP-HRSG-ECON-TEMP	HAR2-HRSG-B-LPECON-REL Econ-CND-2-T erratic
9/8/2021	SOL-P-RRK-BLK00-PCS000-X-IRRAD.POA-WS-SITE-COMP	Weather Station 1- all tags in bad quality
9/8/2021	SOL-P-TRQ-BLK00-PCS000-X-IRRAD.POA-WS-SITE-COMP	Weather Station 3 POA Bad Quality
9/8/2019	GAS-R-DAH-5-X-0-V-ASSMLY-GT-BRG-TEMP	DAH5-GT-BRG-TEMP-REL; 5-TURB-BRG-1-TMP-1-T >240 DEGREES
9/8/2019	GAS-R-FRA-2-A-0-V-ASSMLY-GT-BRG.TCD-TEMP	FRA2-GTA-BRG-TEMP-TRANS-CD
9/8/2019	GAS-R-HAR-2-A-1-M-ASSMLY-BFP-SYS1-GAP	HAR2-BFP-A1-SYS1-GAP-REL
9/8/2019	GAS-R-ROW-4-A-B-M-ASSMLY-BFP-STAT.BRG-TEMP	ROW4-A-BFP-B-TEMP-REL; MOTOR DRIVE END BRG ELEVATED TEMP
9/7/2022	GAS-R-HAR-2-A-0-W-HP-HRSG-SPRAY-TEMP	Harris 2A HP Desuperheater Spray Flow Increase
9/7/2021		Decatur County Block 2 PCS001 Inverter 1 - Reactor Temperature Step Increase



Southern
Power