AVEVAWORLD

ACCELERATE INDUSTRIAL INTELLIGENCE

AVEVA World: SSEN Transmission Network Situational Awareness

Adrian Ferguson
Lead OT Project Manager, SSEN Transmission

Eduan Smit
Digital Solutions Owner, Capula

CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

About Us

Adrian Ferguson

Lead OT Project Manager

SSEN Transmission

- 30 years industry experience
- Senior leadership and team development
- SCADA, AVEVA PI System, Cyber Security, Regulatory/Government liaison

Eduan Smit

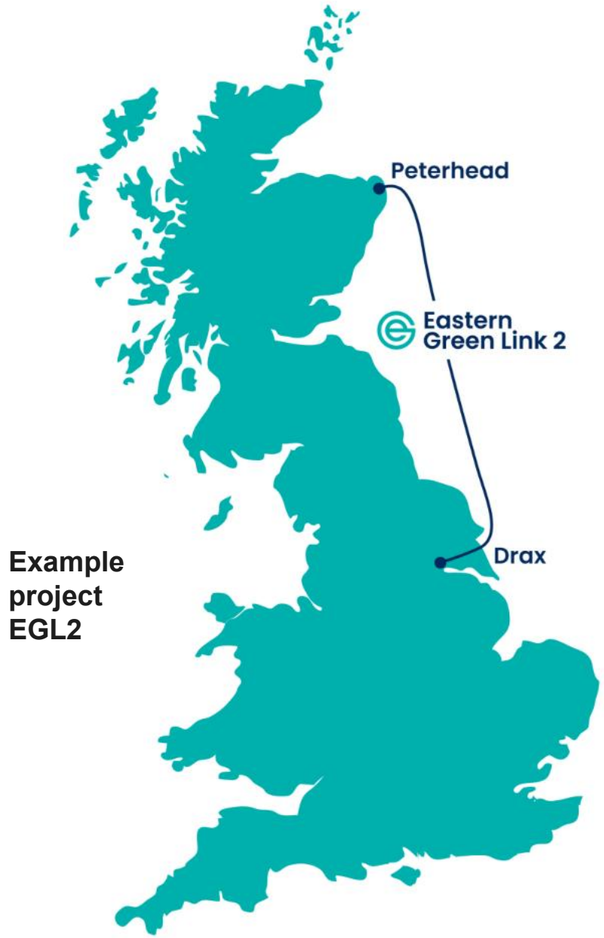
Lead PI System SME

Capula

- Chemical Engineer
- Solution Architect
- 30 years of AVEVA PI System experience in wide variety of industry

About SSEN Transmission

- We are responsible for the electricity transmission network in the north of Scotland, building a network for Net Zero - the clean energy transition.
- We facilitate the delivery of power from the source of generation, primarily offshore and onshore wind and hydro to the demand centres in the south of the UK.
- We are investing billions of UK Pounds into the Scottish Economy.



Example project EGL2

At an investment of over £4bn, EGL2 is the largest ever single investment in the UK transmission system.

CAPULA

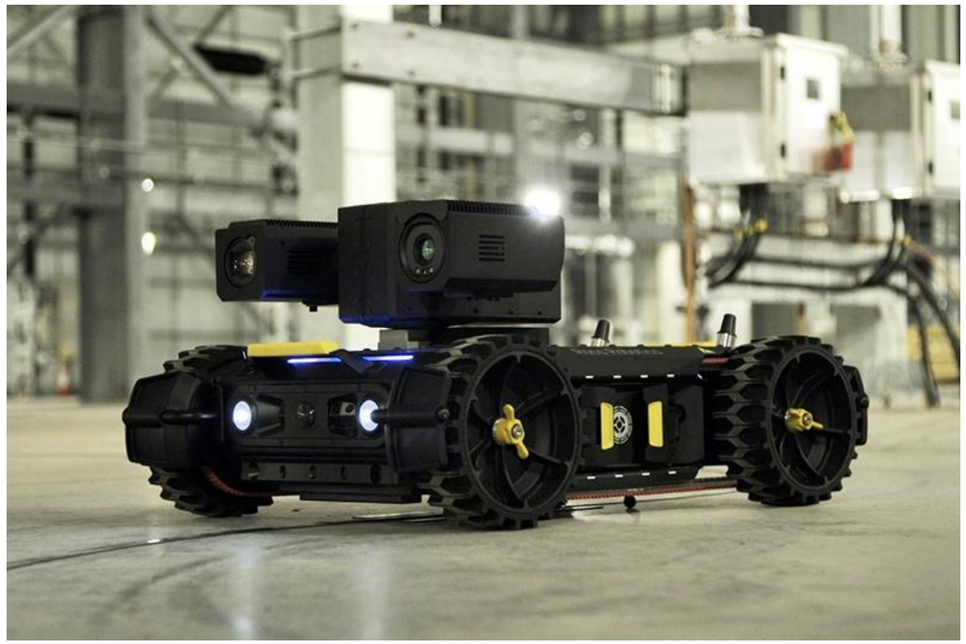
Scottish & Southern Electricity Networks
TRANSMISSION

Business Challenge

Information is there but it is behind walls of our own making

Security (Control Room)

- Control System
- Data Historian
- Fault Recorders
- Dynamic Line Rating
- State Estimation
- Contingency Planning



Accessibility (Asset teams)

- Transformer Systems
- Asset Management System
- Site Records
- GIS System
- Specialised Systems

CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Business Challenge

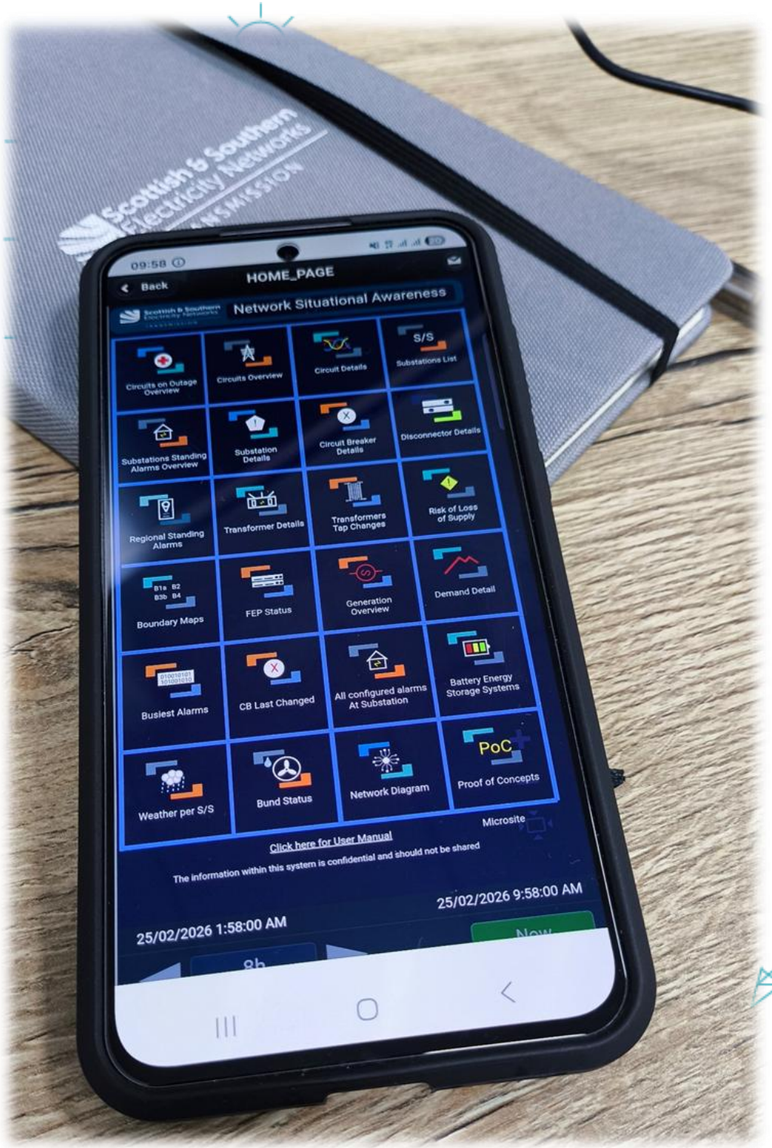
1. There was no simple way to access essential **OT Information** for **Control Teams, Field Engineers, Management and Directors**
2. There is a large amount of information within OT known as “***dark data***” that currently is not surfaced
3. PI Data (Historian) is not **“contextualised”**
4. Much of the Information that is currently prepared is done so **manually**, can be subject to error and is laborious to produce
5. Data quality and accuracy has never fully been examined

This introduces **delay** and **risk and reduces operational efficiency. It costs real money!**

What We Aimed To Achieve

- Enable **quick** and **meaningful** access to information currently locked in OT.
- **Reduce** the demand on the Control Centre for data requests.
- Provide network situational awareness **beyond the control centre to** the field environments.
- Merge OT and IT data, to **provide context** and to aid in effective decision making.
- Ensure, where possible, that OT **data quality** issues have been addressed.
- Build a framework for **future developments.**

Reinforces SSE's market leading position in the execution of its digital strategy and in delivering key components of that action plan



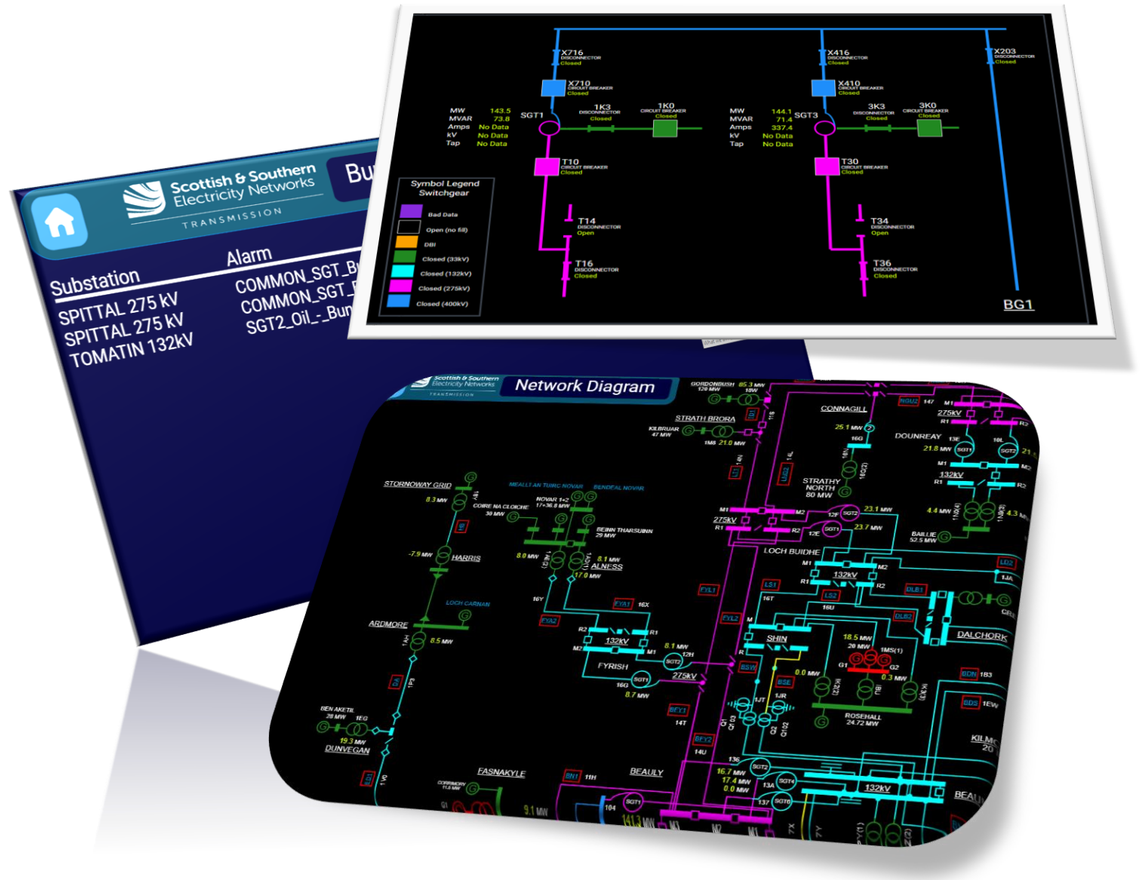
CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

What We Delivered

A fully accessible PI Vision hosted system

Circuit Outages	Delivered
Circuit Breaker Details	Delivered
Standing Alarms	Delivered
Transformer Details	Delivered
Generation Overview	Delivered
Busiest Alarms	Delivered
Battery Storage	Delivered
Weather at Substation	Delivered
Network Diagram	Delivered
Substation Details	Delivered
Fire System Overview	Delivered
Plus 28 further screens	Delivered



- 530 screens developed and in use.
- New ideas added every week
- Improvement in speed of screen and asset completion

CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Benefits – User Comments

BLUE	RED	YELLOW	BLUE CHANGE DIRECTION	RED CHANGE DIRECTION	YELLOW CHANGE DIRECTION
40.79 kg/m3	40.649 kg/m3	40.7 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Rising
40.989 kg/m3	41.02 kg/m3	41.09 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Falling
40.899 kg/m3	40.11 kg/m3	40.54 kg/m3	Gas Level Rising	Gas Level Rising	Gas Level Rising
40.719 kg/m3	41.219 kg/m3	41.229 kg/m3	Gas Level Rising	Gas Level Rising	Gas Level Rising
40.059 kg/m3	40.7 kg/m3	41.139 kg/m3	Gas Level Rising	Gas Level Rising	Gas Level Rising
40.36 kg/m3	40.619 kg/m3	40.54 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Falling
40.75 kg/m3	40.959 kg/m3	40.919 kg/m3	Gas Level Rising	Gas Level Rising	Gas Level Rising
41.559 kg/m3	41.619 kg/m3	41.489 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
41.049 kg/m3	41.319 kg/m3	41.04 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling

"It has been **cutting down** on the number of systems that I need to go between, reducing the time needed for me to get the data I require."

"It is great for the planning team, giving us more control over what gets done, **without wasting** time waiting or being sent to the wrong place."

"It has **focused** field teams on the key activities"

"It has provided **easy access** to data"

"I can conduct my business **anywhere** in the world!"

- **Efficiency transformed**
- **Accessibility enhanced**
- **Accuracy of data improved**

CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Turning a Vision into Delivery Success

Eduan Smit

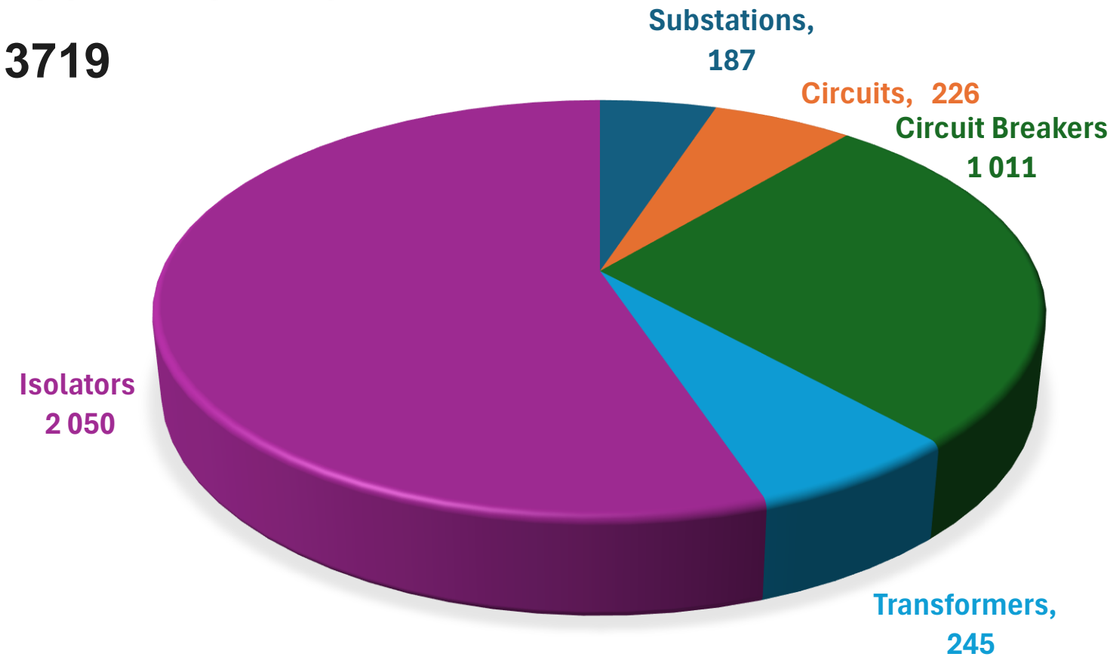
CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

What We Achieved

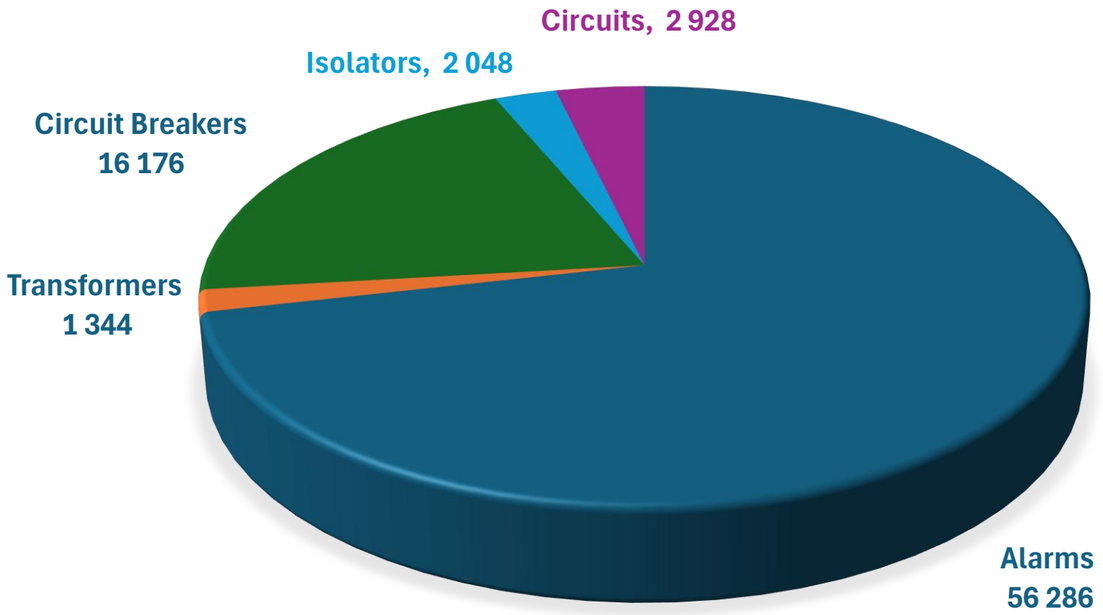
ASSET MONITORED

3719



REQUIRED PI TAGS IN SOLUTION

+78K



Improved Data Quality

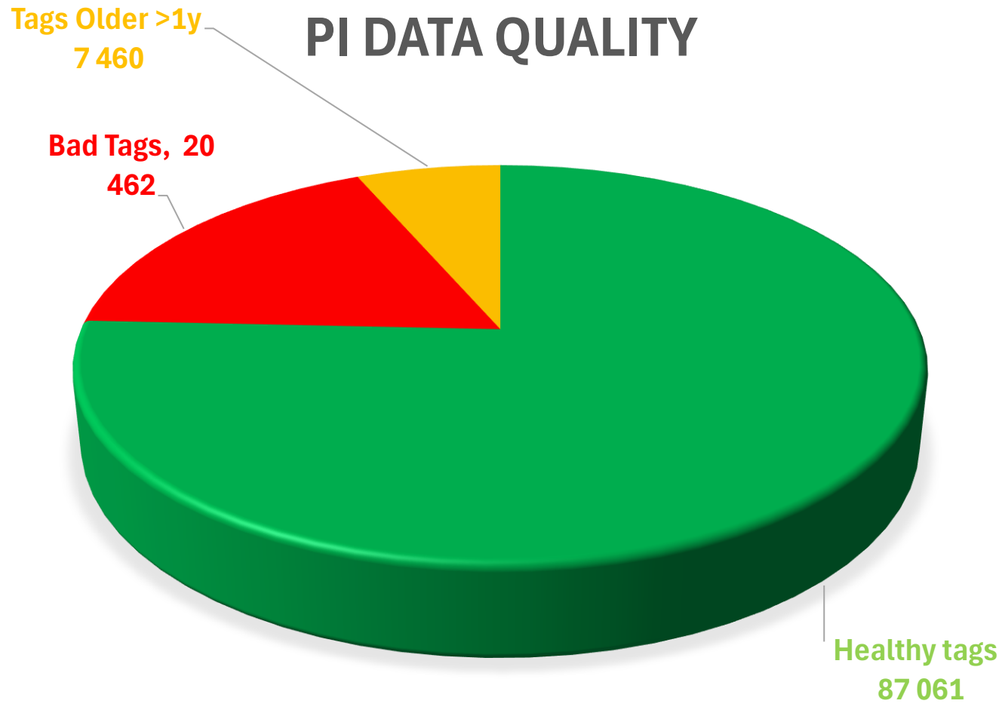
- Source, Control System
- 1st Destination, OT AVEVA PI System
- 2nd Destination, Business AVEVA PI System

Get the Right Data at the Source

- Site Visits
- Correct “Compression” Settings
- Deal with Chattering Data

Stop Inhibiting Data!

- Raise Faults
- Care for the Data
- Care about the Data

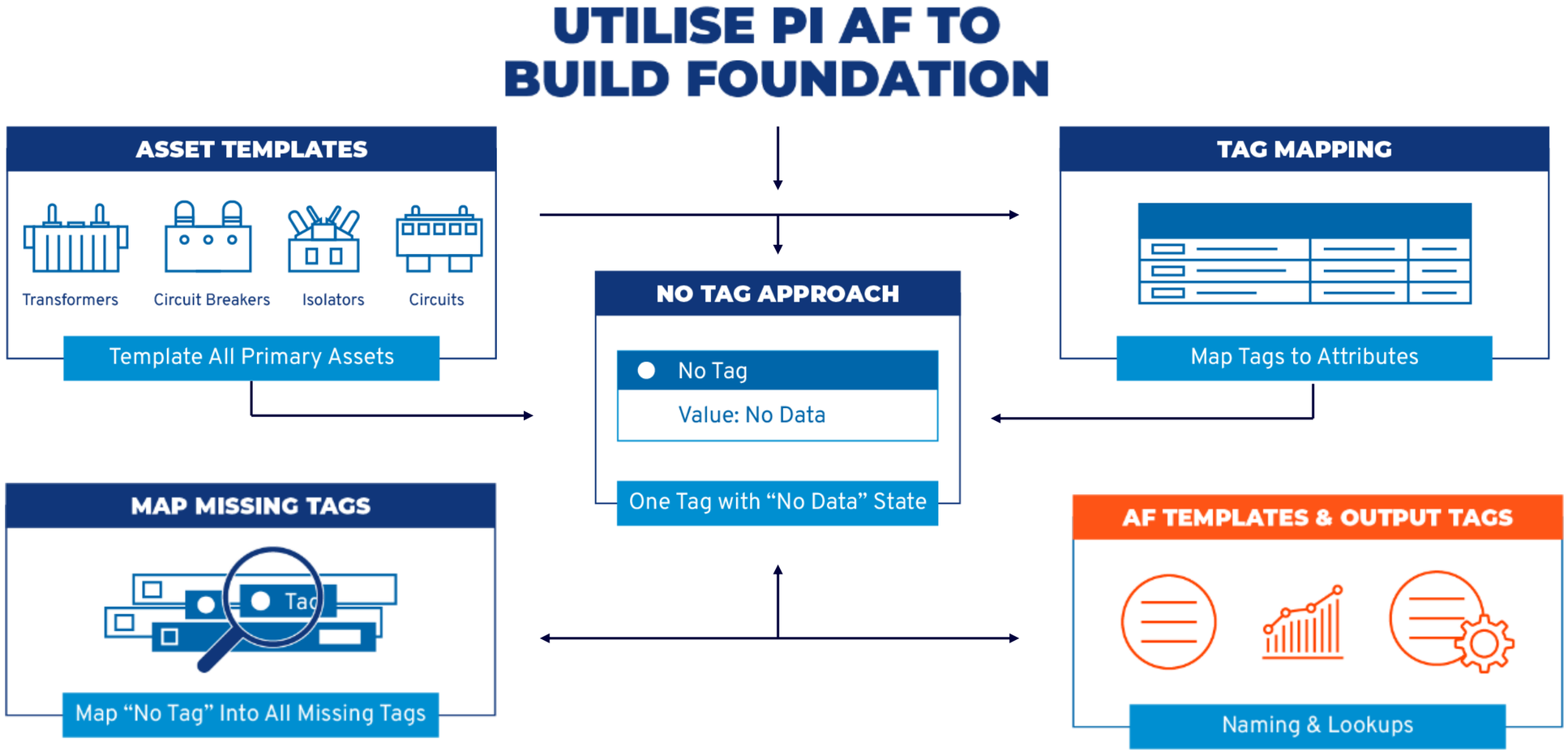


You should view data quality as a high value asset

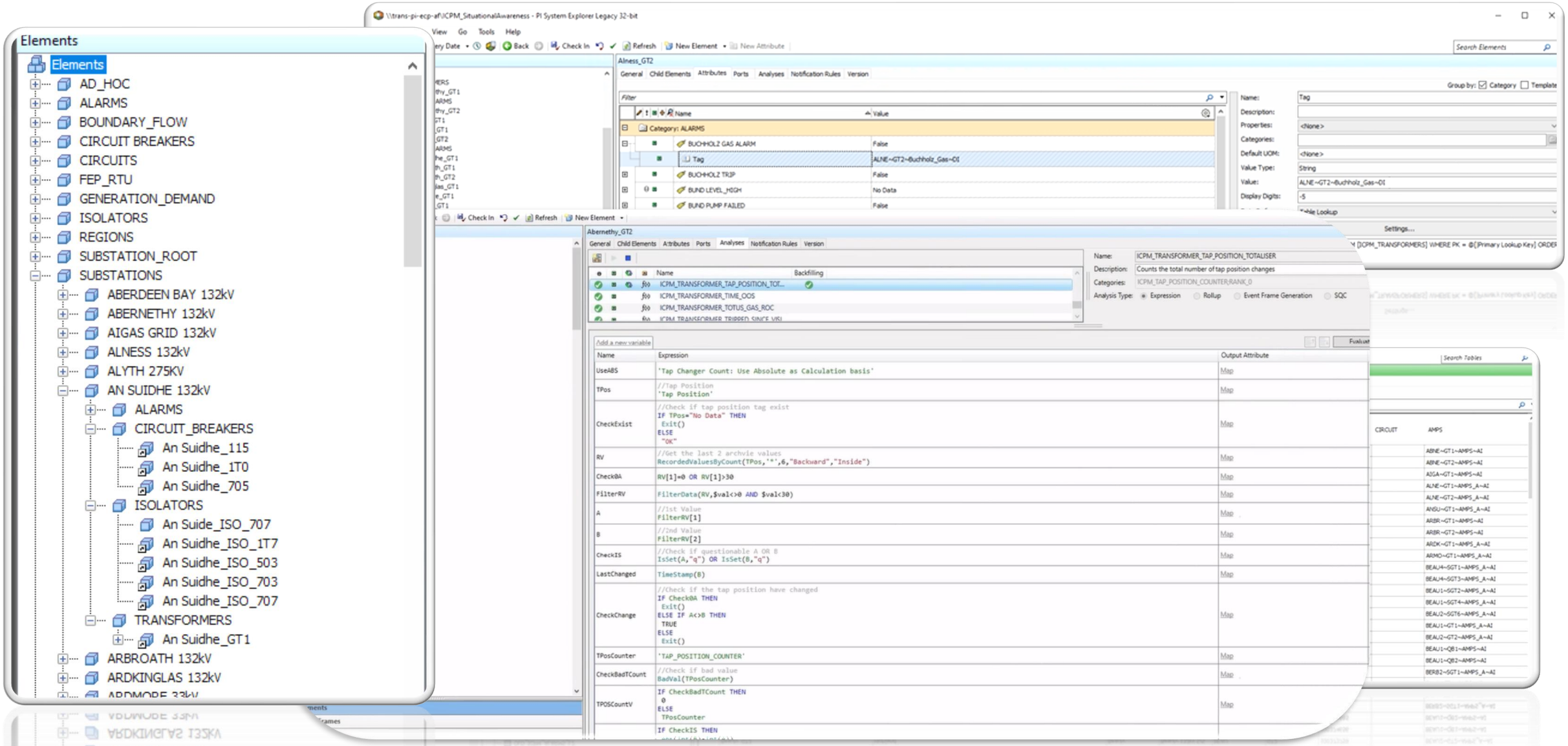
CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Simplify, Standardise, Contextualise



PI AF



CAPULA

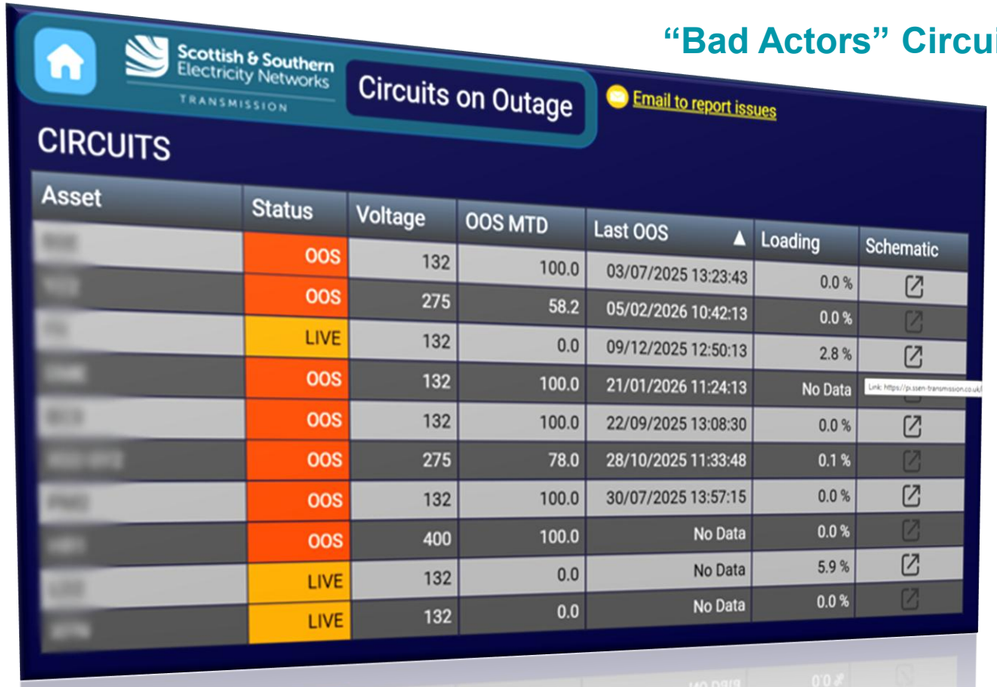
Scottish & Southern Electricity Networks
TRANSMISSION

Situational Awareness: Circuits

Critical Information

- “Bad Actor” – Show Circuits with “Not Good” Status
- All Circuits Display
- Drill down, detailed Display
- Simple Click Journey

“Bad Actors” Circuits



Circuit Details

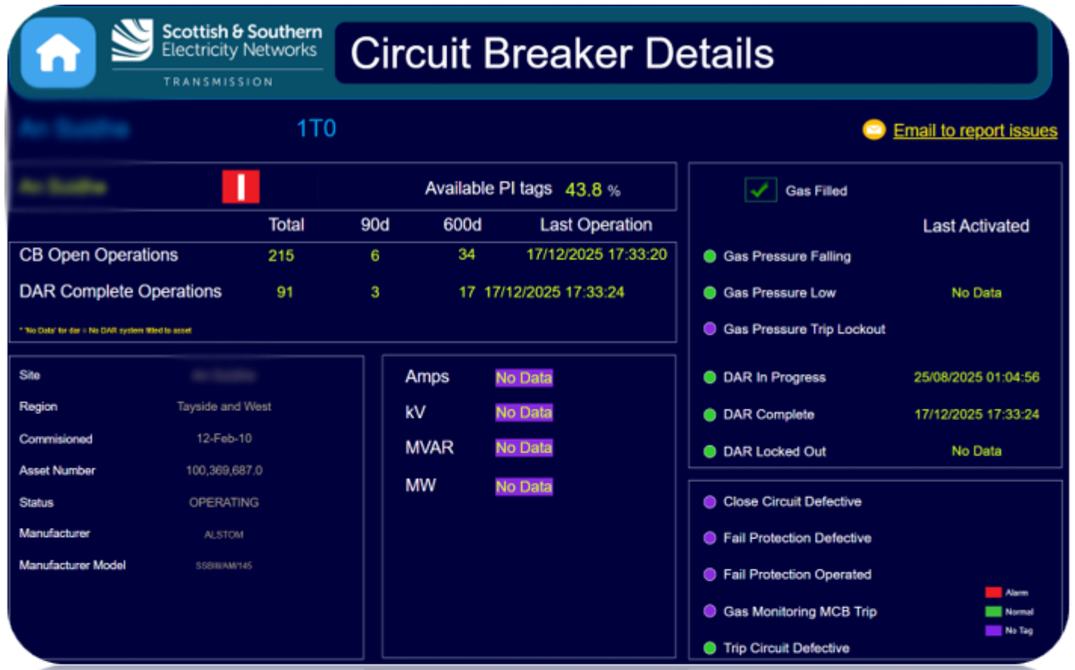
CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Circuits: Detailed Drill Down

- Drill Down Capability into Each Unique Asset
- Collections and Referenced Elements, to Handle Differences

Circuit Breaker details



Transformer details

Substations

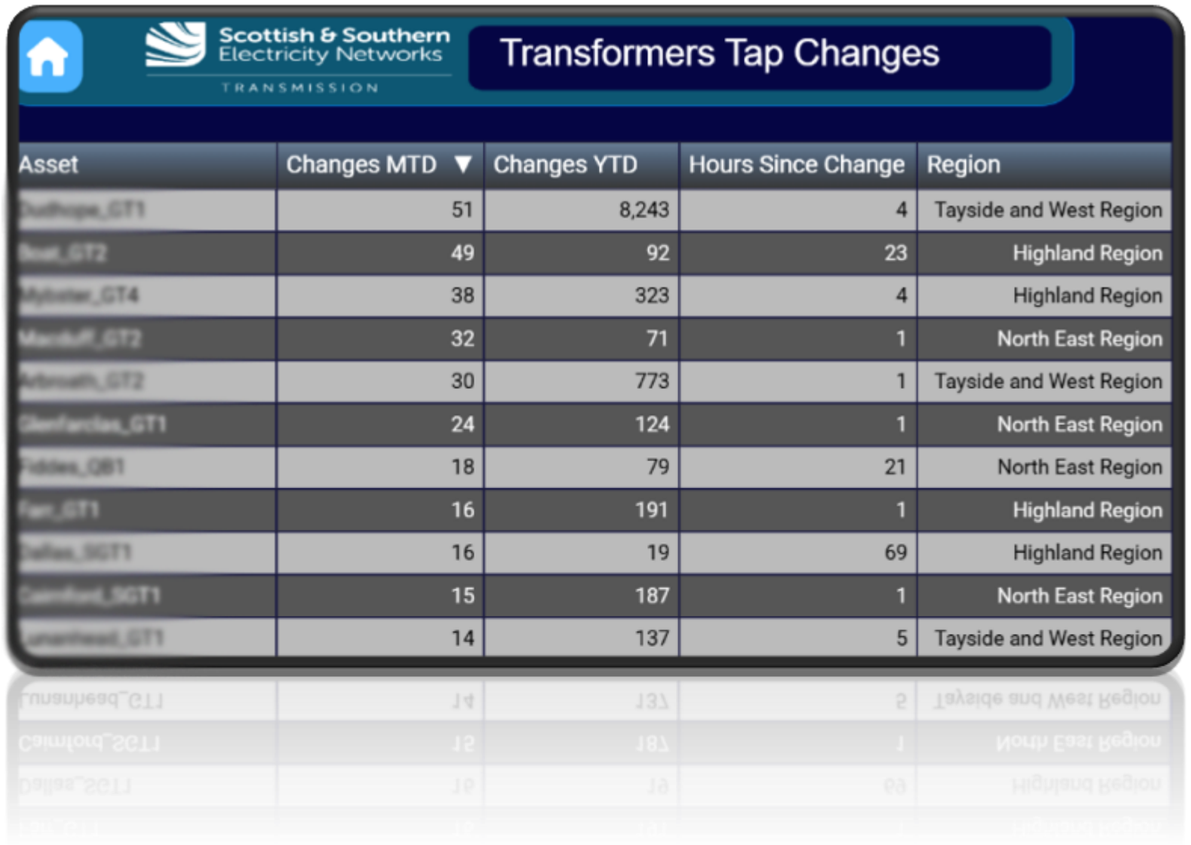
- Overview, Red, Amber, Green (RAG) Status
- Standing Alarm Summation
- Drill down into Substation Detailed Page

CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Use Case: Transformer Tap Changes (High Impact)

- Analytics: Count Total No. Tap Changes since 1-Jan-2018
- Provides Ability to Provide Tap Changes Across any Period
- Users can Drill Down into Transformer Details Page

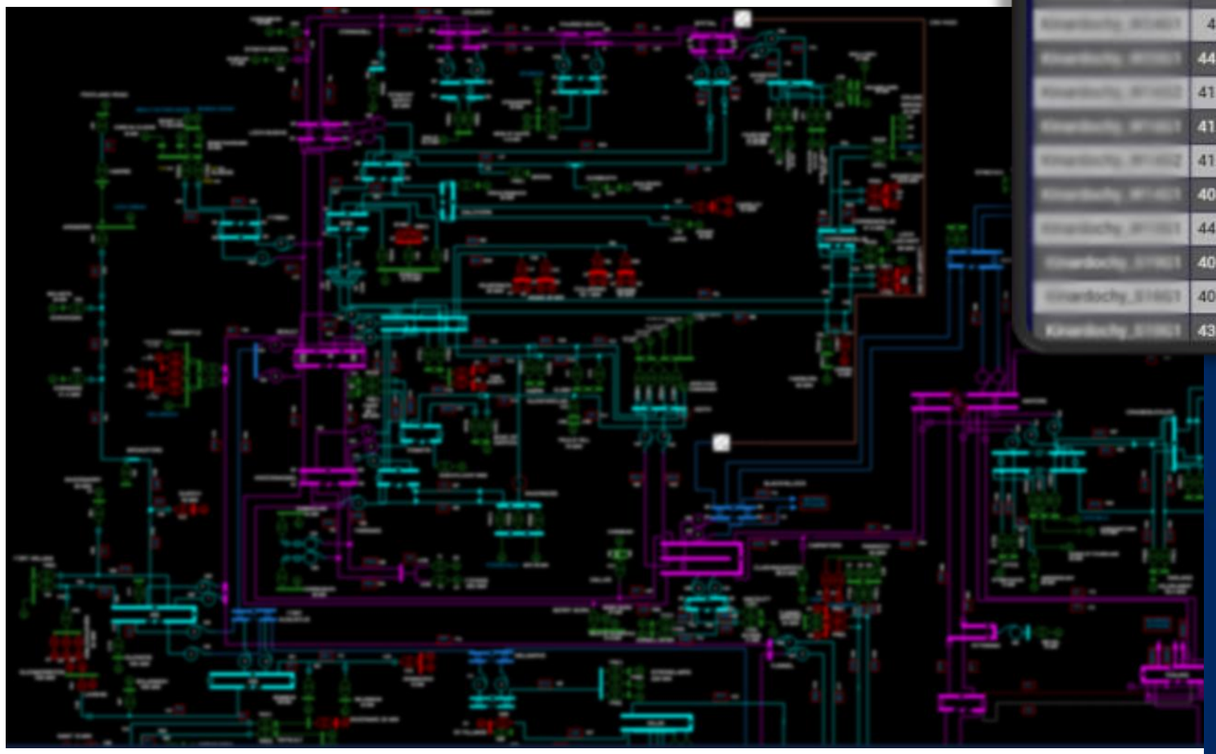


CAPULA

Scottish & Southern Electricity Networks
TRANSMISSION

Other High Value Use Cases

- Network Diagram
- Gas Zone Changes
- Battery Energy Storage Systems



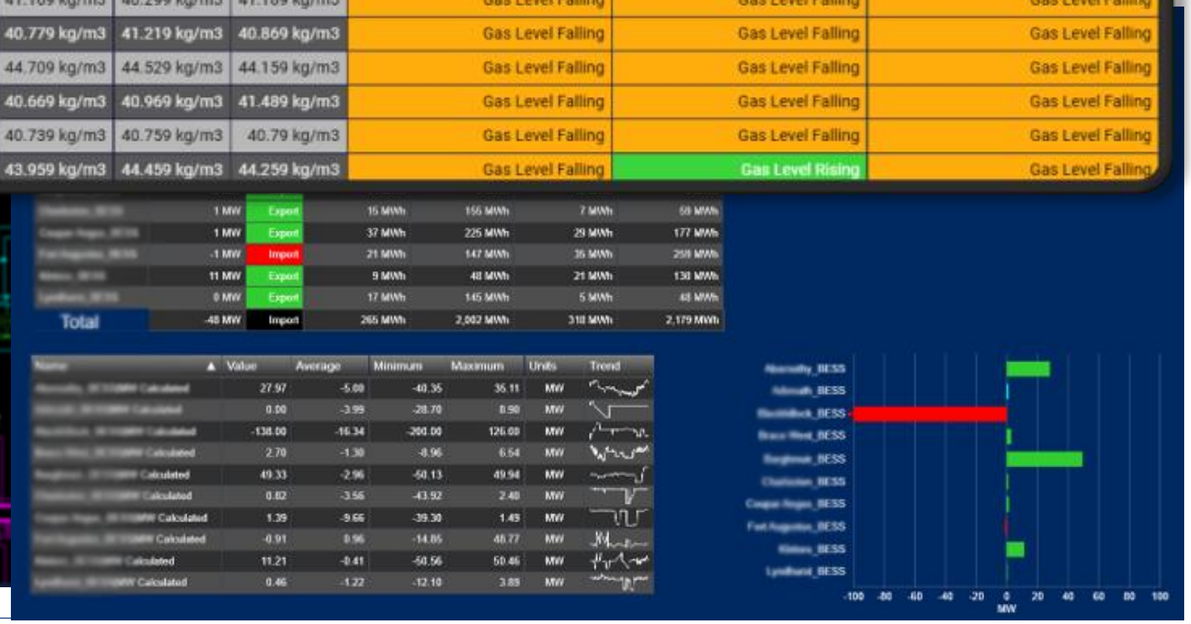
Scottish & Southern Electricity Networks TRANSMISSION

Gas Zones

Email to report issues

Example from [redacted]

Asset	BLUE	RED	YELLOW	BLUE CHANGE DIRECTION ▼	RED CHANGE DIRECTION	YELLOW CHANGE DIRECTION
[redacted]	41.669 kg/m3	41.299 kg/m3	41.009 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Rising
[redacted]	40.759 kg/m3	41.09 kg/m3	41.159 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Rising
[redacted]	40.95 kg/m3	41.219 kg/m3	41.529 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Falling
[redacted]	41.489 kg/m3	41.43 kg/m3	41.139 kg/m3	Gas Level Rising	Gas Level Falling	Gas Level Falling
[redacted]	41.18 kg/m3	41.349 kg/m3	41.459 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	41.189 kg/m3	41.079 kg/m3	40.989 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	40.75 kg/m3	40.669 kg/m3	40.68 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	44.419 kg/m3	44.559 kg/m3	44.389 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	41.819 kg/m3	41.809 kg/m3	41.759 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	41.209 kg/m3	41.409 kg/m3	41.11 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	41.169 kg/m3	40.299 kg/m3	41.189 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	40.779 kg/m3	41.219 kg/m3	40.869 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	44.709 kg/m3	44.529 kg/m3	44.159 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	40.669 kg/m3	40.969 kg/m3	41.489 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	40.739 kg/m3	40.759 kg/m3	40.79 kg/m3	Gas Level Falling	Gas Level Falling	Gas Level Falling
[redacted]	43.959 kg/m3	44.459 kg/m3	44.259 kg/m3	Gas Level Falling	Gas Level Rising	Gas Level Falling



CAPULA

Scottish & Southern Electricity Networks TRANSMISSION

POWER AND UTILITIES | UNITED KINGDOM

SSEN Transmission and Capula deliver secure, real-time network situational awareness at scale

Challenge

- Data was siloed between control room and field teams
- Limited visibility and inconsistent data quality slowed decision-making
- Access to critical operational insight was restricted to a small specialist audience
- Manual data collection and reporting processes increased effort and delay

Solution

- SSEN Transmission engaged Capula to design and implement AVEVA™ PI System ™ using PI Asset Framework (PI AF) and AVEVA™ PI Vision™ to establish a trusted, contextualized OT data foundation for improved data-driven decisions.

Results

- **Improved trust, data quality and consistency across thousands of network assets**
- **Enabled real-time visibility of the health of all circuits and substations**
- **Delivered faster operational decisions through intuitive, role-based virtualization**
- **Expanded access to real-time insights to hundreds of users**
- **Reduce time spent searching for information and manual reporting**
- **Created a scalable foundation for advanced analytics and future AI**

Any questions?