

The background of the entire image is a dark blue gradient. On the left side, there is a faint, stylized illustration of the San Francisco Bay Bridge. On the right side, there is a faint silhouette of the San Francisco skyline, including the Transamerica Pyramid. The overall aesthetic is professional and tech-oriented.

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Enabling Distributed Energy

Route to Market Service through the PI System

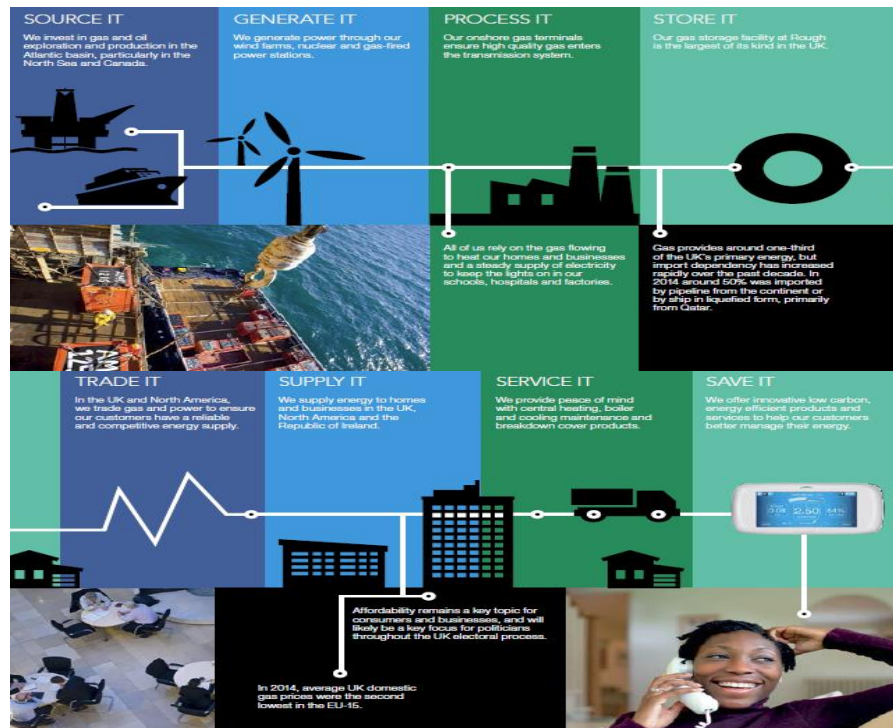
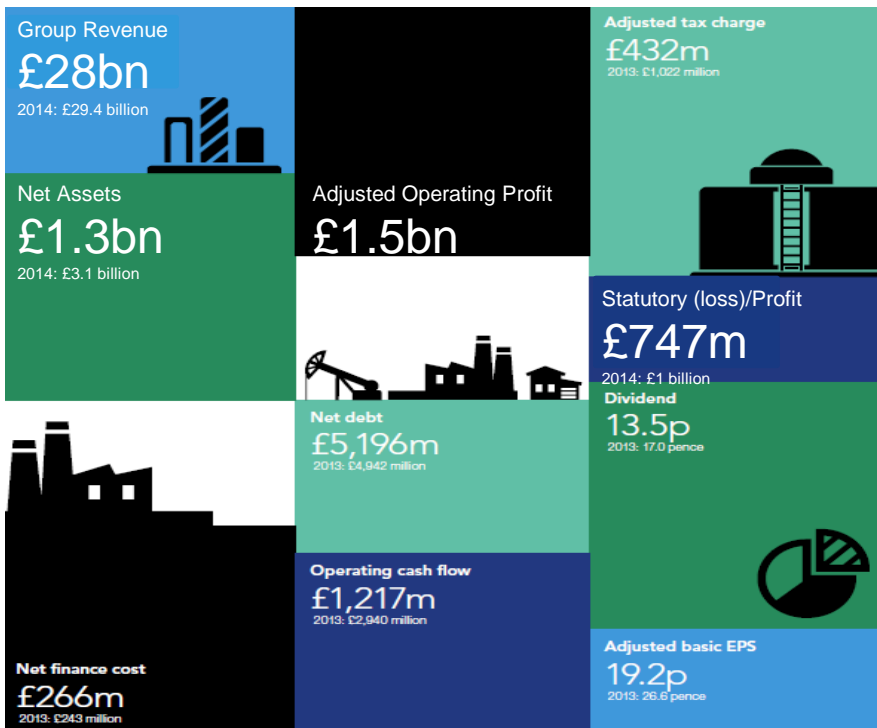
Presented by **Chris Fisher**
Chris Cody

centrica

Who we are

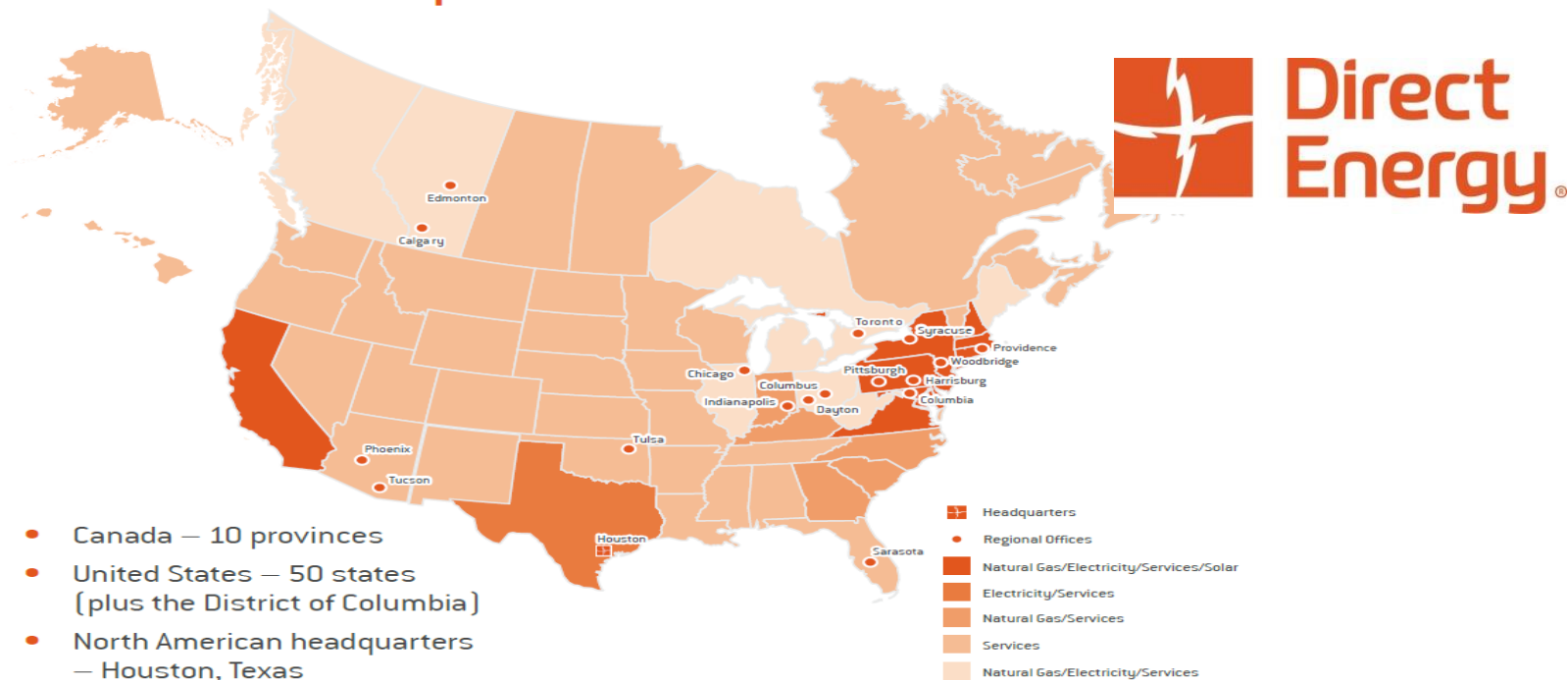


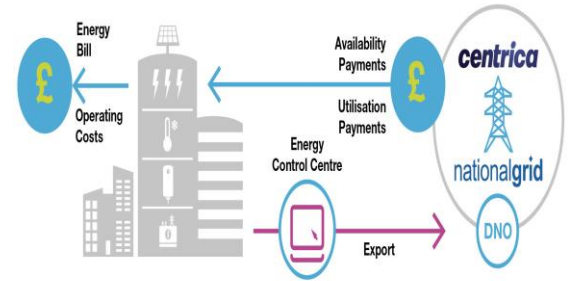
What We Do



We source, generate, process, trade, service, and supply energy to meet your current and future energy needs

Where We Operate³





The Challenge

We plan to support other smaller companies, offering our market access and expertise as a service

So what do these small distributed generators look like?

Wants to

- Find good development opportunity
- Obtain consent and funding
- Build small generation units
- Watch money flow in

Does not want to

- Manage the asset
- Trade the market

What we need:

We are not going to get the deal as they have seen another company who can give them an online portal which shows when to run and how much money they are making

- A platform to submit data
- A way to for the generator to monitor performance
- A way to show indicative profit
- A way to trade as a portfolio but settle by site

A Demo in 2 weeks

Go live in 8 weeks

My Plan

Time to call in some favours....

1. Build a SharePoint online site
2. Build a system to manage the contract that will feed into our trading
3. Build some Power BI screens to show/send invoice information
4. Create new tags in PI System – Normal and Future
5. Build AF analytics to deal with the complexity of the contract
6. Use PI System to turn the sites on and off
7. Build some PI Coresight screens to share data with the customer
8. Build security to allow external counterparties to see our PI Coresight pages
9. **Do a Demo in 2 Weeks**
10. **Go-Live in 8 Weeks**

IS can do this, there is no rush we have 10 weeks

I know someone who is trying to sell Power BI to the department

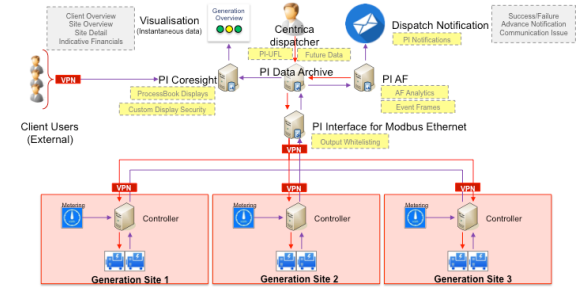
Chris and The Genius Group

Chris and TGG

TGG

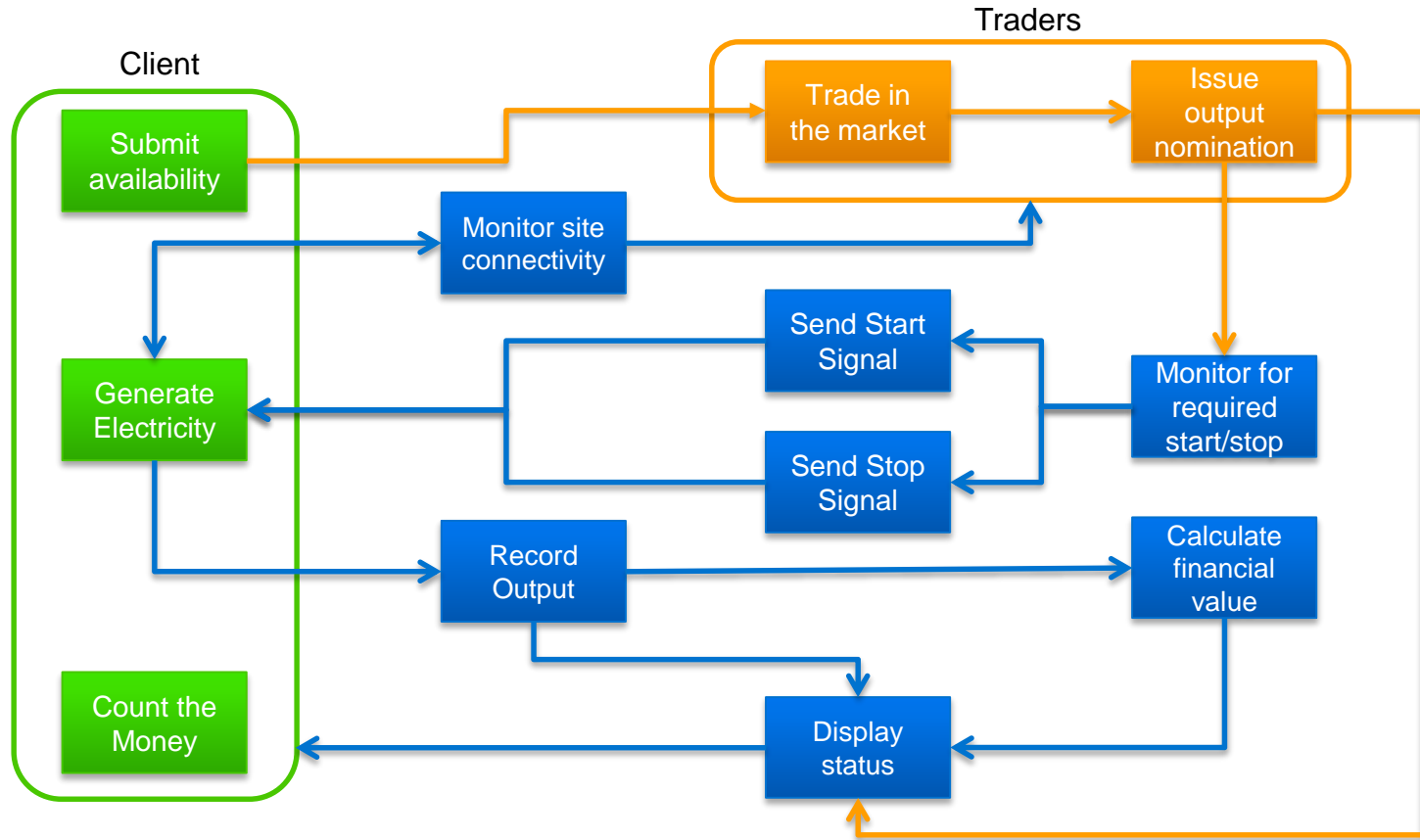
Chris

TGG



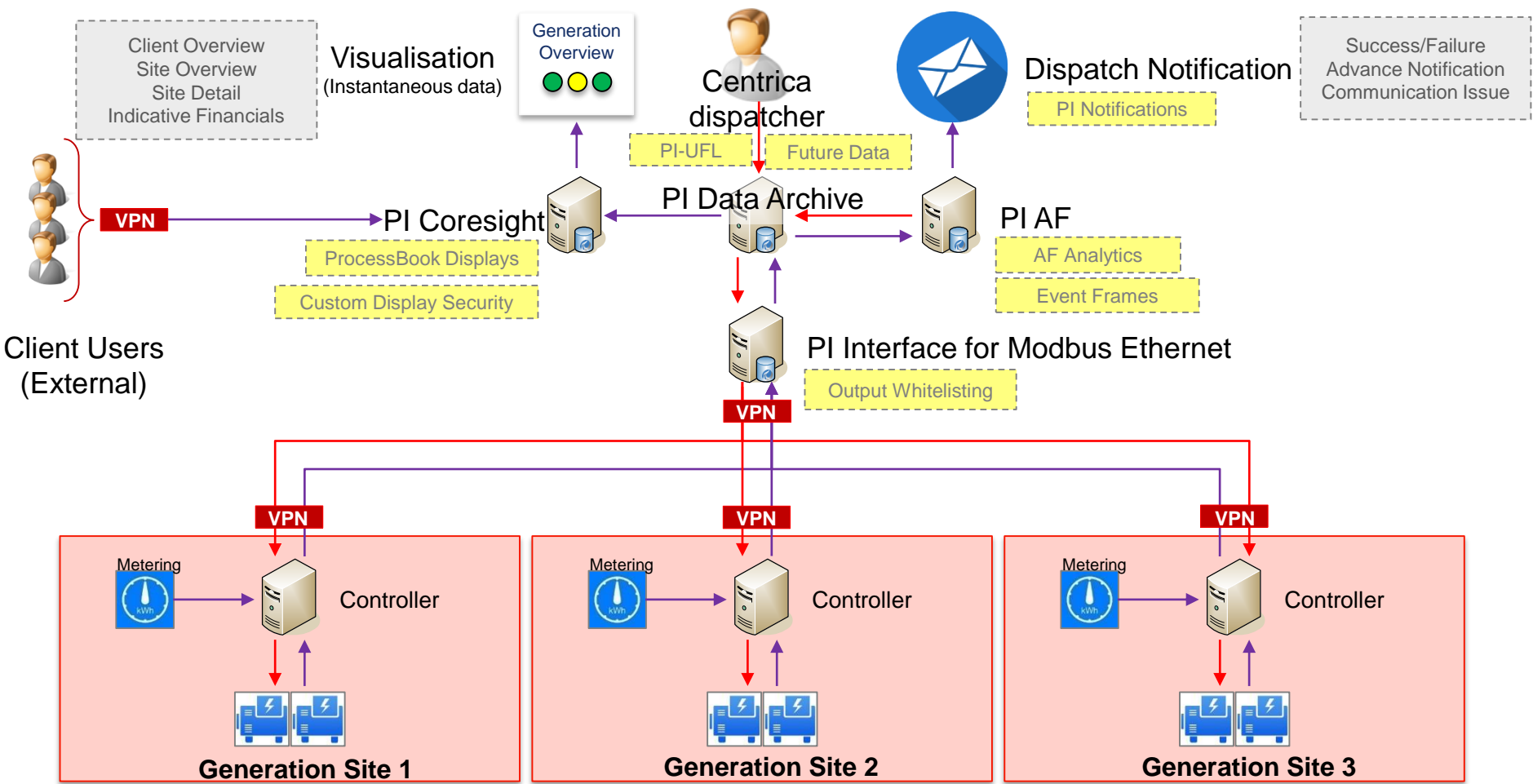
Solution Overview

Basic Flow



Solution Requirements

Requirement	Solution
Capture asset declared availability and traded position in the PI Data Archive	PI Interface for Universal File and Stream Future data capability
Monitor and trigger timely start / stop signals	PI Asset Framework, Asset Analytics
Write start / stop signals to interface plc Read heartbeat, running status, actual generation from interface plc	PI Interface for Modbus Ethernet
Calculate delivery, valuation etc	PI Asset Framework, Asset Analytics
Provide visibility of information	PI ProcessBook displays, visualised through PI Coresight Enhanced security to ensure client can only see their PI Coresight displays
Alert a loss of communications, planned generation activity	PI AF, Notifications



AF Templates configured

Library

- Distributed Generation
 - Templates
 - Element Templates
 - PPA
 - PPA Client
 - PPA Site
 - First Form Template

→

Category: _Static Data

Category: Totals (Monthly)

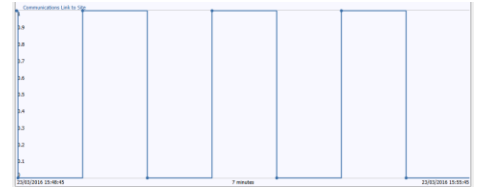
Auction Income (mtd)	0 £
Buy Back Volume (mtd)	0 MWh
Cleared Auction Volume (mtd)	0 MWh
Credited Energy (mtd)	0 MWh
Imbalance Energy (mtd)	0 MWh
Imbalance Income (mtd)	0 £
Must Run Income (mtd)	0 £
Must Run Volume (mtd)	0 MWh
Net Buy Back Income (mtd)	0 £
Net Commercial Volume (mtd)	0 MWh
Net Total Income (mtd)	0 £
Post Auction Income (mtd)	0 £
Post Auction Volume (mtd)	0 MWh
Target Energy (mtd)	0 MWh

Category: Valuation Data

Auction Dispa	
Auction Powe	
Auction Runn	
Post Auction	
Post Auction Power Income (Indicative)	0 £
Post Auction Running Cost (Indicative)	0 £

Monitoring and Alerting

- Each site produces a heartbeat signal, which flips every minute
- Analysis checks for either loss of signal, or stale signal
- Notifications sent on loss of heartbeat
- Analysis of up ratio, and last drop-off date/time

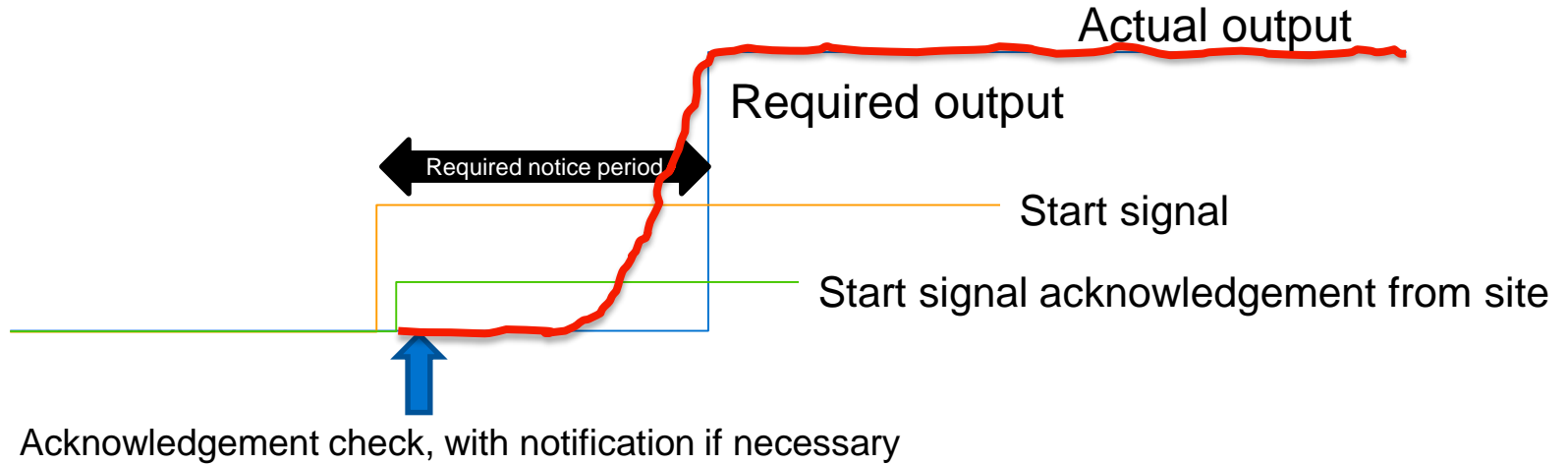


Notifications are also triggered for the following events:

- 10min warning of a start/stop signal being sent
- Station not running when it should be

Notifications are sent via SMS and email

Start Sequence



Assessing the value

Trade volume and price are written to the PI Server as future data

Cashout price is published 20 minutes after the end of the delivery period

AF 2.7 Relative timestamp function is crucial to align values to correct delivery periods

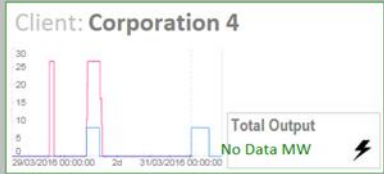
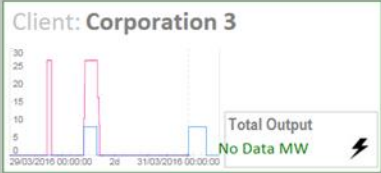
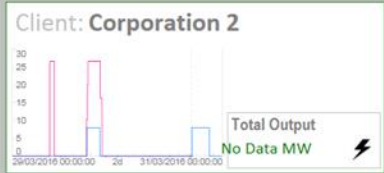




Sample Screenshots

Centrica Overview

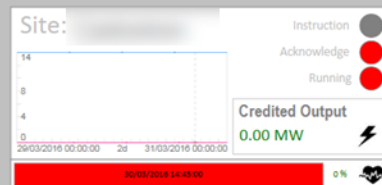
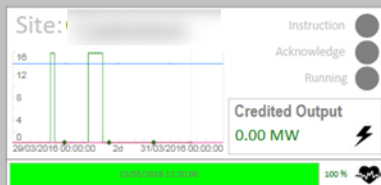
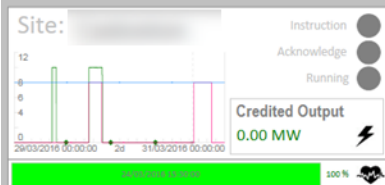
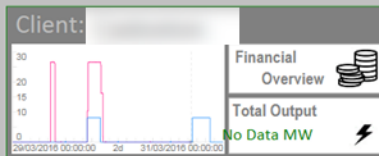
TGG Distributed Generation: Clients Overview



Client Overview

TGG Distributed Generation: Client Overview

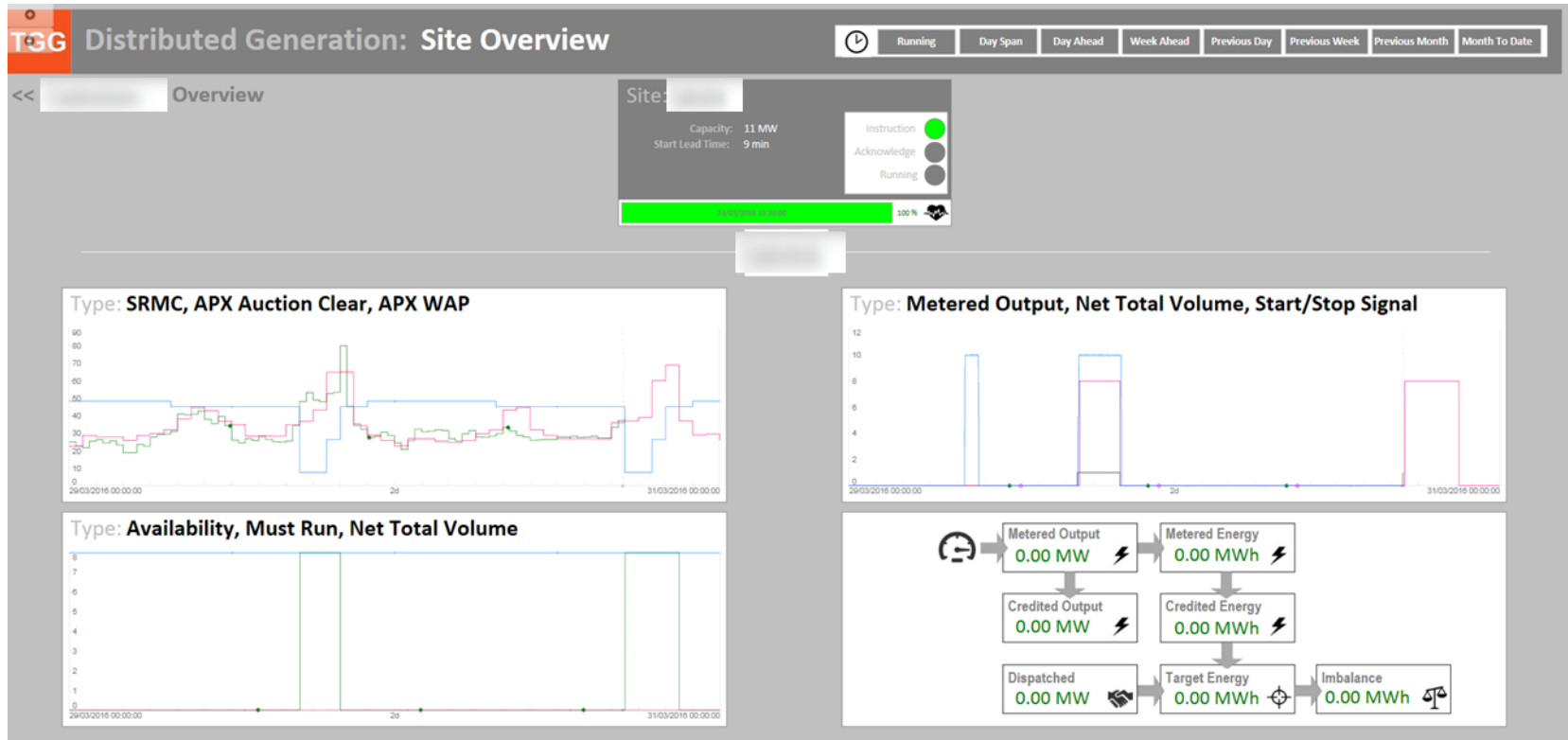
Running Day Span Day Ahead Week Ahead Previous Day Previous Week Previous Month Month To Date



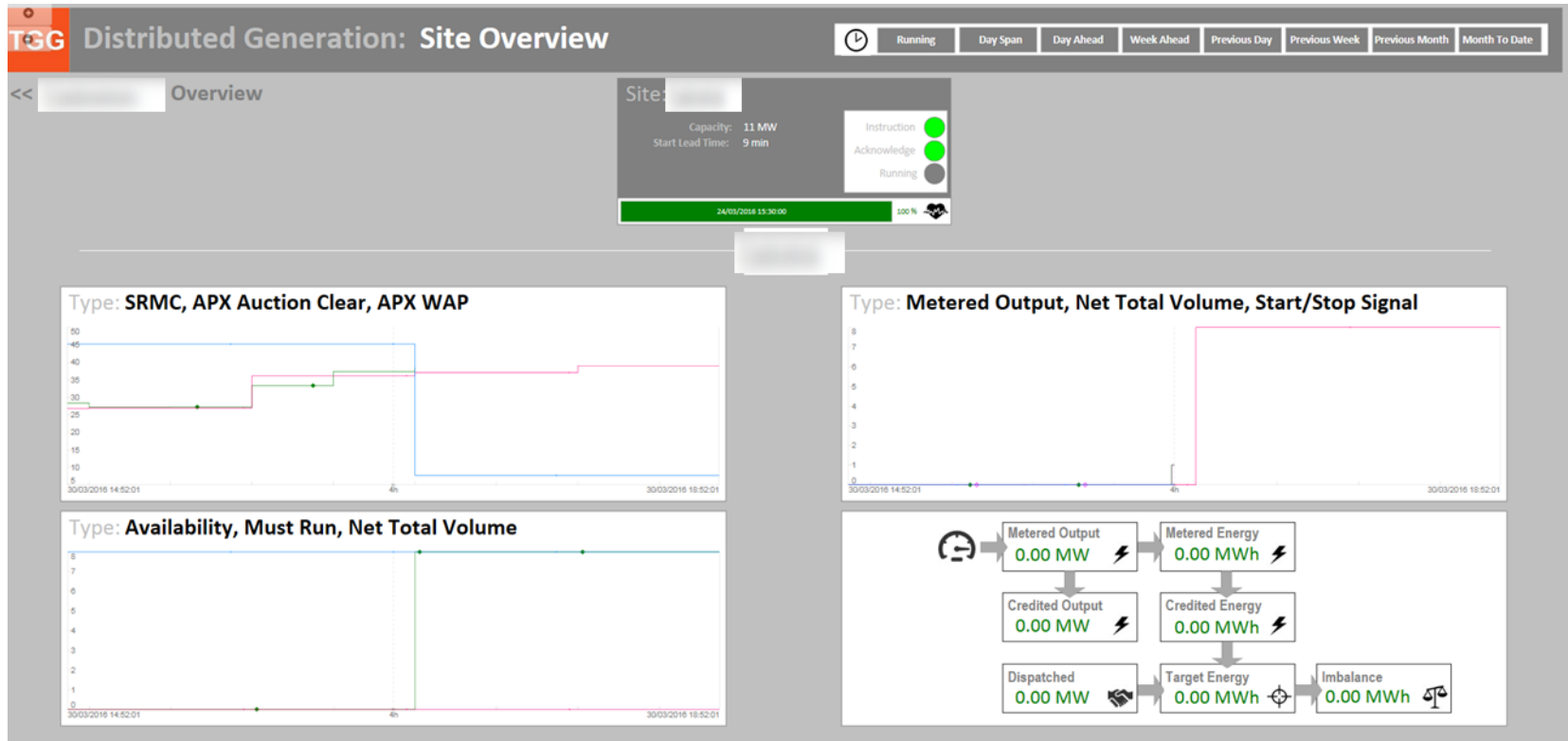
Site Overview



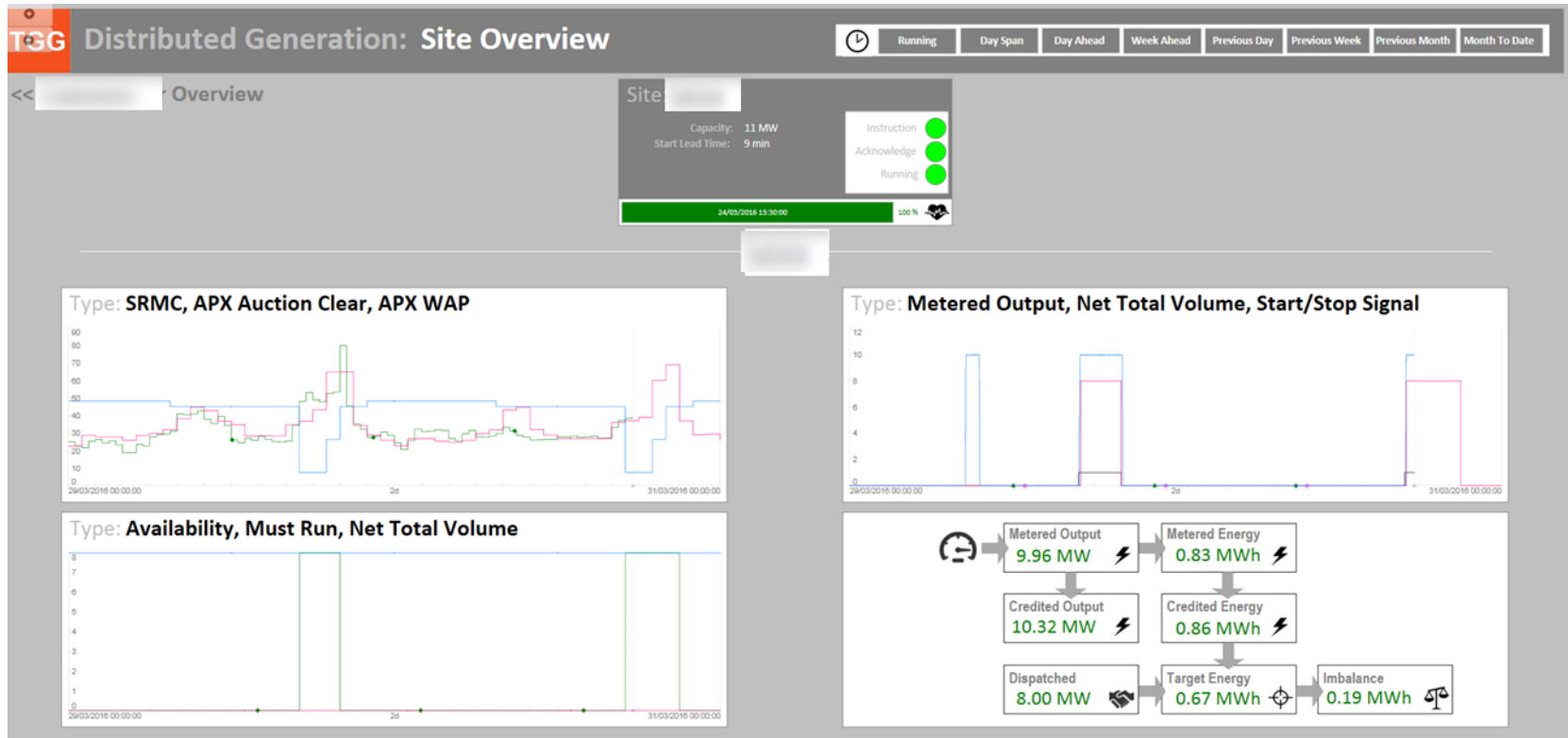
Site Overview – Start Signal Sent



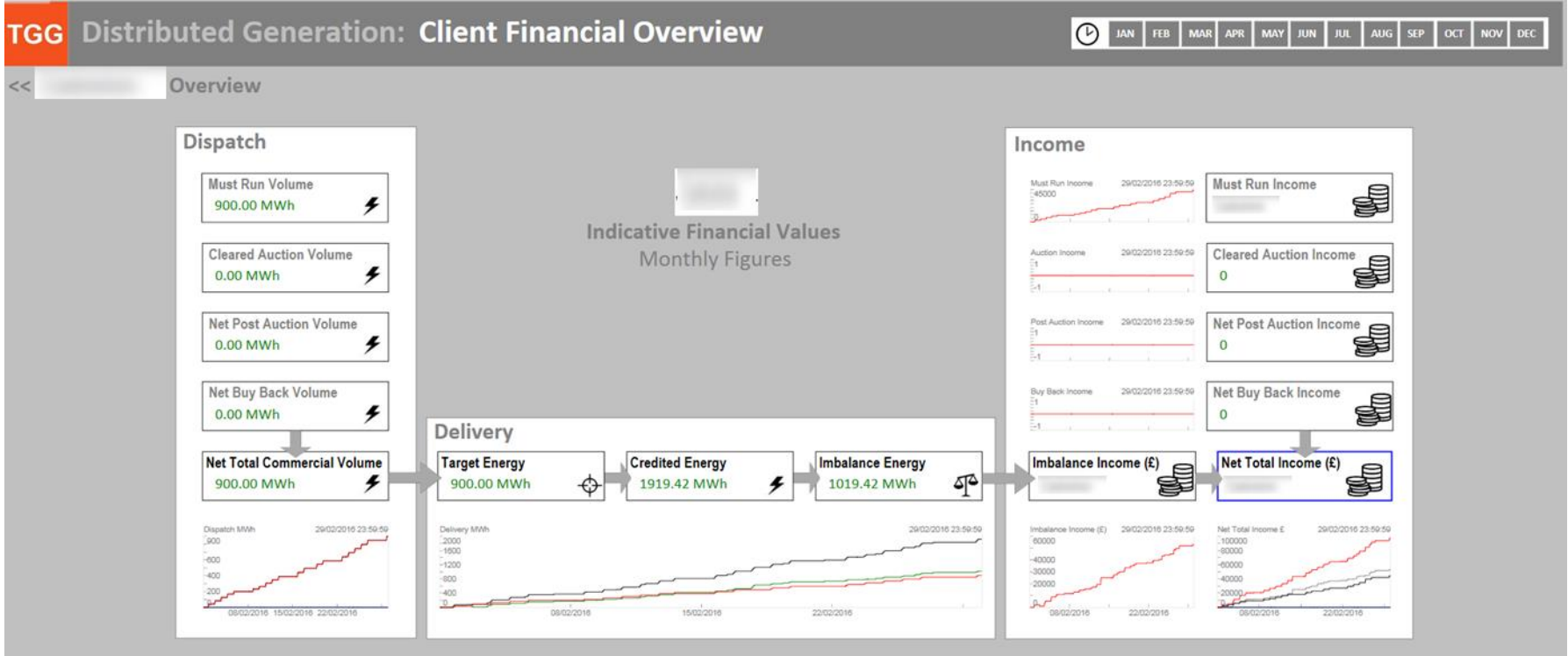
Running view – Start Acknowledged



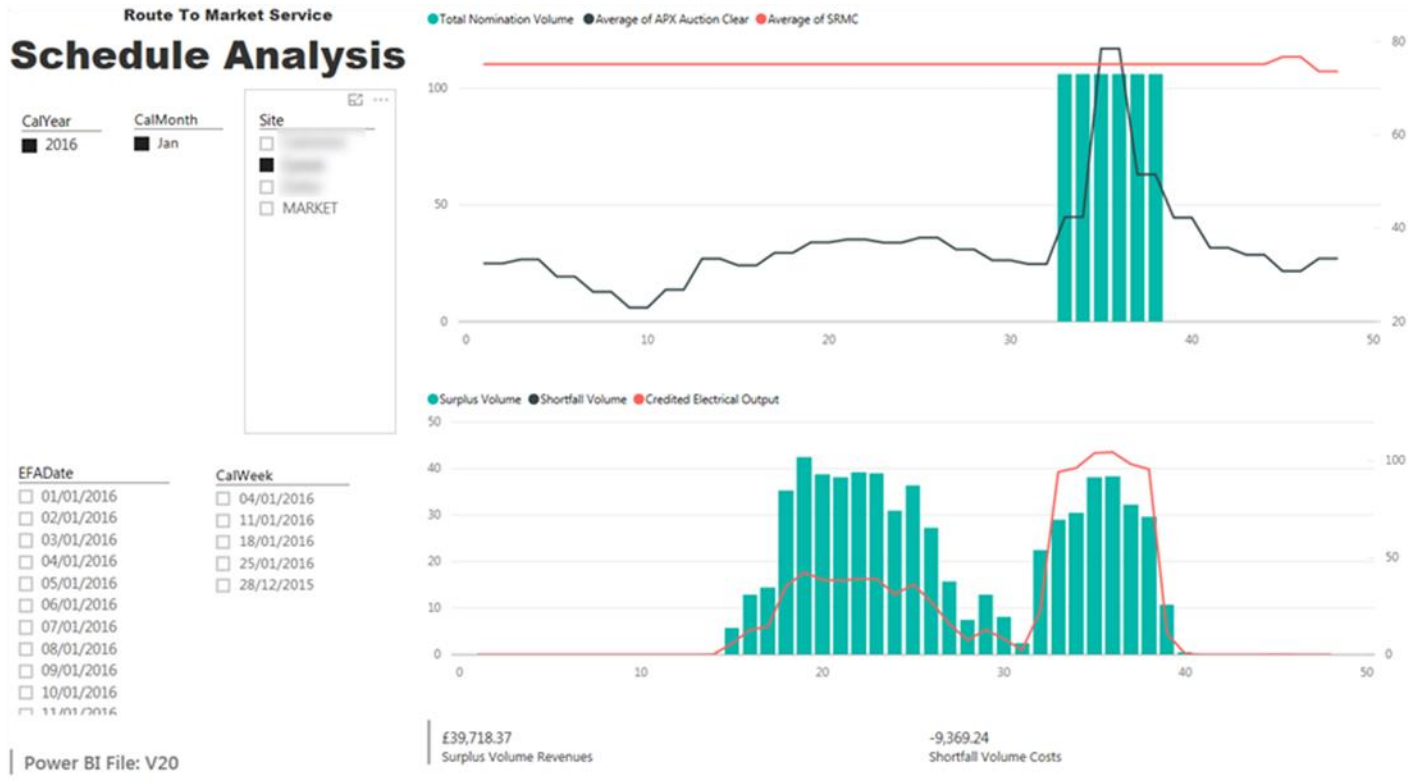
Site Overview - Running



Client Financial Overview



Power BI

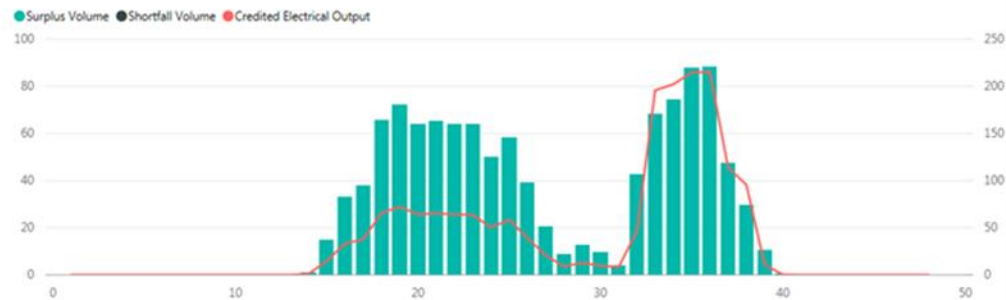
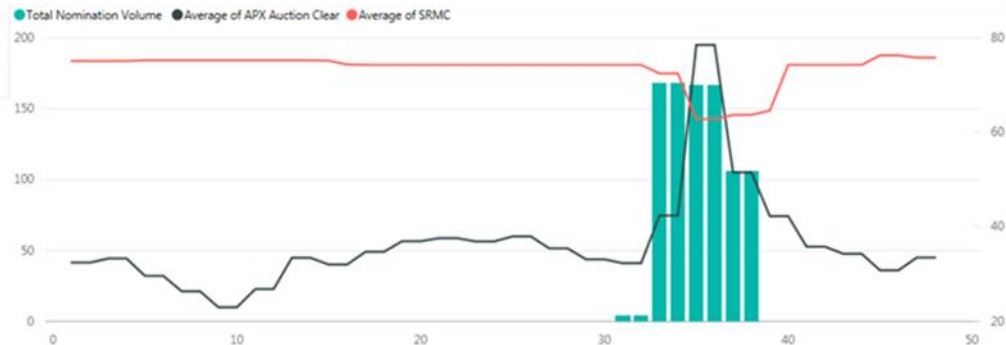


Route To Market Service Schedule Analysis

CalYear: ☒ 2016
CalMonth: ☒ Jan
Site: ☐ ☐ ☐ ☐ MARKET

EFADate: ☐ 01/01/2016 ☐ 02/01/2016 ☐ 03/01/2016 ☐ 04/01/2016 ☐ 05/01/2016 ☐ 06/01/2016 ☐ 07/01/2016 ☐ 08/01/2016 ☐ 09/01/2016 ☐ 10/01/2016 ☐ 11/01/2016
CalWeek: ☐ 04/01/2016 ☐ 11/01/2016 ☐ 18/01/2016 ☐ 25/01/2016 ☐ 28/12/2015

Power BI File: V20



£73,691.08
Surplus Volume Revenues

-9,369.24
Shortfall Volume Costs

Route To Market Service

Metered Output

CalYear

2016

CalMonth

Jan

Availability

- ☐ AVAILABLE
☐ MUST RUN
☐ UNAVAILA...

Site

☐

☐

☐

EFADate

- ☐ 01/01/2016
☐ 02/01/2016
☐ 03/01/2016
☐ 04/01/2016
☐ 05/01/2016
☐ 06/01/2016
☐ 07/01/2016
☐ 08/01/2016
☐ 09/01/2016
☐ 10/01/2016

CalWeek

- ☐ 04/01/2016
☐ 11/01/2016
☐ 18/01/2016
☐ 25/01/2016
☐ 28/12/2015

Power BI File: V20

Credited Electrical Output by Availability

MUST RUN

972.99

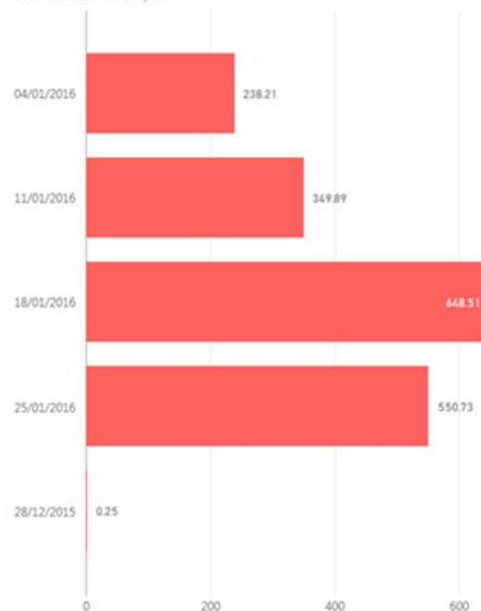
UNAVAILABLE

781.39

Credited Electrical Output

EFADate				Total
01/01/2016	0.00	0.08	0.00	0.08
02/01/2016	0.00	0.09	0.00	0.09
03/01/2016	0.00	0.08	0.00	0.08
04/01/2016	0.00	8.13	35.92	44.04
05/01/2016	0.00	5.95	21.75	27.70
06/01/2016	0.00	7.22	29.57	36.79
07/01/2016	0.00	9.75	44.10	53.85
08/01/2016	0.00	9.03	42.46	51.49
09/01/2016	0.00	0.14	0.00	0.14
10/01/2016	0.00	3.90	20.29	24.19
11/01/2016	0.00	10.06	21.68	31.74
12/01/2016	0.00	13.68	32.47	46.14
13/01/2016	0.00	8.17	21.68	29.84
14/01/2016	0.00	5.08	21.66	26.74
15/01/2016	0.00	53.46	21.70	75.16
16/01/2016	0.00	56.90	39.32	96.22
17/01/2016	0.00	25.69	18.36	44.05
18/01/2016	0.00	63.31	21.68	84.99
19/01/2016	0.00	69.80	21.69	91.49
20/01/2016	0.00	69.78	31.71	101.49
21/01/2016	0.00	68.97	21.53	90.50
22/01/2016	0.00	118.56	63.24	181.80
23/01/2016	0.00	49.59	31.21	80.81
24/01/2016	0.00	10.70	6.73	17.43
25/01/2016	0.00	55.73	21.63	77.36
26/01/2016	0.00	50.11	21.70	71.81
27/01/2016	0.00	51.93	21.54	73.46
28/01/2016	0.00	52.54	21.66	74.20
29/01/2016	0.00	72.25	44.22	116.48
30/01/2016	0.00	0.00	0.00	0.00
31/01/2016	0.00	84.29	53.13	137.42
01/02/2016	0.00	0.00	0.00	0.00
Total	0.00	1,034.98	752.61	1,787.59

Credited Electrical Output



The Future...

Business

- This Route to market service is at the heart of Centrica's strategy going forward.
- There is an estimated 18-20GW of embedded generation in the UK that could potentially benefit from this kind of contract
- The capacity market in the UK has increased this still further by 2GW
- Potential 31GW of embedded generation by 2030

Product

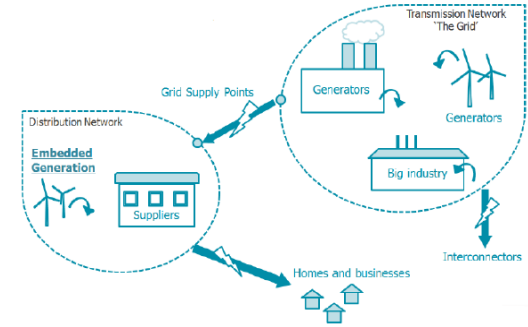
- Evaluate PI Coresight v3 to understand additional value
- Integrators to enhance PowerBI connectivity
- Assess potential for PI Integrator for Esri ArcGIS
- Further use of Event Frames to analyse performance
- Ordering of running profiles
- Future market price alerts

Centrica Route to Market - Summary

COMPANY and GOAL

Enable the strategic direction of Centrica Distributed Energy & Power, supporting the UK transition toward distributed generation

centrica



CHALLENGE

Provide a route to market service for all, current and future small generation sites

- Sites which don't have or can't afford a trading department
- We provide a service to optimise their sites in order to maximise their profits

SOLUTION

Combination of SharePoint Online, PowerBI and PI System 2015 to provide integrated system

- Significant use of future data capability
- AF templates and analyses provide scalability and ease of future implementation
- PI UFL and PI Modbus Interfaces

RESULTS

Enabled new business opportunity in line with strategic direction of company

- Initial contract delivering >40MW service
- Potential early expansion of >20MW
- Significant scope for further growth

Contact Information

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The Centrica logo, featuring the word "centrica" in a bold, blue, italicized sans-serif font.

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Founder and Chief

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Questions

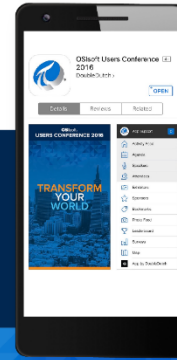
Please wait for the **microphone** before asking your questions



State your **name & company**

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감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado

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