



PI Integrator for Business Analytics, or as I like to call it, 'Bunny Catcher'

Presented by Martin Stanyon MEng

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We are an energy and services company

Everything we do is focused on
satisfying the changing needs of our
customers



Centrica Business Solutions



Existing Plant Projects

1 Energy efficiency
eg, solar panels, LED lighting, heating, ventilation and air conditioning



Barrs Power Station



Roby Power Station



Petton Gas Reception Station

2 Power generation
eg back-up generator

6 Battery storage



The Challenge

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EMEA USERS CONFERENCE • BERLIN, GERMANY

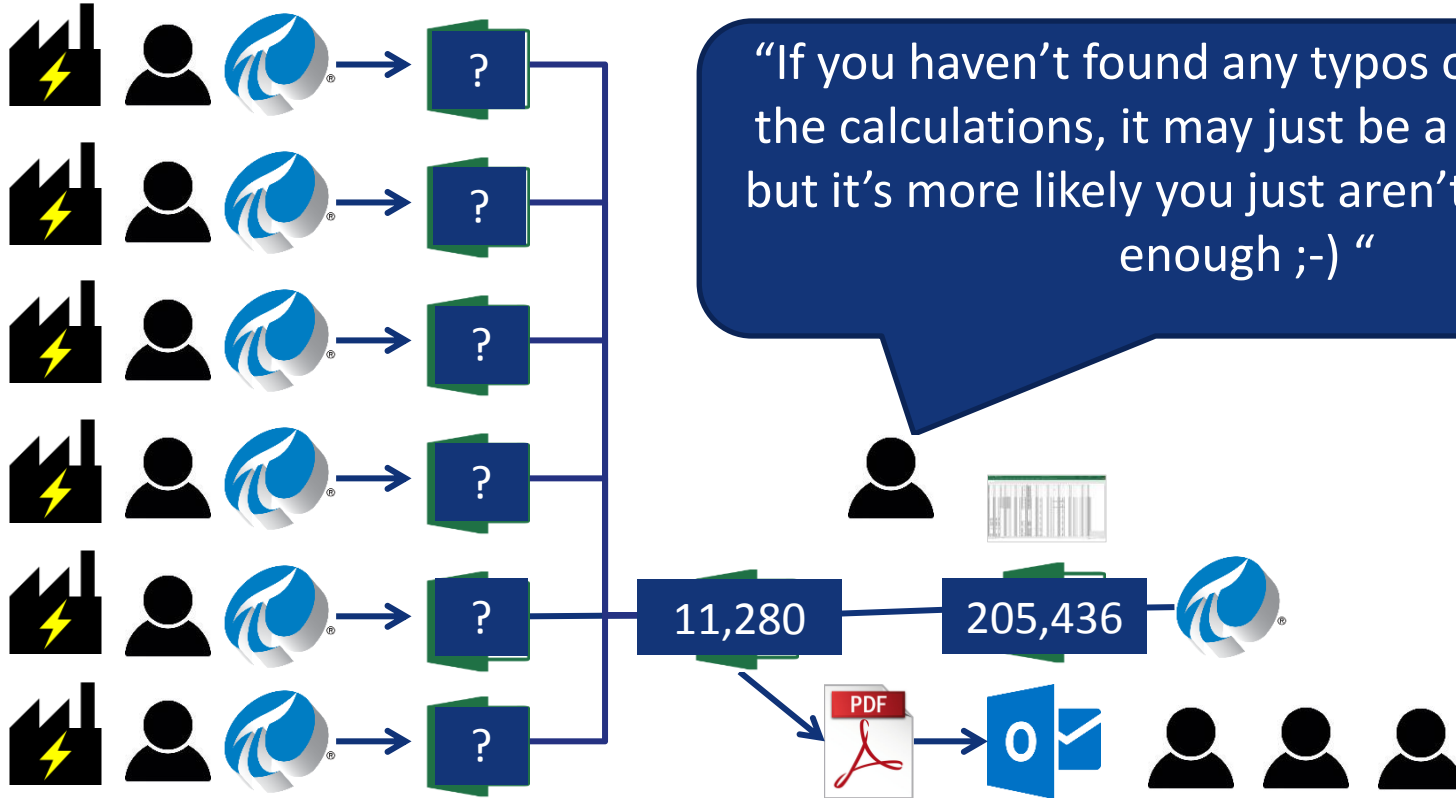
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The Challenge – Monthly Reporting

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“If you haven’t found any typos or mistakes in the calculations, it may just be a good month, but it’s more likely you just aren’t looking hard enough ;-)”

Item	Part No	Part Name	QTY	Unit	Material	Weight	Volume	Surface Area	Notes
1	1000000000
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100

The image shows a large Excel spreadsheet with multiple columns of data. Several cells are highlighted with orange boxes, indicating areas of interest. The highlighted cells are located in the following approximate coordinates (row, column):

- Row 10, Column 10
- Row 10, Column 15
- Row 25, Column 10
- Row 35, Column 15
- Row 45, Column 15
- Row 55, Column 15
- Row 65, Column 15
- Row 75, Column 15
- Row 85, Column 15
- Row 95, Column 15
- Row 105, Column 15
- Row 115, Column 15
- Row 125, Column 15
- Row 135, Column 15
- Row 145, Column 15
- Row 155, Column 15
- Row 165, Column 15
- Row 175, Column 15
- Row 185, Column 15
- Row 195, Column 15
- Row 205, Column 15
- Row 215, Column 15
- Row 225, Column 15
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- Row 575, Column 15
- Row 585, Column 15
- Row 595, Column 15
- Row 605, Column 15
- Row 615, Column 15
- Row 625, Column 15
- Row 635, Column 15
- Row 645, Column 15
- Row 655, Column 15
- Row 665, Column 15
- Row 675, Column 15
- Row 685, Column 15
- Row 695, Column 15
- Row 705, Column 15
- Row 715, Column 15
- Row 725, Column 15
- Row 735, Column 15
- Row 745, Column 15
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- Row 765, Column 15
- Row 775, Column 15
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- Row 835, Column 15
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- Row 865, Column 15
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- Row 895, Column 15
- Row 905, Column 15
- Row 915, Column 15
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- Row 935, Column 15
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- Row 965, Column 15
- Row 975, Column 15
- Row 985, Column 15
- Row 995, Column 15

A7 : x ✓ fx =A8-A4

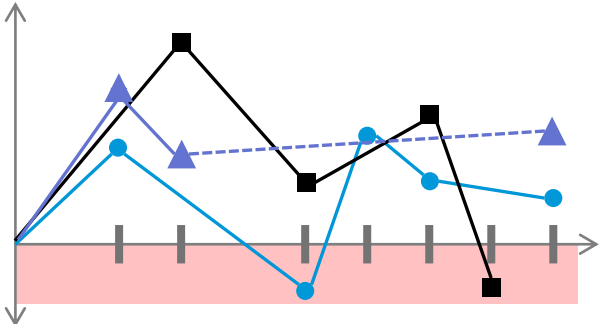
	A	B	C	D	E	F	G	H	I	J
7	42248	Metered Active HH	Electrical Export	Electrical Import	Tag not found	Gas Volume	Tag not found	Lower CV	Tag not found	Higher CV
135	03/09/2015 16:00	-1.200000048	0	0	0	0	35.62799835	35.62799835	39.47999954	39.4799
136	03/09/2015 16:30	-1.179999948	0	0	0	0	35.61999893	35.61999893	39.47100067	39.4710
137	03/09/2015 17:00	-1.149999976	0	0	0	0	35.57500076	35.57500076	39.42300034	39.4230
138	03/09/2015 17:30	-1.159999967	0	0	0	0	35.57600021	35.57600021	39.42399979	39.4239
139	03/09/2015 18:00	-1.149999976	0	0	0	0	35.39300156	35.39300156	39.22700119	39.2270
140	03/09/2015 18:30	-1.149999976	0	0	0	0	35.32099915	35.32099915	39.15000153	39.1500
141	03/09/2015 19:00	-1.149999976	0	0	0	0	35.34899902	35.34899902	39.18099976	39.1809
142	03/09/2015 19:30	-1.149999976	0	0	0	0	35.34500122	35.34500122	39.17599869	39.1759
143	03/09/2015 20:00	-1.149999976	0	0	0	0	35.35100174	35.35100174	39.18299866	39.1829
144	03/09/2015 20:30	-1.149999976	0	0	0	0	35.33900007	35.33900007	39.16999817	39.1699
145	03/09/2015 21:00	250	250	0	0	0	35.47999954	35.47999954	39.32199986	39.3219
146	03/09/2015 21:30	250	250	0	0	0	35.57400131	35.57400131	39.42300034	39.4230
147	03/09/2015 22:00	-1.149999976	0	0	0	0	35.60699844	35.60699844	39.45899963	39.4589
148	03/09/2015 22:30	-1.149999976	0	0	0	0	35.60699844	35.60699844	39.45899963	39.4589
149	03/09/2015 23:00	-1.149999976	0	0	0	0	35.58499908	35.58499908	39.43500137	39.4350
150	03/09/2015 23:30	-1.149999976	0	0	0	0	35.61600113	35.61600113	39.46799855	39.4679
151	04/09/2015 00:00	-1.149999976	0	0	0	0	35.61800003	35.61800003	39.47100067	39.4710
152	04/09/2015 00:30	-1.149999976	0	0	0	0	35.61500168	35.61500168	39.46699905	39.4669
153	04/09/2015 01:00	-1.149999976	0	0	0	0	35.61999893	35.61999893	39.47299957	39.4729
154	04/09/2015 01:30	-1.149999976	0	0	0	0	35.61600113	35.61600113	39.46799855	39.4679
155	04/09/2015 02:00	-1.149999976	0	0	0	0	35.60699844	35.60699844	39.45800018	39.4580
156	04/09/2015 02:30	-1.149999976	0	0	0	0	35.61600113	35.61600113	39.46900177	39.4690
157	04/09/2015 03:00	-1.149999976	0	0	0	0	35.61999893	35.61999893	39.47299957	39.4729
158	04/09/2015 03:30	-1.149999976	0	0	0	0	35.61700058	35.61700058	39.47100067	39.4710
159	04/09/2015 04:00	-1.149999976	0	0	0	0	35.62300111	35.62300111	39.47800064	39.4780
160	04/09/2015 04:30	-1.149999976	0	0	0	0	35.62300111	35.62300111	39.47900009	39.4790
161	04/09/2015 05:00	-1.149999976	0	0	0	0	35.62400055	35.62400055	39.47900009	39.4790
162	04/09/2015 05:30	-1.149999976	0	0	0	0	35.59400177	35.59400177	39.44699866	39.4469
163	04/09/2015 06:00	-1.149999976	0	0	0	0	35.59200085	35.59200085	39.44500015	39.4450

1,521 Hard Coded
Cells!

That's not all

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PI is only one data source



Uneven spacing
Out-of-range values
Different start times
Communication failure
and more...

	●	■	▲
	●	■	▲
	●	■	?
	●	■	?
	●	■	?
	●	■	?
	●	■	?
	●	■	?
	●	■	▲

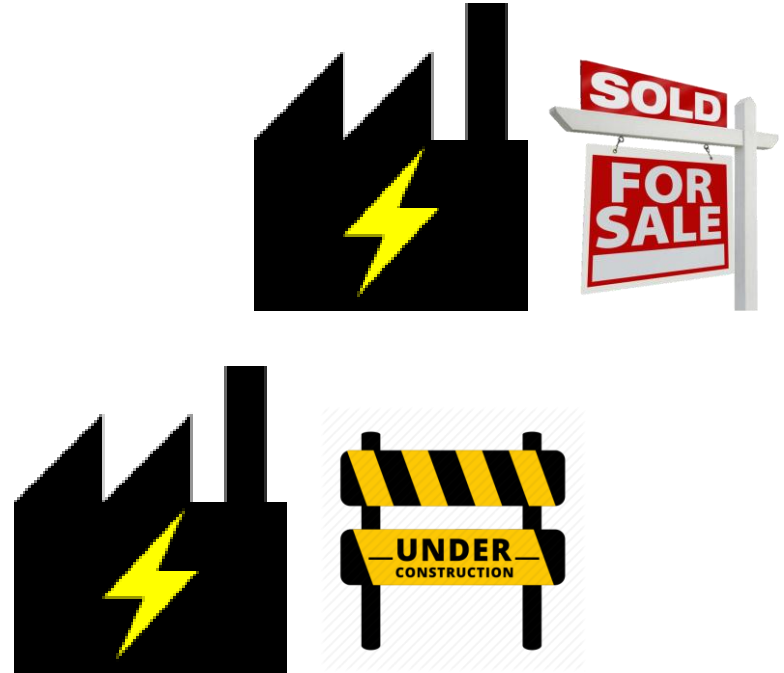
Challenge
Join operational data
with relational data

That's not all

PI is only one data source



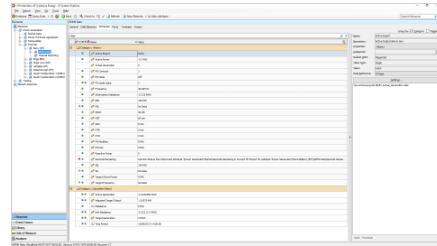
Our Businesses Change



The Solution – Data Preparation

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Source



Elements

- Elements
 - Power Generation
 - Market Data
 - Power Purchase Agreement
 - Renewables
 - Thermal
 - Barry (BY)
 - GPMS Data
 - Thermal Reporting
 - Brigg (BG)
 - Kings Lynn (KL)
 - Langage (LE)
 - Peterborough (PH)
 - South Humber Bank 1 (SHB1)
 - South Humber Bank 2 (SHB2)
 - Trading
 - Element Searches

Event Frames

Library

Unit of Measure

Analyses

GPMS Data

General Child Elements Attributes Ports Analyses Version

Filter

Name	Value
Category: <None>	
Active Export	0 MW
Active Power	-0.7 MW
Actual Generation	0
FR Contract	1
FR Mode	Off
FR mode Value	0
Frequency	49.965 Hz
Information Imbalance	-0.315 MWh
MEL	140 MW
MIL	No Data
MNZZ	30 min
MZZ	60 min
NDZ	6 min
NTB	2 min
NTO	2 min
PN Modified	0 MW
PN Plan	0 MW
Reactive Power	0
Seconds Remaining	Cannot retrieve the referenced Attribute "Power Generation\Market\Seconds Remaining in Current H1 Period" for attribute "Power Generation\Thermal\Barry (BY)\GPMS Data\Seconds Rema...
SEL	140 MW
SIL	No Data
Target Active Power	0 MW
Target Frequency	No Data
Category: Calculation Result	
Active Generation	-0.2230556 MWh
Adjusted Target Output	1.24375 MW
Imbalance	0 MW
Net Imbalance	-0.2211111 MWh
Target Generation	0 MWh
Time Period	12/09/2017 14:00:00

Group by: Category Template

Name: Active Export

Description: Active Output above zero

Properties: <None>

Categories:

Default UOM: MegaWatt

Value Type: Single

Value: 0 MW

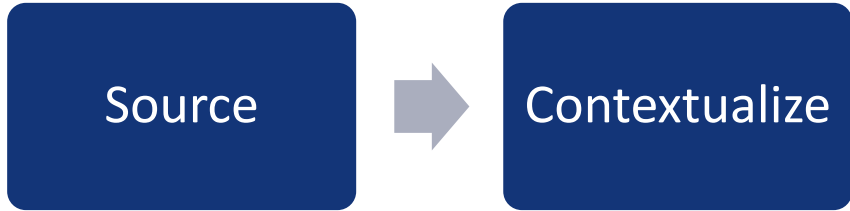
Data Reference: PI Point

Settings...

\\ce-central-pi-prod-db\BY.Actual_Generation.AGG

Limits Forecasts

The Solution – Data Preparation



ID	Name	Other Attributes
1	John Doe	...
2	Jane Smith	...
3	...	...

Name	ID	Other Identifiers	Category	Source	Target
John Doe	12345	...	...	...	...
Jane Smith	67890	...	...	...	...

Event Frames

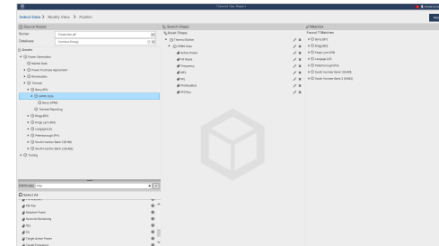
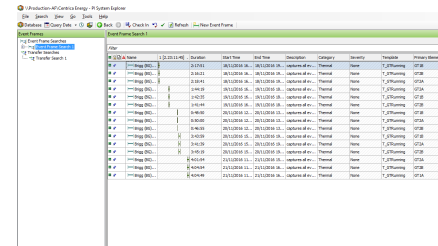
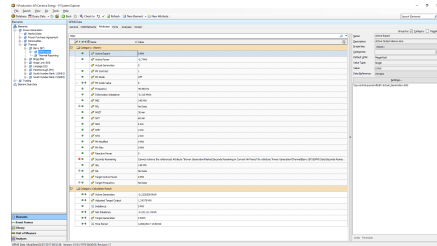
- Event Frame Searches
 - Event Frame Search 1
- Transfer Searches
- Transfer Search 1

Event Frame Search 1

Filter

		Name	1 [2.23:11:45]	Duration	Start Time	End Time	Description	Category	Severity	Template	Primary Element
		Brigg (BG)...		2:17:51	18/11/2016 16...	18/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT1B
		Brigg (BG)...		2:16:21	18/11/2016 16...	18/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT2B
		Brigg (BG)...		2:18:41	18/11/2016 16...	18/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT2A
		Brigg (BG)...		1:44:19	19/11/2016 16...	19/11/2016 18...	captures all ev...	Thermal	None	T_GTRunning	GT2A
		Brigg (BG)...		1:42:35	19/11/2016 16...	19/11/2016 18...	captures all ev...	Thermal	None	T_GTRunning	GT1B
		Brigg (BG)...		1:41:44	19/11/2016 16...	19/11/2016 18...	captures all ev...	Thermal	None	T_GTRunning	GT2B
		Brigg (BG)...		0:48:50	20/11/2016 12...	20/11/2016 13...	captures all ev...	Thermal	None	T_GTRunning	GT1B
		Brigg (BG)...		0:50:00	20/11/2016 12...	20/11/2016 13...	captures all ev...	Thermal	None	T_GTRunning	GT2A
		Brigg (BG)...		0:46:55	20/11/2016 12...	20/11/2016 13...	captures all ev...	Thermal	None	T_GTRunning	GT2B
		Brigg (BG)...		3:43:59	20/11/2016 15...	20/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT1B
		Brigg (BG)...		3:41:39	20/11/2016 15...	20/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT2A
		Brigg (BG)...		3:45:19	20/11/2016 15...	20/11/2016 19...	captures all ev...	Thermal	None	T_GTRunning	GT2B
		Brigg (BG)...		4:01:54	21/11/2016 11...	21/11/2016 15...	captures all ev...	Thermal	None	T_GTRunning	GT2A
		Brigg (BG)...		4:04:54	21/11/2016 11...	21/11/2016 16...	captures all ev...	Thermal	None	T_GTRunning	GT2B
		Brigg (BG)...		4:04:49	21/11/2016 11...	21/11/2016 16...	captures all ev...	Thermal	None	T_GTRunning	GT1A

The Solution – Data Preparation



Source Assets

Server: Production-AF

Database: Centrica Energy

Assets

- Power Generation
 - Market Data
 - Power Purchase Agreement
 - Renewables
 - Thermal
 - Barry (BY)
 - GPMS Data**
 - Barry GPMS
 - Thermal Reporting
 - Brigg (BG)
 - Kings Lynn (KN)
 - Langage (LE)
 - Peterborough (PH)
 - South Humber Bank 1 (SHB1)
 - South Humber Bank 2 (SHB2)
 - Trading

Search Shape

Asset Shape

- Thermal Station
 - GPMS Data
 - Active Power
 - FR Mode
 - Frequency
 - MEL
 - MIL
 - PN Modified
 - PN Plan

Matches

Found 7 Matches

- Barry (BY)
- Brigg (BG)
- Kings Lynn (KN)
- Langage (LE)
- Peterborough (PH)
- South Humber Bank 1 (SHB1)
- South Humber Bank 2 (SHB2)

Edit Filters

Asset Name

Barry (BY)

Asset Template

Thermal Station

Asset Category

Thermal

+ Add Filter

Cancel Save

Attributes Filter

Select All

- PN Plan
- Reactive Power
- Seconds Remaining
- SEL
- SIL
- Target Active Power
- Target Frequency

Select Data > Modify View > **Publish**

Target Configuration

TDC



Run Once

Run on a Schedule

First Run

*



Recur every

Summary

Shape and Matches

- **There are 7 Matching Instances**

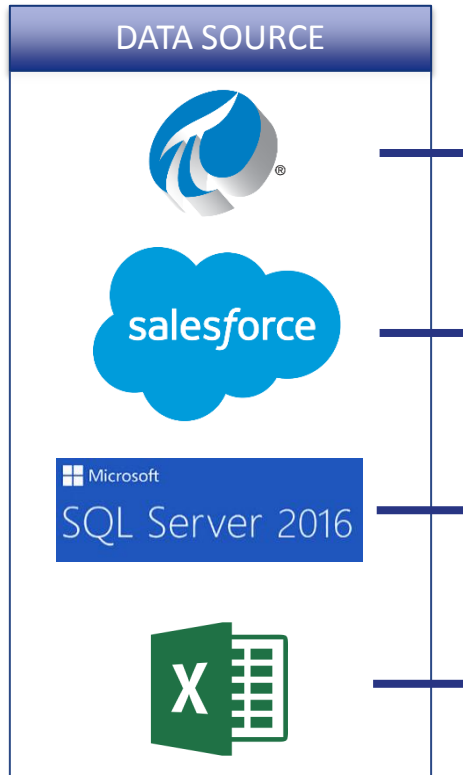
Timeframe and Interval

- Your Start Time is **Y**
- Your End Time is **T**
- Your Time Interval gets an interpolated measurement **Every 30 minutes**

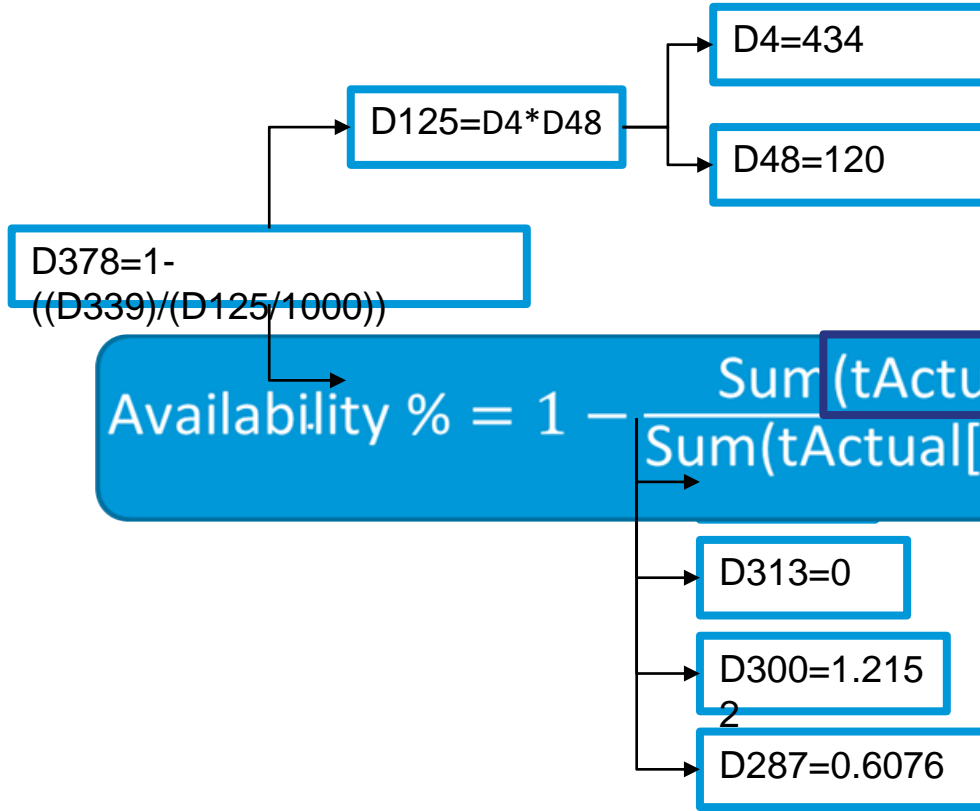
Publish

The Solution – Bringing it all together

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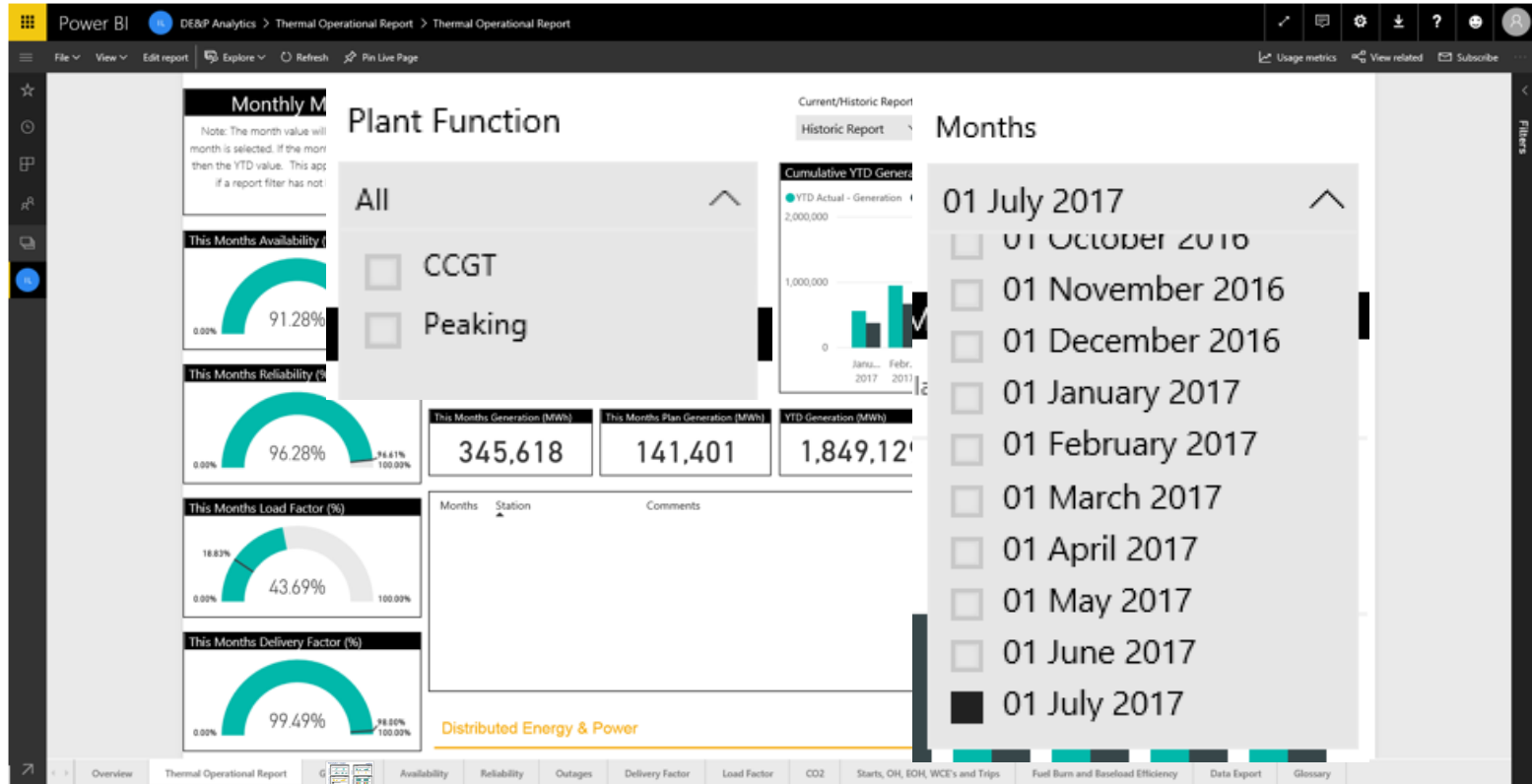
What about the calculations?



What do they all mean?

Same Calculation Done 276 times!

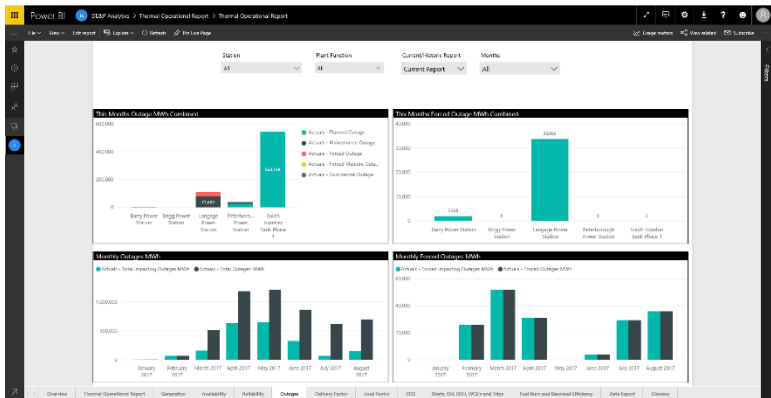
The Solution – Output



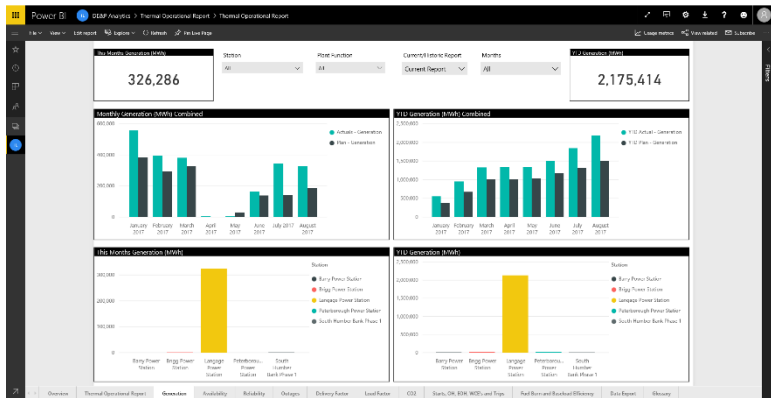
The Solution – Output



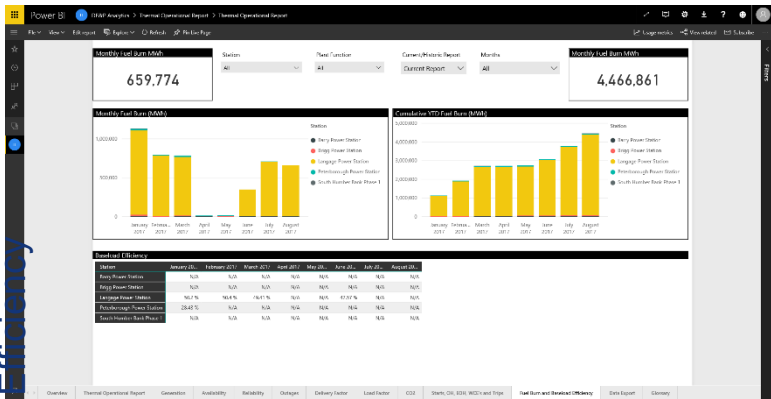
Outage Summary



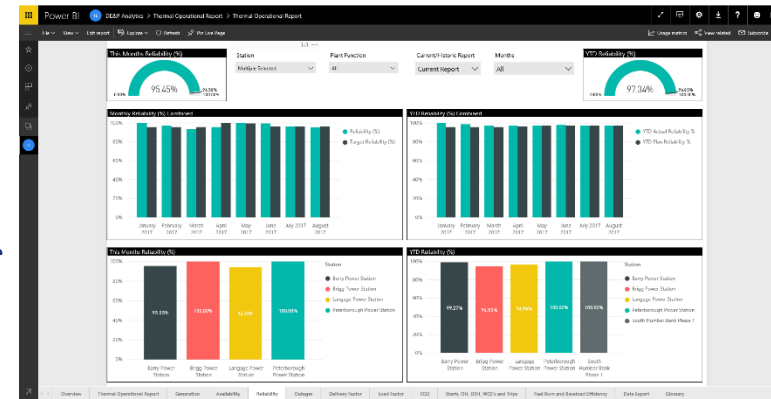
Generation



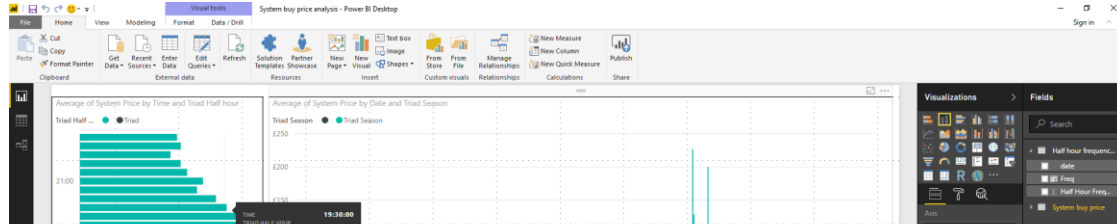
Fuel Burn and Efficiency



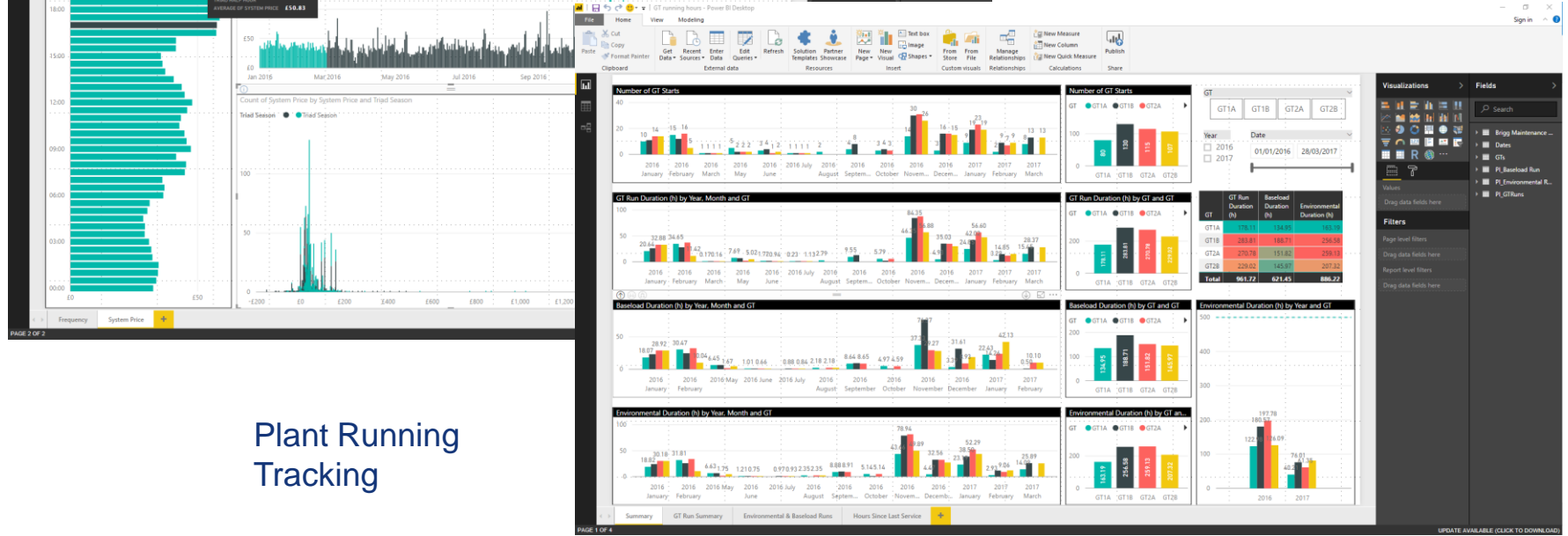
Delivery Factor



What's Next?



UK Market Analysis



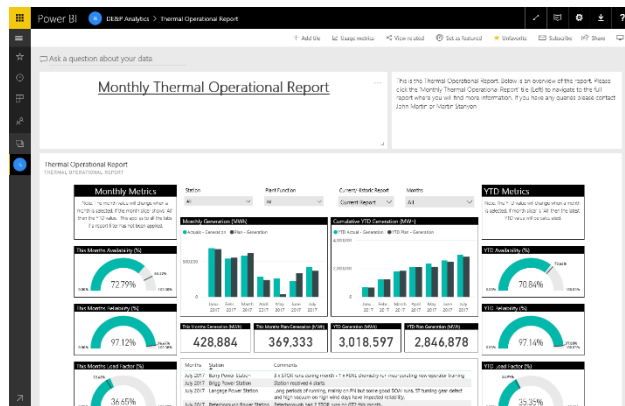
Plant Running Tracking

Summary

COMPANY and GOAL

We are an energy and services company and one of our strategic goals is **Cost Efficiency & Simplification**

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CHALLENGE

An aging reporting process with confused ownership of data took too long to produce and quality was questionable

SOLUTION

Give the data context using **Asset Framework**, find it using **Event Frames** and prepare using **Integrators**

- ZERO lines of custom coding
- New assets included and disposed of assets removed automatically

RESULTS

Vastly reduced time spent preparing reports

- We now have a simple and efficient process for operational reporting
- Allowing the Data & Analytics team to do more analytics and less data preparation

Martin Stanyon

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Data & Analytics Manager

Centrica

Questions

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

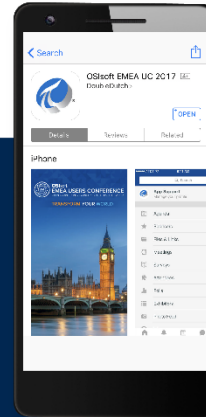


State your **name & company**

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감사합니다

Danke

谢谢

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado