

Public

**P375 'Metering behind the
Boundary Point'
P376 'Utilising a Baselining
Methodology to set Physical
Notifications'**

Workgroup 2

18 March 2019

Health & Safety

In case of an emergency

An alarm will sound to alert you. The alarm is tested for fifteen seconds every Wednesday at 9.20am

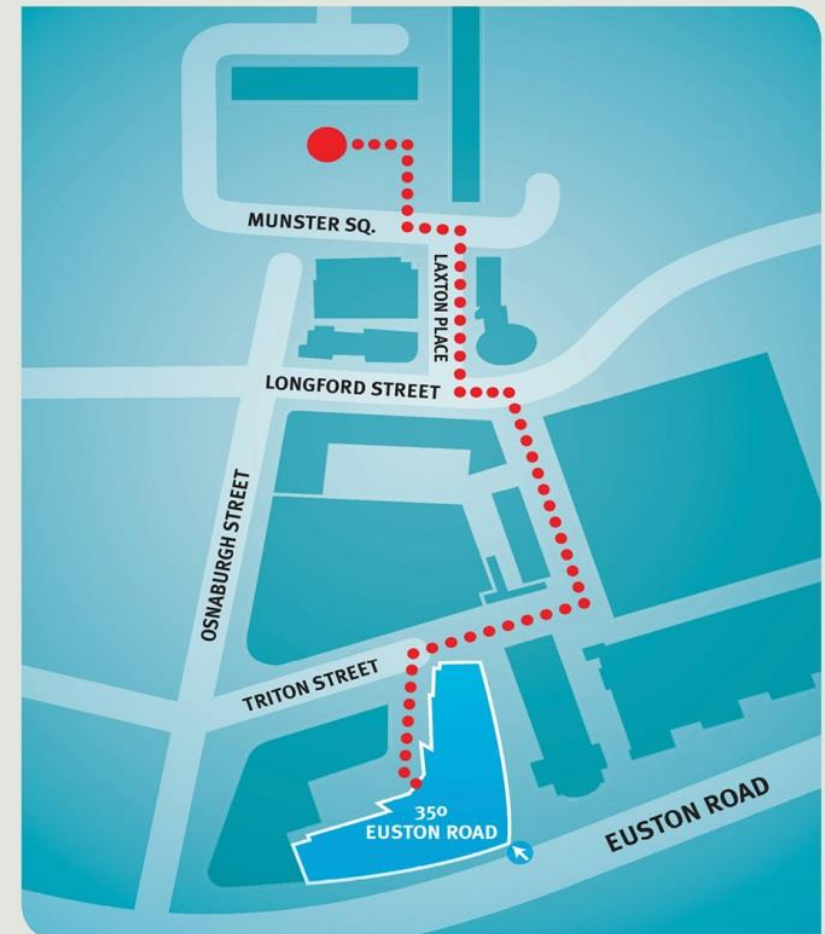
Evacuating 350 Euston Road

- If you discover a fire, operate one of the fire alarms next to the four emergency exits.
- Please do not tackle a fire yourself.
- If you hear the alarm, please leave the building immediately.
- Evacuate by the nearest signposted fire exit and walk to the assembly point.
- Please remain with a member of ELEXON staff and await further instructions from a Fire Warden.
- For visitors unable to use stairs, a Fire Warden will guide you to a refuge point and let the fire brigade know where you are.

When evacuating please remember

- Do not use the lifts.
- Do not re-enter the building until the all clear has been given by the Fire Warden or ground floor security.

Our team on reception is here to help you, if you have any questions, please do ask them.



Agenda (1 of 2)

- Welcome and apologies
- Review of meeting 1 and actions
- Where, when and how the PN feeds into settlement
 - Availability of adjusted data
- Registration of Metering Systems
- Overview of the dispatch process
 - Timings of Meter data
 - Consequential changes to the Grid Code
- What Metering Standards are appropriate
 - Codes of Practice
 - Unmetered Supplies and EV charging points

Agenda (2 of 2)

- How can losses be accounted for?
- What techniques can be used to provide assurance?
 - Techniques for Operational Metering
 - Techniques for Baseline Methodologies
 - Can the solutions be used to assure each other?
- Are there outstanding considerations?
 - Review of Workgroup Terms of Reference
 - What analysis / IA are needed?
- AOB and next steps

Actions from Workgroup 1

No	Action	Action on
1.	Present an overview of the dispatch process at the next Workgroup meeting, including how sites with inaccurate FONs are considered	NGESO
2.	Look into the timings of any meter data it received in relation to Balancing Services and how/if this could be used to provide assurance that assets were delivering as intended.	NGESO
3.	Consider whether related Grid Code changes would be needed.	NGESO
4.	ELEXON agreed to consider how the function could work for administering the Baseline Methodologies.	ELEXON
5.	Provide a walkthrough of metering standards at the next workgroup to help it decide what is appropriate.	ELEXON
6.	Look at some examples of how losses could be accounted for.	ELEXON
7.	Provide a detailed overview of potential assurance methods at the next Workgroup.	ELEXON

Objectives

- Identify the standard of metering required for operational metering
 - Identify any major pieces of work or show stoppers
- Consideration of requirements for Meter registration
- Identify process for applying line losses
- Consideration of risk management through performance assurance techniques

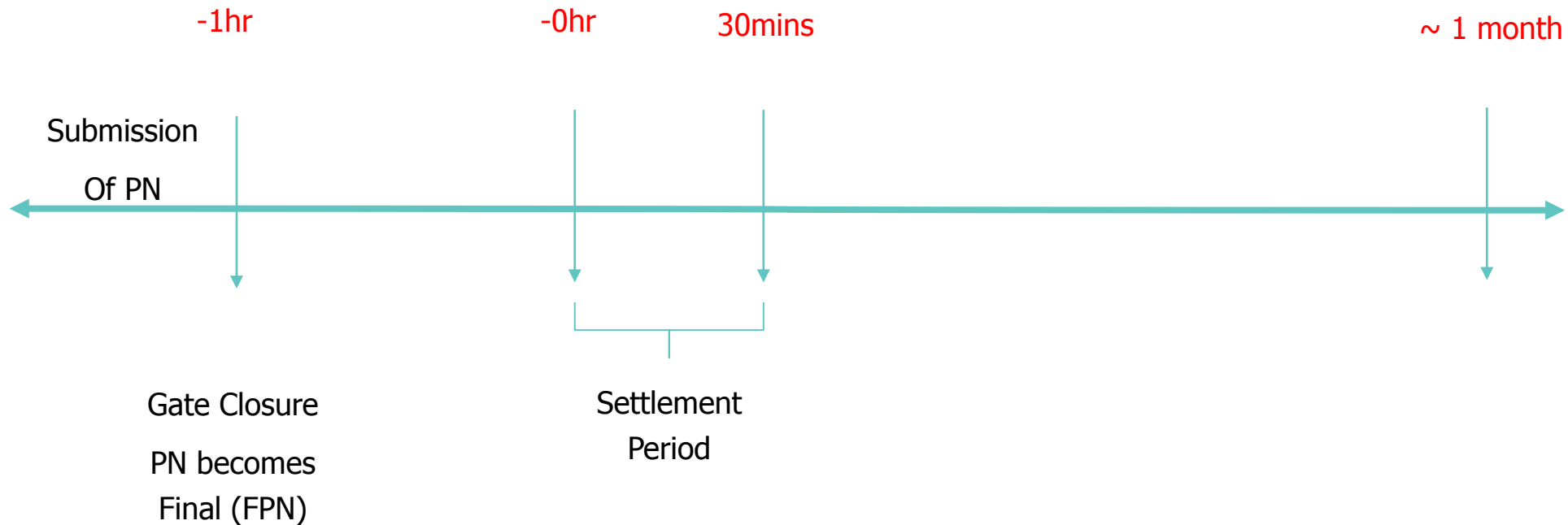
Public

FPNs and Settlement Process (Baselining)

18 March 2019
Damian Clough

ELEXON

FPNs and Settlement Process (Baselining)



- Most Baseline Methodologies require real time data to set FPN
- ELEXON receive Settlement data relating to ~ days before the relevant Settlement Period
- However for P376 we are proposing that the FPN for Dispatch (FPND*) can be different from the FPN for Settlement (FPNS*)
- *unofficial term

Accuracy of PNs (Grid Code)

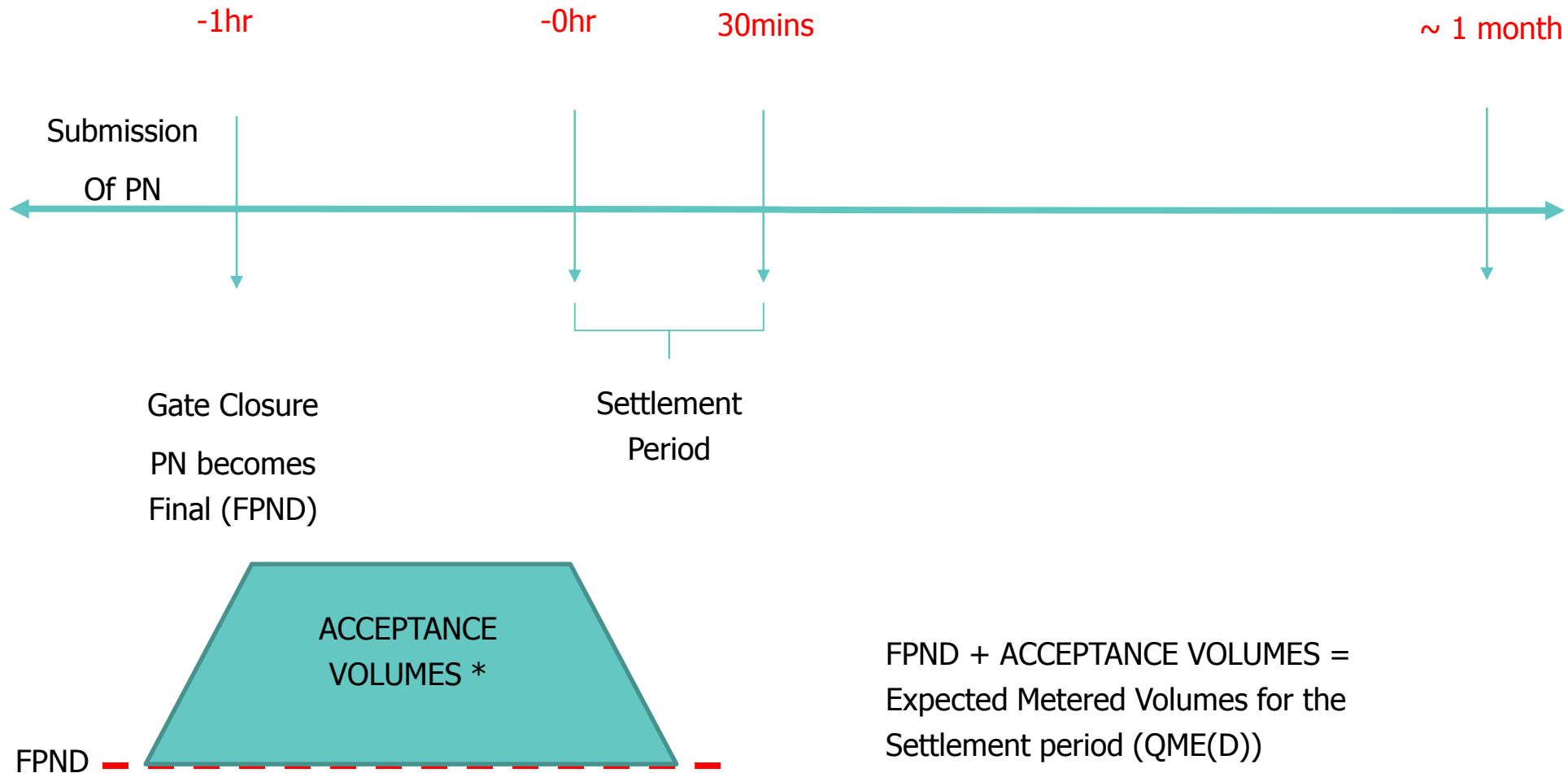
■ **BC2.5.1 Accuracy Of Physical Notifications**

- Except where variations from the Physical Notification arise from matters referred to at (a),(b or (c) above, in respect only of BM Units (or Generating Units) powered by an Intermittent Power Source, where there is a change in the level of the Intermittent Power Source from that forecast and used to derive the Physical Notification, variations from the Physical Notification prevailing at Gate Closure may, subject to remaining within the Registered Capacity, occur providing that the Physical Notification prevailing at Gate Closure was prepared in accordance with **Good Industry Practice.**
- FPND as well as Bids and Offers must relate to the GSP Group (i.e. adjusted for losses)
- P376 is not proposing to create the FPN for dispatch

Line Losses and PN's

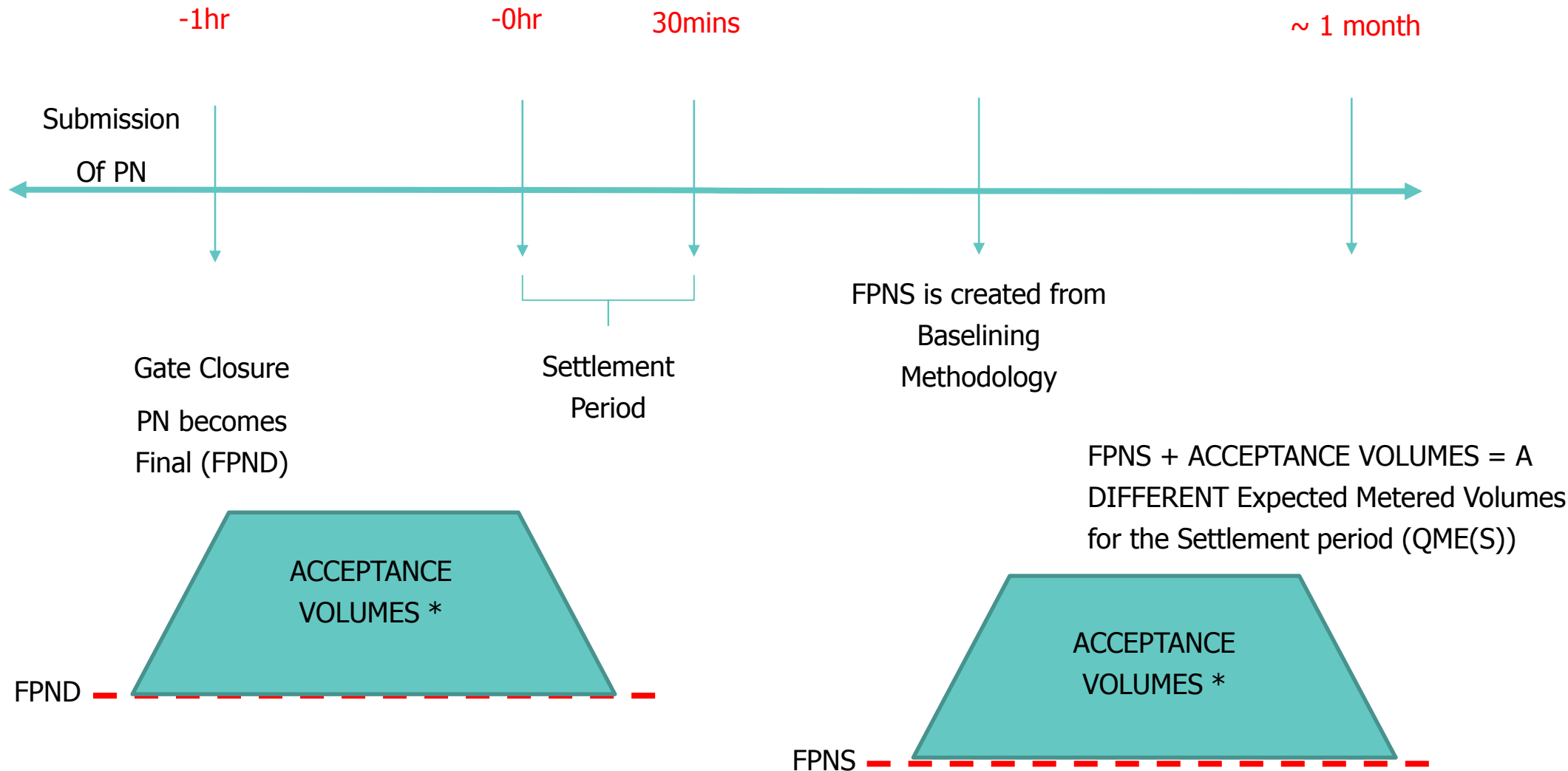
- FPN
- The Grid Code states the following;
- BC1.4 SUBMISSION OF DATA In the case of Additional BM Units or Secondary BM Units any data submitted by Users under this BC1 must represent the value of the data at the relevant GSP Group. In the case of all other BM Units or Generating Units Embedded in a User System, any data submitted by Users under this BC1 must represent the value of the data at the relevant Grid Supply Point.
- Therefore PN's and Bids and Offers should be submitted taking losses into account.
 - To avoid discrepancy these should be the same as what the HHDC uses to amend metered flows at the asset
- Baseline values should therefore also include losses. If the values inputted into the baseline methodology are adjusted volumes then this is ok.
 - However raw meter data cannot be used

FPNs and Settlement Process (Baselining)



*created from
Bids and Offers

FPNs and Settlement Process (Baselining)



*created from
Bids and Offers


Summary

- The FPN for Settlement and Dispatch can be different, thus allowing the Settlement FPN to be created at a later date when Settlement Date is first available for the Settlement periods preceding the relevant Settlement period to be settled
- FPNS could be created for all BMU's and Boundary meters and could act as a check on delivery/independence for P375
- FPNS will be published similar to existing FPNs which are published on BMRS
- Parties could use published historic FPNS to create their FPND, albeit they will not be as up to date and potentially as accurate as FPNS due to the availability of data



Registration of Metering Systems

John Lucas




Overview of the Dispatch Process - Timings of Meter data Possible Grid Code changes

Graham Neale

Dispatch Process and Possible Grid Code Changes

No	Action	Action on	Progress/update
1	Present an overview of the dispatch process at the next workgroup meeting, including how sites with inaccurate FONs are considered	NGESO	Process is the same as a 'traditional' generator and imbalance will be managed in the same manner as well (i.e. in line with the attached - https://www.elexon.co.uk/documents/training-guidance/bsc-guidance-notes/imbalance-pricing/)
2	Look into the timings of any meter data it received in relation to Balancing Services and how/if this could be used to provide assurance that assets were delivering as intended.	NGESO	Grid code (introduced in GC097 – BC4.4.1) requirements state that a VLP will need to provide Operational Metering for each Secondary BMU in aggregate and for each 'asset' of 1MW. This is regardless of if/what Balancing Services are provided.
3	Consider whether related Grid Code changes would be needed.	NGESO	Don't believe any are required for P375 (assuming the above requirement is met) but depending on the scope of P376 (i.e. what sites are eligible for the baselining solution), changes may be required.



Code of Practices - Standards for Metering Unmetered Supplies and EV

Iain Nicoll /John Lucas

What does the BSC require?

- BSC Section L 3.2.1 requires all Metering Equipment to either:
 - comply with the requirements set out in the relevant Code of Practice (CoP) at the time the Metering System is first registered for Settlement; or
 - be the subject of, and comply with, a Metering Dispensation.
- Metering Dispensation process defined in BSCP32
 - If for practical and/or financial reasons any Metering Equipment or Metering System does not meet any of the requirements set out in the relevant CoP, the Metering Equipment or Metering System may be the subject of an application for a Metering Dispensation from that relevant Code of Practice
 - Application presented to either Imbalance Settlement Group (ISG) or Supplier Volume Allocation Group (SVG)

What is the relevant Code of Practice?

- For Half Hourly Metering Systems:
 - Code of Practice 1 – Circuit Rating $> 100\text{MVA}$
 - Code of Practice 2 – Circuit Rating $> 10\text{MVA}$ and $\leq 100\text{MVA}$
 - Code of Practice 3 – Max Demand $> 1\text{MW}$ and Circuit Rating $\leq 10\text{MVA}$
 - Code of Practice 5 – Max Demand $\leq 1\text{MW}$
 - Code of Practice 10 - The Metering of Energy via Low Voltage Circuits for Settlement Purposes

- Code of Practice 4 is for the Calibration, Testing and Commissioning Requirements

- Anything else must comply with Smart Metering Equipment Technical Specifications

What are the relevant BSCPs in CMRS?

- A Central Meter Registration Service (CMRS) is one that is:
 - Directly connected to the Transmission System
 - Connected to the Distribution System and be licensable to be a BMU
 - Exemptable Generation can choose to be in CVA (Central Volume Allocation)
- A CMRS site will always be a BMU
- The relevant BSCPs are:
 - BSCP02 for Proving Tests
 - BSCP06 for Meter Operations requirements
 - BSCP20 for registration of the Meter Technical Details
 - BSCP75 for registration of the Aggregation Rules

What are the relevant BSCPs in SMRS?

- A Supplier Meter Registration Service (SMRS) is one that is:
 - **NOT** directly connected to the Transmission System
 - Connected to the Distribution System and is not licensable
 - Exemptable Generation can choose to be in CVA rather than SVA (Supplier Volume Allocation)
- A SMRS site will always have an MPAN (separate MPANs for Active Import and Active Export)
- The MPAN can be put in the Supplier's Base BMU or be allocated to an Additional BMU
- An SVA Metering System can be put in a Secondary BMU
 - for purposes of participating in the BM and TERRE
- The relevant BSCPs are:
 - BSCP514 for Meter Operations requirements

What does the Code of Practice require?

- Measurement Criteria
 - Measured Quantities and Demand Values
 - Accuracy Requirements
- Metering Equipment criteria
 - Measurement Transformers
 - Testing Facilities
 - Meters
 - Displays and Facilities for Registrant Information
 - Outstation
 - Communications
 - Sealing
- Defined Metering Point (DMP)

What are the limits for Overall Accuracy?

- Each category of site has a maximum permissible error at the DMP
 - For example in a CoP1 / Type 1 (>100MVA) site

Condition	Limits of Error at Stated System Power Factor	
% of Rated Current	Power Factor	Limits of Error
120% to 10% inclusive	1	±0.5%
Below 10% to 5%	1	±0.7%
Below 5% to 1%	1	±1.5%
120% to 10% inclusive	0.5 lag and 0.8 lead	±1.0%

What are the limits for Overall Accuracy?

- Each category of site has a maximum permissible error at the DMP
 - Summary of all CoPs at most common load point

Code of Practice	Condition	Limits of Error at Stated System Power Factor	
		Power Factor	Limits of Error
1	120% to 10% inclusive	1	±0.5%
2	120% to 10% inclusive	1	±1.0%
3	120% to 10% inclusive	1	±1.5%
5	120% to 20% inclusive	1	±1.5%
10	See note below		

- CoP10 - be within the limits of error of the Electricity Act 1989. These limits of error shall apply at the Reference Conditions defined in the appropriate Meter specification.

<https://www.legislation.gov.uk/ukpga/1989/29/contents>

What makes up the Metering System?

- High Voltage/High Current System (Transmission or Distribution System)
 - Voltage Transformer
 - Current Transformer
 - Meter

- Low Voltage/High Current System (Distribution System connected)
 - Current Transformer
 - Meter

- Low Voltage/Low Current (Directly connected)
 - Meter

- All Metering Equipment is manufactured to an IEC standard

What are the requirements for Metering Equipment?

- Voltage Transformers
 - Summary of all CoPs

Code of Practice	Accuracy Class	IEC Standard
1	0.2	IEC 61869-3
2	0.5	
3	1	
5	1	
10	N/A	

- IEC 61869-3 INSTRUMENT TRANSFORMERS – Part 3: Additional requirements for inductive voltage transformers

What are the requirements for Metering Equipment?

- Current Transformers
 - Summary of all CoPs

Code of Practice	Accuracy Class	IEC Standard
1	0.2s	IEC 61869-2
2	0.2s	
3	0.5	
5	0.5	
10	0.5	

- IEC 61869-2 INSTRUMENT TRANSFORMERS – Part 2: Additional requirements for current transformers

What are the requirements for Metering Equipment?

■ Meters

- Meters are Compliance and Protocol approved via BSCP601 (Metering Protocol Approval and Compliance Testing)
- Summary of accuracy class for all CoPs

Code of Practice	Accuracy Class	IEC Standards
1	0.2s	IEC 62053-22
2	0.5s or C	IEC 62053-22 / BS EN 50470-3
3	1 or B	IEC 62053-22 / BS EN 50470-3
5	2 or A	
10	See below	

- CoP10 - Active Energy Meters shall be supplied which shall meet the requirements of Schedule 7 of the Electricity Act 1989.

<https://www.legislation.gov.uk/ukpga/1989/29/contents>

Metering Standards

■ Active Energy:

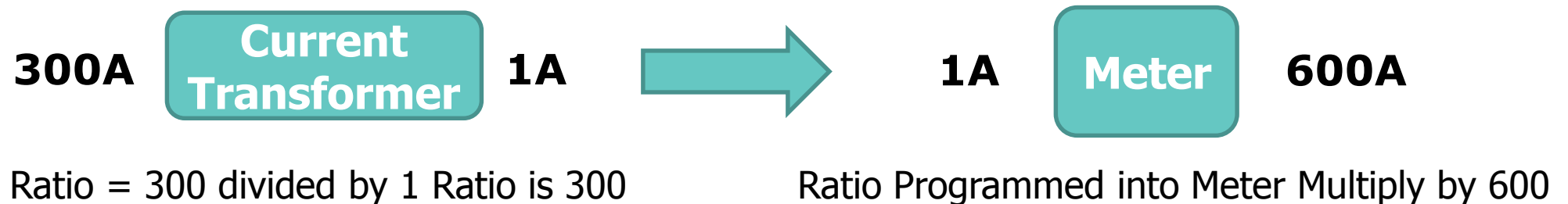
- IEC 62053-22: Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
- IEC 62053-21: Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
- BS EN 50470-3: Electricity metering equipment (a.c.). Particular requirements. Static meters for active energy (class indexes A, B and C)

■ Reactive Energy:

- IEC 62053-23: Electricity metering equipment (a.c.) - Particular requirements -Part 23: Static meters for reactive energy (classes 2 and 3)

So why do we commission?

- Code of Practice 4 (The Calibration, Testing and Commissioning Requirements of Metering Equipment for Settlement Purposes) details the requirements.
- Imagine a situation where the Current Transformer is on a ratio of 300/1A while the Meter is set to a ratio of 600/1A



For every 1 kWh Generated the Meter will record 2 kWh and submit this into the Settlement System

- This is why the Metering System must be commissioned:
 - This can be considered in two parts
 1. Measurement Transformers; and
 2. Meters

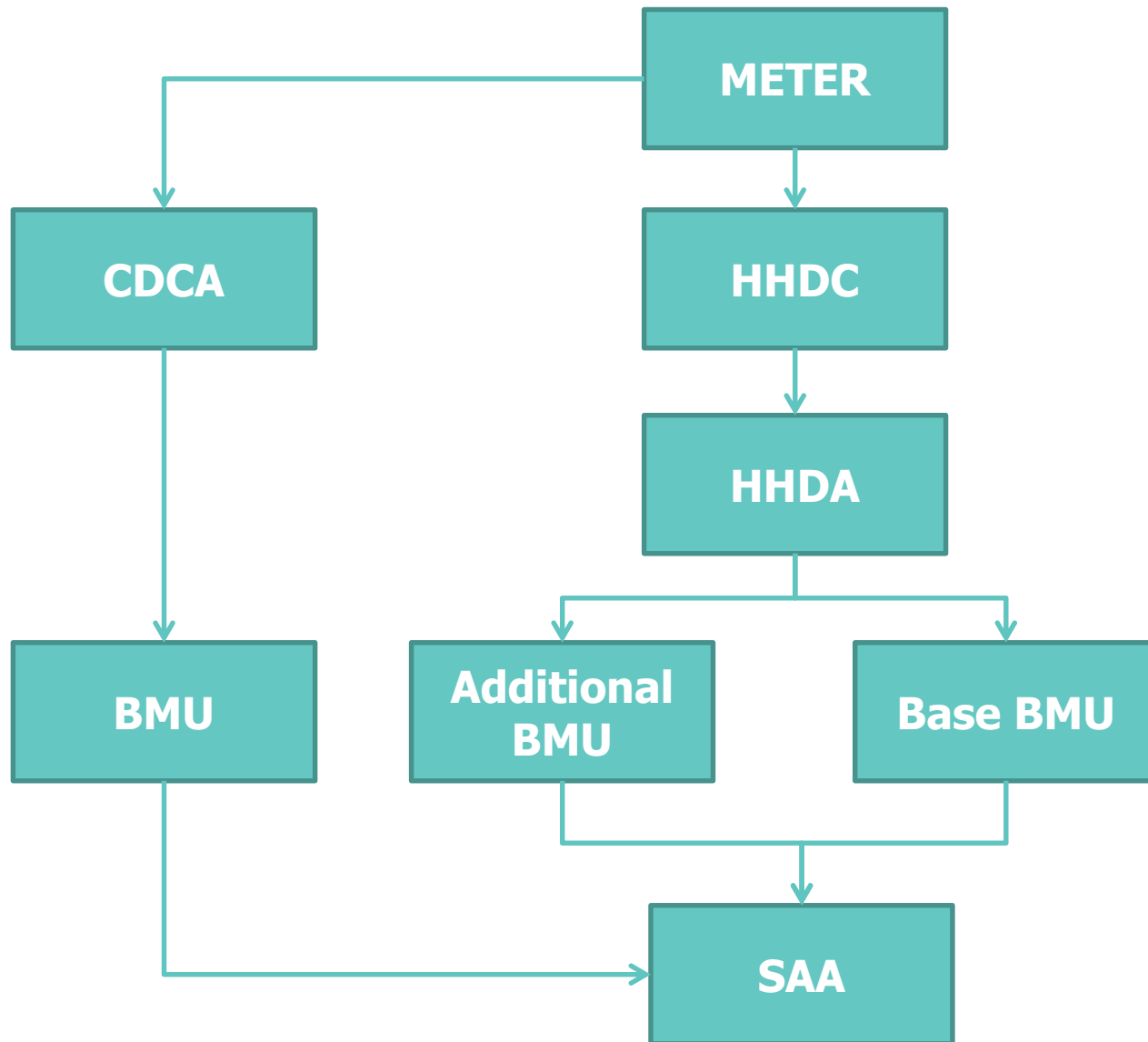
How do we commission?

- Measurement Transformers:
 - Inject a known Primary voltage or current to confirm the ratio
 - Carry out a test to confirm polarity (proves transformer facing the correct direction)
- Meters:
 - Metering Commissioning will typically confirm
 - Accuracy (e.g. measurements of V, I, W, VAr, VA and an accuracy test)
 - Phase rotation
 - No alarms
 - Programmed ratios (if applicable)
 - Independent Primary values (e.g. kV, A, kW)
 - Meter Proving Test (if applicable) will confirm Data Collector is receiving accurate Metered Volumes

Roles and Responsibilities

- Meter Operator Agent – Appointed to install, commission and maintain the Meter
 - Accredited under MOCOPA (Meter Operation Code of Practice Agreement)
- Distribution Network Operator
 - Installs, commissions and maintains Measurement Transformers where the equipment owner (if not MOA responsibility)
 - Creates MPANs for all points of connection (maybe import and export for the same Metering System)
- Half Hourly Data Collector (HHDC) – Appointed to download half hourly data and pass to the HHDA
- Half Hourly Data Aggregator (HHDA) – Appointed to process data from HHDC and allocate Metered Volumes to the relevant Supplier's Base BMU (or Additional BMU)
 - This is done for each Grid Supply Point area

So how do we get the Half Hourly data?



CDCA – Central Data Collection Agent
HHDC – Half Hourly Data Collector
HHDA – Half Hourly Data Aggregator
BMU – Balancing Mechanism Unit
SAA – Settlement Administration Agent

Non-BSC Requirements

- Requirements of Schedule 7 of the Electricity Act 1989.

<https://www.legislation.gov.uk/ukpga/1989/29/contents>

- *'Where a customer of an authorised supplier is to be charged for his supply wholly or partly by reference to the quantity of electricity supplied, the supply shall be given through, and the quantity of electricity shall be ascertained by, an appropriate meter.'*
- *'is of an approved pattern or construction and is installed in an approved manner'*
- *'Where electricity has been supplied for any period through such a meter which is of an approved pattern or construction and is installed in an approved manner, the register of the meter shall be presumed...'*
- There are accurate meters available that can operate to the required Accuracy Class to provide energy readings but don't have a display

Unmetered Supplies

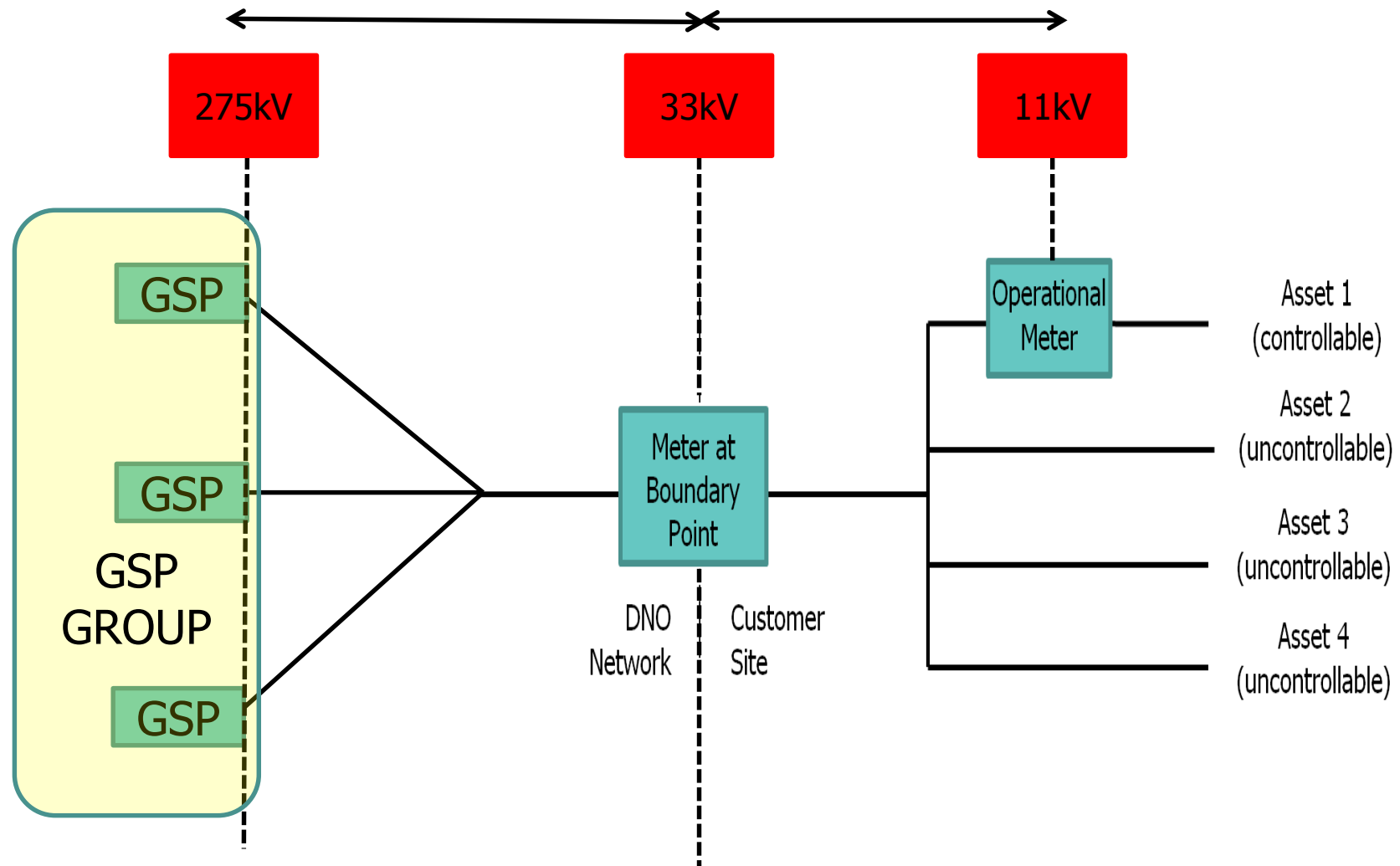
- An Unmetered Supply is any electronic equipment that draws a current and is connected to the Distribution Network without a meter recording its energy consumption. Unmetered Supplies (UMS) exist in the half hourly and non half hourly Supplier Volume Allocation (SVA) markets.
 - e.g. street lights and traffic lights
- The UMS process is governed by BSCP520 – Unmetered Supplies Registered in SMRS. The Unmetered Supplies Operator (UMSO) provides the UMS service on behalf of a distributor.
- Should Meter-like measuring devices be treated as Unmetered?
 - Certain EV charging points have a measuring device that provides Settlement with data just as reliable and accurate as that from a Meter, but doesn't meet the strict (non-BSC) legal requirements for a Meter



How Losses can be Accounted for

Damian Clough

Line Losses



Line Losses

- Electricity entering or exiting the Distribution System is adjusted to take account of energy that is lost as it is distributed through the network.
- This adjustment is used in energy settlement to take metered consumption to a notional grid supply point so that Suppliers purchases take account of the energy lost on the Distribution System.
- DNOs are responsible for calculating the Line Loss Factors (LLFs) and providing these to ELEXON.
- LLFs are used to adjust the Metering System volumes to take account of losses on the Distribution System.
- Embedded Generation has LLFs added too its output, Demand has LLFs deducted.
 - I.e. Generation of 20MW at the GSP will reduce in volume by the time it reaches Consumption. Demand at the GSP will increase as it reaches the point of consumption. If Grid expect 20MWs of output, Aggregator has to deliver 20MW less LLF.

Line Losses and FPNs

- As metered volumes take account of losses in settlement, Physical Notifications should also therefore be based on the adjusted volumes at the GSP Point
- **BC1.4 Submission of data**
 - In the case of Additional BM Units or Secondary BM Units any data submitted by Users under this BC1 must represent the value of the data at the relevant GSP Group. In the case of all other BM Units or Generating Units Embedded in a User System, any data submitted by Users under this BC1 must represent the value of the data at the relevant Grid Supply Point.
- FPNs and Bids and Offers should be submitted taking losses into account.
 - To avoid discrepancy these should be the same as what the HHDC uses to amend metered flows at the asset.
- Baseline values should include losses. If the values inputted into the Baseline Methodology are adjusted volumes then this is ok.
 - However raw meter data cannot be used as there will be discrepancy between real time values at the Operational Meter and Settled values

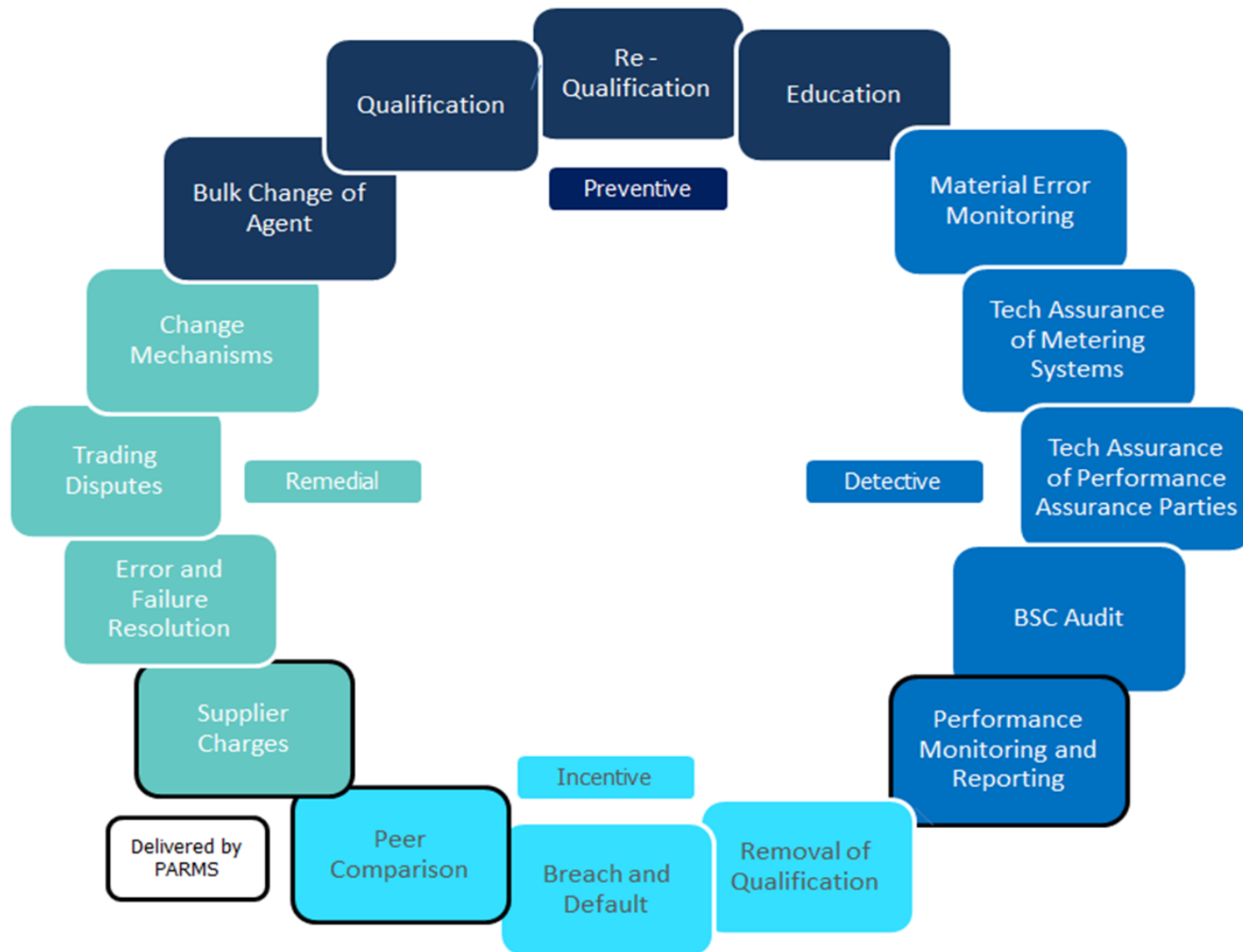


Performance Assurance Techniques

Ryan Dale

ELEXON

Performance Assurance Techniques (PAT)



P375 Appropriate PATs

- Would be treated as a Risk Event in the Risk Operating Plan
 - R007 - Retrieval of Metered Data
 - R003 - Metering Equipment installation, programming, maintenance and Commissioning
 - R026 - Aggregation Rules

- Risk Event of the Capability to manage HH Settlement Processes

- Applicable PATs:
 - Technical Assurance of Metering (TAM)
 - BSC Audit
 - Material Error Monitoring

P376 Appropriate PATs

- Comparison between the different calculation methodologies
- Would require further clarification to assess where the Risk manifests:
 - R028 – NETSO Submissions
 - R029 – SAA Calculation
- Applicable PATs:
 - BSC Audit
 - Technical Assurance of Performance Assurance Parties
 - Trading Disputes



Review of ToRs

Terms of Reference (1 of 2) – P375 Workgroup

- What standard of metering will be required? Note any differences between the standards of metering used for other Balancing Services such as STOR (the use of Secondary BM Unit's may be extended further than the use of Replacement Reserve under TERRE).
- Consider appropriate ways to demonstrate independence of the asset if required? How can we appropriately provide assurance of the impacts of the balancing service on the Total System?
- How will pseudo MPANs be registered and linked to the asset and how will these MPANs be subsequently be linked to the Settlement Meter?
- Is the solution, or can it be future proofed against potential future Industry developments, for example domestic assets providing Balancing Services or operating in the Balancing Mechanism.

Terms of Reference (2 of 2) – P375 Workgroup

- What changes are needed to BSC documents, systems and processes to support P375 and what are the related costs and lead times?
- Are there any interactions (complements and conflicts) between P375 and P376?
- Will any new data flows or amendments to data flows be required?
- Are there any Alternative Modifications?
- Should P375 be progressed as a Self-Governance Modification?
- Does P375 better facilitate the Applicable BSC Objectives than the current baseline?

Terms of Reference (1 of 2) – P376 Workgroup

- How will the Baseline FPN be created and by whom?
- Can the Baseline Methodology be used for purposes other than providing the FPN for Settlement purposes?
- How will the new service be funded? i.e. should only those who benefit from this service pay for the service?
- Which Parties will be allowed to use a Baseline Methodology for their FPN used in Settlement?
- Will there be one Baseline Methodology or will there be different methodologies aligned to Technology type. If so how will this work in practice?
- What changes are needed to BSC documents, systems and processes to support P376 and what are the related costs and lead times?

Terms of Reference (2 of 2) – P376 Workgroup

- Are there any interactions (complements and conflicts) between P376 and P375?
- Will any new data flows or amendments to data flows be required?
- Are there any Alternative Modifications?
- Should P376 be progressed as a Self-Governance Modification?
- Does P376 better facilitate the Applicable BSC Objectives than the current baseline?



AOB and Next Steps

Progression timetables

Proposed Progression Timetable for P375/6

Event	Date
Workgroup Meeting	18 March 2019
Workgroup Meeting	April 2019
Industry Impact Assessment	8 April 2019 – 26 April 2019
Workgroup Meeting	W/B 13 May 2019
Assessment Procedure Consultation	3 June 2019 – 21 June 2019
Workgroup Meeting	W/B 1 July 2019
Present Assessment Report to Panel	8 August 2019

