

PUBLIC

# Market-wide Half-Hourly Settlement

Design Working Group: Draft Skeleton  
TOMs for Evaluation



ELEXON

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# MARKET WIDE HALF-HOURLY SETTLEMENT

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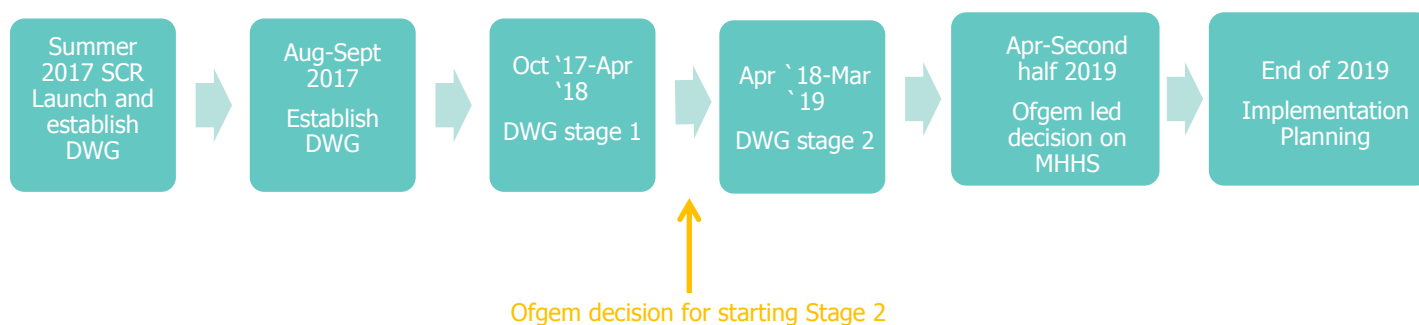
## INTRODUCTION

### 1. Ofgem SCR on Market-wide Half-Hourly Settlement

This report sets out the five draft Skeleton Target Operating Models (TOMs) developed by the ELEXON led Design Working Group (DWG). The TOM development work forms part of the Ofgem led Significant Code Review (SCR) on Market-wide Half-Hourly Settlement (MHHS). The main objective of the TOMs is to create an enduring Settlement process that is simple, more accurate and facilitates innovation based on the [Design Principles](#) set out by Ofgem.

The report covers the key services of the end-to-end Settlement process for MHHS, describes the DWG developed TOMs, the advantages of the design common to all TOMs. Appendix A sets out the DWG approach used in developing the TOMs and its rationale (in the first 4 meetings of the DWG, up to their meeting on 10 January 2018).

This report will be used by the DWG in their evaluation of the draft skeleton TOMs. The Skeleton TOMs and their DWG evaluation will form the basis of the final report for Ofgem on DWG Stage 1 of the Settlement design work for MHHS. The detailed timeline for the Settlement design work and overall Ofgem SCR process can be found in the Ofgem SCR Launch [Statement](#). The high level timetable for this project is as follows:



Appendix A report also covers the key discussions and agreements of four meetings of the DWG (see [ELEXON website DWG](#) for further details on the meetings). It sets out the TOM baseline principles agreed by the DWG and used to develop the TOM service groupings and then the draft TOMs.

### 2. What is a Target Operating Model (TOM) for MHHS?

A TOM for MHHS is a set of services and processes required to deliver Settlement Period (SP) level data from a Meter to a central Settlement body to enable the calculation of the amount of energy a Supplier's customers have consumed for each Settlement Day (SD). This calculation is then used in the Imbalance Settlement process which compares the Supplier's contracted purchases of energy to the amounts deemed to have been consumed (sales) by each Supplier's customers (and recognises any amounts of energy contracted by National Grid under the Balancing Mechanism). In further developing the TOMs there will be consideration of the additional benefits that can be realised by having access to the Settlement Period level data: for example, for smart grid development, innovation or flexibility offerings. Additionally, it is intended that the TOMs will allow for shorter Settlement timescales. The smart Meter roll out should allow for more frequent collection of consumption data and allow reduction from the current 14 month reconciliation window. It should be noted that there is a dependency on the data privacy/ data access policy decision on the granularity of data that can be collected from smart Meters. Reduction in Settlement timescales could also provide further benefits (e.g. reduction in credit cover).

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## 3. What future innovation could the TOMs support?

It is intended that all the TOMs will enable benefits to be unlocked innovation in technologies and energy services. To achieve this, the TOMs are designed to be as flexible as possible (within certain market constraints), so as not to be a barrier to future innovations. Future uses of the TOMs could include new processes to support Electric Vehicles (EVs) (both charging and discharging), vehicle to grid services, Peer to Peer trading (P2P), community energy schemes, energy flexibility offerings such as DSR, battery storage offerings, Time of Use (ToU) tariffs and future services from Smart Grids. These may require the TOMs to support multiple and/or different parties contracting parties (other than the Supplier) with the consumer. These may also need the TOMs to support the provision of HH Meter data to new participants (with the appropriate access rights) both in aggregate form (new forms of aggregated data) or individual HH Meter data.

## 4. What do we mean by Meter data?

Meter data is any data that is stored at and can be collected from the Meter. This includes Register Readings for both cumulative and ToU registers, Active Import (AI) and Active Export (AE) data at Settlement Period level. It may include Reactive Power Meter data where for example such data is required for network charging purposes. Meter data can also include information on how Meters are configured such as the time of operation of the ToU Registers.

## 5. What do we mean by Meter data for non-Settlement purposes?

As well as providing Meter data for Settlement, Meter data may be collected for non-Settlement purposes. This could include Meter data that is required for network charging, customers billing or energy management services.

## 6. What is the Objective for Stage 1 of the DWG work

Stage 1 of the DWG work is to develop several potential TOMs for the target end state when most customers will have a Meter capable of delivering Settlement Period level data for Settlement purposes. All the TOMs will be evaluated with the aim of identifying the TOM which best meets the [Design Principles](#) set out by Ofgem.

The evaluated Skeleton TOMs will then feed into a consultation which will seek to identify any further detail that can be fed into further evaluations of the TOMs.

Stage 1 will not seek to consider low level detailed processes. For example, how Meter data is validated or how data is estimated when data is missing or invalid. Detailed design will be considered as part of DWG Stage 2. Stage 2 will also deliver detailed transitional arrangements to the TOMs. These will be consulted on as part of Stage 2.

## 7. What are the Draft Skeleton TOM Evaluations?

A draft Skeleton TOM is a description and a map of services, showing link/interaction between the services that cover the end to end Settlement arrangements (Meter to bank) for Market-wide HHS. Each TOM covers all the different market segments (Metering types), e.g. smart Meters, Advanced Meters, non-smart Meters (dumb/legacy) and unmetered supplies. See below for details and Appendix B for glossary of terms.

The draft Skeleton TOMs will be evaluated using the DWG agreed objectives and evaluation criteria set out in the DWG working document '[Evaluation Criteria for HHS Target Operating Models](#)'. The objectives are listed below along with evaluation criteria.

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## DWG agreed objectives

Objective	Description
<b>Accurate</b>	Maximising the use of actual half-hourly consumption data Cost-reflective and equitable Make electricity demand forecasting more reflective of actual usage
<b>Timely</b>	Less commercial risk, e.g. credit cover and Settlement timescales Reduces barriers to entry for new market participants
<b>Efficient</b>	Reduces Settlement costs Facilitates efficient use of energy resources and flexibility
<b>Facilitates innovation</b>	Improve Opportunities to offer new products that benefit the consumer Provides opportunities to provide flexibility, e.g. Demand Side Response or peer to peer trading Supports new technologies Flexible to include new entrants (Third parties, new entrants, new market types)

## The Evaluation Criteria to be used by the DWG in evaluating the draft Skeleton TOMs:

1. Coverage
2. Cost Reflectivity
3. Timing
4. Design Simplicity
5. Design Flexibility
6. Consequential Impacts
7. Data Privacy
8. Solution costs
9. Ease of Implementation
10. Facilitates new technologies and innovation
11. Impact on new entrants

It should be noted that the initial evaluation of the TOMs will only cover a subset of the above criteria. Consequential Impacts, Solution Costs and some elements of Data Privacy will need to be considered in Stage 2 of the TOM development work when more is known about Policy decisions and the Business Case.

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## 8. What are the Market Segments that are covered in the TOM design?

The TOMs are designed to cover all Metering Points connected to the distribution networks (known in Settlement as GSP Groups). These are settled under the Balancing and Settlement Code in Supplier Volume Allocation (in England and Wales and Scotland) taking into account the type of Meter data that can be obtained from the Metering System. The five Market Segments are:

- i) Smart Meters with Settlement Period level data available;
- ii) Smart Meters with only Register Readings available;
- iii) Non-smart Meters with Register Readings;
- iv) Advanced Metering Systems with Settlement Period level data available; and
- v) Unmetered Supplies.

The purpose of Stage 1 is to design an end to end Settlement design for the target end state. It is assumed that this target end-state is when the majority of Meters will be smart. Therefore, the number of non-smart Meters will be small. Furthermore most Advanced Meters (typically AMR Meters) in the current non-half hourly sector will either be replaced with a smart Meter or be settled in the Advanced Metering Systems Market Segment.

## 9. Why do the TOMs not explicitly set out the role of the Supplier?

In the context of the TOMs the Supplier is the party as currently defined under the [Electricity Act 1989](#) and the holder of a [Electricity Supply Licence](#) with these functions/obligations under the BSC:

- Registrant of Metering Systems;
- Party liable for settled energy costs;
- Provider of retail electricity services;
- Accessing Smart Meters serviced via the [Data and Communications Company \(DCC\)](#).

The Supplier will also be responsible for configuration of smart Meters and collection of data for customer billing.

The Supplier is not explicitly mentioned in the TOMs as it could be the party that is providing, procuring or interfacing with the services defined in the TOMs.

It is also recognised that in the future the role of the Supplier may change. For example, new market participants could take on the role traditionally known as Supplier. Furthermore, the customer may contract with new or multiple energy providers in future, with one potentially being the Supplier as we know it currently for just the customer's demand and others for generation or other specialist energy services, e.g. for an Electric Vehicle. A Supply contract could become part of a wider bundled service to customers. For the purposes of this document the Supplier is the party providing the functions and obligations set out above.

## 10. Why do the TOMs refer to Settlement Period Level data and not Half-Hourly data?

Currently Settlement is based on a Settlement Period equal to thirty minutes. The TOMs refer to Settlement Period level data rather than Half-Hourly data as the Settlement Period could change in the future. For example, it could be harmonised across Europe to a lower granularity or be reduced for innovation of flexibility products. Therefore, the Settlement Period could be fifteen minutes or even more granular in the future.

This may mean Metering Systems will need to be replaced or re-configured to provide data at the harmonised level.

Additionally, where Metering Systems only provide Register Readings there would also be a requirement to 'load shape' or 'profile' the Meter advances to a more granular Settlement Period (e.g. less than thirty minutes currently).

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## WHAT ARE THE SERVICES FEATURED IN ALL TARGET OPERATING MODELS (TOMS)?

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This section describes all the services that cover the end to end Settlement process for MHHS that have been used to construct the TOMs. Within some of the TOMs, some of these services have been combined into a single service. However, the core components of each service do not change.

The services are:

### 1. Registration Service

- registrar for all Metering Systems (and other related registration information) in Supplier Volume Allocation (SVA).- A service currently undertaken by the Licenced Distribution System Operators

### 2. Metering Service

- responsible for installing, commissioning and maintaining all Meters and associated physical technical details, (and associated equipment)

### 3. Meter Reading Service

- responsible for obtaining Register Readings (RRs) from non-smart Meters only

### 4. Retrieval Service<sup>1</sup>

- responsible for accessing and retrieving energy usage data (import and export) from Meters and associate technical details.

### 5. Processing Service

- responsible for validating and estimating Meter data (SP and RRs), converting Register Readings (RR) to Settlement Period level data, providing data to relevant parties and exception reporting

### 6. Load Shaping Service

- responsible for deriving 'Load Shapes' to be used by the Processing Service in converting Register Readings (RR) to Settlement Period level data

### 7. Settlement Period level Unmetered Supplies Service

- responsible for calculating Settlement Period level data for unmetered supplies such as street lights and traffic signals

### 8. Aggregation Service

- responsible for receiving and aggregating Settlement Period level data for use in Settlement, network charging and other purposes (e.g. flexibility)

### 9. Volume Allocation Service

- responsible for receiving aggregated Meter volume from aggregation service, applying correction to ensure all energy is accounted for and calculating [Balancing Mechanism Unit](#) (BMU) volumes.

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<sup>1</sup> For the avoidance of doubt the retrieval service is the service requesting and receiving energy usage data but not the communication services to the Meter. The Data and Communications Company for smart Meters and the communications service providers for Advanced and AMR Meters (such as Vodafone, Orange and O2) are not deemed part of the retrieval Service.

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In each of the TOMs, multiple market implementations of each service have been considered (competitive provision or single/multiple monopoly providers), except where a particular implementation is a key feature of the TOM or not appropriate for that service.

Services have also been defined in a way that allows different ways for market participants to deliver them, such as 'self-serve' (in house say for a Supplier) and/or independent provider options. Where services have been combined, this does not preclude individual services within the grouping being subcontracted to other providers. However, a single organisation will remain responsible for ensuring the delivery all the services in a particular grouping.

All TOMs assume that the Licenced Distribution System Operator (LDSO) will remain responsible for providing the necessary Distribution Losses data to allow the application of losses by the relevant service.

The detailed functions and responsibilities of each service are listed below and are split by market segment where relevant.

## Registration Service

This service will be responsible for:

- acting as registrar for all Metering Systems;
- receiving, validating and processing updates from the registrant;
- maintaining and updating data items as appropriate within the Registration system; and
- provision of registration data or access to registration data to other parties as required.

## Metering Services for Advanced, Smart and non-smart Metering Systems

This service will be responsible for:

- installing, commissioning and maintaining Advanced, smart and non-smart Meters;
- configuration of non-smart Meters;
- maintaining the Physical Meter Technical Details (MTD);
- energisation and de-energisation of Advanced, smart and non-smart Meters;
- connection and disconnection of Advanced, smart and non-smart Meters; and
- Meter fault investigation where a site visit is required.

## Meter Reading Service for non-smart Meters

This service will be responsible for:

- obtaining non-smart Meter Register Readings (RRs) from non-smart Meters either via a site visit or remotely as applicable;
- providing non-smart Meter Register Readings (RRs) to the Processing Service for smart and non-smart Meters; and
- providing non-smart Meter Register Readings (RRs) to the party responsible for customer billing.



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## Retrieval<sup>2</sup> and Processing Service for Advanced Meters

This service will be responsible for:

- receiving appointments to Advanced Metering Systems;
- retrieving the Settlement Period level Active Import (AI) and Active Export (AE) consumption (and other data as required e.g. reactive power) data from Advanced Metering Systems;
- receiving and maintaining Meter Technical Detail (MTD) data from the Metering Service for Advanced Metering Systems;
- validating Settlement Period (SP) level consumption data for Active Import and Active Export (and other data as required) using a common set of agreed validation rules to be implemented electronically where possible;
- estimating Settlement Period (SP) level consumption data for Active Import and Active Export (and other data as required) where such data fails validation or is missing or unavailable;
- maintenance of standing data as appropriate;
- exception reporting for any Metering Systems where data is deemed to be invalid or where access or issues with Metering Systems are identified;
- providing access to validated Settlement Period (SP) level data to the separate Aggregation Service(s); and
- providing validated Settlement Period (SP) level data to the other parties as appropriate.

## Retrieval Service for smart Meters

This service will be responsible for:

- receiving appointments or similar notifications to Metering Systems;
- retrieving Time of Use (TOU) Register Readings (RRs) for Active Import Registers and the Active Export Register and Meter configuration data from smart Meters where required for Settlement. This retrieval communication method will be achieved via the Data and Communications Company (DCC) service;
- retrieving the Active Import (AI) and Active Export (AE) data log (Settlement Period level) data from smart Meters where required for Settlement. This retrieval communication method will be achieved via the Data and Communications Company (DCC) service; and
- providing access to the retrieved data to the Processing Service for smart and non-smart Metering systems.

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<sup>2</sup> The retrieval and processing is combined in all TOMs as the processor is likely to need access to the Meter for this Market Segment. However, it is noted that there are currently a number of instances where the retrieval service is outsourced in this Market Segment. The TOMs do not explicitly preclude these situations.

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## Processing Service for smart and non-smart Metering Systems

This service will be responsible for:

- receiving appointments or similar notifications to Metering Systems;
- accessing Time of Use (TOU) Register Readings (RRs) for Active Import Registers and the Active Export Register and Meter configuration data for smart Meters from the Retrieval Service for smart Meters where required for Settlement.
- accessing the Active Import (AI) and Active Export (AE) data log (Settlement Period level) data for smart Meters from the Retrieval Service for smart Meters where required for Settlement.
- accessing Meter Register Read (RR) data and Meter Technical Details (MTDs) for non-smart Meters from the Meter Reading Service according to a defined reading schedule from the Retrieval Service for smart Meters where required for Settlement;
- validating Settlement Period (SP) level consumption data for Active Import and Active Export or smart Meter Register Readings (RRs) using a common set of agreed validation rules to be implemented electronically where possible;
- calculating Meter Advances (MAs) for Register Read (RR) data;
- estimating Settlement Period (SP) level consumption data for Active Import (AI) and Active Export (AE) where such data fails validation or is missing or unavailable;
- conversion of Meter Advances for Metering Systems with Register Readings (RRs) into Settlement Period (SP) level data using information on Meter configuration and data provided by the Load Shaping Service (LSS);
- estimating Settlement Period (SP) level data for Metering Systems with Register Readings (RRs) where such data fails validation or is missing or unavailable;
- maintenance of standing data as appropriate;
- exception reporting for any Metering Systems where data is deemed to be invalid or where access or issues with Metering Systems are identified;
- providing access to validated Settlement Period (SP) level data to the Aggregation Service(s); and
- providing access to validated Settlement Period (SP) level data to any other parties as appropriate).

## Load Shaping Service

This service will be responsible for:

- receiving smart Meter Settlement Period (SP) data for Active Import (AI) and Active Export (AE) from the 'Processing Service for Smart and non-smart Meters' according to an agreed schedule;
- deriving 'Load Shape' data for an agreed number of categorisations relating to the type of Metering Systems for which Load Shaping information is required; and
- providing 'Load Shape' data for the agreed categorisations to the Processing Service for Smart and non-smart Meters according to an agreed schedule.

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## Settlement Period level Unmetered Supplies Service

This service will be responsible for:

- contracting with and receiving appointments for unmetered supply customers;
- receiving inventory data associated with unmetered Supplies from distribution businesses;
- validating the inventory data as appropriate;
- accessing other dynamic information relating to the operation of unmetered Supplies;
- accessing standing data relating to unmetered supplies;
- calculating Settlement Period level data for unmetered supplies according to a defined schedule; and
- providing access to calculated Settlement Period level data to the Aggregation Service for Advanced Metering Systems.

## The Aggregation Service

The Aggregation Service will be responsible for:

- receiving appointments to Metering Systems (except where such a service is a procured monopoly responsible for a defined set of Metering Systems);
- maintenance of standing data as appropriate;
- receiving registration data from the Registration Service;
- accessing validated Settlement Period level data for Smart and non-smart Meter from the Processing Service for smart and non-smart Meters according to a defined schedule;
- accessing validated Settlement Period level data for Advanced Metering Systems from the Processing Service for Advanced Metering Systems to a defined schedule;
- accessing validated Settlement Period level data for unmetered supplies from the Settlement Period level Unmetered Supplies Service to a defined schedule.
- identifying duplication or omission of Metering System data;
- Estimating data where missing according to Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for the calculation of Imbalance Settlement purposes based to defined Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for the calculation of Network Charging (as appropriate) based on defined Settlement timescales;
- aggregating the Settlement Period level data based on defined aggregations for other purposes, e.g. flexibility or smart grids (as appropriate) based on defined Settlement timescales;
- applying distribution network loss factors to aggregated volumes as appropriate using data provided by distribution businesses;
- provision of aggregated consumption volumes and losses to the Volume Allocation Service according to Settlement timescales; and
- provision of aggregated consumption volumes and losses to other parties as required.

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## Volume Allocation Service

This service will, according to Settlement timescales, will be responsible for:

- receiving aggregated Settlement Period level data from the Aggregation Service;
- receiving information from other central services on the net volume of energy entering a distribution region for each Settlement Period (as currently provided by the Central data Collection Agent (CDCA));
- aggregating data for Balancing Mechanism Units (BMUs);
- aggregating all data within a distribution region;
- comparing and calculation differences between the aggregated BMU data with the information on the net volume of energy entering a distribution region for each Settlement Period;
- correcting the BMU data within a distribution region as appropriate;
- aggregating the corrected BMU data across distribution regions for use in the imbalance Settlement calculations;
- providing out-turn data to the Service responsible for the Imbalance Settlement calculation;
- maintaining standing data as appropriate; and
- providing reports and data to other parties as appropriate.

## 11. What were the main considerations when grouping Services?

The DWG started from the basis that the Services would be separately defined so that market participants would have maximum freedom in how these might be organised and delivered.

In considering a TOM with four separately defined Services (Retrieval, Processing, Aggregation and Volume Allocation) the DWG noted that Processing (as currently defined) in the traditional HH (Advanced) market is an extension of Retrieval and therefore there was less justification for maintaining this as a separate service. Any defined Aggregation Service would best sit across the whole market, with MPAN level Meter data as input.

The DWG also approached the Advanced HH market segment with the principle that any change from the current baseline would largely be driven by the design choices taken in the Smart Meter segment. As the TOMs propose to dispense with NHH processes, including EACs and AAs, the Aggregation service will largely be a summation of Settlement Period level data across the MPAN portfolio held by the Data Processing service in a set of defined categories.

For the centralised option the DWG noted that a single 'Retrieval to Volume Allocation' service was possible for Smart Meters, but that this option had less clear benefits from the Advanced HH market where competitive Data Processing services already exist. Therefore, any TOM based on a centralised model would need to integrate the Advanced segment in a way that left the existing 'Retrieval + Processing' services intact. Such a TOM would then need to use common market-wide Aggregation and Volume Allocation for both segments.

When considering services across market segments the DWG felt that, even though some services like Processing could look very similar for 'Smart with Settlement Period data' and Advanced Meters, it was prudent to leave these as separate services until the detailed requirements for each service became clearer.

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## THE FIVE DRAFT SKELETON TOMS FOR EVALUATION

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The following section sets out the five draft Skeleton TOMs developed by the DWG:

- A.** Combined Retrieval and Processing with Separate Aggregation;
- B.** Separate Retrieval with combined Processing and Aggregation;
- C.** End-to-end service covering Retrieval through to Aggregation;
- D.** Separate services; and
- E.** Single central service covering Retrieval through to Volume Allocation.

Each TOM has been designed to provide advantages over the current Settlement arrangements. These are set out below.

### Advantages common to all TOMs as a result of Baseline Principles adopted

The TOMs have been designed to create an optimal end to end settlement process for all five Market Segments and focussing on the majority of Meters in the target end state being smart Meters. The following lists the advantages that the TOMs will provide over the current market model for NHH and HH Settlement:

#### Creating Settlement Period and Metering System level data up front for Meters with Register Readings

- For Meters with only Register Readings, the TOMs produce Settlement Period level Meter data earlier in the settlement process (than currently is the case, where it is calculated in BSC systems in central Volume Allocation). This allows Settlement Period level data for all Meter segments to be available consistently and much earlier (and potentially to a wider set of parties for flexibility purposes). This is done by creating a new Load Shaping Service (a more accurate process) and the removal of existing complex NHH 'profiling' and settlement process. The conversion of Meter register advances into Settlement Period level at an earlier stage also allows for greater optionality in how certain services can be delivered;

#### Simplifying data aggregation

- Aggregation becomes a much more simplified<sup>3</sup> service overall (and potentially across Meter Market Segments) as it will only need to aggregate Settlement Period level data;

#### Simplifying Change of Agent processes

- The Change of Measurement Class (CoMC) and the Change of Agent (CoA)<sup>4</sup> process are hugely simplified as there are no separate NHH processes requiring a change of agent from NHH to HH and vice versa which are complex and error-prone. Data hand-offs for Meters with Register Readings are reduced (as the Processing service covers both non smart and smart Meters);

#### Improving the Settlement of embedded export

- This design provides support for more accurate settlement of embedded export by having access to accurate Settlement Period level data for export on smart Meters (provided that the export is registered by a Supplier);

#### Simplifying the switch between Settlement Period data and Register Read data

- The Retrieval and Processing services allows Meters to move from being settled on Register Readings to Settlement Period level data without requiring a complete change of settlement processes (and agent as is

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<sup>3</sup> note new types aggregations may be required for flexibility offerings

<sup>4</sup> where the same provider is used for both Settlement Period and Register Read processes

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currently the case). Additionally, the services will ensure continuity in service provision and accuracy in data even where Settlement Period level data may not be available;

## **More accurate and simpler Settlement of Unmetered Supplies**

- The creation of a common Settlement Period level process for Unmetered Supplies (facilitated by the Settlement Period level Unmetered Supplies Service) will deliver a more accurate calculation. It will also make it easier for new entrants and smaller Suppliers to enter this segment;

## **Improving Settlement Timescales<sup>5</sup>**

- Accessing Settlement Period level data remotely from Smart Meters should allow for improved accuracy of settlement at earlier reconciliation runs. Thereby it will facilitate shorter reconciliation periods than are used currently and hence impacts on Suppliers and cost to service their customers;

## **Efficiency in provision of enduring arrangements**

- The TOMs avoid having to maintain separate enduring processing arrangements for the non-smart Meters (once the transition to the target state has been completed). The only process required is the separate Meter Reading Service to accommodate any remaining legacy non-smart Meters.

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<sup>5</sup> *It should be noted that the overall timescales for Settlement will have a dependency on the number of Metering Systems that cannot be remotely read and will require a site visit. If small enough numbers consumption for such Meters could be estimated for Settlement purposes. This would also allow for faster Settlement.*

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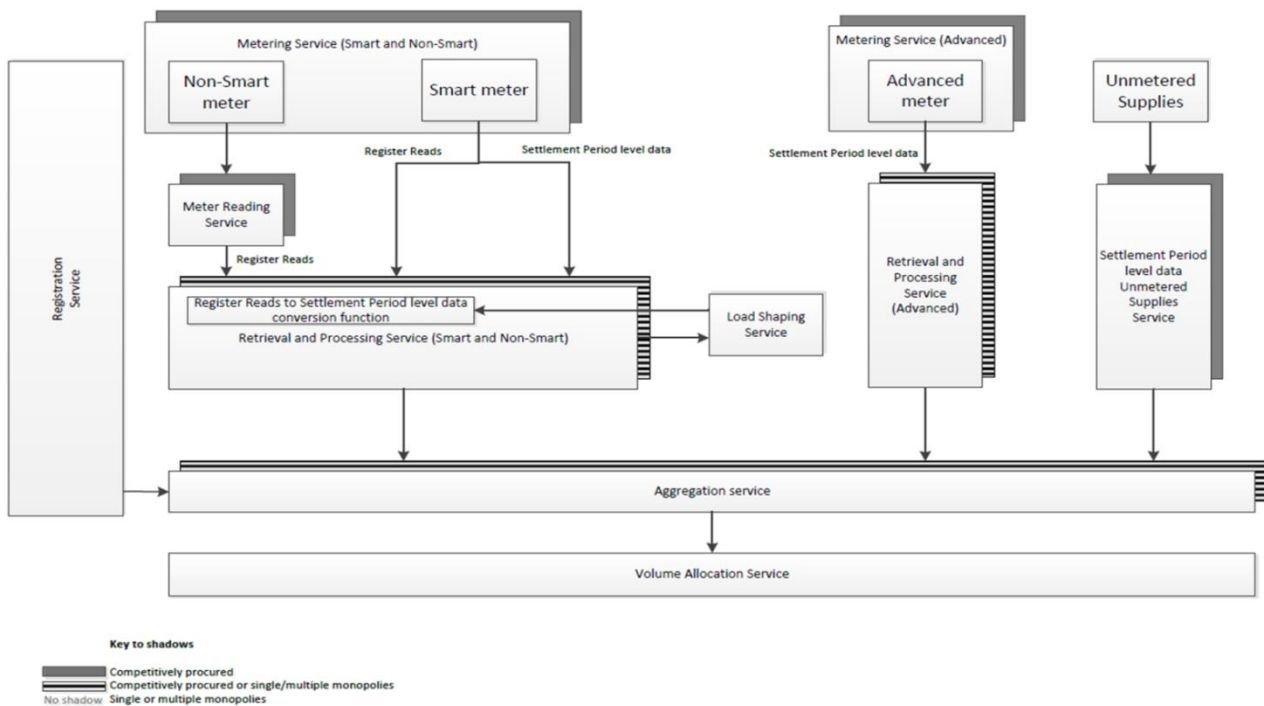
## TOM A: COMBINED RETRIEVAL AND PROCESSING WITH SEPARATE AGGREGATION

### Description of TOM A:

The basis of this TOM is that Retrieval and Processing are bundled into a single service, one variant for Smart (including non-smart) and one for Advanced. This reflects the different ways of communicating with these Meters and the different Meter functionality and configurations. The Retrieval and Processing Service (smart and non-smart) will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period data to the Aggregation Service that covers all market Segments. The Aggregation Service will sum up the data provided for all market Segments before providing access to aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately. This is because of the need to convert Register Readings into Settlement Period level data for smart (and non-smart) Meters which is not required for Meters in the Advanced Segment.

If there was a single aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements (to be determined through Ofgem's Targeted Charging Review).



# MARKET WIDE HALF-HOURLY SETTLEMENT

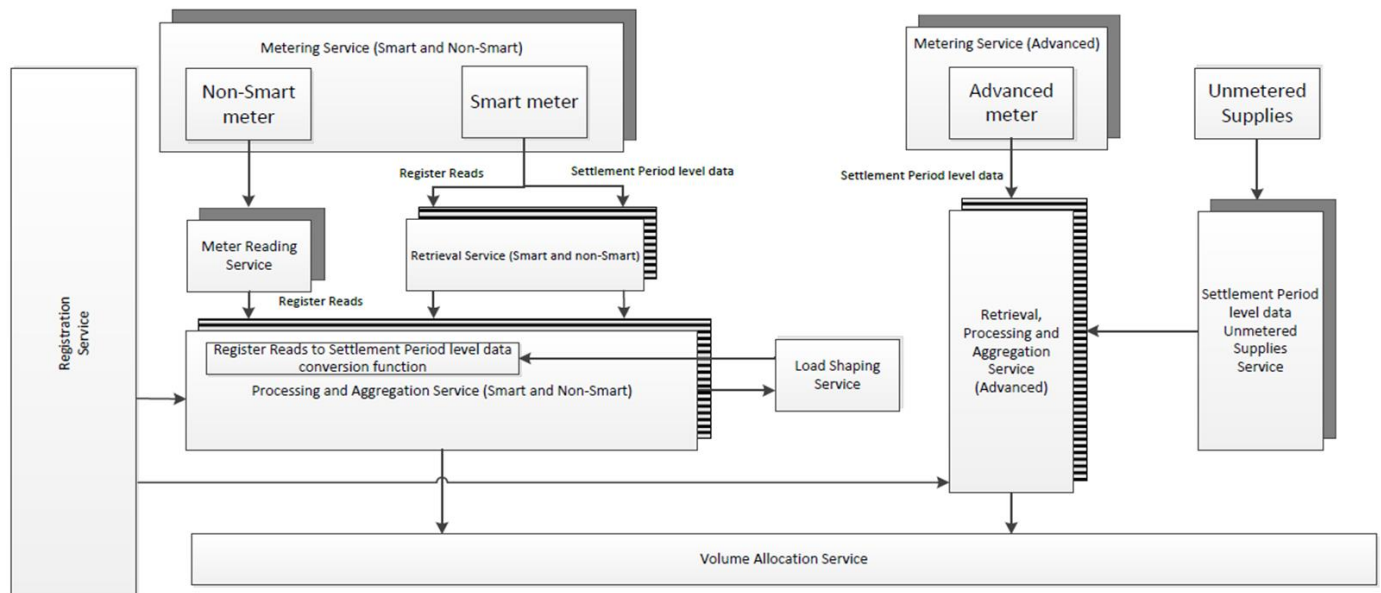
## TOM B: COMBINED PROCESSING AND AGGREGATION WITH SEPARATE RETRIEVAL

### Description of TOM B:

The basis of this TOM is that the Processing and Aggregation are bundled into a single service for Smart (and non-smart) Meters. The retrieval of readings via the [Data and Communications Company \(DCC\)](#) is separated out to allow more flexibility in who might deliver that Retrieval Service.

With Aggregation done as part of Processing, it means that with multiple Processing Services operating the data will be aggregated first before reaching the Volume Allocation Service which covers the whole market. That would mean that there is no single market segment-wide view of Meter level data. This may hinder certain flexibility offerings, e.g. should it be required for demand-side response or other activities that require access to this Meter data. To mitigate this, a separate view of market-wide Meter level data would have to be obtained or accessed from all the Processing services operating in the market.

No significant differences in market services structure from current state barring the merging of processing and aggregation services, hence impacts may be less for the existing providers.



#### Key to shadows

- Competitively procured
- Competitively procured or single/multiple monopolies
- No shadow: Single or multiple monopolies



# MARKET WIDE HALF-HOURLY SETTLEMENT

## TOM C: END TO END SERVICE COVERING RETRIEVAL THROUGH TO AGGREGATION

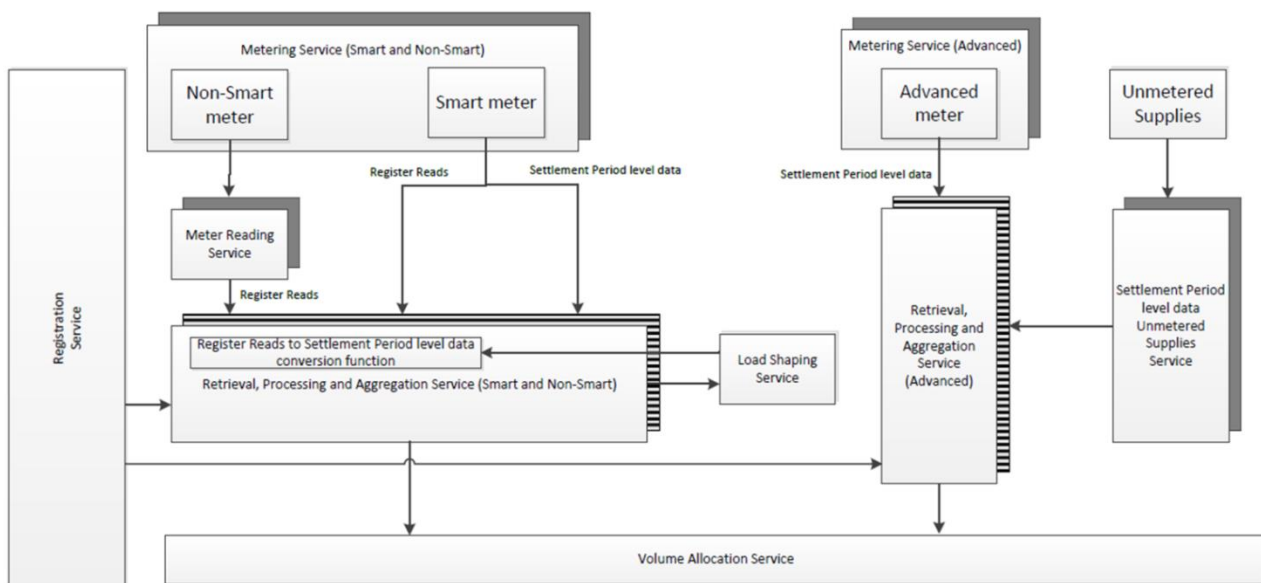
### Description of TOM C:

The basis of this TOM is that Retrieval, Processing and Aggregation are bundled into a single service, one variant for Smart (including non-smart) and one for Advanced Metering Systems. This reflects the different ways of communicating with these Meters. The Retrieval, Processing and Aggregation Services will sum up the data provided before providing access to aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately. This is because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

With Aggregation done together with Retrieval and Processing, it means that with multiple Retrieval, Processing and Aggregation Services operating the data will be aggregated before reaching the Volume Allocation Service which covers the whole market. There is no single market segment-wide view of Meter level data. This may hinder certain flexibility offerings, e.g. should it be required for demand-side response or other activities that require access to this Meter data. To mitigate this, a separate view of market-wide Meter level data would have to be obtained or accessed from all the Retrieval, Processing and Aggregation Services operating in the market.

The key feature of this model is the reduction in hand-offs the Meter level data is only accessed once is then aggregated. The aggregated data then goes straight into Volume Allocation Service.



**Key to shadows**

- Competitively procured
- Competitively procured or single/multiple monopolies
- No shadow: Single or multiple monopolies

# MARKET WIDE HALF-HOURLY SETTLEMENT

## TOM D: SEPARATE SERVICES

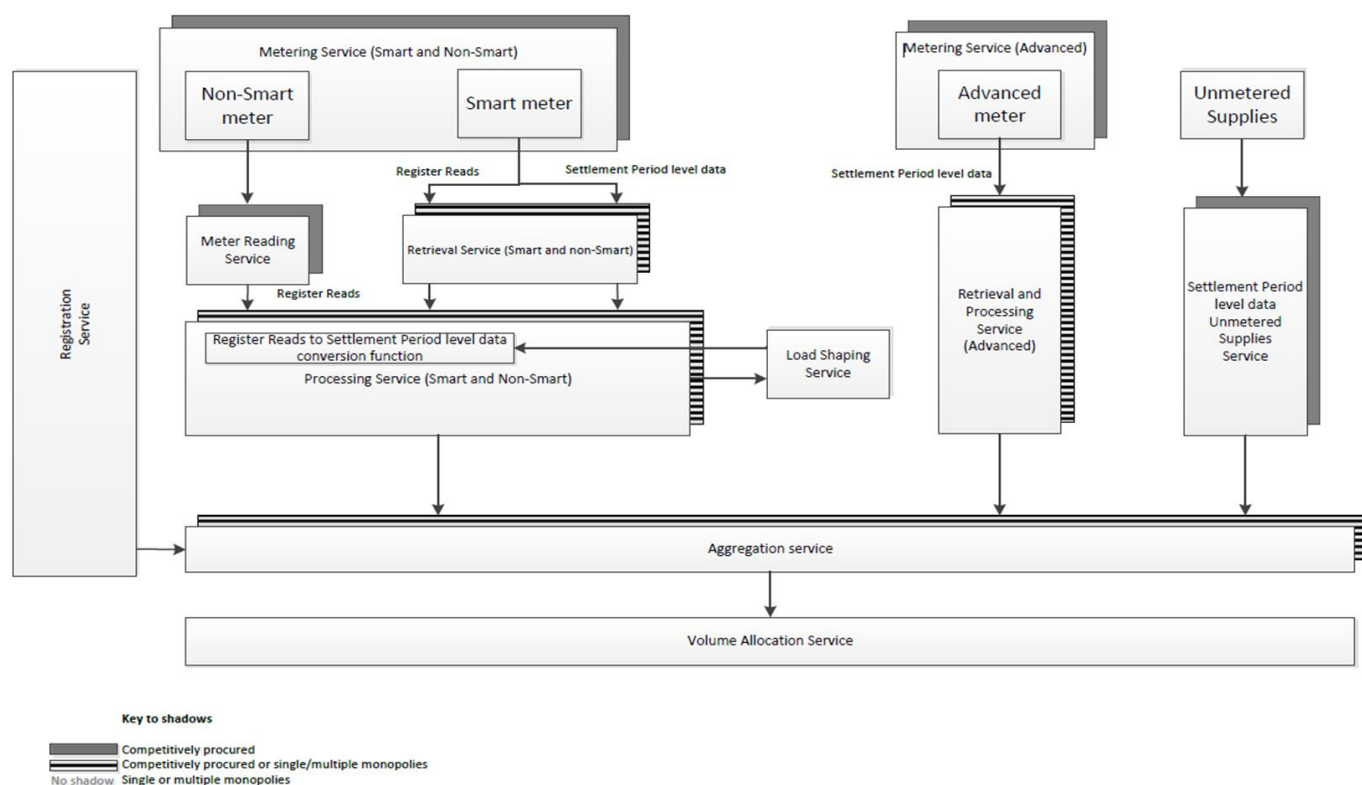
### Description of TOM D:

The basis of this TOM is that Retrieval, Processing and Aggregation are kept as separate services. Smart (including non-smart) and Advanced Metering Systems are also separated, reflecting the different ways of communicating with these Meters. The retrieval of readings via the [Data and Communications Company \(DCC\)](#) is also separated out which allows more flexibility in who might deliver that Retrieval Service.

The Smart Meter (and non-smart Meter) Processing Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period level data to the Aggregation Service that covers all market Segments. The Aggregation Service will sum up the data provided before providing access to aggregated volumes to a single Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter segments, these are defined separately because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

If there were a single aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements (to be determined through Ofgem's Targeted Charging Review).



# MARKET WIDE HALF-HOURLY SETTLEMENT

## TOM E: SINGLE CENTRAL SERVICE COVERING RETRIEVAL THROUGH TO VOLUME ALLOCATION

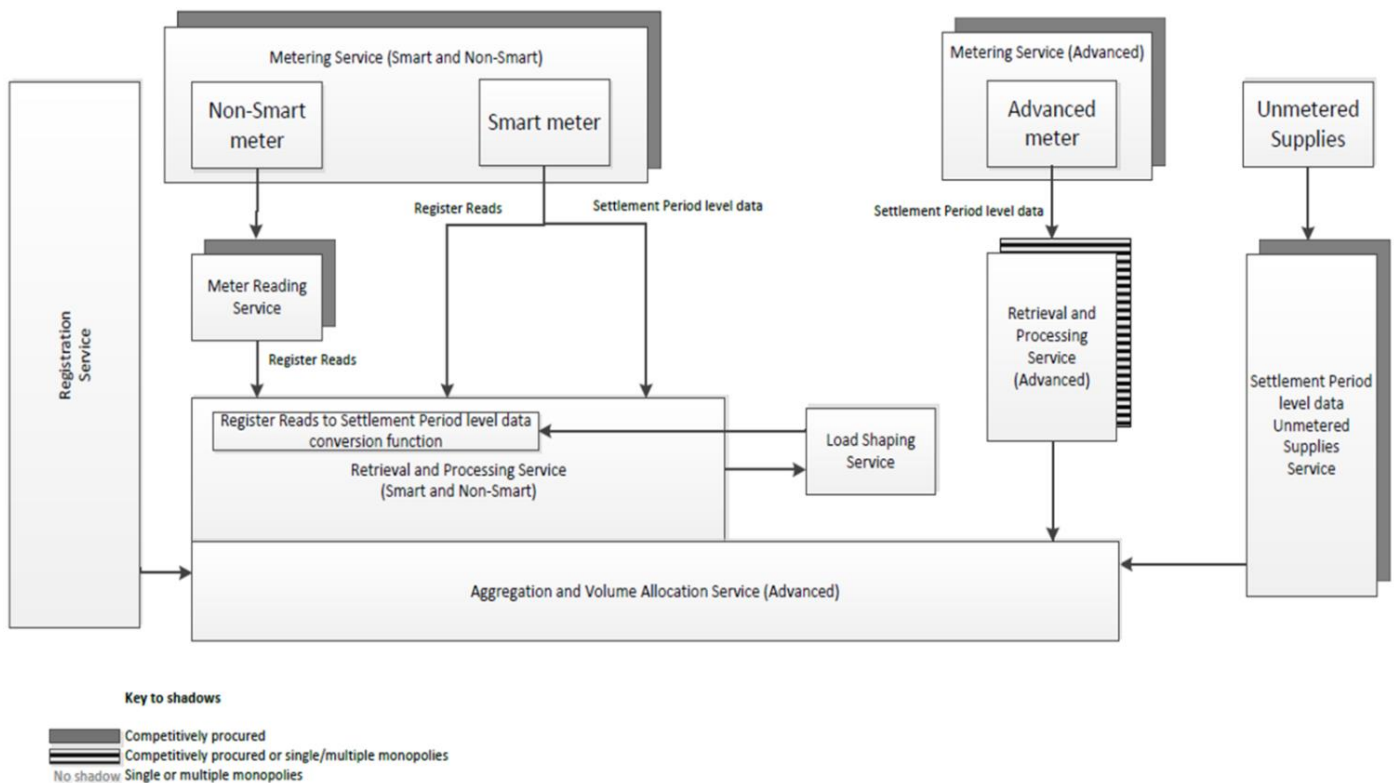
### Description of TOM E:

The basis of this TOM is that Retrieval, Processing and Aggregation are all provided by centralised Services for Smart and non-smart Meters. Retrieval and Processing for Advanced Meters are separate, reflecting both the different ways of communicating with these Meters and that these can be competitively or centrally procured.

The central Retrieval and Processing Service will also apply conversion where Settlement Period level data is not available before providing access to Settlement Period level data to the internal Aggregation Service that covers all market Segments. The central Aggregation Service will sum up the data provided before providing access, to aggregated volumes, to the associated Volume Allocation Service.

Though much of the processing of Settlement Period level data is likely to be similar between the Smart and Advanced Meter Segments, these are defined separately. This is because of the need to convert Register Readings into Settlement Period level data which is not required for Advanced Meters.

This TOM has the fewest processing hand-offs of Meter data. The central aggregation service (subject to Ofgem policy decisions), all the Settlement Period level data would be aggregated across market, thus facilitating flexibility, e.g. aggregators, demand-side response, peer-to-peer arrangements, Distribution System Operators and Meter data for new network charging arrangements (to be determined through Ofgem’s Targeted Charging Review).



# MARKET WIDE HALF-HOURLY SETTLEMENT

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## INITIAL DWG RECOMMENDATIONS

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The Design Working Group was asked to rank the TOMs in order of preference. The DWG considered that all TOMs were viable. The DWG agreed that no TOM should be ruled out at this stage. DWG discussed the balance between having a single Aggregator to facilitate new aggregation requirements, and the risk this could create as a single point of failure.

However, the DWG split the TOMs into two groups with the focus to be made on TOMs A, C and E. The DWG's initial view is that TOMs A, C and E had fewer interfaces (hand-offs) which could lead to data errors or duplication of services holding data, than TOMs B and D<sup>6</sup> due to Retrieval being separate to the Processing service for Smart Meters. The DWG also felt that TOMs B and D could perpetuate data quality issues that exist in the current HH and NHH markets. The DWG also thought TOMs A, C and E together gave a good range of options which would cover all the scenarios that could come out of the Ofgem policy decisions.

### **DWG recommended focus on TOMs:**

- **A:** Combined Retrieval and Processing with Separate Aggregation
- **C:** End-to-End service covering Retrieval through to Aggregation
- **E:** Single central service covering Retrieval through to Volume Allocation

### **TOMs B and D less favoured:**

- **B:** Separate Retrieval with Combined Processing and Aggregation
- **D:** Separate Services

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<sup>6</sup> The DWG recognised that some of the concerns around data hand-offs and storage could be addressed in the detailed solution requirements.

# MARKET WIDE HALF-HOURLY SETTLEMENT

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## Appendix A: DWG TOM development work

See attachment.

# MARKET WIDE HALF-HOURLY SETTLEMENT

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## Appendix B. Glossary of terms

### A

#### **Advanced Meter**

The electricity supply licence defines an Advanced Meter as an electricity Meter that, either on its own or with an ancillary device, and in compliance with the requirements of any relevant Industry Code:

- a) provides measured electricity consumption data for multiple time periods, and is able to provide such data for at least half-hourly time periods; and
- b) is able to provide the licensee with remote access to such data.

#### **AMR Meter**

AMR (Automated Meter Readings) Meters are Meters where Meter Register Readings can be obtained remotely but are not necessarily capable of recording or providing half-hourly consumption data. Advanced Meters form a subset of AMR Meters where data for at least half-hourly time periods is available.

### B

#### **Balancing and Settlement Code (BSC)**

The BSC is the document that sets out the terms for electricity balancing and settlement in Great Britain, including the governance process for modifications to the BSC.

#### **Balancing and Settlement Code (BSC) Panel**

The Balancing and Settlement Code (BSC) Panel is established and constituted pursuant to and in accordance with Section B of the BSC. It is responsible for ensuring that the provisions of the BSC are given effect fully, promptly, fairly, economically, efficiently, transparently and in such a manner as will promote effective competition in the generation, supply, sale and purchase of electricity.

### D

#### **Data Aggregator (DA)**

As part of the settlement process, the party appointed by an electricity supplier in accordance with Section S of the BSC to aggregate metered consumption data to meet the requirements set out in the BSC.

#### **Data Access and Privacy framework**

The government has developed a data access and privacy policy framework to determine the levels of access to energy consumption data from smart Meters that Suppliers, network operators and third parties should have. It also establishes the purposes for which data can be collected and the choices available to consumers.

#### **Data Collector (DC)**

As part of the Settlement process, the party appointed by an electricity supplier in accordance with Section S of the BSC to retrieve, validate and process Meter readings to meet the requirements set out in the BSC.

#### **Data and Communications Company (DCC)**

The DCC is the company that manages the data and communications to and from domestic consumers' smart Meters.

#### **Demand-side response (DSR)**

Actions taken by consumers to change the amount of energy they take off the grid at particular times in response to a signal, such as a price.

# MARKET WIDE HALF-HOURLY SETTLEMENT

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## **Licensed Distribution System Operators (LDSOs)**

LDSOs are the companies that are licensed by Ofgem to maintain and manage the electricity distribution networks in Great Britain.

## **Dynamic time-of-use tariff**

A dynamic time-of-use tariff is one that provides for price or pricing structures to vary at short notice in response to market events, subject to contractual terms.

## **E**

### **Electricity supplier**

A company licensed by Ofgem to sell energy to and bill customers in Great Britain.

## **ELEXON**

ELEXON is the organisation responsible for administering the BSC. The role, powers, functions and responsibilities of ELEXON are set out in Section C of the BSC.

## **I**

### **Imbalance charge**

This is the charge that suppliers (and other market participants) pay for any difference between contracted and metered volumes. See also Settlement process.

## **M**

### **Market Segments**

The five Market Segments are the four combinations of Meter types and Meter consumption data (Settlement Period level and Register Readings) plus unmetered supplies.

### **Market-wide**

Market-wide in the context of the SCR means the Settlement of Settlement Period data where such data can be accessed subject to data privacy and data access policy.

Market-wide in the context of Services means a service which would provide cross-segment-aggregation.

### **Master Registration Agreement (MRA)**

The MRA is the agreement that provides a governance mechanism to manage the processes established between electricity suppliers and distribution companies to enable electricity suppliers to transfer customers. It includes terms for the provision of Metering Point Administration Services (MPAS) Registrations.

## **N**

### **New Electricity Trading Arrangements (NETA)**

The arrangements under which electricity is traded in the Great Britain wholesale electricity market. NETA was initially put in place for England and Wales (since 2001), and subsequently changed its name to the British Electricity Trading and Transmission Arrangements (BETTA) in 2005 with the expansion to include the Scottish wholesale electricity market.

### **National Grid Electricity Transmission (NGET)**

NGET is the System Operator for the electricity transmission system in Great Britain, with responsibility for making sure that electricity supply and demand stay in balance and the system remains within safe technical and operating limits.

# MARKET WIDE HALF-HOURLY SETTLEMENT

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## **Non-half hourly Settlement (NHH)**

As part of the Settlement process, NHH Settlement is the arrangement for estimating how much energy a supplier's customer's use in each Settlement period based on Meter readings spanning longer intervals. These consumers are not settled using half-hourly consumption data.

### **Non-smart Meter**

A non-smart Meter is a Meter that is either not compliant with the Smart Metering Equipment Technical Specifications (SMETs) or one where only Register Readings can be collected due to Meter functionality or data privacy and data access policy. The latter category can include AMR and Advanced Meters.

## **O**

### **Ofgem**

The Office of Gas and Electricity Markets (Ofgem) is responsible for protecting gas and electricity consumers in Great Britain. It is governed by the Gas and Electricity Markets Authority (GEMA).

## **P**

### **Profile Class**

Consumers that are not settled using actual Meter readings for each Settlement period are grouped into one of eight Profile Classes. For each Profile Class, a load profile is created that estimates the consumption shape of the average consumer. This load profile (or variations of it) is used to determine the consumption in each half hour for all consumers assigned to the Profile Class. See also non-half hourly Settlement.

### **Profiling and Settlement Review Group (PSRG)**

The PSRG was a sub-group of the Supplier Volume Allocation Group (SVG) from 2010-15. The PSRG reported to the BSC Panel and was tasked with maintaining the integrity of the Settlement arrangements in the short to medium term as smart Meters are rolled out.

## **R**

### **Register Readings**

Register Readings are the Meter readings obtained from a Settlement Meters tariff registers. This could be the cumulative register or the Meter's Time of Use (TOU) Registers. These readings may be taken remotely or via a site visit.

## **S**

### **Settlement Period**

The period over which contracted and metered volumes are reconciled. This is currently defined as a period of 30 minutes. See also Settlement process.

### **Settlement Period level data**

Settlement Period level data is consumption data that is the granularity of the Settlement Period this could be actual consumption data obtained directly from the Meter or consumption data derived from Register Readings or unmetered supplies that is processed to Settlement Period granularity.

### **Settlement process**

Settlement places incentives on generators and suppliers to contract efficiently to cover what they produce or their customers consume respectively. For suppliers, it operates by charging for any difference between the volumes of electricity that they buy and the volume that their customers consume.



# MARKET WIDE HALF-HOURLY SETTLEMENT

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## **Significant Code Review (SCR)**

The SCR process is designed to facilitate complex and significant changes to a range of industry codes. It provides a role for Ofgem to undertake a review of a code-based issue and play a leading role in facilitating code changes through the review process.

## **Smart Energy Code (SEC)**

The Smart Energy Code (SEC) is a multi-Party agreement, coming into force under the DCC Licence, which defines the rights and obligations of energy suppliers, network operators and other relevant parties involved in the end to end management of smart metering in Great Britain.

## **Smart Meter**

A smart Meter is a Meter which is compliant with the Smart Metering Equipment Technical Specifications (SMETs). In addition to traditional metering functionality (measuring and registering the amount of energy that passes through it), is capable of providing additional functionality (for example, recording consumption in each half hour of the day and of being remotely read) is known as a smart Meter.

## **Static time-of-use tariff**

A time-of-use tariff that fixes in advance the peak and off-peak periods for electricity consumption and the prices applied at these times.

## **Supplier Volume Allocation (SVA) arrangements**

Within the BSC, the SVA arrangements provide the mechanism for determining the allocation of energy volumes to suppliers in each half hour of the day.

## **System Operator**

The entity charged with operating the Great Britain high voltage electricity transmission system, currently National Grid Electricity Transmission Plc.

## **T**

### **Time-of-use (ToU) tariffs**

Energy tariffs that charge different prices at different times of the day, week, month or year are known as time-of-use tariffs. See also dynamic time-of-use tariff and static time-of-use tariff.

## **U**

### **Unmetered Supplies**

Unmetered Supplies (UMS) means a supply of electricity to a particular inventory of equipment in respect of which a Licensed Distribution System Operator (LDSO) has issued an Unmetered Supply Certificate. For example, this equipment could be any electrical equipment that draws a current and is connected to the Distribution Network without a Meter, i.e. there is no Meter recording its energy consumption, e.g. street lights, traffic signs, zebra crossings, etc.

# MARKET WIDE HALF-HOURLY SETTLEMENT

Acronyms used in this document are listed in the table below.

Glossary of Defined Terms	
Acronym	Definition
AE	Active Export
AI	Active Import
AMR	Automated Meter Reading
BMU	Balancing Mechanism Unit
CoA	Change of Agent
CoMC	Change of Measurement Class ( <i>process</i> )
DCC	Data and Communications Company
DSR	Demand Side Response
DWG	Design Working Group
EV	Electric Vehicle
HH	Half Hourly
NHH	Non Half Hourly
MHHS	Market-wide Half Hourly Settlement
MTD	Meter Technical Details
P2P	Peer to Peer
RR	Register Readings
SD	Settlement Day
SP	Settlement Period
SVA	Supplier Volume Allocation
SVAA	Supplier Volume Allocation Agent ( <i>BSC Agent</i> )
TOM	Target Operating Model
ToU	Time of Use
UMS	Unmetered Supplies