Estimation of
Non Interval Meter Readings

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Document Updates		
Date	**Description**	**Version**
28 Nov 2003	Create initial draft	0.1
12 Feb 2004	Section 2: Append further notes describing the circumstances under which estimates are created and used. Section 3.1: Add note regarding choice of weighting procedure. Section 3.2.2: Clarification added with respect to determination of representative period Section 3.2.3: Clarification added with respect to profiling of periods. Section 3.2.4: Add note regarding relationship between the default Periodic Consumption value and the Initial Estimated Usage Factor. Section 4: Clarification added with respect to determination of expected demand for MD registers. Section 5: Clarifications added to estimating scenarios Section 6: Clarifications added regarding weighting procedures and conversion of data	0.2
06 April 2005	Finalised document, to reflect outcome of Estimation Validation Exercise.	1.0
16 Feb 2021	Revised Version as part of Schema Release V13.0 (Smart). Document updated to reflect name change from NQH to Non Interval.	2.0

Table Of Contents

1. Purpose of the Document

The purpose of this document is to communicate to market participants the approach of ESB Networks to the estimation of Non Interval meter readings.

Section 2 describes why and when Networks will estimate meter reads.

Sections 3 and 4 describe how Networks will estimate meter reads.

Section 5 walks through a number of estimation scenarios.

Subsequent sections discuss meter reading estimation and how it relates to other functional areas such as reading validation and market messaging.

2. Summary

A successful estimation procedure is dependent on two crucial components, firstly, a solid estimation algorithm and secondly, good quality data for the estimation procedure to work with.

To achieve a solid estimation procedure, ESB Networks will implement a standard algorithm provided by SAP IS-U, which requires the configuration of a number of parameters. ESB Networks has implemented certain settings for these parameters as outlined in the following sections. The implemented values are based on the experiences of utility companies that have used standard SAP in other parts of the world, and as a result of evaluations performed during the Estimation Validation Exercise conducted by the ESB Networks team.

To achieve the second component of implementing a successful estimating procedure, the ESB Networks data conversion team migrated data from legacy systems into SAP IS-U such as to maximise the performance of the estimation algorithm.

ESB Networks will estimate Non Interval meter readings and consumption for the following principal purposes:

- To determine the expected consumption in order to validate meter readings received or collected by Networks
- For use in DUoS Billing when a plausible actual or customer read is not available
- To resolve a disputed meter reading
- To support the Change of Supplier and Change of Legal Entity processes
- To provide closing or de-energisation read where a plausible actual read is not obtained
- To replace missing, disputed or implausible reads

Note 1: ESB Networks meter reading estimates are only used by Data Aggregation in the strictly defined circumstances listed in MPD 14.
Note 2: Meter Operator Start Reads are always actual readings.
Note 3: Reads will be "missing" if no reading has been obtained, due to no access for example.

ESB Networks will distribute to relevant market participants all meter reading estimates that have been used in DUoS billing or that have been produced as a consequence of no reading being obtained by Data Collector.

ESB Networks will use the procedures described and illustrated in this document in order to produce estimates for the above purposes.

3. How will Networks Estimate Reads?

3.1 The Calculation

An estimated reading is calculated as the previous plausible reading plus the expected advance.

The expected advance is determined as:

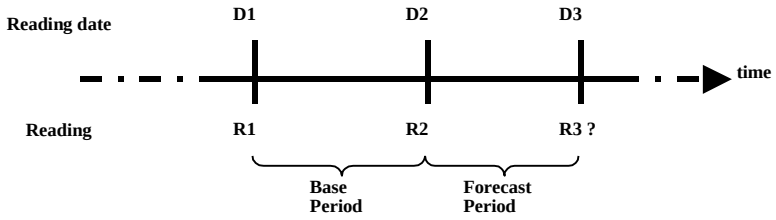
Base Advance * (Profiled weight of forecast or expected advance period ÷ Profiled weight of base advance period)

The base advance is the advance in the immediate previous period (or read periods) provided that such periods are representative.

If representative data is not found, then the estimating procedure goes back to the next actual reading in the history to establish a representative base period.

If a representative base period cannot be determined from reading history, the expected advance is derived from the default “Periodic Consumption” set for the register.

An estimate is calculated through the following formula:



Expected reading (R3) assuming D1 to D2 as a representative period and linear weighting:

$$R3 = R2 + \left[(R2 - R1) \times \frac{(D3 - D2)}{(D2 - D1)} \right]$$

Expected reading (R3) assuming D1 to D2 as a representative period and seasonal weighting:

$$R3 = R2 + \left[(R2 - R1) \times \frac{\Sigma \text{ (weighting units for period D3 to D2)}}{\Sigma \text{ (weighting units for period D2 to D1)}} \right]$$

The Estimation Validation Exercise conducted by the ESB Networks team concluded that seasonal weighting produced the best reading estimation results.

3.2 The Key Parameters when estimating Non Interval meter readings

The key parameters in the calculation of a meter reading estimate are as follows:

- The representative historic base period upon which the estimating procedure will base new estimated readings. Note that only actual reads[1] will be used to form representative historic base periods.
- The determination of whether or not a historic base period is representative.
- The weightings to make the consumption value for a historic base period representative of the forecast period.
- The default periodic consumption value (or the default period demand value) for a register.

The following sections explain how ESB Networks will use these parameters.

[1] Actual Reads can be received from the Data Collector or from the Customer or Supplier as a Customer Own Read.

3.2.1 Period which will be used as the basis for estimating new meter reading.

By default, expected meter readings are extrapolated based on the immediate previous period[2].

Based on the forecast date, the estimating procedure goes backwards in time to locate the two most recent actual readings.

The period formed by such readings will be used as the base period for extrapolation purposes, subject to it being deemed representative.

A historic base period is not used in the following circumstance:

- When a meter is first installed in a new installation the estimating procedure will base estimates on a default periodic consumption value. This is the default annual consumption value for a register used to calculate an estimate when representative meter reading history is not available (see section 3.2.4 for determination of default periodic consumption values).

[2] The base period category may be set per meter point. By default all meter points will have base period category set to “Previous Period ”. For specific meter points, base period category may be updated to “Period Previous Year” as appropriate.

3.2.2 The determination of a representative period

There are two control parameters indirectly associated with each register,

- Weighted length of the Billing period
- Minimum portion percentage

The minimum portion is a percentage used to determine the minimum size for a weighted historic base period in order for it to be deemed representative of the weighted length of the Billing period.
To represent seasonal changes, periods may be weighted when calculating estimates (see section 3.2.3)

Therefore, for a historic base period to be deemed representative:

Σ Weighting units (Base period)	**>=**	**Minimum Portion Percentage**	*****	**Σ Weighting units (Length of Billing period)**

ESB Networks use a Minimum Portion Percentage of 80%.

This value is based on:

- The ratio of the shortest and longest scheduled meter read period lengths

  A rule can be set that the minimum portion percentage should not stop the shortest meter read period from being a basis for estimating the longest meter read period. This gives an indication that the minimum portion percentage should not be greater than 80%

- Experience from other utility companies using equivalent estimation procedures.

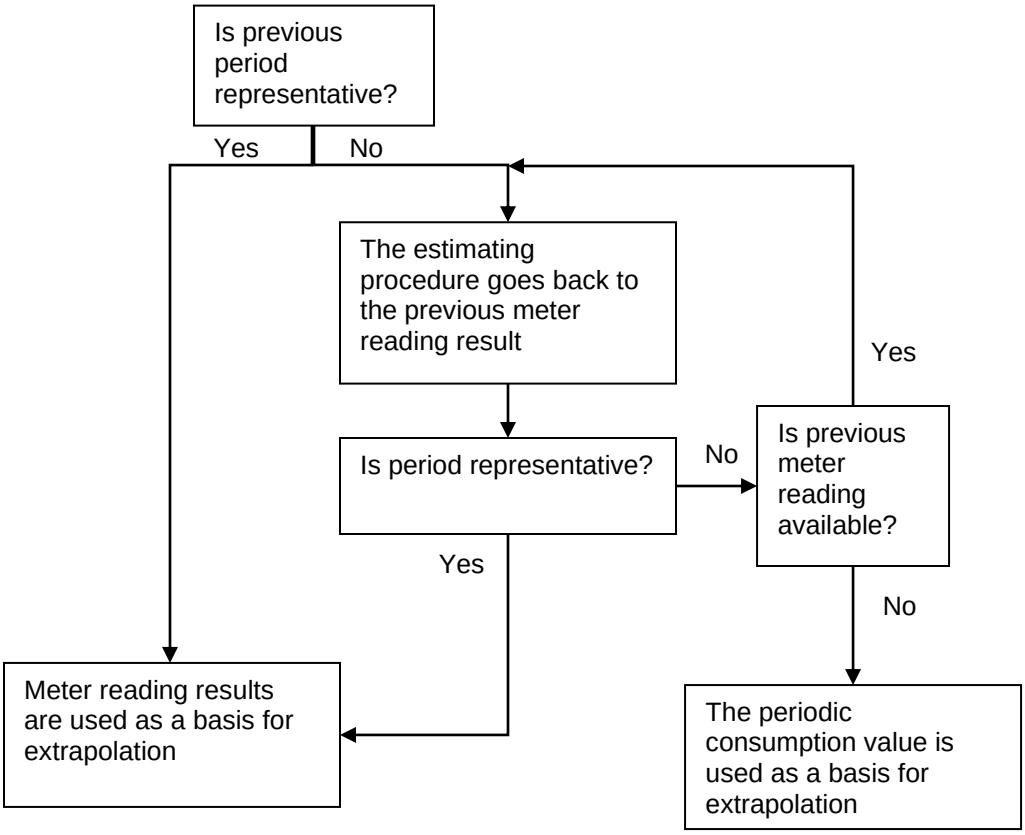


Figure 3.2 : Process for finding a basis for extrapolation.

The above diagram shows the process followed to determine a basis for extrapolation. The steps are as follows:

Is this period representative? This check is carried out using the previously described formula. If the period is found to be representative the meter reading results are used as a basis for extrapolation.

The estimating procedure goes back to the previous meter reading result: If the base period is not deemed to be representative, the estimating procedure will shift the 'start read' of the base period backwards in time to previous actual meter reading. The check for a representative period then re-occurs for the newly expanded base period.
If the base period is still not deemed to be representative, the procedure continues to shift the 'start read' of the base period backwards in time, in accordance with the available actual readings.
If a representative base period cannot be found, the default periodic consumption value assigned to the relevant register will be used as the basis for estimation.

The periodic consumption value is used as a basis for extrapolation: The estimating procedure will use the periodic consumption to calculate the estimated reading in the circumstances where a representative base period can not be found from the historical actual readings.

Meter reading results are used as a basis for extrapolation: If the base period is found to be representative, it will be used as the basis of the estimation.

3.2.3 Profiling of Periods

The estimation algorithm may utilise linear weightings or seasonal weightings.

Seasonal weightings take seasonality into account, which under certain circumstances improve the quality of estimations.

When seasonal weighting is used, the weighting procedure assigned to a register is based on the standard load profile and time of use allocated to that register for purposes of Data Aggregation for settlement.

The Estimation Validation Exercise conducted by the ESB Networks team concluded that seasonal weighting produced the best reading estimation results.

3.2.4 Periodic Consumption

Periodic consumption is the default consumption value that is used when a representative historic base period cannot be found. It is a value representing an estimated annual consumption for the register.

Determination of Periodic Consumption for a consumption register upon conversion of data from legacy systems

For each consumption register, Data Conversion will interrogate its historical meter readings for the twelve months prior to go-live and derive the consumption for that period. The consumption value so derived will be used as the Periodic Consumption for the register.

If a history of meter readings is available for a consumption register but is not at least twelve months in duration, then Data Conversion will extrapolate a yearly consumption value from the available history.

NB: If settlement-relevant historical readings are migrated from legacy systems for a register then such readings will form the basis for reading estimation (the migrated Periodic Consumption values will be irrelevant)

If a history of meter readings is not available for a consumption register, then Data Conversion will derive a Periodic Consumption as per the setup of new metering.

Determination of Periodic Consumption for a consumption register upon setup of new metering

Networks will maintain a default Periodic Consumption value for each allowable combination of DUoS Group / Load Factor Code / MCC / Timeslot.

NB: The default Periodic Consumption values will be equivalent to the default EUF values maintained by Networks for each allowable combination of DUoS Group / Load Factor Code / MCC / Timeslot. Where there are multiple registers at a meter point with the same Timeslot, then the initial Estimated Usage Factor for that Timeslot will be the sum of the default Periodic Consumption values allocated to those registers.

Therefore upon installation of a consumption register, its Periodic Consumption will be derived in accordance with the:

(a) DUoS Group of the associated meter point
(b) Load Factor Code, if applicable, of the associated meter point
(c) Meter Configuration Code of the associated meter point
(d) Timeslot of the consumption register

Please refer to the Periodic Consumption Report for more information and for a listing of the finalised set of default Periodic Consumption values.

The relationship between the default Periodic Consumption value and the Initial Estimated Usage Factor[3]:

Every installed consumption register will be allocated a default Periodic Consumption value upon it's installation.

An Estimated Usage Factor will be allocated to every Timeslot applicable at a meter point.

Where there is a single register at a meter point for a Timeslot, then the initial Estimated Usage Factor for that Timeslot will be equal to the default Periodic Consumption value allocated to the register.

Where there are multiple registers at a meter point with the same Timeslot, then the initial Estimated Usage Factor for that Timeslot will be the sum of the default Periodic Consumption values allocated to the registers.

Plase refer to the Data Aggregation Paper for a more detailed description of Usage Factors and their related processing.

NB: Usage Factor values are updated upon the processing of meter readings, whereas Periodic Consumption values are not.

[3] The Estimated Usage Factor for a Timeslot is a statement in kWh of the estimated consumption for the Timeslot for the 365 days starting from the Effective From Date of the Estimated Usage Factor.

The update of Periodic Consumption values and Estimated Usage Factor values

The Periodic Consumption value assigned to a consumption register is not automatically updated as a result of the Networks Billing of the meter readings received for the register[4].

The Actual Usage Factor (AUF) and Estimated Usage Factor (EUF) values associated with a given Timeslot are automatically updated as a result of the Networks processing of settlement-relevant readings received for a meter point

Please refer to the Data Aggregation Briefing Document for a more detailed description regarding the update of Usage Factor values.

In the special circumstance that Networks is notified that a premises is (or will be) unoccupied, then the Periodic Consumption values assigned to the consumption registers of the relevant meter point may be manually updated to zero (or to an appropriate low value). The Usage Factors will remain unchanged upon manual update of the Periodic Consumption. However the later processing of nil advance readings subsequently received for the unoccupied premises will automatically result in the calculation of a zero value AUF.

The deviation of Periodic Consumption values and Estimated Usage Factor values

Periodic Consumption is held per register – and there may be multiple registers for a given Timeslot at a meter point – while Usage factors are held at Timeslot level.

The Periodic Consumption value for register X will be the same as the Estimated Usage Factor for Timeslot Y in the following scenario:
(a) Register X is the only register applicable to Timeslot Y
and
(b) Settlement-relevant readings have not yet been processed for Register X

In all other scenarios the Periodic Consumption and Usage Factor values will deviate. For example, when multiple registers exist for a Timeslot, or upon the processing of settlement-relevant readings (which results in the calculation of AUF and the re-calculation of EUF, and which also results in Periodic Consumption becoming irrelevant).

Note that if settlement-relevant readings have not yet been processed for a meter point, then the initial EUF for a Timeslot will be the sum of the Periodic Consumption values allocated to the registers for that Timeslot.

[4] Once settlement-relevant readings are received for a register the Periodic Consumption value becomes irrelevant (the Periodic Consumption is only used for estimation purposes when no history of readings exists for a register).

4. Estimation of readings for Non-Consumption Registers

4.1 Calculating Expected Demand for Maximum Demand registers

The expected demand will be determined as the highest actual demand in a representative period.

By default, the representative period will be the previous period.

If no previous period is available, the representative period will be the corresponding period of the previous year[5].

If a representative period cannot be determined, then the expected demand will be set to the default Period Demand allocated to the register

Derivation of default Period Demand

If a history of representative actual meter readings is not available, then the default Period Demand for all demand registers at a meter point will be set to 80% of the Maximum Import Capacity defined for the meter point.

4.2 Estimation for Wattless registers

The expected meter reading advance on a wattless register will be determined using the same estimation algorithm as for consumption registers.

4.3 Non billable registers

Meter reading estimation will not be performed for registers defined as being non-billable.

Non-billable registers are registers associated with devices such as Statistical Meters, Check Meters and Supervisory Meters.

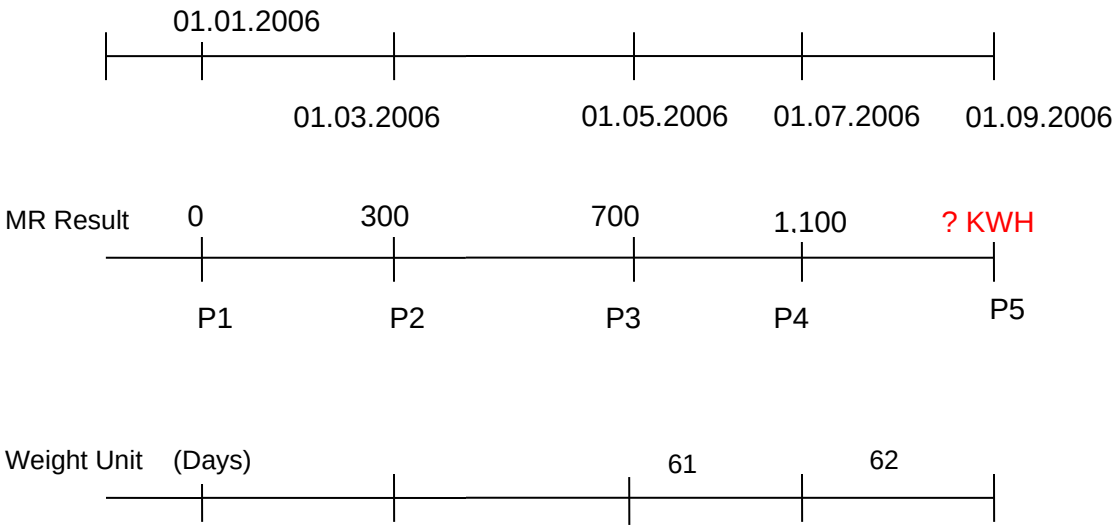
[5] For maximum demand registers, the estimation algorithm will only utilise a reading in the previous year with the same allocation month as the meter reading being estimated.

5. Estimating Scenarios

For the purposes of explaining the estimation procedure, linear weighting will be applied. *In reality seasonal weightings will be assigned to represent seasonal changes (see section 3.2.3).*

For the scenarios below assume that Meter Multiplier = 1 and that the length of the Billing period is 60 days.

5.1 Scenario 1: Estimate based on actual readings from previous period



Meter is installed on 1.1.2006.

The minimum portion of weighting in percent is 80%
The sum of the weighting units for one year is 365

For a meter reading estimate at P5, the estimation algorithm will check whether the previous period P4 to P3 can be used as a representative base period.

The period P4 to P3 is representative due to the following calculation,

Minimum number of days in order for a period to be representative	=	Length of Billing Period	*	Minimum Portion in Percent
	=	60	*	0.80
	=	48		

Length of base period (P3 to P4) is 61 days, which is greater than the minimum 48 days required to make the period representative.

The expected meter reading is determined as follows:

A) Determination of meter reading difference P4 to P3:

1100 kWh – 700 kWh = 400 kWh

=> Consumption P3 to P4 = 400 kWh

B) Determination of consumption per weighting unit :

Consumption of base period / No of days in base period : 400/61 kWh

C) Extrapolation of consumption for period P4 to P5 (forecast period length = 62 days):

62 * 400/61 kWh = 407 kWh

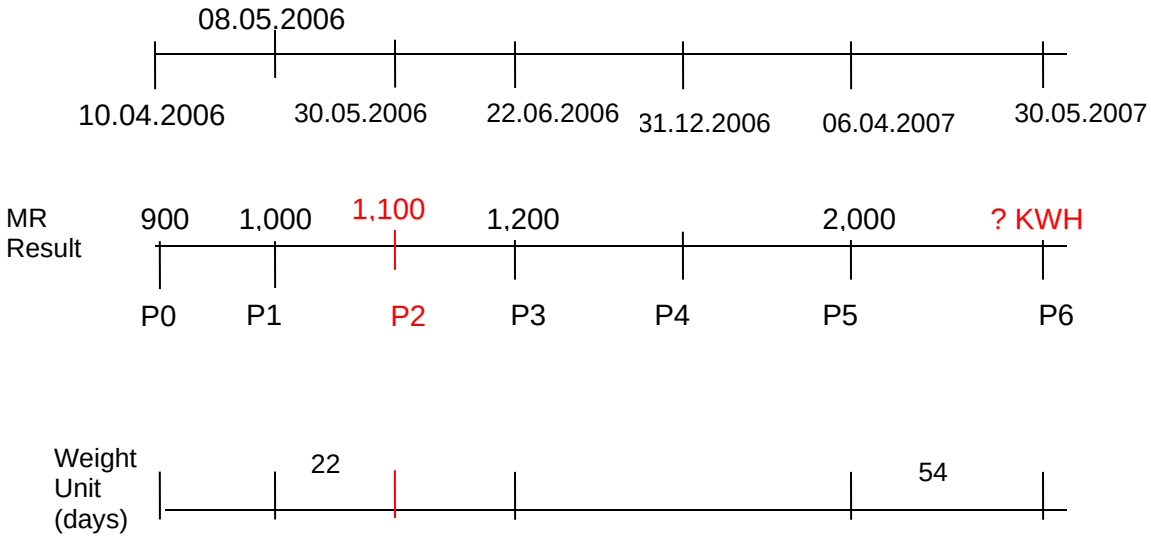
Expected reading advance for period P4 to P5 = 407 kWh

D) Determination of the expected meter reading at P5 by adding the expected reading advance to the reading from P4 :

1,100 kWh + 407 kWh = 1,507 kWh

The expected meter reading at time P5 is 1,507 kWh

5.2 Scenario 2: Building a representative base period



On 1.1.2006 a period consumption value of 1,000 kWh / year was entered for the register.

The minimum portion of weighting in percent is 80%.

The sum of the weighting units for one year is 365.

Readings P0, P1 and P2 are actual readings.

Readings P3, P4 and P5 are estimated readings.

The period P1 to P2 is **not** representative due to the following calculation,

Minimum number of days in order for a period to be representative	=	Length of Billing Period	*	Minimum Portion in Percent
	=	60	*	0.80
	=	48		

Period P1 to P2 is only 22 days which is less than the minimum 48 days required to make the period representative.

Therefore, the base period is expanded from P1 back to P0.

Base period P0 to P2 is 50 days which is greater than the minimum 48 days required to make the period representative.

The expected meter reading is determined in the following way,

A) Determination of meter reading difference P2 to P0:

1,100 kWh – 900 kWh = 200 kWh

=> Consumption to P2 = 200 kWh

B) Determination of consumption per weighting unit :

Consumption of base period / No of days in base period : 200/50 kWh

C) Extrapolation of consumption for period P5 to P6 (forecast period length = 54 days)

54 * 200/50 kWh = 216 kWh

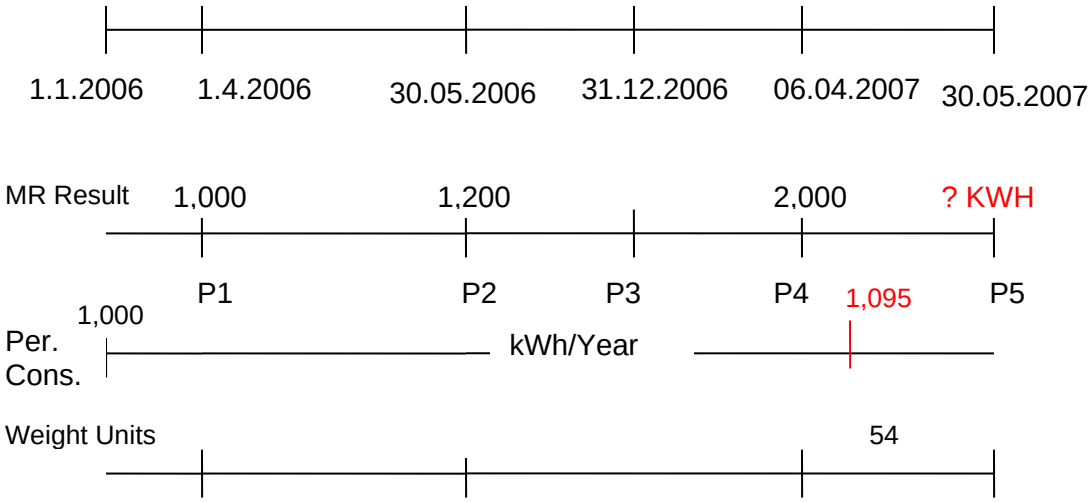
Expected reading advance for period P5 to P6 = 216 kWh

D) Determination of the expected meter reading at P6 by adding the expected reading advance to the reading from P5 :

2,000 kWh + 240 kWh = 2,216kWh

The expected meter reading at P6 is 2,216kWh

5.3 Scenario 3: Manual update of period consumption value in the forecast period



On 1.1.2006 a period consumption value of 1,000 kWh / year was entered for the register. On the 10.04.2007 during the period P4 to P5, this value was changed to 1,095 kWh / year directly after the last periodic meter reading result entry.

The minimum portion of weighting in percent is 80%
The sum of the weighting units for one year is 365

Manual update of period consumption influences the directly following forecast period - extrapolation is based on the manually changed period consumption value rather than the previous meter reading results.

The expected meter reading is determined in the following way:

A) Determination of period consumption per weighting unit by dividing the periodic consumption by the weight of it's validity period.

   1,095 kWH / 365 days

B) Extrapolation of consumption for period P4 to P5 (forecast period length = 54 days):

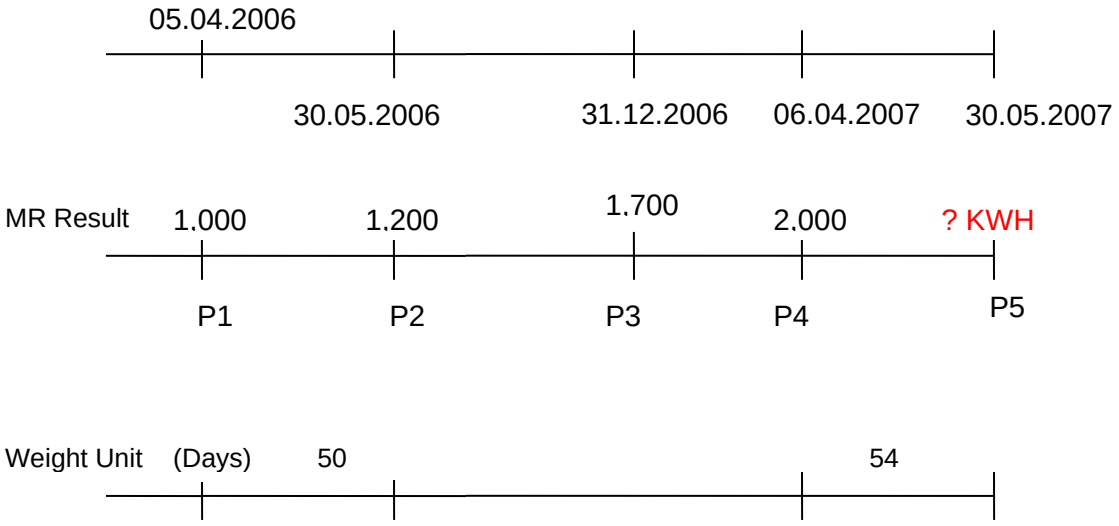
   1,095/365 * 54 days = 162 kWh

C) Determination of the expected meter reading at P5 by adding the expected reading advance to the meter reading from P4 :

   2,000 kWh + 162 kWh = 2,162 kWh

The expected meter reading at time P5 is 2,162 kWh.

5.4 Scenario 4: Estimated readings in previous period



The minimum portion percentage is 80%.

The sum of the weighting units for one year is 365.

Readings P1 and P2 are actual readings.

Readings P3 and P4 are estimated readings.

The period P1 to P2 is representative due to the following calculation,

Minimum number of days in order for a period to be representative	=	Length of Billing Period	*	Minimum Portion in Percent
	=	60	*	0.80
	=	48		

Length of base period (P1 to P2) is 50 days, which is greater than the minimum 48 days required to make the base period representative.

The expected meter reading is determined as follows:

A) Determination of meter reading difference P2 to P1:

1,200 kWh – 1,000 kWh = 200 kWh

=> Consumption to P2 = 200 kWh

B) Determination of consumption per weighting unit :

Consumption of base period / No of days in base period : 200/50 kWh

C) Extrapolation of consumption for period P4 to P5 (forecast period length = 54 days)

54 * 200/50 kWh = 216 kWh

Expected Meter Reading difference for period P4 to P5 = 216 kWh

D) Determination of the expected meter reading at P5 by adding the expected reading advance to the reading from P4 :

2,000 kWh + 216 kWh = 2,216kWh

The expected meter reading at time P5 is 2,216kWh

6. Estimation parameters – Summary of Networks default settings

The Estimation Validation Exercise conducted by the ESB Networks team evaluated possible settings for estimation parameters based on Irish historic data.

Refer to Table 6.1 below which summarises the chosen parameter settings, which represent the outcome of the Estimation Validation Exercise.

The Validation Exercise concluded that such settings produced the best reading estimation results.

Table 6.1 : Estimation Parameters

Parameter	**Purpose**	**Networks setting**
Exclude estimates from base period determination?	To only use actual readings for purposes of extrapolation	ACTIVE (Estimates will be excluded)
Base Period	This is the period that the estimating procedure will use to derive an estimate	Previous Period
Weighting Keys	To represent seasonal adjustments in consumption	Seasonal Weighting (Based on the standard load profiles and time of use that are used in data aggregation for settlement[6])
Periodic Consumption	The default value assigned to a consumption register to facilitate estimation when a representative base period is not available	Refer to the Periodic Consumption Report
Period Demand	The default value assigned to a demand register to facilitate estimation when a representative base period is not available	80% of the Maximum Import capacity defined for the meter point
Minimum Portion Percentage	The factor used to determine if a historic base period is representative in relation to the length of the Billing period.	80%

[6] Also see action item number 2 on page 24

The Estimation Validation Exercise identified further actions as follows with respect to Non Interval meter reading estimation:

1. Re-evaluation of the default settings for estimation parameters should be conducted at an appropriate time in the future when the system reaches steady-state operation.

2. Further analysis should be conducted of meter reading estimates for Night Storage Heating (NSH) registers

   The present ESB Networks approach is that profiles for general night usage are utilised for settlement aggregation of NSH. Therefore the seasonal weightings for NSH estimations are based on general night usage.

   It is possible to derive NSH profiles in sufficient detail to produce seasonal weighting procedures for reading estimation purposes. Such profiles would not be refined enough for settlement purposes.

   ESB Networks propose to introduce such “NSH” weighting procedures for reading estimation purposes in the near future.

7. Meter reading estimation in relation to meter reading validation

Meter reading estimation will be used to determine an expected consumption in order to validate actual readings received or collected by Networks.

If an actual reading is deemed implausible, it may be replaced by a reading estimate.

Note however that an implausible reading will not *always* be replaced with an estimate.

An implausible actual reading may be *released without correction* (after suitable verification and investigation). In effect such an actual reading is deemed to be plausible. It then forms the basis for the validation of subsequent readings. The accuracy or otherwise of past estimates then becomes irrelevant.

It should also be appreciated that Networks implement automatic correction of estimates in the context of “Present less than Previous”.

This is the scenario where the current actual reading is less than the previous estimate (or estimates) but greater than the previous actual reading. In such circumstances, Networks will automatically correct the over-estimation(s) based on the past and current actual readings. Furthermore the current actual reading will then be treated as plausible.

In the context where a special reading is taken because of an issue with estimates, the special reading will **not** be treated as implausible just because it is less than the previous estimate or estimates recorded for the meter point. The “Present less than Previous” scenario will apply, as already described above.

In the context where a special reading is taken to validate another reading such as a disputed Change of Supplier reading, then the Disputed Read resolution process will be triggered. Again, the special reading will not be “rejected” just because it is initially saved as implausible – it will be deemed as plausible as a consequence of the Disputed Read / Replacement Read business process.

8. Dissemination of periodic meter reading estimates to market participants

As defined within the baseline Market Message Design, non-settlement relevant reading estimates are disseminated on the 305 market message, while settlement relevant reading estimates are disseminated on the 300 market message.

Please refer to the Data Aggregation briefing paper and MPD 14 for more detailed explanation of settlement versus non-settlement relevancy.

In short, if a complete set of reading estimates are produced for a meter point, and such estimates are not being used for final billing purposes, then the complete set of estimated readings will be forwarded on a 305 message[7].

If a complete set of reading estimates are produced for a meter point, and such estimates are being used for final billing purposes, then the estimated readings will be forwarded on a 300 message[8].

If a mixture of actual and estimated readings are produced for a meter point, then the readings will be forwarded on a 300 message[9].

[7] A complete set of estimates for a meter point not for final billing purposes, are not relevant to settlement. Therefore such readings are ignored by Data Aggregation, meaning that such readings do **not** result in update of Usage Factor data. This is the reason why there is no Usage Factor information contained on the 305 message – such information is irrelevant.
[8] Any set of readings used for final billing purposes will be relevant to settlement. Such readings are picked up by Data Aggregation, resulting in update of Usage Factor data. The updated Usage Factor information is forwarded on the 300 message.
[9] A set of readings will be relevant to settlement if the set contains at least one actual plausible reading. Such readings are picked up by Data Aggregation, resulting in update of Usage Factor data. The updated Usage Factor information is forwarded on the 300 message.

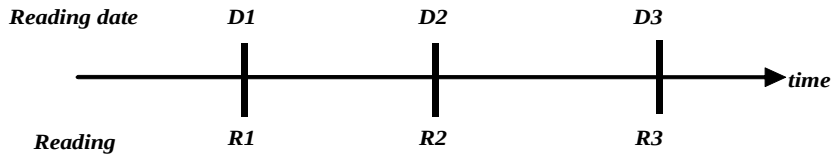
9. Interpolation of meter reading estimates – The "Present less than Previous" scenario

Normally meter reading estimates are extrapolated from earlier actual readings, however in certain scenarios, reading estimates are interpolated from *later* actual readings.

The "Present less than Previous" scenario occurs when an actual read is received subsequent to an estimate which indicates that the estimate was over-estimated.

In these cases the original estimates are withdrawn, and replaced.

The following interpolation algorithm is used to calculate the new estimates. Explanation is with reference to the following diagram:



1. Upon receipt of a current actual reading (R3) which is less than the previous reading (R2), check whether the previous reading is an estimate and whether the current actual reading is not less than the most recent actual reading in history. If true in both instances then continue to Step 2.

2. If the previous estimated reading (R2) is greater than the current actual reading (R3) then perform re-estimation of R2 as follows:

Retrieve the reading prior to the reading requiring re-estimation (R1 in the figure above).

Determine the total consumption between R1 and R3.

Pro-rate the total consumption obtained for the period D1-D3, between the periods D1-D2 and D2-D3.

Re-estimated reading for R2 = R1 + (Pro-rated consumption for period D1-D2)

Note 1:
The pro-ration of the total consumption for period D1-D3 between the periods D1-D2 and D2-D3 may be performed using either linear weighting or seasonal weighting. If performed using linear weighting then the ratio between the two periods is based on the number of days within the respective periods. If performed using seasonal weighting then the ratio the two periods is based on the sum of the weighting units within the respective periods.

Note 2:
If many estimated readings exist in the intervening period between the current actual reading and the previous actual reading, then re-estimation will occur for each estimated reading that is greater than the current actual reading.

Example:

	Read Date	**Original Read**		**Revised Read**	
R1	24.05.2003	2400	Actual		
R2	24.07.2003	3400	Estimate		
R3	23.09.2003	4400	Estimate		
R4	23.11.2003	5400	Estimate	4899	Re-Estimate
R5	24.01.2004	5399	Actual		

Receipt of current actual reading (R5) which is less than the previous estimated read (R4) but greater than the previous actual reading (R1).

NB: Assume meter multiplier of one and linear weighting.

$$\text{Re-estimated R4} = \text{R3} + (\text{Consumption R3 to R5}) \times \frac{\text{Number days 23.09.03 to 23.11.03}}{\text{Number days 23.09.03 to 24.01.04}}$$

$$= 4400 \text{ kWh} + 999 \text{ kWh} \times 0.499$$

$$= 4400 \text{ kWh} + 498.5 \text{ kWh}$$

$$= 4899 \text{ kWh}$$

10. Meter reading estimation – Overview per Business Event

Business Event	Overview of meter reading estimation subsequent to Business Event
Change of Supplier	The previous meter reading history for the device / register is used to determine estimate.
Change of Legal Entity	The previous meter reading history for the device / register is used to determine estimate.
De-Registration	Meter point should be de-energised, hence meter reading estimate = nil consumption.
De-energistation – Non Payment of Account	If a meter point is de-energised, then meter reading estimate = nil consumption.
De-energistation – Vacant premises	If a meter point is de-energised, then meter reading estimate = nil consumption.
Install new device / register	The default periodic consumption for the register is used to determine estimate.
Exchange device / register – Like For Like	The previous meter reading history for the device / register is used to determine estimate.
Exchange device / register – Not Like For Like	The default periodic consumption for the register is used to determine estimate.
Re-energisation – existing device / register remains in situ	The previous meter reading history for the device / register is used to determine estimate.
Re-energisation – install new device / register	The default periodic consumption for the register is used to determine estimate.
Change of DUoS Group – existing device / register remains in situ	The previous meter reading history for the device / register is used to determine estimate, subject to the weighting procedure associated with the new DUoS Group. Given a new DUoS Group, the standard profile associated with the meter point will change, hence the weighting procedure will be altered.
Change of DUoS Group – install new device / register	The default periodic consumption for the register is used to determine estimate.