

Taylor Wimpey Methodology Statement

Specification of data sources

Moving on from the transitional year of 2014, AJR Management (AJR) has been responsible for data collection and reporting during the whole of 2015, 2016, 2017 and 2018. AJR through 2018 has been responsible for the utility management process commencing at the point that Taylor Wimpey (TW) become responsible for the supply, usually at the point of installation, through to successful handover to buyer, Housing Association (HA) or Management Company, or disconnection. However, during 2018, AJR has also been fully involved in the meter call-off process giving greater visibility of meter requests.

As a backdrop to this management process, AJR complete regular site visits (minimum quarterly), obtain weekly legal completion reports from each TW Business Unit (BU), liaise with site and sales staff, receive and process all invoices and obtain missing data direct from suppliers where necessary.

During the course of this work, AJR monitor closely the release of new sites to ensure all sites are covered and complete a site checklist at each quarterly visit to each site to ensure all meters are covered. AJR receive a weekly legal completions report from each BU which is used to ensure all handover meter readings have been received and processed onto AJR system. On a monthly basis, a consolidated legal completions report is obtained from Head Office and this is used to ensure all completions are accounted for in terms of consumption or that any missing is explained, namely because they are HA plots that have invoiced but have not physically been built. There are also additions to this list which are HA plots built and handed over which have already “legally completed” but were not reported on at that point due to the circumstances previously mentioned above.

AJR system produces a suite of reports to identify missing data or to question data integrity measured against a set of expected criteria. It highlights contradictory meter data for further investigation, requests validation of things such as clocked meters, meter removals and identifies duplicated or potentially erroneous data.

The methodology below explains the protocols in place from which the 2018 data has been drawn together.

Meter Types

All meters are divided into two categories – A and B. Within a given category, there are a number of different meter types.

The full list of meter types for electricity meters in category A is Temp Building Supply, Office, Compound, Showhome, Site Office, Pumping Station, Feeder Pillar, Unmetered, Communal Areas, Community Centre, Sales Centre, Car Park, Business Premises, Crane Supply, Existing Buildings, Silo, Street Lighting, Car Charging Point, Telecommunications, Undercroft Lighting and Bin Store. All of these are grouped into ‘Site’, with the exception of ‘Office’, which constitutes its own grouping.

The full list of meter types for gas meters in category A is Showhome, Site Office, Office, Communal Areas, Community Centre, Temp Building Supply, Sales Centre, Energy Centre and Business Premises. All of these are grouped into 'Site', with the exception of 'Office', which constitutes its own grouping. The full list of meter types for electricity and gas meters in category B is Plot and Stock Plot. These are grouped into 'Plot' meters for electricity and gas.

Electricity

The data included is from a variety of sources with the preferred, coming via direct data collection from site. However, on occasion, access to the meter is not possible, photographs do not turn out as expected and therefore invoices are used and failing invoices being available, data gathered from supplier databases and as a last resort, estimation using prior consumption data. For unmetered street lighting supplies, all consumption is recorded from invoices or on occasion, the unmetered supply inventory. Please see below the breakdown of meter types for electricity and the normal and fall-back method of data collection.

1. Site Meters (All except half-hourly, Profile – 00) – Data collection is preferred by photograph quarterly on site by AJR site visit staff. Where a photograph is not possible, contact is made with the supplier to obtain up to date invoices where not already received or as a minimum recent consumption data and failing that, an estimate is generated using the average consumption from previous readings. Installation readings are obtained where possible from tags left with the meter or by initial invoice. Last resort would be contacting the supplier where the reading is required for a data set prior to the normal invoicing cycle. Final readings when the meter changes responsibility away from TW or is disconnected is taken from final invoices but AJR liaise closely with site staff in the periods leading up to site closure or meter disconnections to obtain readings direct from site at this point also.
2. Site Meters (Half-Hourly, Profile – 00) – Data collection has to be by invoiced consumption. This type of meter is connected to a modem for half-hourly data collection and therefore all invoices are accurate and the most effective source of consumption data. There should never be cause for estimation for this meter type. As invoices show consumption over a period rather than an opening and closing reading, there is no requirement to obtain initial readings and similarly, change of responsibility readings are not required with the final consumption being by way of the final invoice.
3. Site Meters (Unmetered Street Lighting) – Data collection is by invoiced consumption as there is no physical meter to read. An inventory of equipment is held by the network operator and an agreed amount of consumption is set, against which invoices are raised by the supplier.
4. Office Meters – Data collection for offices is exactly the same as for Site Meters above and will be as described in Point 1 or 2 depending on whether a standard or half hourly meter.
5. Plot Meters (except Showhomes which are treated as Site Meters above) – Data collection is on site by site or sales staff at the point of handover with initial readings being gathered (by AJR) either from tags left with the meter or from initial invoice or as a last resort by contacting the supplier where the reading is required for a data set prior to the normal invoicing cycle. In the exceptional circumstance that readings are not taken on handover by site or sale staff, AJR ensure meter readings are taken at the earliest possible opportunity thereafter by contacting site staff to obtain or as a last resort, taking readings on the next quarterly cycle and using estimation for the handover date.

Please note that where a meter is found to have clocked, it is flagged as such and in reporting, calculates the total consumption from supply start reading or quarter start reading to the point the meter returns to 0 plus the reading from 0 to the supply end reading or quarter end reading.

Please note that plot consumption is reported entirely within the quarter that it legally completes. This can sometimes mean consumption from prior quarters and even prior years is reported for that quarter. However, this was decided upon due to the fact that it was totally impractical to obtain quarterly meter readings for all plots given the volumes and also that the majority of plots legally complete roughly 90 days after meter installation and there are usually a similar number of stock plots, meaning the approach is consistent.

Gas

Data collection is exactly the same for gas as for electricity with site (including showhomes) or office meters being collected quarterly and plot meters being assessed upon handover to either a private buyer or housing association.

The meters, metered consumption units and conversions are described below.

1. Metric Meter – Records consumption in Cubic Metres and this is the reading held on the AJR system. The assumed Loss Conversion Factor and Calorific Value are 1.02264 and 39.39 (an average arrived at by averaging National Figures for a 12 month period provided by National Grid) and the conversion calculation is as follows.
 - a. Metered Units x Loss Factor (1.02264) x Calorific Value (39.39) divided by 3.6
2. Imperial Meter – Records in 100 cubic feet and this is the reading held on the AJR system. The assumed Loss Conversion Factor and Calorific Value are 1.02264 and 39.39 (an average arrived at by averaging National Figures for a 12 month period provided by National Grid) and the conversion calculation is as follows.
 - a. Metered Units x Loss Factor (1.02264) x Calorific Value (39.39) x Imperial to Metric Conversion (2.83) divided by 3.6
3. Heat Meter – Records in kWh and no conversion is required.

Please note that where a meter is found to have clocked, it is flagged as such and in reporting, calculates the total consumption from supply start reading or quarter start reading to the point the meter returns to 0 plus the reading from 0 to the supply end reading or quarter end reading.

Plot gas meters are treated in the same way as plot electricity meters in that they are reported within the quarter in which they legally complete.

Fleet fuel consumption

The methodology applied for 2018 vehicles fleet consumption has been reported on a more accurate basis than simply the contracted mileage.

This year we have received regular vehicle mileage reports providing mileage readings. Where we have two or more readings for a vehicle we have calculated the average daily mileage between the two readings that are closest to the extremes of the year. If the contract was live for the full year, we get the reading closest to 1/1/2018 and that closest to 31/12/2018 and calculate an average daily mileage which is then applied across the full year by creating estimated mileage readings for each and of the year.

Where a contract commenced within year, we have used the start date and reading and where available, used an additional reading later in the year to create a daily average which we have then applied for the active period.

Where a contract terminated during the year, we have used that end date and reading and where available, used an additional prior reading to create a daily average which has then been applied for the active period.

It was deemed that using the actual mileages available would always give us the best chance of an accurate reflection given that many of the contracts are substantially above or below the contracted mileage.

Where only one reading is available for a vehicle, we have taken an average daily mileage by dividing the contract mileage by the contract length in days and applied this to the active period during the year.

Please note that no deduction has been made for personal mileage as in prior years because there is no knowledge base or data available to assist.

A consideration for future reporting years is the impact of recent allegations regarding manufacturer quoted emissions figures. Thoughts may be given to an uplift to take account of 'real-life' figures.

Other fuels

Other Fuels consumption has for all of 2018 been tracked by AJR requesting invoices from BUs on a monthly or quarterly basis depending upon the working practices of the individual BU and inputting data onto the AJR system.

1. Run an "Other Fuels" Report on a quarterly basis and advise BUs of all sites where there had been prior "Other Fuels" consumption that had reported zero for this quarter. Request confirmation that this was correct from the BU. The BUs confirm on a quarterly basis that we have received all invoices.
2. Verify sites taking delivery of "Other Fuels" as part of a site checklist completed on first site visit to any site and then reviewed quarterly as part of our audit process.

Data is input onto our system by AJR following receipt of approved invoices from the BU.

Following guidance last year, all Diesel used on sites which had previously been reported using a 100% Mineral Diesel emissions factor, is now being reported using the emissions factor for Gas Oil as this was deemed to be more closely aligned to the "Red" diesel typically used on site.

Please note that under “Metered LPG”, this is metered in cubic metres and then converted to Litres of LPG on the invoices by using a multiplier of 3.85. In order to report using the metered consumption, we report in Cubic Metres and then use the product of the Litre Conversion multiplier (3.85) and the Litres of LPG to KgCO₂e conversion (1.519060), a factor of 5.848380, to calculate the CO₂e in Kg.

Estimates

What

It is important to be clear on the two types of “Estimation” that may exist within the data.

- Validated System Generated Reading – This is a reading estimated to a quarter end date that has been produced using two evidenced readings from that quarter and the previous quarter. This was implemented last year in order to standardise the quarters and thereby lend greater credibility to year on year comparisons that up until then could have been for significantly different periods had data for one quarter been gathered before the deadline and the following quarter after the deadline. Unless an actual reading type was taken on the actual quarter end date (31/3, 30/6, 30/9, 31/12), or the supply was installed or handed over / disconnected during the quarter, all reported readings will be “Validated System Generated”.
- System Generated Reading – This would be a reading estimated where we were unable to validate it due to the data available being outside of the current quarter and either previous or subsequent quarter. These estimates are still based on consumption for the supply using averages but are used to signify that the readings used are outside the usual tolerances of current and previous quarter. TW have for 2018 (as in at least two previous years) decided to include estimates for offices where TW do not pay the bill directly. This is covered in the methodology section below.

Electricity and Gas Category A (Site, Sales and Offices) are covered by estimates and “Other Fuels” are not. There is no estimation within the Category B plot data.

Methodology

Estimations are carried out by AJR in line with the following.

- Where Estimation date is between two known actual readings – Calculate average daily consumption between the two readings by dividing the total consumption (Later Reading minus Earlier Reading) by the total number of days between the readings (Later Reading Date minus Earlier reading Date). Work out the number of days from whichever reading date is closest to the desired reading date to the date of the required reading, multiply this number of days by the average daily consumption and then add this result to the Closest Reading.
- Where Estimation Date is prior to earliest known reading but at least two actual readings exist for the supply – Calculate current daily supply average (using latest reading and closest actual reading to 1 year apart). Work out the number of days from the nearest actual

reading to the required reading date, multiply by the number of days between this date and the required reading date and then deduct the result from the nearest actual reading.

- Where Estimation Date is after latest known reading but at least two actual readings exist for the supply – Calculate current daily supply average (using latest reading and closest actual reading to 1 year apart). Work out the number of days from the nearest actual reading to the required reading date, multiply by the number of days between this date and the required reading date and then add the result from the nearest actual reading.
- The priority order for estimations would be as follows.
 - Calculate reading between two actual readings
 - Calculate reading using closest actual and annual consumption average
 - Calculate reading using average for that supply type on that site
 - Calculate reading using average for that supply type for that BU
 - Calculate reading using average for that supply type for TW nationally

TW Offices with no directly metered supply

For 2018 TW have decided to report on these offices where there is no direct metered supply, rather that the costs of these elements are folded into the service charge / rent. We have assumed for the purposes of this assessment that all offices being estimated have both gas and electricity supplies and in order to estimate the consumption we have used the quarterly consumption in 2018 for the offices that have metered gas and electricity supplies.

For each quarter, we worked out an average kWh/ft² value for gas and electricity individually taking account of the total gas or electricity consumption across these offices and dividing these totals by the combined ft² of the same offices.

We have then applied this kWh/ft² to the unmetered offices by multiplying the ft² of each unmetered office by the kWh/ft² and applying the resulting value as gas or electricity consumption for that office. This has been added to the main raw data and factored into all subsequent totals.

Spain

Electricity data is available for TW Spain. Data collected relates only to category A meters (please see meter types above).

TW Spain does not report on category B meters (plots) as all plots are managed by sub-contractors prior to sale. TW Spain pays for negligible amounts of energy so it is deemed to be de minimis.

TW Spain does not consume natural gas.

Data was provided in relation to a small amount of other fuels consumption for 2017. However, the Golf site to which this related is now closed and there is therefore no other fuels consumption for Spain.

Fleet data has been provided for 2018 in the form of mileage figures for specific vehicles on a quarterly basis. Although the fuel type of each vehicle is not known, we have added those that we can be sure of and used the appropriate factors. For those classified as unknown we have used a factor for

unknown fuel kgCO₂e per km provided by DEFRA but in other cases (kgCO₂e per litre and kWh per litre) have erred on the side of caution and opted for a Diesel Factor as the worst case scenario.

2018 'location based' and 'market-based' Scope 2 emissions

Under the new GHG Protocol Scope 2 Guidance (http://www.ghgprotocol.org/scope_2_guidance), organisations wishing to report their carbon emissions are now required to publish two numbers for their Scope 2 emissions. The first of these is calculated under the location-based method, using a national or regional emission factor, as in previous years. The second is generated using the market-based method. This method enables organisations to report the carbon emissions of the electricity they have chosen to purchase based on specific suppliers fuel mix disclosure, and/or on the emissions from specific tariffs and/or based on a residual grid mix.

Both the 'location based' and 'market-based' Scope 2 emissions are published in our Annual Report and Accounts and our Sustainability Report. The calculation methodology for the market-based Scope 2 emissions is given below.

For 2018, in addition to the usual model, we have extracted all actual consumption by supplier and included where known the specific tariff name. In this extract we have not included carbon emissions factors as these will be obtained by the carbon trust through dialogue with suppliers. Please note that where there have been changes of supplier, the supplier quoted is the one in place at the commencement of that quarter.

Location	Supplier / Contractual Instrument Type	Determination of Factor Used	Energy Consumption (MWh)	Emission Factor (KgCO ₂ e / kWh)	Emissions (tCO ₂ e)
UK	British Gas	Supplier Fuel Mix Disclosure	7,376.61	0.210000	1,549.09
	British Gas Business	Supplier Specific Residual Fuel Mix Excluding Renewable	1,028.38	0.214000	220.07
	Ecotricity	Supplier Fuel Mix Disclosure	82.66	0.000000	0.00
	EDF	Supplier Specific Residual Fuel Mix Excluding Renewable	338.58	0.175000	59.25
	EON	Supplier Specific Residual Fuel Mix Excluding Renewable	1,228.03	0.324000	397.88
	First Utility	Supplier Fuel Mix Disclosure	1.51	0.355400	0.54
	Green Star Energy	Supplier Fuel Mix Disclosure	3.48	0.000000	0.00
	Npower	Supplier Specific Residual Fuel Mix Excluding Renewable	284.00	0.359000	101.96
	Npower	REGO Backed Renewable Tariff	7,223.27	0.000000	0.00
	Opus Energy	Supplier Fuel Mix Disclosure	265.01	0.000000	0.00
	Ovo Energy	Supplier Fuel Mix Disclosure	4.11	0.204000	0.84
	Robin Hood Energy	Supplier Fuel Mix Disclosure	1.98	0.359000	0.71
	Sainsburys Energy	Supplier Fuel Mix Disclosure	1.43	0.252000	0.36
	SSE Business	Supplier Specific Residual Fuel Mix Excluding Renewable	455.35	0.342000	155.73
	Scottish Power	Supplier Fuel Mix Disclosure	4,392.10	0.310000	1,361.55
	Spark Energy	GB Residual Mix	12.47	0.367000	4.58
	SSE	Supplier Fuel Mix Disclosure	125.18	0.310000	38.81
	Unknown	GB Residual Mix	653.23	0.367000	239.73
	Utility Warehouse	Supplier Fuel Mix Disclosure	13.84	0.359000	4.97
Spain	Unknown	Spain Residual Mix	836.66	0.446000	373.15
Total			24,327.87		4,509.21

Operational Boundary

Scope 1 and 2 footprint of Electricity, Gas, and other on-site fuels and fuels used by vehicles owned or based within the organisational boundary.

Specifically in relation to CHP / District Heating Systems these are treated as follows.

- Where TW are responsible financially for the input supply (main incoming gas or electricity supply), then this is reported under the usual reporting terms as described earlier in this document. However, in these circumstances, the output supplies, namely plots before sale, are excluded as this would constitute double reporting.
- Where TW are responsible for the input supply but receive financial recompense for plots that have handed over, we have calculated for each quarter the number of plots that are not the responsibility of TW versus the number that are. We have then turned that into a Multiplier for the TW responsibility by calculating the percentage (as a fraction) of the plots that were theirs during that quarter. We have added this multiplier under the Column Heading "Joint Venture Multiplier" such that the consumption is calculated appropriately. A note has been added to all affected "Joint Venture Multipliers" in the affected cells.
- Where TW are not responsible financially for the input supply, this is not reported and the output supplies (typically heat meters for the plots before sale) are reported as for conventional plot supplies.

The following sources of emissions were excluded or part-excluded from this report:

- Fugitive emissions (refrigerant gases): excluded on the basis of expected immateriality and difficulty in acquiring.
- Gas and electricity of part-exchange properties: excluded on the basis of immateriality due to very few completions of this type;
- Certain joint venture properties: where Taylor Wimpey was not part of the handover process. In these cases other house builders have captured MCR-related data;