THE CROWN ESTATE

The Crown Estate

Environmental Reporting Criteria and Methodology

FOR THE CROWN ESTATE'S SUSTAINABILITY AND DATA REPORTING PROGRAMME

1st April 2017 – 31st March 2018

CarbonCredentials

Document Information

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1. Introduction & Background

The Crown Estate's role is to make sure that the land and property it invests in and manage are sustainably worked, developed and enjoyed to deliver the best value over the long term. The Crown Estate's vision is to be a progressive commercial business creating significant value beyond financial return. The Crown Estate is committed to working with partners and stakeholders to grow its business, outperforming the market whilst delivering sustainable long-term return and making a positive impact through its Total Contribution to the UK.

Carbon Credentials (CCES) has been engaged to support The Crown Estate in the collation, aggregation and analysis of environmental data for the purpose of compliance, reporting and analysing sustainability performance, as well as supporting the Sustainability Action Plan (SAP).

This document sets out roles and responsibilities within the sustainability data process, and details specifically how The Crown Estate and Carbon Credentials ensure that all data is prepared in a robust and auditable manner – with areas of uncertainty clearly identified, documented and managed.

This document will be updated annually to reflect evolution in The Crown Estate's environmental reporting programme. This document specifically relates to the reporting period 1st April 2017 – 31st March 2018.

2. The Crown Estate's Portfolio & Stakeholder Structure

Understanding the organisation structure and key stakeholders (Figure 1) is essential when implementing and rolling out the environmental data programme. Carbon Credentials has built relationships with all stakeholders and have taken significant time and effort in appreciating the organisation structure.

Portfolios

The Crown Estate has four main portfolio strands subject to the measurement of carbon, water and waste – Central London, Regional and Rural and Coastal. Due to the nature of lettings within the Rural and Coastal portfolio, the main area subject to measurement is the Windsor Estate. For this reason Windsor is identified, and often referred to, separately in this report.

Central London

The Central London portfolio includes the whole of Regent Street and much of St James's, the portfolio also includes The Crown Estate's residential properties. These are managed by Managing Agents; Regent Street Management Direct (RSMD), BNP Paribas Real Estate (BNPPRE), and Savills respectively.

Regional

The Regional Retail portfolio extends to 14 retail and shopping parks, three shopping centre and one leisure destination. The Crown Estate take a bespoke approach at each asset, with a long-term view to investing in, developing and delivering the best retail and leisure destination, in the right locations across the UK. The assets are managed by Savills.

Windsor

The Windsor estate covers approximately 6,400 hectares and includes Windsor Great Park, the Home Park of Windsor Castle, extensive forests, residential and commercial properties, golf courses, a racecourse and let farms. The estate is directly managed by The Crown Estate.

Rural and Coastal

The Rural portfolio is made up of rural sites which are managed by both The Crown Estate directly. Much of the rural portfolio, consists of indirectly managed sites which are excluded for the majority of the environmental data programme. With the transfer of The Crown Estate's management duties to the Scottish Government the size of the portfolio has reduced to one asset in 2017/18.

External Stakeholders and Support

It is important to note that in addition to the Managing Agents who are appointed by The Crown Estate, there are other external stakeholders which support and contribute to the environmental data programme.

Carbon 2018

The Managing Agents, RSMD and BNPPRE, employ the energy bureau service Carbon 2018 for their respective portfolios. Carbon 2018's main role is to ensure procurement, bill validation and energy performance support. It is important to highlight that Carbon 2018 is appointed by the Managing Agents and not directly by The Crown Estate.

Ecova

Following the instruction of Savills to manage The Crown Estate's regional portfolio in August 2015, Ecova have been instructed as their energy bureau taking over from Carbon 2018. Ecova's main role is to ensure procurement, bill validation and energy performance support. As with Carbon 2018, it is important to highlight that Ecova is appointed by the Managing Agents and not directly by The Crown Estate.

Arup

Arup are directly employed by The Crown Estate and provide both strategic support in terms of the carbon trajectory which focuses on long term carbon reduction targets as well as support to the Sustainability Action Plans (SAP) for the Central London team. It is also responsible for providing energy performance support to both RSMD and BNPRE for their respective portfolios.

TFT Consulting

TFT Consulting is also employed directly by The Crown Estate and is responsible for supporting the Regional portfolio with its SAP and energy performance projects.

BNP Paribas

BNP Paribas is employed directly by The Crown Estate as the managing agent for the St James's portfolio: the portfolio is comprised of 4 million ft^2 of retail, office and residential space with a value of over £1 billion. As part of the programme the managing agent provides environmental data such as meter reads to Carbon Credentials. With the support of ARUP, BNP Paribas is responsible for delivering across areas of the SAP.

Savills

Savills is employed directly by The Crown Estate as the managing agent for the Residential and Regional Portfolio. The Regional Retail portfolio extends to 14 retail and shopping parks, three shopping centre and one leisure destination. The Crown Estate take a bespoke approach at each asset, with a long-term view to investing in, developing and delivering the best retail and leisure destination, in the right locations across the UK.

Regent Street Management Direct (RSMD)

RSMD is a part of JLL and is employed directly by The Crown Estate as the managing agent for the Regent Street portfolio: the portfolio is comprised of The Crown Estate properties north of Piccadilly Circus, including office and retail units. As part of the programme the managing agent provides environmental data such as meter reads to Carbon Credentials. With the support of ARUP, RSMD is also responsible for delivering across areas of the SAP.

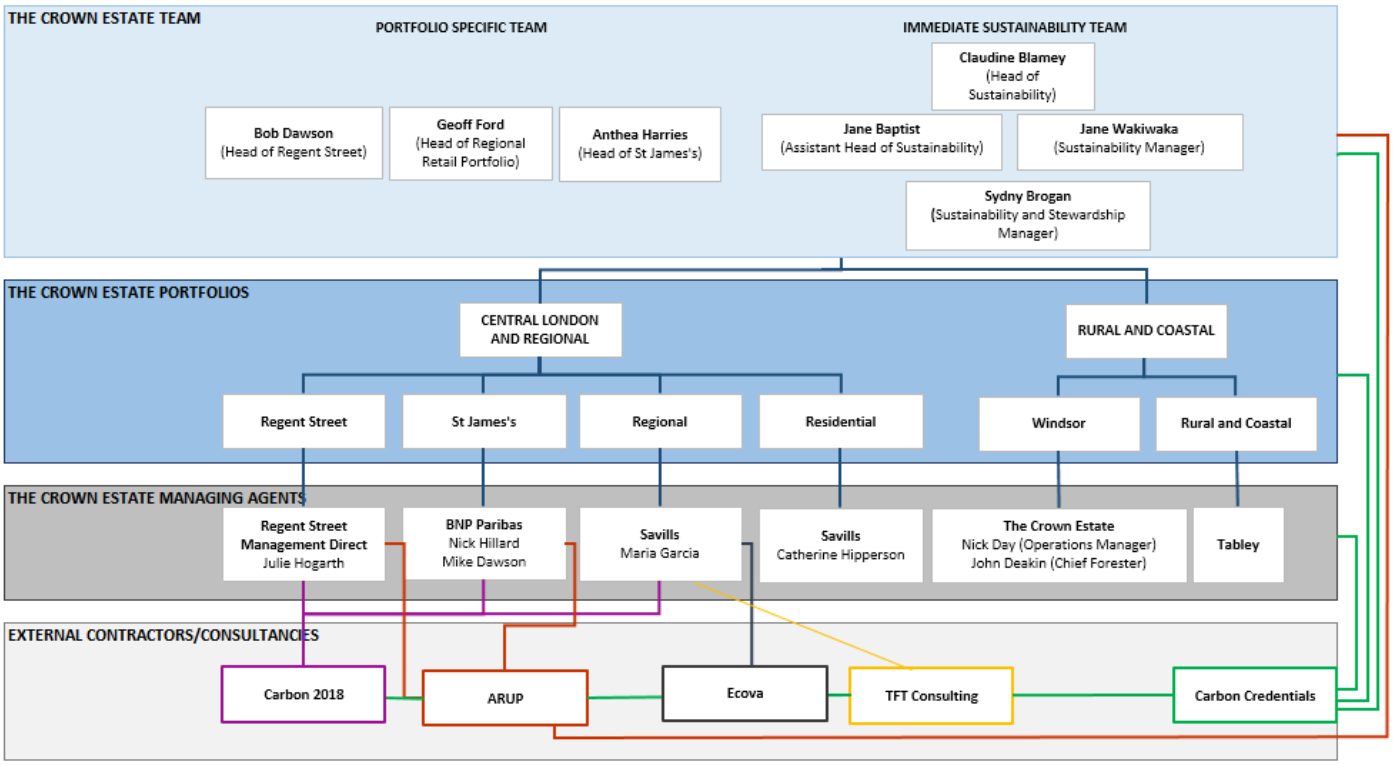

Figure 1: Environmental data programme across the portfolios

3. Scope & Boundary

The Carbon Credentials Crown Estate data programme includes 100% of directly managed properties and can extend to additional assets as required by certain reporting requirements, which extends the boundary of properties to be included.

Figure 1 demonstrates the scope of the environmental data programme with the specific portfolios which are included. Operationally, the organisation is split into the following portfolios:

Central London and Regional

The Central London and Regional portfolios are directly managed through third party managing agents and includes some tenant energy where these costs are paid by The Crown Estate and re-charged through service charge. The portfolio's includes:

- Regent Street, which includes offices, retail and some residential in the area around Regent Street, London. This portfolio is managed by Regent Street Management Direct (RSMD).
- St James's, which includes offices and retail in the St James's area of London. This portfolio is managed by BNP Paribas.
- Regional, which consists of a number of retail/leisure parks, shopping centres, and offices. This portfolio is managed by Savills.
- Residential, which is primarily in St James and managed by Savills.

Windsor

The Windsor Estate is directly managed and The Crown Estate is only responsible for assets where there is a direct cost to The Crown Estate (no tenant energy is included as this is paid directly by the tenants).

- Windsor Estate, which includes 'The Royal Landscape' and some residential properties.

Rural and Coastal

The Rural & Coastal Estate is also directly managed and The Crown Estate is only responsible for assets where there is a direct cost to The Crown Estate (no tenant energy is included as this is paid directly by the tenants).

- Rural portfolio, which includes assets throughout the UK, the majority of which The Crown Estate does not have responsibility for the energy consumption or Infrastructure: The Crown Estate owns assets but is not responsible for energy consumption.

Reporting Boundary

Environmental data reporting encompasses all the directly managed operations under The Crown Estate's control on its Central London, Regional, Rural & Coastal (R&C) and Windsor portfolios. Under these portfolio's some tenant energy where these costs are paid by The Crown Estate and re-charged through service charge. The R &C portfolio is also directly managed and The Crown Estate is only responsible for assets where there is a direct cost to The Crown Estate (no tenant energy is included as this is paid directly by the tenants). The Windsor Estate is directly managed and The Crown Estate is only responsible for assets where there is a direct cost to The Crown Estate (no tenant energy is included as this is paid directly by the tenants).

Carbon Credentials, on behalf of the Crown Estate, collects and reports building emissions at a meter level for all energy supplies that are landlord obtained. Usage from other heating fuels (e.g. burning oils) at The Crown Estate's properties is calculated based on the amounts delivered to those properties during the year and meter reads provided by the managing agents. There is also

fuel usage for fleet, machinery and rural buildings for the Windsor and R&C portfolios. For both of the portfolios the finance team provides usage via the Agresso finance system, the only instance where this data is not applied is for the Windsor Estate fuel stock data – which is provided directly from the fuel stock database. Primary expenses data from business travel journeys by its employees is used to calculate emissions from those journeys. Types of journey include: tube, train, bus, flights, taxi, ferry and car hire. Finance records void consumption for assets that fall under The Crown Estate's responsibility for a limited time between the lapse and beginning of a new lease. Due to the challenges of collecting void data an estimation technique is applied that applies a historic total. For water usage, data coverage includes water consumed at buildings where the supplies are landlord controlled. For waste generation, the data covers all buildings where The Crown Estate is responsible for the disposal of waste.

Reporting Checks

The Crown Estate's property, asset management and finance teams provide an up-to-date list on properties across the estate throughout the year. In addition to this, a list of all properties where a service charge is collected, is taken from The Crown Estate's Horizon property database (set up to record all tenancy details and for internal users only). Windsor's finance team provides the property listing for the Windsor estate. Any updates (i.e. acquisitions, disposals, lettings, voids, floor areas etc.) to these lists throughout the year are communicated to The Crown Estate on a quarterly basis. In addition to the property lists, Carbon Credentials collects environmental data directly from the managing agents on an on-going quarterly basis – where they are able to provide their own property lists and a void schedule for properties becoming vacant/ tenanted throughout the year. Collecting data routinely also allows for a continual meter mapping process to track existing and new meters. An annual reconciliation is undertaken between the Horizon database and the information provided by the managing agents to ensure an accurate list of properties and voids is used. Regarding Joint Ventures, Carbon Credentials reported on sites where The Crown Estate has operational control and excluded others where they did not such as Princesshay (Exeter).

Importantly, quarterly meetings and on-going data collection enables Carbon Credentials to provide validation checks and highlight anomalies to the managing agents on a quarterly basis. For energy usage the more sophisticated approach via the Crown Carbon Indicator is applied where usage is calculated per square meter, this enables efficient and inefficient buildings to be identified. All data is stored on a structured database that importantly allows for a number of data streams to be collected, including half hour, invoice, meter reads and supplier statements. By being able to collect these data streams Carbon Credentials can carry out validation checks.

As in the previous reporting year, the total absolute scope 1, 2 & 3 emissions have continued to be split out due to a better understanding of the scope 3 exclusive tenant energy usage. An example of this includes Quadrant 3 where 11 MWh of consumption was re-charged to the tenant.

SECTON II: DATA MANAGEMENT

4. Building Level Energy, Water & Waste Data

Data Sources

- Electricity
- Natural gas
- Water
- Waste

The Crown Estate's data is collected and then stored on a software tool that acts as Carbon Credential's data management platform. This specialised tool is catered towards the professional management of environmental data, whereby information can be stored at a granular level - whether this be at the meter, vehicle or asset level etc. In addition to this, the tool can store numerous data sources such as invoices and half hourly data; this permits us to carry out validation checks on the data to ensure it remains accurate. As shown below, numerous data sources are fed into the system to produce an array of outputs (please see figure 2).

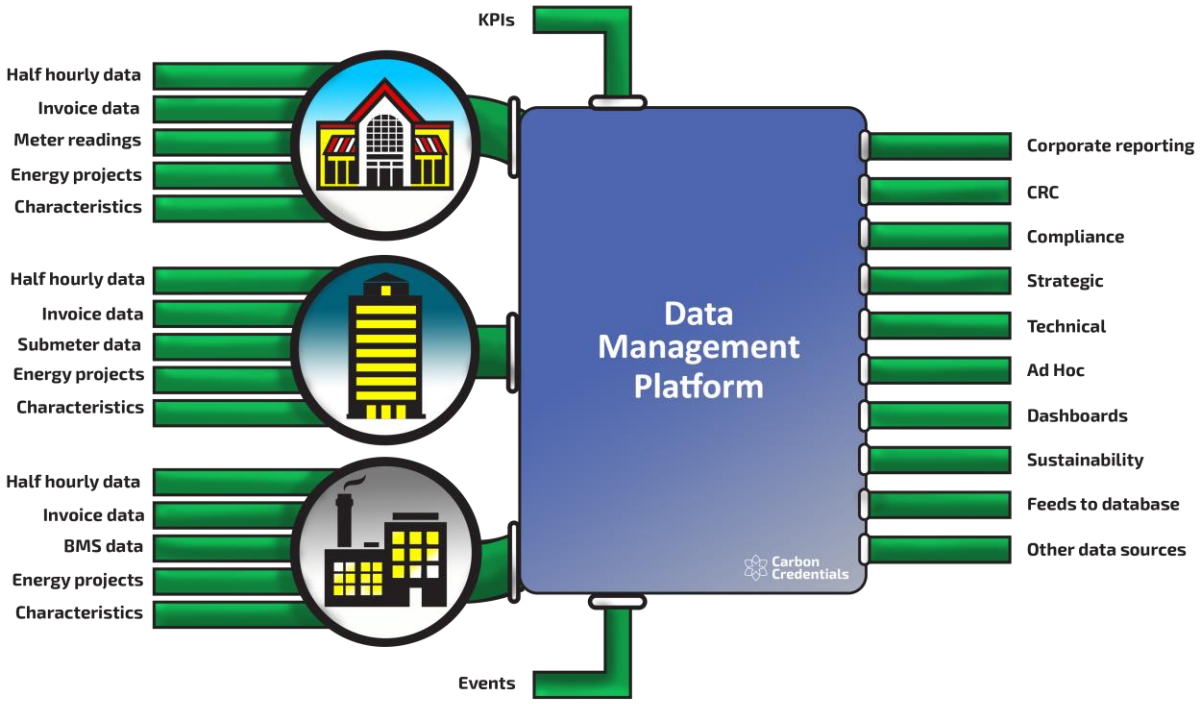

Figure 2: The data management platform inputs and outputs

Summary of Key Processes

- St James's and Regent Street Energy Invoices: This data is currently obtained monthly, direct from the supplier using the supplier account information provided by Carbon 2018, The Crown Estate and Managing Agent.
- Regional Invoices: Since the appointment of Ecova, invoices for the regional portfolio have been sent monthly, directly from the energy bureau in a spreadsheet format.
- Electricity meter reads for non-HH/AMR properties are sent by the Managing Agents at the end of each month/beginning of the following month, either via a monthly spread sheet or daily, directly from the data collator.
- Water and natural gas meter reads for all properties are sent by the Managing Agents at the end of each month/beginning of the following month via a monthly spread sheet.
- Regent Street and St James's HH/AMR: sent monthly by Carbon 2018.
- Regional HH/AMR: Since the appointment of Ecova the HH/AMR is sent weekly.
- Asset Listing: Sent by The Crown Estate and energy bureaus. Requested at least quarterly.
- Projects: Sent by each Managing Agent. Requested at least quarterly.
- Special Events: Sent quarterly by Carbon 2018 for Regent Street, and St James's. Regional is sent by Ecova. Requested quarterly from Rural and Residential.
- Waste Data: This is sent by each Managing Agent responsible for each portfolio on a quarterly basis.
- Sub Meter Data: This is collected by Carbon 2018 and is important for the re-charge of tenant consumption. Sub meter data is key for splitting out scope 3 emissions. The desire is to collect this quarterly.
- Tenant Data: Tenant data is sent by Ecova and Carbon2018 on an annual basis, this is based upon energy recharged to tenants. This allows scope 3 emissions to be split out.

Data Flows

The data flows for each portfolio and thus Managing Agent have been created and distributed to all. These summarise the data flows of all the environmental data and Figure 3 provides an overview. Appendix 2 lists out these data flows per portfolio for more detailed in depth data flows.

PM		Monthly Energy Invoices	Energy HH/AMR	Monthly Meter reads (Energy/water)	Waste Data
Regent Street (RSMD)	Data Flow	Obtained monthly directly from supplier. CCES working to obtain this from Carbon 2018 via spread sheet going forward.	Sent monthly by Carbon 2018. CCES to work in automating this for day +1.	Spread sheet sent direct from RSMD monthly	Sent quarterly in spread sheet form from RSMD
	Contact	**Suppliers:** Numerous **Carbon 2018**	**Carbon 2018**	**RSMD**	**RSMD**
St James's (BNPPRE)	Data Flow	Obtained monthly directly from supplier. CCES working to obtain this from Carbon 2018 via spread sheet going forward.	Sent monthly by Carbon 2018. CCES to work in automating this for day +1.	Spread sheet sent direct from BNPPRE monthly	Sent quarterly in spread sheet form from BNPPRE
	Contact	**Suppliers:** Numerous **Carbon 2018**	**Carbon 2018**	**BNPPRE**	**BNPPRE**
Regional (Savills)	Data Flow	Obtained monthly from Ecova in a spreadsheet format.	Sent weekly by Ecova.	Sent via email from facility managers monthly.	Sent quarterly in spread sheet form from FMs
	Contact	**Suppliers:** Numerous **Ecova**	**Ecova**	Numerous (see Appendix 2)	Numerous (see Appendix 2)
Residential (Savills)	Data Flow	Obtained directly from monthly supplier.	To be obtained directly from supplier monthly	To be sent monthly by FMS	To be sent quarterly by Savills
	Contact	**Supplier:** Numerous	**Supplier:** Numerous	**Savills**	**Savills**
Rural (Windsor)	Data Flow	Obtained directly from monthly supplier.	Obtained directly from supplier monthly	Spreadsheet sent quarterly	Spread sheet sent quarterly
	Contact	**Supplier:** Numerous but largely British Gas	**Supplier:** Numerous but largely British Gas	**Windsor Rural**	**Windsor Rural**

Figure 3. Summary of Data Flows and Contacts

5. Transport and Vehicle Data

As part of The Crown Estate's annual reporting process; the collection of transport and vehicle takes place towards the end of the financial year (between January and April). This data can be exported from the Finance Team's internal database tool Agresso.

Information on how transport and vehicle data is reported can be found below:

Rural and Windsor

- Fleet Data: This is captured on the Allstar system, when the driver purchases fuel using their credit card. The data is then exported & inputted by the Finance Team into the Agresso System.
- Petrol Data: The usage is measured and collected by the drivers fob, this can then be accessed and collated by the Finance Team.
- Diesel Data: is also processed and collected by Finance and is received by Carbon Credentials annually in a spreadsheet.
- Employee commuting: excluded

Please Note: Data is collected by Windsor on their fuel stock system (for transport, machinery and other handheld items). This data is viewed to be more accurate than data provided by Finance and therefore takes priority. Finance fuel stock data can be identified under category 5.

Non-road Business Travel

- Rail Data: This is collected via employees' expenses and stored on the Agresso system. To best understand the total emissions, rail data includes whether the journey was:
    I. Single or return
    II. First or second class.
- Vehicle (incl. Taxi) Data: This is again collected via employees' expenses data and stored on Agresso. Where possible the engine size is documented by the Finance Team in the expenses system.

Data Controls

Carbon Credentials carry out year on year variance checks on the data to isolate anomalies. Any anomalies identified are queried with the finance team and rectified if required. In regards to the business travel data, the methodology can be found detailed below:

Emissions factors

All emission factors were downloaded from: http://www.ukconversionfactorscarbonsmart.co.uk/

Miles to Km: Miles were converted into kilometres using the following conversion:

1 mile = 1.609344 kilometres

6. Other Fuel Data

Other fuel usage data such as diesel used in machinery or in buildings is again collected largely by Finance and provided in the form of invoices or provided directly by the supplier, this impacts Windsor, Rural, the Central London and Regional portfolios. Carbon Credentials receive this data twice a year.

For Regent Street & Regional, Carbon Credentials receive building fuel oil usage from managing agents twice a year.

The types of other fuel usage include:

- Lubricant
- Gas Oil
- Diesel
- Engine Oil
- Kerosene

Please Note: Data is collected by Windsor on their fuel stock system (for transport, machinery and other handheld items). This data is viewed to be more accurate than data provided by Finance and therefore takes priority. Finance fuel stock data can be identified under category 5. This includes usage for machinery such as tractors or other handheld items, such as: unleaded, diesel or gas oil.

Data Controls

Again Carbon Credentials review the data and carries out year on year variance checks, to identify any anomalies of the data – where there are queries outstanding, Carbon Credentials refers back to the primary evidence or supplier.

7. Void Data

The void period is the period between when a property is vacant and generating no rental income, but the landlord still has to cover overhead costs. The managing agents will inform finance and the suppliers when this takes place and the bills will subsequently be collected and paid for by the finance team.

The finance team store all void consumption data and primary evidence (in the form of invoices) on the Agresso System. The data is collated at the meter level and stores the:

- Start and end date of the usage
- The consumption for the period

This data is subsequently used in the CRC annual report, to ensure The Crown Estate has 100% coverage.

Void data for annual reporting

Void data consists of around 3% of total supply. In the annual report, void consumption is included as an estimate based upon the void consumption for the previous year - consumption for each void meter is taken from the previous year's CRC submission. The reason for this is that void data is extremely challenging to collect in time for the publication of the annual report; hence last year's data provides a good representation of actual emissions.

8. Renewable Generation Data

Renewable generation data such as solar PV, biomass, CHP, and Fuel Cell is collected by various contacts within The Crown Estate and provided in various forms. Carbon Credentials receive this data annually. This data is collected for compliance purposes, however, it is not to be assured as a part of the annual GHG assurance process and the generation figure is not a component of the final GHG emissions.

The generation data has been excluded due to the following two scenarios:

- The majority of generation supply is tenant; meaning it does not fall under the operational control of The Crown Estate – therefore it is excluded.
- For the supply consumed by the occupied assets; the generated electricity has an emission factor of zero. This may be re-addressed in the following reporting year, based on the relevant emissions methodology.

Central London

- Fuel Cell, CHP, and PV data are download in a spreadsheet format off esight. Data is download on a bi-annual basis.

Windsor

- Solar PV data for Windsor is sent directly from the on-site Windsor team on an annual basis.
- Windsor installed a Biomass boiler in the 2015/16 reporting year and came online on 6th August 2015, the primary evidence for consumption is meter reads sent from the on-site team. The biomass boiler largely supplies tenant properties in the Windsor village.

Rural and Coastal

- Solar PV data is sent by Jayshree Patel at the Crown Estate on an annual basis.

9. Data Check and Validation

Carbon Credentials performs an ongoing validation process on data collated which is designed to highlight:

- Meters without data when data is expected
- Meters where invoice and AMR/HHM data do not align
- Meters where weekday on weekday (i.e. this Monday against last Monday) variance is outside of tolerance (typically 5%)
- Meters where Year on Year variance is outside of tolerance (typically 5% for electricity, 15% for gas)
- Consistency and variance in water data (by quarter due to invoice frequency)
- Consistency in waste trend (by quarter)

This validation process is reviewed once per month and The Crown Estate is issued a Data Receipt. This Data Receipt is a PDF report which provides an overview of all data, with gaps, issues and corrective actions highlighted.

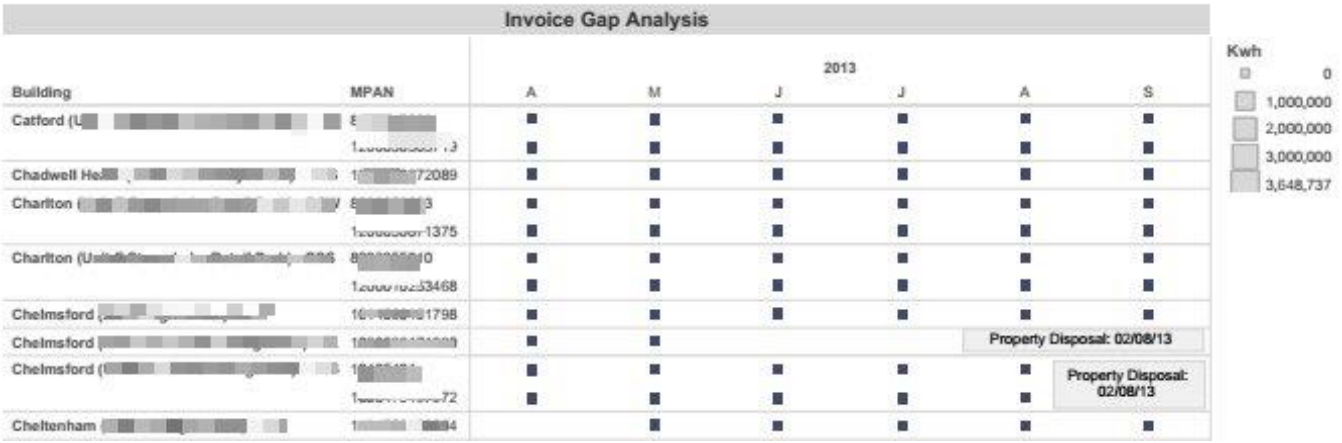

Figure 4: Invoice Data Receipt

Data Receipts are created for Half Hourly Metered (HHM)/Automatic Meter Read (AMR) and Invoice data, each to the relevant granularity. A sense of scale of consumption supports this process – either by size or by colour.

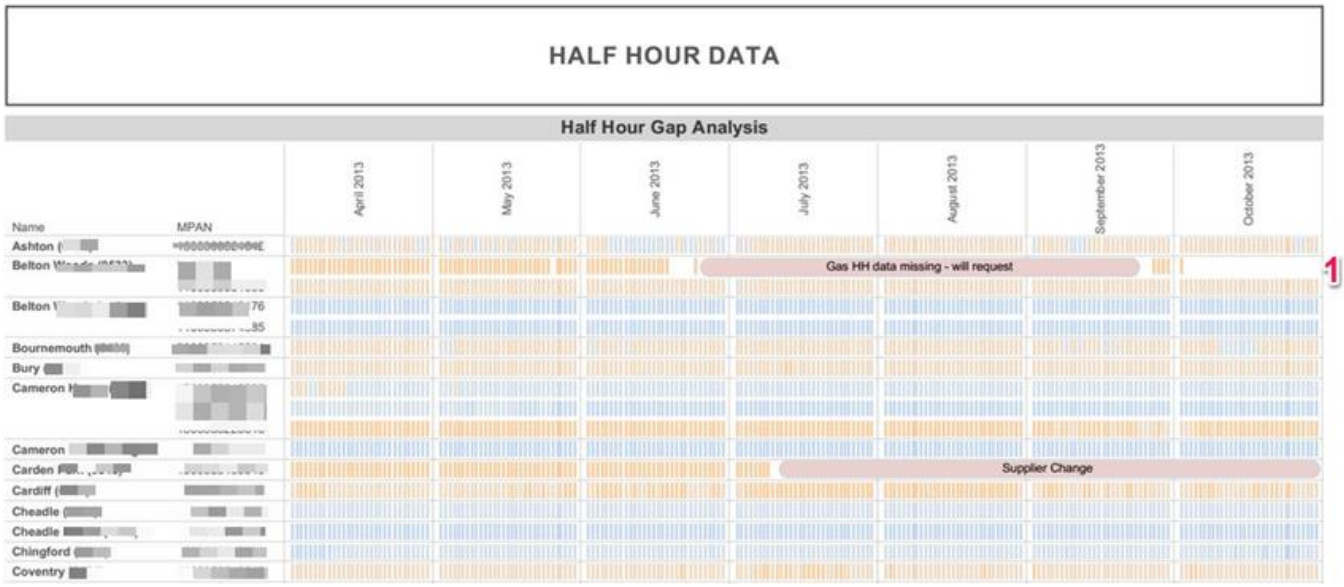

Figure 5: HHM/AMR Data Receipt

Note that for the Data Receipt to be issued to the client, the monthly Quality Assurance process must have been completed. This means that a number of other data validation checks (as listed above) have already been completed. If there are outstanding actions and queries at the time the Data Receipt is issued, these will be listed in the Data Receipt document.

Note that this process is designed to identify exceptions. Top consuming assets will be reviewed exclusively to ensure that trend and consistency with billing are clear. These two processes will be conducted on a monthly basis.

Monthly Data Validation

As part of the data validation, monthly reports are sent out to all facilities managers at the beginning of the month. The Facilities Managers then have the opportunity within a week to comment on any anomalies or add any comments adding another layer of validation.

Forecast and Confirmation

As a method for improving data quality, Carbon Credentials is looking at developing energy, water and waste forecasts. Part of the ongoing data validation will be comparing performance against forecast. This is used as a way of both providing forecasts to The Crown Estate as a business but also as a way of analysing expectations across the portfolio and tracking the performance of trends against that analysis.

SECTON III: EMISSION CALCULATIONS

10. Greenhouse Gas Emissions Reporting Methodology

The Crown Estate discloses greenhouse gas (GHG) emissions from its UK wide operations within the company's annual report; the integrated report is aligned with the Companies Act 2006 (Strategic report and Directors report) Regulations 2013. Detailed below are the different scopes that The Crown Estate reports on:

- **Scope 1 'direct' emissions** (from fuel combustion and the operation of any facility)
- **Scope 2 'energy indirect' emissions** (from purchase of electricity, heat, steam or cooling for its own use)
- **Scope 3 'indirect energy usage'** – These are GHG emissions, other than energy indirect GHG emissions, which is a consequence of an organisation's activities, but arises from GHG sources that are externally owned or controlled. The Crown Estate report on the following Scope 3 emission categories:
    - Category 6: Business travel (see detail below)
    - Category 13: Downstream leased assets (see detail below)

The Crown Estate continuously reviews and modifies current reporting practices in order to ensure its emissions disclosure is transparent, consistent, comparable, complete and accurate. In addition, The Crown Estate shall also develop and maintain robust procedures and internal controls in order to avoid the risk of any material discrepancy within the annual report.

The reporting period is from 1st April to March 31st each year; the reported data is audited annually by KPMG and they provide limited assurance on the data reported.

Methodology

The most recent edition of the GHG Protocol Corporate Accounting and Reporting Standard is used to calculate The Crown Estate's Scope 1, 2 and 3 emissions. It is worth noting that in 2015, the GHG Protocol released additional Scope 2 Guidance to update the Corporate Standard and standardise how corporations measure Scope 2 emissions. The Scope 2 Guidance requires that we quantify and report Scope 2 emissions from purchased electricity consumption for our own use using two different methodologies: the location-based method and the market-based method. This is known as dual reporting.

For the current reporting year (2017/18), evidence has been gathered from our electricity suppliers confirming the exclusivity and traceability of the green electricity that we procure. Carbon Credentials have focused on gathering evidence such as Renewable Energy Guarantees of Origin (REGO) certificates from the suppliers responsible for the largest proportion of energy supplies. The Crown Estate's largest energy supplier, EDF, supply a large proportion of the total electricity supply and due to this we have predominately focused on their provision.

The EDF supplies are on the 'Renewable for Business' tariff which originates from a blend of UK-based sources, including hydropower, wind, solar, biomass and landfill gas. EDF obtains independent assurance of the REGO's for the tariff that is unrelated to The Crown Estate's annual assurance.

The GHG Protocol Scope 2 guidance outlines a number of quality criteria for evaluating the credentials of contractual instruments used in the market-based Scope 2 emission reporting; all assured renewable contracts meet these requirements. KPMG audit the collated evidence and provide limited assurance over The Crown Estate's total Scope 2 market based figure for the annual report.

For that market-based calculation, 67% of Crown's overall scope 2 supply was confirmed to be exclusively supplied with renewable energy by a REGO-backed tariff and therefore a 0 emission factor was applied. For the remaining 38%, we have applied the supplier

specific emission factor where the supplier is known. For a small number of supplies where the supplier specific emission factor is not known, the RE- DISS residual emission factor (published AIB) factor for the UK in line with the GHG Protocol Scope 2 data hierarchy is applied.

Organisational Boundary

The operational control approach is used to consolidate The Crown Estate's organisational boundary in each reporting year. This approach best reflects the company's influence over its climate change impact. At the legal structure level, it is considered that the company has operational control over an operating entity if The Crown Estate has the full authority to introduce and implement its Environment Policy at the operating entity.

The same operational control approach at the legal structure level is then applied at the facility level in order to define responsibility for emission sources occurring within facilities. The Crown Estate is therefore responsible for reporting GHG emissions from all emission sources that occur within facilities over which The Crown Estate or one of its operations has the full authority to introduce and implement its Environment Policy.

The definition of a facility varies significantly between reporting standards and frameworks, as well as voluntary and regulatory GHG disclosure programmes across the world. ISO14064-1 defines a facility as: "a single installation, set of installations or production processes (stationery or mobile), which can be defined within a single geographical boundary, organisational unit or production process"

The Crown Estate interprets and applies this definition of a facility to mean:

- Any permanent or temporary installation (e.g. a building or portacabin).

For The Crown Estate, facilities therefore predominantly constitute buildings, blocks, and vehicles within their operational control.

Categorizing Emissions from Leased Assets:

1. Operating lease. The lessor has ownership and financial control of these assets but not operational control. Since the operational control approach is used, emissions from fuel combustion and the use of purchased electricity will always be scope 3 (indirect) for the lessor.
2. Finance or capital lease. The lessor does not have ownership, financial or operational control of these assets. Therefore, the associated emissions always are scope 3 (indirect) for the lessor, regardless of the type of organizational boundary approach used.

For The Crown Estate, the operating lease is the most relevant.

Change in Organisational Boundary - Procedure Step

If there is a change in ownership or control at either the legal structure or facility level that could potentially impact data capture, management and/or GHG quantification procedures.

Example: The Legal Structure Level.

- *The General Counsel and Company Secretary identifies that The Crown Estate will be acquiring a new subsidiary within the next three months. This entity has several buildings that may need to be included within data processes. As such, the General Counsel and Company Secretary notifies Carbon Credentials and the Head of Sustainability of this change.*

- *Carbon Credentials will review the change to assure it is needed using the Reporting Boundaries Decision Tree (see Appendix 5), which follows the company's chosen operational control approach.*

- *Carbon Credentials evaluates the associated impact of the organisational boundary change on data capture, management and/or GHG quantification procedures in order to plan any necessary course of action.*

- *Carbon Credentials and the Head of Sustainability approve the organisational boundary change and works with relevant persons to ensure it is reflected in data capture, management and/or GHG quantification procedures.*

Change in Operational Boundary - Procedure Step

A Property Manager identifies a change in emission sources within a facility or group of facilities for which they are responsible that could potentially impact data capture, management and/or GHG quantification procedures.

Example: Substitute emission source.

- *A Property Manager identifies that the current oil-fired heating system will be switched next month to an LPG alternative with an automatic fuel gauge. This will affect the way in which data is captured and managed, as well as the required emission factor for GHG quantification. As such, the Property Manager notifies Carbon Credentials of this change.*

- *The Property Manager notifies Carbon Credentials and the Head of Sustainability that a change to the operational boundary is needed.*

- *Carbon Credentials reviews the change to assure it is needed using the GHG Protocol website and Reporting Boundaries Decision Tree (see Appendix 5), which follows the company's chosen operational control approach.*

- *Carbon Credentials and the Head of Sustainability evaluate the associated impact of the operational boundary change on data capture, management and/or GHG quantification procedures in order to plan any necessary course of action.*

- *Carbon Credentials and the Head of Sustainability approve the operational boundary change and works with relevant persons within the GHG Responsible Parties Register to ensure it is reflected in data capture, management and/or GHG quantification procedures.*

Exclusions

The Crown Estate reports all emission sources under its operational control apart from de minimis sources.

Emission Factors

Emissions factors for Scope 1, 2 and 3 GHG emission reporting are directly extracted from the DEFRA website:

https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting

The methodology is designed to select the most appropriate emission factors for sections like business travel.

For scope 2 market based reporting, a selection of emission factors are used in order to accurately calculate emissions based upon the electricity purchased from each utility supplier – please refer to page 20 for more detailed information. For reporting, the emission factors applied are used in the below order of preference based upon availability.

1. Market Based
    a. Market-based emissions factor is specific to the electricity which has been purchased from each utility supplier. It takes into account renewable energy that has been purchased and is a more accurate reflection of carbon emissions.
    b. These emissions factors are published by the utility suppliers and are publically available on supplier websites.
    c. Any supplies on a 100% renewable tariff will have a 0 emission factor applied.
2. Residual
    a. The residual factor is the UK national grid average energy generation mix.
    b. https://www.aib-net.org/documents/103816/176792/AIB_2016_Residual_Mix_Results.pdf/6b49295b-ad99-a189-579e-877449778f62
    c. The residual factors is only used when the supplier energy mix is unknown.

Estimations & Assumptions

Where possible, it is better to use primary data to calculate emissions. However, in some cases data may not be available or of sufficient quality (e.g. due to lack of measurement capability, equipment replacements, equipment failures or billing issues) in which case secondary data, such as industry-average figures, proxy data and extrapolation, can be used.

EXTRAPOLATED
Bridging using consumption data in the invoice period - the surrounding data is converted to an average daily consumption figure and is used to estimate the missing consumption
PROXY
Bridging using closest actual meter readings to the period - also includes using year-on-year estimation where a previous year's consumption in the same period is used to estimate the current period's consumption.

Estimation techniques should be prioritised based on the level of accuracy provided as illustrated below:

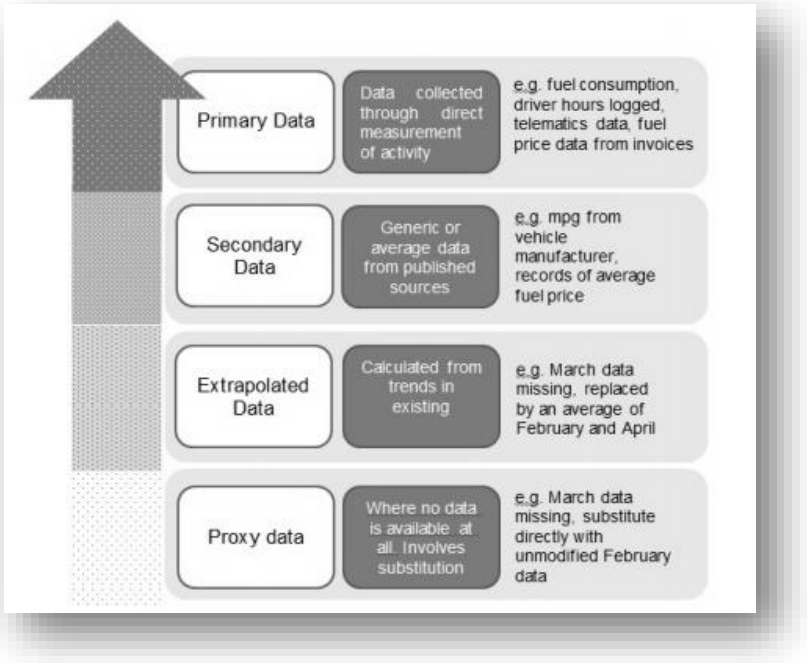

Figure 6: Data hierarchy

We also apply the pro rata technique. More information on this can be found in the CRC section.

Joint Ventures

Increasingly, The Crown Estate has increased the number of joint ventures within the organisation.

The Crown Estate must report 100% of emissions from operating entities over which they have full authority to introduce and implement Crown operating policies (e.g. Environmental Policy or H&S Policy).

Since The Crown Estate has management control over their joint ventures, a number will be included:

- Wexford Retail LLP; Fosse Park (opened in 2014)
- Maple Investment LP: which occupies under One Eagle Place
- St James Market Haymarket LP – St James's Market
- St James Market Regent Street LP – St James's Market
- TCE Purple Investment LP – this is a wholly owned TCE entity. It forms part of the Regent Street structure.

Not to be included:

- Gibraltar LP – full name: The Gibraltar Limited Partnership (managed by British Land)
- The Westgate Oxford Alliance LP (managed by Land Securities)
- Crown Point, Leeds
- Ellington Estate

Scope 3 Category 6: Business Travel

This category includes emissions from the transportation of employees for business-related activities in vehicles owned or operated by third parties, such as aircraft, trains, buses, and passenger cars. Data is provided by finance for the following business travel types:

1. Bus
2. Tube
3. Train
4. Flights
5. Taxi
6. Ferry
7. Car hire
8. Grey Fleet

The following tools have been used to find the distances:

1. Origin and destination points are extracted from the dataset as accurately as possible, using postcodes when available, along with country information.
2. These origins and destinations are then passed through the Google Maps API to obtain distances.
    - For all trips other than flights and ferries, the following API address is used;
        - "https://maps.googleapis.com/maps/api/distancematrix/json?origins=%s&destinations=%s&mode=transit&transit_method=%s&key=%s"
        - Where the origin and destination are substituted for the first and second "%s" characters, the transit method is substituted for the third, and the API key is substituted for the final (e.g. "AIzaSyBT_D6OAqsjiesJTeUN6zJ1O5BmQ8tGxWc"). This API call returns distances calculated through Google Maps for the specified travel type.
        - Transit method includes road (car), bus, train, tram and subway.
    - For flights, the following API address is used for both the origin and destination separately;
        - "https://maps.googleapis.com/maps/api/geocode/json?address=%s&key=%s"
        - Where the location is substituted for the first "%s" character and the key for the second. This API call returns latitude/longitude pairs for the specified location. The distance is then calculated as the great-circle distance between locations (i.e. airports) using the Haversine formula.
        - -Ferry trips were found by manually entering the journey in www.google.co.uk/maps, using the directions feature. For flights Air Miles Calculator was used to calculate distance (http://www.airmilescalculator.com)
3. For each entry, a multiplying factor is applied to the distance based on whether the journey is single or return, and to account for multiple trips.
4. In each instance, API inputs are detailed alongside the outputs given by Google Maps (where applicable). The outputs are the locations that Google Maps interpreted from the inputs and are a point of reference for auditing the distances.
5. For Mileage, distance was detailed in the 'Text' column. Miles was separated out from the other text within the column to be converted into kgCO_2.

6. For Fuel, litres of fuel were detailed in the 'Text' Column. Litres was separated out from the other text within the column to be converted into $kgCO_2$
7. Estimations of the overall totals were made by finding an average spend per kilometre (£/km) for each transport type and multiplying the total spend by this figure.
8. All emission factors were downloaded from: http://www.ukconversionfactorscarbonsmart.co.uk/
9. Miles to Km: Miles were converted into kilometres using the following conversion:
    - 1 mile = 1.609344 kilometres

Scope 3 Category 13: Downstream Leased Assets

This category includes emissions from the operation of assets that are owned by The Crown Estate (acting as lessor) and leased to other entities in the reporting year that are not already included in scope 1 or scope 2.

Evidence Pack

Information relating to the annual reporting process is stored in an evidence pack; all source data such as half hour and invoice data have been signposted.

Carbon Credentials currently manage and maintain the evidence pack on behalf of the Crown Estate.

SECTON IV: SUSTAINABILITY REPORTING

11. Operating Reporting Process

A vital part of the Environmental Reporting Programme is to ensure that the environmental data and information is used for improving operations and performance across the group. Consequently, there is a process for developing monthly operational reports which support the environmental programme and provide key information, as required, to the appropriate parts of The Crown Estate.

Sustainability Action Plans

The Sustainability Action Plan (SAP) programme was implemented during 2013 with the main objective to enable the Central London and Regional Managing Agents to focus on 7 main areas of sustainability within the management of their assigned properties. These include:

- Customer Focus
- Governance
- Place making
- Resource Efficiency (Carbon, Water, Waste)
- Employment
- Certification
- Partnership

The vehicle for monitoring progress is currently via an excel document which is updated on a quarterly basis by the Managing Agents.

Quarterly Data Release Process

Each quarter in preparation for the Quarterly Managing Agent Forum, Carbon Credentials send out to key contacts the site level energy performance of all assets in The Crown Estate portfolio. The energy performance is reviewed based upon the year on year changes in consumption. As a part of the release, site that have shown a significant level of variation are flagged as to be investigated with the Managing Agent. Carbon Credentials work with the Managing Agents to contact the flagged sites to create a narrative around the large variance and ensure the reported consumption change is accurate. The information gathered during

this process is then presented as a part of the Managing Agent Meeting.

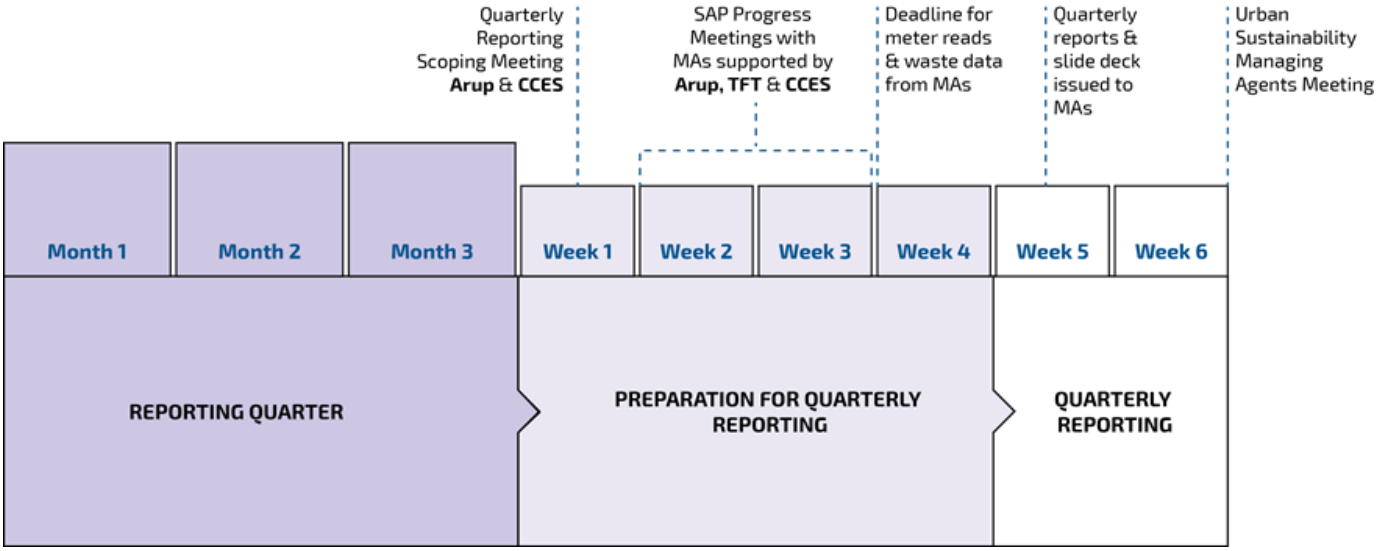

Figure 7: Quarterly SAP Programme Timeline

Quarterly Reporting to the Board

The Sustainability team reports to the Executive Committee and the Board every six months against their targets. Carbon Credentials support by providing data against three key targets:

- Halve our impact: Improve carbon emissions intensity by a further 40% from a 2012/13 baseline for property under our direct control (31st March 2022).
- 100% procurement of renewable energy from RE100 providers (by 2020)
- 80% (managed assets where we have control) and 95% (developments) of waste generated to be reused or recycled (by 2022).

12. The Crown Estate Annual Reporting Process

The Crown Estate's Annual report is based on the FY 1st April – 31st March. The annual reporting process is conducted between January and May each year. The purpose of the Annual Reporting Process is to define a set of valid figures which will be published as a public statement of performance. These will be aligned to DEFRA and EPRA guidance.

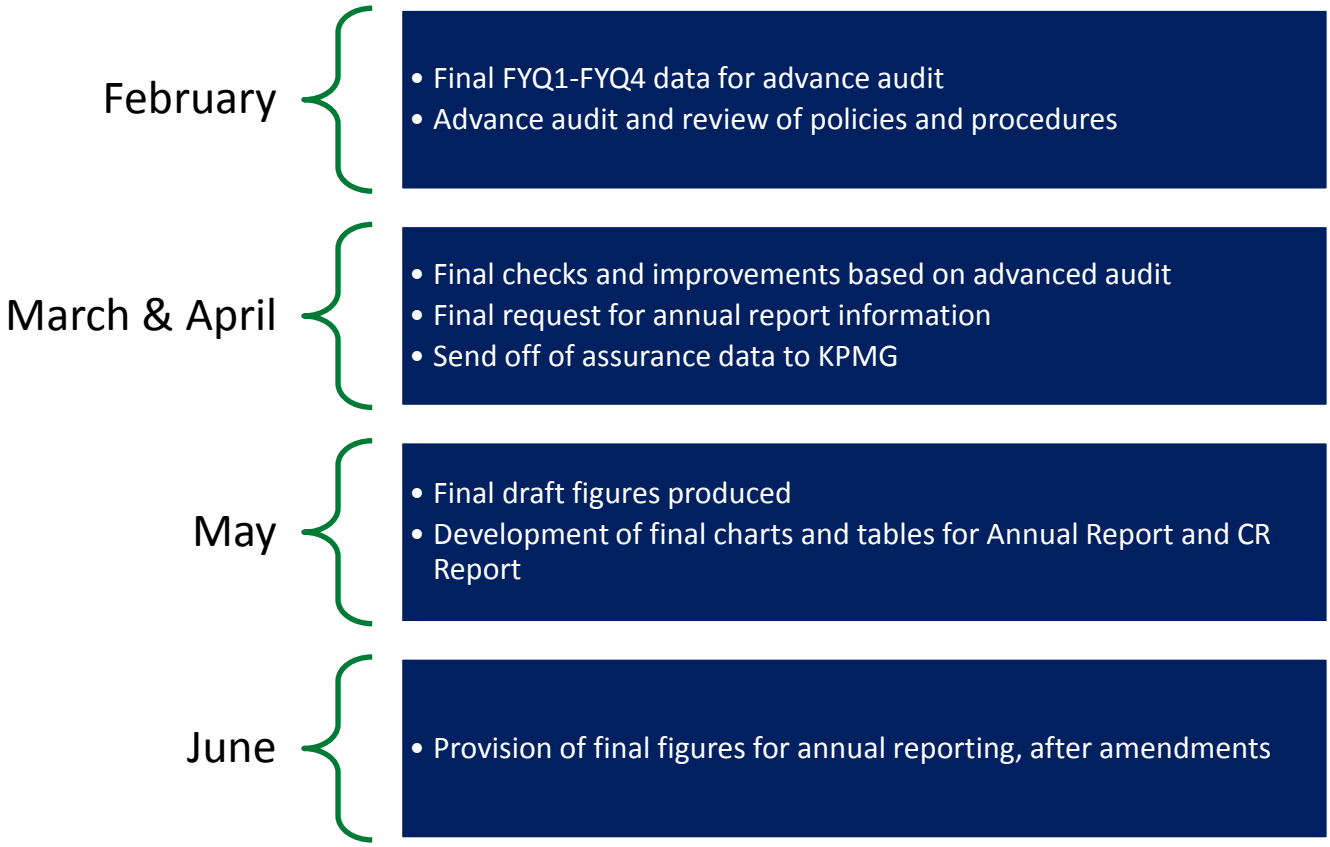

Figure 8: Annual reporting timeline

13. The Crown Carbon Indicator

The Crown Carbon Indicator has been developed by Carbon Credentials to track The Crown Estate's Energy Intensity performance against their set target from their baseline year, the purpose of this is to support:

1. Carbon Reporting of Targets – The Crown Estate has a 10 year emissions' intensity improvement target of 40% from 2012/13 baseline by 2022/23.
2. Operational Reporting of Site Performance
3. Portfolio Comparison

The Crown Carbon Indicator was developed to replace a previously developed benchmarking methodology. The data sources applied include:

1. Floor Areas, consisting of:
    a. Quarterly on-going horizon report
    b. Historic survey documents
    c. Valuation reports (where unable to rely on survey documents)
2. Occupancy:
    a. This information is provided by managing agents or independent surveyors
    b. Rental values:
        i. Where floor area information is absent, rental value has been used to calculate occupancy. Percentage occupancy is obtained by taking the actual rental income for each quarter at a site and dividing it by the total expected income of the site. This information is received on a quarterly basis.
        ii. Quarterly on-going horizon report
        iii. Evidence: this is a commercial component of The Crown Estate which makes it highly fluid. Since it is sensitive, Carbon Credentials do not have visibility on how it is evidenced.
    c. Floor areas:
        i. Where floor area information is available, occupied floor area has been divided by total building floor area to calculate occupancy. This is done quarterly.
3. Carbon Data
    a. Quarterly on-going energy data gathered from invoices and half hourly readings.

The Crown Carbon Indicator excludes the following:

- Site that emit less than 1 tCO2 per annum (di minimum threshold)
- Sites with less than 24 months of data
- Sites which came off-line during the reporting period i.e. redeveloped or sold

There are 4 key components of the methodology as shown below:

Occupancy

- Ratio of % of asset which is occupied
- Not required for:
  - Retail Parks: Denominator is Car Park Spaces
  - Shopping Centres: Denominator is common parts areas (CPA)
  - Offices where Common Areas only: Denominator is common parts areas (CPA)

Denominator: Occupancy Adjusted Serviced Area

- Based on “appropriate” measurement. Usually:
  - Net Internal Area (NIA) for Offices
  - Common Parts Area (CPA) for Shopping Centres
  - Car Park Spaces for Retail Parks
- Energy Provision: how much area is served by energy: converts to Serviced Area by landlord utilities
- Occupancy adjustment where appropriate

Intensity

- Energy data converted to Carbon: GHG Protocol + Defra emissions factors
- 12 months of carbon emissions, rolling quarterly
- Carbon Emissions / “Denominator”
- Only calculated once there is 24 months of data available

Index

- Total Energy Intensity for The Crown Estate is calculated (Total Carbon Emissions / Total "Demoninator")
- Total Energy Intensity change from the baseline is calcualted in each quarter
- Calculation: ((Energy Intensity for the Quarter - Baseline Energy Intensity) / Baseline Energy Intesity) * 100
- The same calculation is applied to each portfolio

Therefore: baseline = 100

- Quarterly Value = % change in intensity since the baseline year
- Crown Carbon Index (CCI), baseline + quarterly percentage change

Figure 9: 4 Components for the Crown Carbon Index methodology

The data flows can also be seen mapped below:

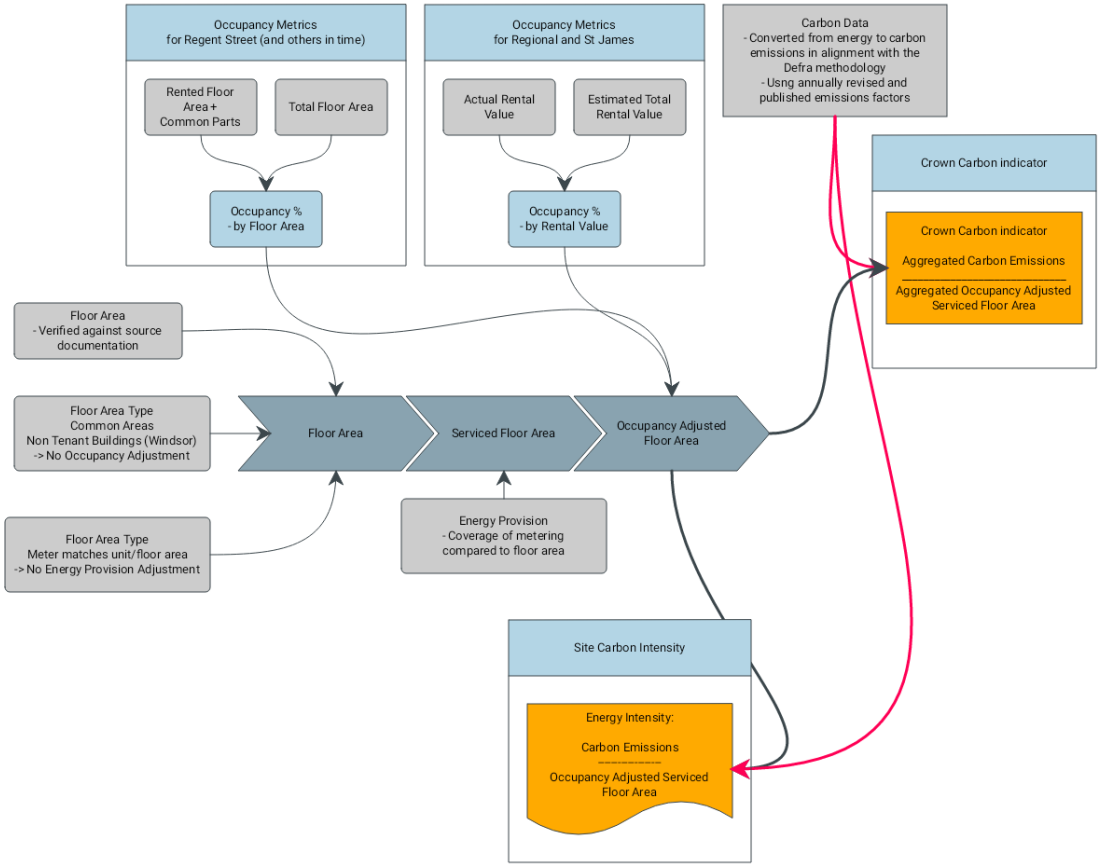

Figure 10: Flow map of Crown Carbon Index data sources

Energy Provision

The following methodology is applied to establish how much of the floor area is served by the metering, when the metering is known to not supply 100% of the stated floor area:

1. If the energy serves the whole building or 100% of the floor area stated in the denominator, then the Energy Provision is 100%
2. If the energy serves only part of the building or the floor area stated as the denominator, then a percentage is applied to provide the amount of the building, by floor area, that the energy would cover
3. Where the Energy Provision Scenario is unknown, Carbon Credentials worked with Arup to calculate an average energy intensity based upon all assets where the Energy Provision Scenario is known and correct in the baseline year. The value calculated was 194. The value is used to calculate the landlord served floor area where the area is unknown.
4. This part of the metric will be superseded by improving the understanding of which specific floor area are served by meters and specifically allocating the floor areas to the meters.

An illustration of how the floor area split may be split up can be seen below:

Figure 11: Breakdown of floor area

Indexing

To establish the performance of each site, all individual sites are indexed to 100.

Aggregation is complex and there is a need to scale to: building, portfolio and organisation, as well as this not all buildings are equal.

Baseline Recalculation

The following methodology is applied for the two scenarios.

Scenario 1: Building enters portfolio

What should happen?

- If nothing happens, there should be no change to the baseline
- Subsequent changes should then affect the CCI

Scenario 2: Building leaves portfolio

What should happen?

- Nothing, building's affect stops with last reporting
- No drop or change due to building departure

14. APPENDIX 1: Quarterly Reporting Timeline

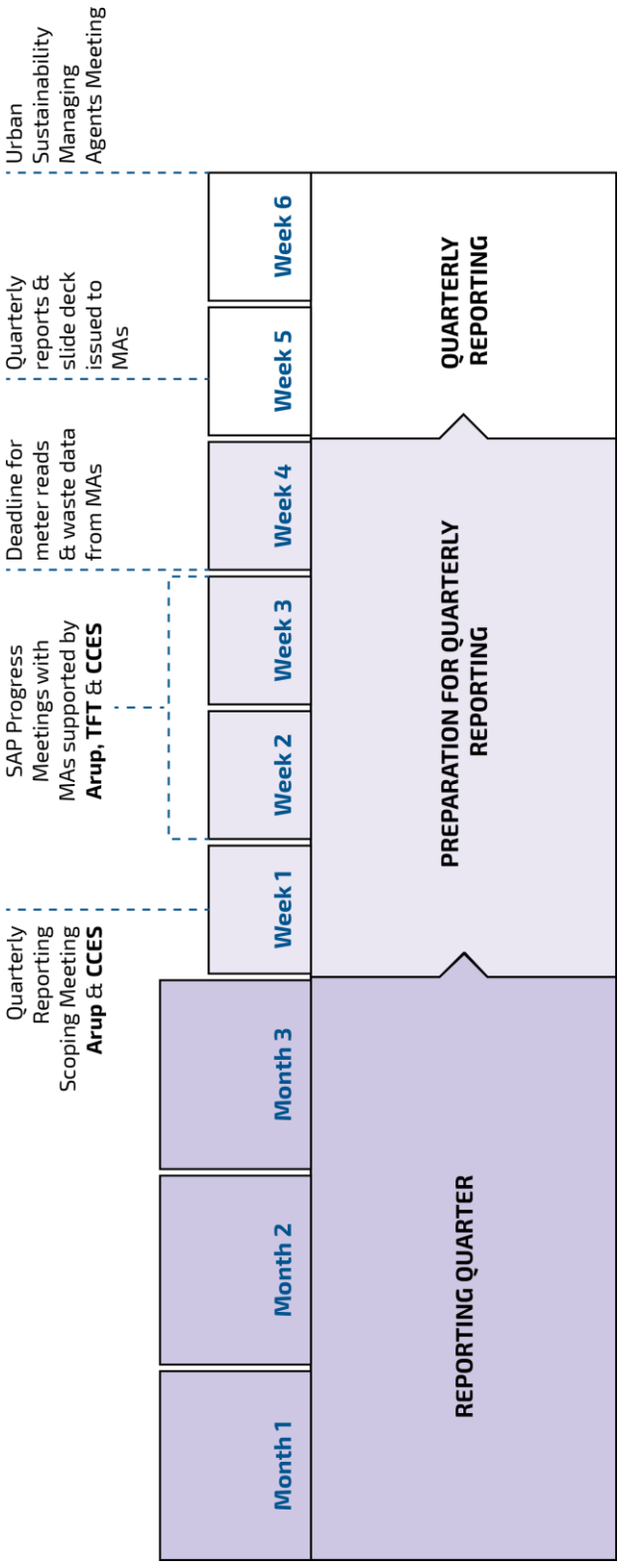

Figure 12: Reporting timeline

15. APPENDIX 2: Data Flows by Managing Agent

Regent Street

Data Type	Data Source	Data Process	Frequency	Deadline (if applicable)	Contact
Energy HH/AMR	Carbon 2018	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st working day after month end	Charlotte Carter (Carbon 2018)
Gas AMR*	IMServ	Daily Update → DigitalEnergy	Daily	Mid-day each day	Duncan Griffiths (IMServ)
Energy and Water Meter Reads	RSD	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st week after month end	Julie Hogarth (RSD)
Energy Invoices	Supplier (Excel); Carbon 2018 (pdf)	Monthly from Suppliers → CCES → DigitalEnergy	Monthly	3rd week after month end	Numerous
Waste	RSD	Sent in collated spread sheet → CCES → DigitalEnergy	Quarterly	3rd week after quarter end	Julie Hogarth (RSD)

St James's

Data Type	Data Source	Data Process	Frequency	Deadline (if applicable)	Contact
Energy HH/AMR	Carbon 2018	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st working day of each month	Charlotte Carter (Carbon 2018)
Gas AMR*	IMServ	Daily Update → DigitalEnergy	Daily	Mid-day each day	Duncan Griffiths (IMServ)
Energy Meter Reads	BNP Paribas	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st week after month end	Mike Dawson
Energy Invoices	Supplier (Excel); Carbon 2018 (pdf)	Monthly from Suppliers → CCES → DigitalEnergy	Monthly	3rd week after month end	Numerous
Waste	BNP Paribas	Sent in collated spread sheet → CCES → DigitalEnergy	Quarterly	3rd week after quarter end	Mike Dawson (BNP Paribas)
Water	BNP Paribas	Sent in collated spread sheet → CCES → DigitalEnergy	Monthly	1 week after month end	TBC

Regional

Data Type	Data Source	Data Process	Frequency	Deadline (if Applicable)	Contact
Energy HH/AMR	Ecova	Emailed via spread sheet → CCES → DigitalEnergy	Weekly	1st working day of the month	Philip Whiting (Ecova)
Gas AMR*	Ecova	Daily Update → DigitalEnergy	Daily	Mid-day each day	Philip Whiting (Ecova)
Energy Meter Reads	Site Contacts	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1 week after month end	Various
Energy Invoices	Supplier (Excel) Ecova (excel)	Monthly from Suppliers → CCES → DigitalEnergy	Monthly	3rd week after month end	Numerous; Philip Whiting (Ecova)
Waste	Savills Facilities Managers	Sent in collated spread sheet → CCES → DigitalEnergy	Monthly	3rd week after quarter end	Karl Rigby
Water	Savills Facilities Managers	Sent in collated spread sheet → CCES → DigitalEnergy	Monthly	1 week after month end	Various

Residential

Data Type	Data Source	Data Process	Frequency	Deadline (if applicable)	Contact
Energy HH/AMR	Supplier	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st working day after month end	Supplier
Energy and Water Meter Reads	Savills	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	4 weeks after quarter end	Catherine Hipperson
Energy Invoices	Supplier (Excel)	Monthly from Suppliers → CCES → DigitalEnergy	Monthly	3rd week after month end	Numerous
Waste	Savills	Sent in collated spread sheet → CCES → DigitalEnergy	Quarterly	3rd week after quarter end	Catherine Hipperson

Windsor

Data Type	Data Source	Data Process	Frequency	Deadline (if applicable)	Contact
Energy HH/AMR	Supplier	Emailed via spread sheet → CCES → DigitalEnergy	Monthly	1st working day after month end	Supplier
Gas AMR*	British Gas	Daily Update → DigitalEnergy	Daily	Mid-day each day	British Gas
Energy and Water Meter Reads	Windsor	Emailed via spread sheet → CCES → DigitalEnergy	Quarterly	4 weeks after quarter end	Andrew Dunning
Energy Invoices	Supplier (Excel)	Monthly from Suppliers → CCES → DigitalEnergy	Monthly	3rd week after month end	Numerous
Waste	Windsor	Sent in collated spread sheet → CCES → DigitalEnergy	Quarterly	3rd week after quarter end	Andrew Dunning or Nicholas Day