



Infrastructure  
and Projects  
Authority

# Part One - Developing a Decarbonisation Plan

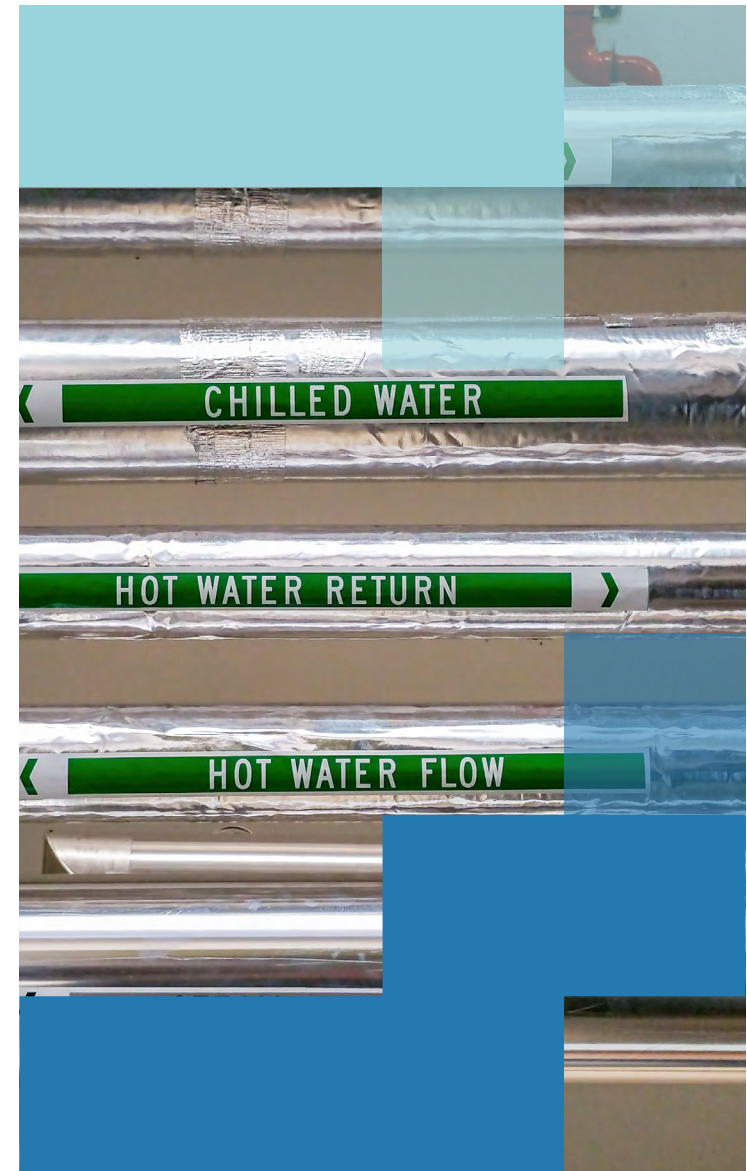


Decarbonisation of Operational PFI Projects

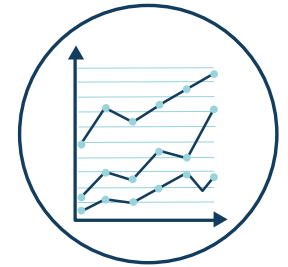
Handbook of recommended good practice for contracting authorities

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# 1. Data first



In order to assess the starting position and set decarbonisation targets for a PFI project, it is important to begin by gathering information about existing energy consumption and efficiency. This information will be an important basis for early conversations between the project company and its contractors, the Authority and the building users and managers, to identify and agree a decarbonisation pathway for the building. It is also likely to be required as a component of business case analysis when considering the expected quantum of energy and carbon reduction benefits from a proposed intervention.

## Access to information

Authorities will require access to relevant and up-to-date energy consumption data from the PFI project. As referred to in section 5 below, this energy consumption data is the starting point for calculating the project's carbon emissions and for identifying the baseline position as part of the development of a decarbonisation plan. Some energy consumption data may be held or maintained by other parties. The sources of this information will include utility bills

and meter readings and access will require collaboration between the parties that have direct control of the information, including bill payers, facilities managers and, where applicable, project energy managers. Some project contract arrangements may already require the project to prepare energy reports that are shared with the contract authority on a periodic basis.

All versions of SOPC contain provisions requiring that Authorities are granted access to records and other information, and energy consumption and asset performance data should be readily available

to the Authority. Notwithstanding the contractual position, experience to date has shown that the private sector (project company, lenders, FM providers and MSA providers) is willing to grant such access and participate actively in up front feasibility work to help facilitate decarbonisation measures.

In the unlikely scenario that information is not forthcoming, Authorities should look carefully at the information provisions in their contracts to ascertain what rights exist to secure access to data. By way of example, the BSF standard form project agreement requires the project company to maintain a full record of particulars of the costs of performing the works and the services (the 'costs'). It goes on to provide a right, upon request, for the Authority to receive a written summary of any of the costs, including details of any funds held by the Contractor specifically to cover such costs, in such form and detail as the Authority may reasonably require enabling the Authority to monitor the performance by the Contractor of its obligations under the Project Agreement.

Access to information is a key area where the interests of project owners and customers are aligned. Increasingly, the reporting of project performance against environmental metrics, including greenhouse gas emissions, is an objective for the investors in privately financed projects, as well as for the local authorities, government departments and other public bodies that procure and use them.

This may mean that project companies and investors require access to data held by the Authority or other asset users, and vice versa. In this regard, Project companies and Authorities alike are encouraged to deal with information requests positively and adopt an approach of openness and transparency, which should enhance the chances of being able to deliver successful net zero changes.

The IPA has been engaging with a working group of PFI investors, management services and facilities management providers as well as representatives from DHSC, DfE, DLUHC and NHS England, to identify and agree practical measures that will support decarbonisation. The group has developed a standardised carbon emissions questionnaire to support a consistent approach to carbon data collection by project investors, and to reduce reporting burdens for projects and the authorities and building users that will be asked to supply information. This data collection exercise is led by the project investors currently, reflecting their reporting needs. It is the aim of the IPA that project investors will also make the information collected available to projects and contracting authorities to enable decarbonisation planning and reporting by them. The current version of the template emissions questionnaire is provided in an appendix to this document. Investors may collect the data in different formats including the use of data management platforms in this or future years. It is likely that the questionnaire will evolve and improve over time to reflect learning and changing reporting requirements.

## Meters and Sub-meters

The quality, detail and accessibility of available energy consumption information is likely to depend upon the level of metering and sub-metering systems currently installed. Sub-metering and automated meter reading devices in association with modern building management systems and energy management systems can facilitate greater ease of analysis and control of zonal and periodic energy consumption, often remotely and in close to real time, and enable less efficient equipment and energy intensive areas or departments to be more readily identified. Where there is a lack of granularity in available energy consumption data and where it is practical to do so, smart meters and sub-meters should be installed as an early step in a decarbonisation plan. As part of the programme for decarbonisation of government offices led by the Government Property Agency, the aim is to install sub meters before other interventions where possible, enabling accurate energy consumption data to be accessed that provides a starting point against which future performance can be benchmarked, and to identify excessive energy consumption in particular areas or by less efficient equipment. Energy sub metering data will help with proving the value and savings associated with efficiency measures. A guide to smart meters is available from the Department for Energy Security and Net Zero.<sup>1</sup> The Better Buildings Partnership has published advice on the different available metering systems and how metering data can be used to make energy cost and CO<sub>2</sub> reductions<sup>2</sup>.

As has been learned from data collection exercises in the past, it is to be expected that the availability and quality of data collected will improve over time as metering data improves and lessons can be learned to improve the collection, verification and analysis of available data. This is likely to include reviewing the accuracy of metered data, and whether appropriate periodic calibration of meters has been performed. To the extent that there may be gaps in available data initially, it is appropriate to consider the use of appropriate proxies (for example if metered energy consumption data is not available for a particular period, a prior period's energy usage in similar working and seasonal conditions could be used).

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1 <https://www.gov.uk/government/publications/smart-meters-in-the-public-sector/an-introductory-guide-to-smart-meters-for-the-public-sector-accessible-webpage>

2 <https://www.betterbuildingspartnership.co.uk/better-metering-toolkit>

## 2. Know your contract



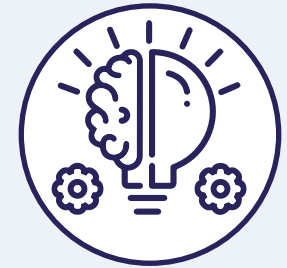
There are opportunities to align the interests of public and private sector partners to deliver decarbonisation. The perceived inflexibility of contractual structures designed before Net Zero commitments were made should not be a barrier preventing what is the right thing to do.

It is recognised that responsibility for energy use and the allocation of energy consumption and tariff risks is treated differently under different contracts. Where contracts already provide for energy management, reporting and the targeting of energy efficiency improvements, contracting authorities should review whether existing obligations are being met, and, if applicable, whether energy reports provide information in a way that supports the needs of the Authority and the project.

The implementation of some energy reduction and decarbonisation measures may have only minor contract compliance implications, and in other cases contract changes may be required to enable decarbonisation measures to be implemented, including to amend service requirements and payment mechanisms. An assessment of decarbonisation options and delivery mechanics for a project will require a good understanding of how the existing contract works. At an early stage of assessing decarbonisation interventions, it is recommended that consideration be given to the extent of contract changes that may be required, and the process that would be needed to implement them.

**The following questions are helpful to consider when reviewing the existing contract arrangements:**

- Does the contract contain provisions which specifically deal with energy management and energy saving initiatives? If so, what do they say and are they being complied with?
- What information rights and energy reporting requirements are there?
- Who takes energy risk – both consumption and tariff risk? Is there a pain/gainshare mechanism?
- How may service specifications, maintenance and lifecycle requirements be affected by alternative decarbonisation options?
- If measures do require a contract change, how sophisticated is the change mechanism and is it likely to be suitable to deliver the proposed net zero change? If the change mechanism is not suitable, on what basis will the net zero change be progressed?
- Do the financing arrangements require lender notification, consents and/or waivers for the variations that may be required?
- How are risks allocated between the parties and would the net zero change affect that risk allocation (and, if so, might that affect the project's payment mechanism, and/or the budgeting and accounting treatment)?



A review of contractual arrangements will be required by those responsible for managing the contract. This should include the main body of the contract, including any variations implemented to date, construction specifications and defects provisions, service specifications, the payment mechanism and change control obligations. Specialist external support is also likely to be required to identify the contractual implications of decarbonisation options under consideration, and to document contract changes. Reference should also be made to the IPA's PFI Training Technical Content, Module 4 – Change Management.

## Decarbonisation as part of maintenance and lifecycle plans

Typically, annual and five-yearly lifecycle plans are prepared on a rolling basis by a project company and its sub-contractors. Whole project life maintenance and lifecycle assumptions were made at project inception and take into account the contract requirements for asset condition at expiry of the PFI contract term. Contracting Authorities, project companies and sub-contractors should as part of their engagement discuss together the project lifecycle plans and consider whether more energy efficient solutions may be available as an alternative to planned like for like lifecycle replacement of plant and equipment and the extent to which the capital costs of these options can be met from existing lifecycle budgets (for example where spend is replacing planned like for like investment or savings are offered as part of the costs of the proposed change).

Options evaluation well ahead of scheduled end of life replacement of plant and equipment will maximise the opportunity for decarbonisation to be factored into plans, with sufficient time for the review of the cost and risk impacts of proposals. Long term planning also provides an opportunity to align the timing of targeted decarbonisation interventions with other maintenance and capital investment activities and to reduce installation costs, including to take into consideration the period beyond the expiry of the PFI contract.

An assessment of cost considerations of a decarbonisation intervention should consider the impact of the proposal on future maintenance and lifecycle services being delivered under the contract. A reprofiling of future planned maintenance and lifecycle budgets may be considered appropriate to the changes being proposed (for example if the replacement equipment has a longer asset life or ongoing maintenance will be less intensive).

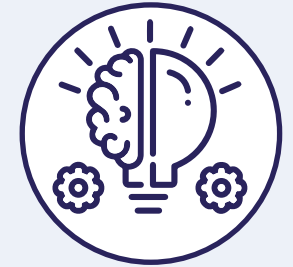
If low carbon alternatives to like for like equipment replacement are more expensive than assumed in project lifecycle spending plans, consideration could be given to Authority capital contributions or grant funding (if applicable) being combined with existing project budgets. Effective use has been made of the Public Sector Decarbonisation Scheme grant funding for a number of PFI properties to date. Details of eligibility criteria for future waves of the scheme are expected to be made available as each new wave is announced.<sup>3</sup>

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<sup>3</sup> <https://www.gov.uk/government/publications/public-sector-decarbonisation-scheme-phase-3>  
<https://www.salixfinance.co.uk/>



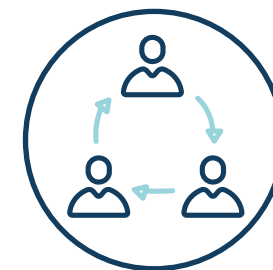
**Changes to the balance of public capital funding for the project that may arise as a result of the intervention, as well as changes that may affect risk allocation or increase Authority influence or control over project decision making, can have implications for the accounting and budget treatment of the project for the Authority and sponsoring department. HM Treasury applies the national accounts classification in its approach to budgeting and public expenditure control, and so the statistical classification of a PFI project will determine the budgetary impact for central government procuring authorities or sponsoring departments. The two main determinants of a PFI project's classification are whether the project company is under the control of the public sector, and if not, whether the economic ownership of the underlying asset rests with the project company.**



Where the procuring authority is a local authority, the statistical classification of PFI projects will determine the budgetary impacts for the sponsoring department where there is an ongoing grant in support of the project in payment, but the local authority will use IFRS to determine the treatment in its financial statements. Since these financial statements and the project classification apply different principles, it may be that a proposed project change may have no impact on the financial statements of a procuring authority, but still have a significant impact on how the sponsoring department will have to budget for the project and therefore on how it might behave towards that procuring authority.

This is a complex area and so proposed contract changes should be considered carefully with the Authority's finance department and contract managers should engage with a sponsoring department at an early stage to consider the impacts of proposed changes. This will minimise the risk of delays at a later stage should it not be possible to agree planned amendments.

## 3. Engage stakeholders



The development and delivery of decarbonisation plans for existing public private partnerships will require collaboration between the project, the Authority, facilities management providers and building users. In addition, once decarbonisation interventions have been identified and agreed, contract change processes will require the approval of the contracting parties and often project lender approval will also be required.

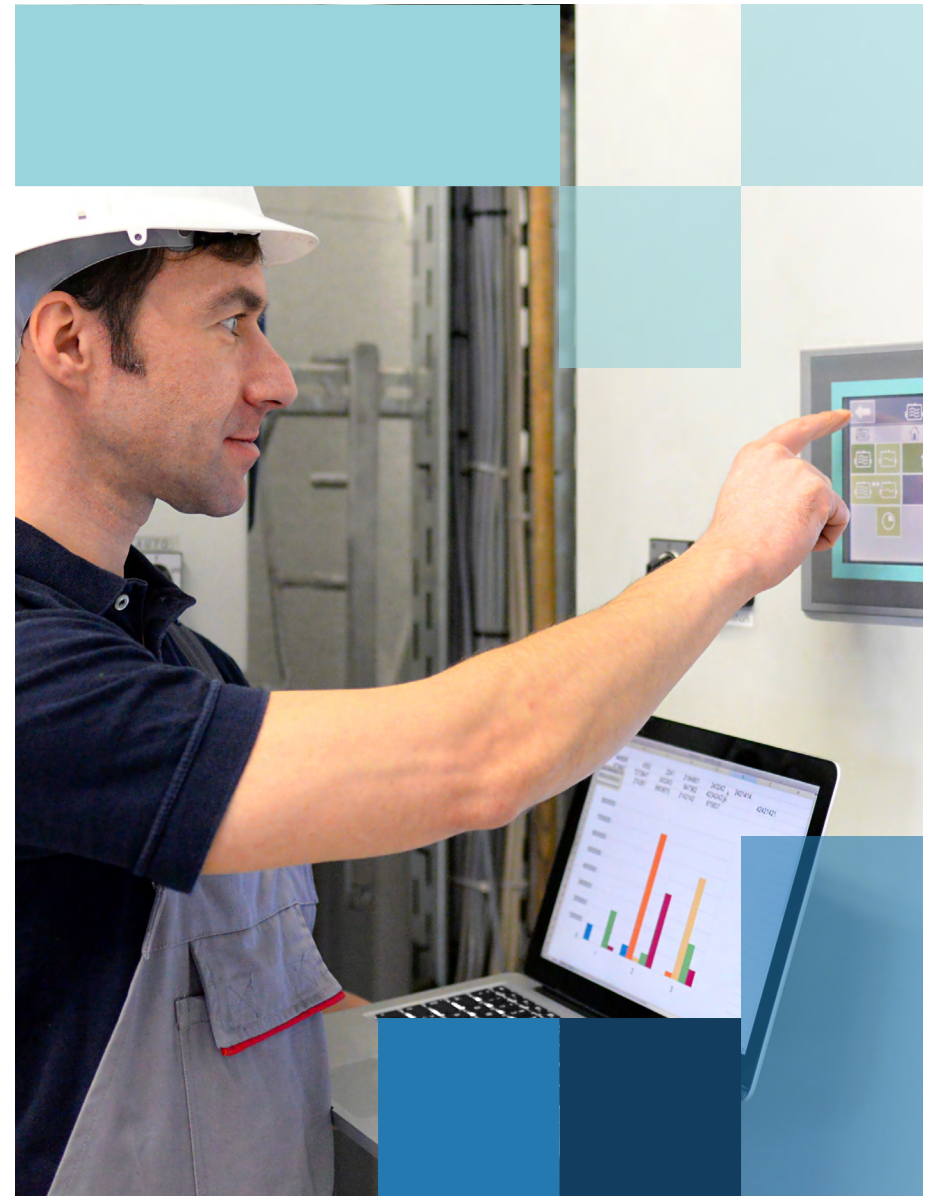
Feedback from public and private sector stakeholders that have delivered retrofit decarbonisation projects has confirmed the value and importance of setting up the right governance frameworks from the outset. This means knowing who all the stakeholders are in the management and use of the building, and ensuring that they are represented appropriately in groups that will respectively identify, approve, deliver and oversee decarbonisation projects. Useful guidance is available from the Better Buildings Partnership on how to set up a stakeholder group to focus on improving building environmental performance and sustainability.<sup>4</sup>

A review of contract responsibilities and of change processes and approval requirements will help to identify all the stakeholders with an interest in the management and use of the building, and from whom approvals may be required (including project lenders). Early engagement will increase the likelihood that important stakeholder concerns can be identified at an early stage, and reduce the risk of lengthy and costly delays or changes being required later in the process.

<sup>4</sup> <https://www.betterbuildingspartnership.co.uk/green-building-management-toolkit>

In many PFI projects existing liaison groups or operating committees may already be in place as a forum for the Authority, project company, management services providers and facilities management providers to meet periodically and discuss project performance. It is recommended that projects build on existing governance structures by adding decarbonisation as a standing agenda item, and drawing in other stakeholders as appropriate.

When considering the membership of stakeholder and governance groups, it is helpful to consider the role of each group and the interests being represented. For example, an Authority may wish to have visibility of a project's decarbonisation activity to place this in its strategy for a broader portfolio of Authority assets and projects. At project level, there will be an interest in assessing the potential impacts of decarbonisation proposals for required service levels. In all cases, there will be benefits in project oversight and delivery teams being able to draw on the experience of public and private sector stakeholders from the delivery of decarbonisation projects elsewhere. The aligned interests of public and private sector partners in delivering reduced carbon emissions from the project should provide a good foundation to support positive behaviours and the collaboration that will be required to facilitate change.



# 4. Prioritise



It is for all interested parties and stakeholders (including investors, FM contractors and management services providers) to actively consider and bring forward opportunities for decarbonisation. This should not simply be for the Authority to consider.

There are benefits for all in pursuing decarbonisation opportunities. The co-operation of all parties will be required to review existing energy performance and user and manager behaviours, and to look constructively at what each party can do to optimise building performance.



Decarbonisation interventions are likely to fall into one of three main categories:

Energy conservation	Energy efficiency	Renewables
<p>Reducing the energy demand from existing assets and equipment, implementing building fabric improvements, and promoting changes in building user and manager behaviours</p>	<p>Getting the most out of energy inputs by increasing the efficiency of energy consuming plant and equipment</p>	<p>The use of natural resources or sources of energy that are not depleted by use</p>
<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Reviewing energy reports and metering data to identify potential excess consumption</li> <li>• Changes in user behaviour to close windows/ doors and turn off lights and equipment when not in use</li> <li>• Optimising the use of existing heating and cooling systems through building management systems</li> <li>• Building fabric improvements, including insulation, triple glazing and solar shading</li> </ul>	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Installation of light emitting diode (LED) luminaires and lighting controls</li> <li>• Upgrading air handling units and fans and heating and cooling controls</li> <li>• Lower energy heating and cooling systems, including district heating, heat pumps and higher efficiency chillers</li> </ul>	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>• Switching purchased energy to renewable tariffs</li> <li>• The installation of on-site energy generation such as solar photovoltaic panels</li> <li>• Replacing natural gas boilers with electric boilers or heat pumps powered by energy from renewable energy sources (where viable and practical)</li> </ul>

## Energy conservation measures

The government's Net Zero Estate playbook recommends that the first decarbonisation actions to be taken should focus on energy conservation, before moving on to consider investing in improving the energy efficiency of building systems and equipment. This enables full advantage to be taken from changes to behaviours and property use that will reduce energy demand and maximise the carbon reduction impact and potentially reduce the cost of later energy efficiency and carbon reduction investment. In a world where budgets are constrained, it is also practical to start with consideration of options to conserve energy and reduce energy cost, and these may often be the quickest and lowest cost changes that can be implemented.

A visual inspection of the site by the Authority and/or building user together with project partners responsible for building management and maintenance can be useful to identify 'quick win' energy conservation opportunities. Examples might include missing or inadequate pipe insulation in plant rooms, excess consumption of energy for lighting of areas that are not in use or that benefit from adequate daytime natural lighting, or the habitual opening of windows and doors for ventilation whilst heating or cooling systems are in use indicating that adjustment to set points may improve comfort levels. Engaging building managers and users to collaborate as part of an energy campaign to identify and reduce excess energy consumption can be extremely effective for the reduction of energy use and costs in a relatively short timescale. Minor fabric improvements such

as insulation may be appropriately carried out as part of normal maintenance without requiring a contract change. In other cases, more significant fabric improvements or changes that may require an adjustment to agreed availability criteria, such as thermostat set points or lighting levels, may require a contract change but should be relatively quick to implement.

## Energy efficiency of plant and equipment

After measures to conserve energy, consideration can be given to investing in upgrading building plant and equipment to more energy efficient options. These interventions can range enormously in terms of complexity of installation, cost, and length of payback periods. Shorter payback period options with minimally disruptive installation requirements might include LED lighting and switching controls and upgrades of inefficient AHU fans and drives. Consideration should also be given to smaller scale interventions that may be capable of being delivered as a low value change or outside the change mechanism completely.

Some energy efficient system upgrades may be costly and/or have complex impacts on service delivery and contract payment mechanisms, and will need to be planned for implementation in a manageable way over a longer timeframe. For example, the replacement of fossil fuel boiler heating systems with heat pumps are likely to offer material carbon savings for a project, but may not be immediately affordable within project or Authority budgets. While organisational strategies may have identified the elimination of fossil fuel heating as a priority (e.g. Government Property Agency and NHS England), lifecycle funding requirements of PFI projects are

determined at the outset of the contract so that, in the absence of new funding sources, it may only be realistic to consider significant equipment replacement at end of life. With that in mind, the timing and potential costs and benefits of lifecycle replacement of larger plant and equipment such as heating systems should be considered carefully as part of planning for contract expiry. It is recommended that the project and Authority consider together asset condition requirements and lifecycle works that may be planned for the remaining period of the contract, so that there is an opportunity for low carbon alternatives to large scale system replacement (for example the electrification of heating systems) to be considered in the context of the Authority's long term plans for the building's use and management beyond the contract expiry. The potential for changes to asset condition requirements and for contract variations may be considered to facilitate this.

## Renewable energy

After considering energy conservation and energy efficiency, the final tier of measures to consider will relate to the potential for switching to renewable energy tariffs (if not already done) and for onsite renewable energy generation. Depending on site constraints, energy generation options may include roof-mounted or car park solar PV installation and wind turbines. While relatively short payback periods and well-established installation and service models for solar PV in particular may make this appear an attractive option, it may be complex to put in

place new arrangements alongside existing contract arrangements. Implications for the existing project including risk allocation will need to be considered carefully before proceeding, in order to avoid the risk of costly delays at a later stage if commercial and contractual challenges emerge. If new contracting arrangements are considered, such as power purchase agreements for the procurement of onsite generated energy from third party owned and managed equipment, then the risk allocation of proposals should be considered together with the Authority's finance department and sponsoring department, to ensure that budgeting and accounting implications are well understood and that changes to the assessed economic ownership or control of the project or to risk allocation do not result in unintentional changes to the budgetary treatment for sponsoring departments. Reference should also be made to HMT Green Book guidance on project appraisal, including supplementary guidance on the valuation of energy use and greenhouse gas emissions<sup>5</sup>. Any scheme which is novel or contentious in nature should be appropriately assured.

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<sup>5</sup> <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>  
<https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

## 5. Make a plan



A programme of shortlisted decarbonisation interventions should be selected as part of a planned and deliverable pathway to decarbonisation. Having a short-, medium- and long-term plan with an opening baseline, decarbonisation target milestones and with a set of expected carbon reduction contributions from a series of interventions, will enable the tracking of progress.

It will also make it easier to plan implementation of preferred options to align with the project company's planned maintenance and lifecycle intervention points and to assess and amend delivery plans to reflect changes over time, for example if operational performance or budgets change or new technologies become available.

### Baselines and targets

Each project should identify its baseline energy consumption and greenhouse gas emissions position. This will represent the 'starting point' for the journey to net zero carbon. The baseline position also enables a project to compare its energy and carbon performance against sector benchmarks, to sense check the quality of its data and

analysis, and to identify the level of challenge and rate of change that may be necessary to progress with decarbonisation.

The selected baseline year should ideally align with the decarbonisation targets set by the relevant Authority or sponsoring department. The decarbonisation interim target from government's Clean Growth Strategy and the Net Zero Estate Playbook is for a 50% reduction in direct public sector emissions by 2032 by reference to a 2017 baseline. 2017 is also the baseline year adopted by the Department for Education in its net zero policy. The latest Greening Government Commitments framework for 2021-25 references a 2017/2018 baseline year. It is noted that the NHS England target is to reduce the NHS Carbon Footprint by 80% by 2028-2032 compared with the position in 1990. Given few PFI projects are likely to have energy



consumption and emissions data dating back to 1990, it is suggested that projects use 2017 or 2017/18 as the baseline year to the extent that data is available for that period, or if not, the earliest available data post 2017 or 2017/18. For projects whose energy consumption was materially impacted by Covid lockdowns, it is recommended to avoid where possible selecting as the baseline a year that was not representative of typical energy and carbon performance prior to and since the periods impacted by Covid lockdowns.

Once the baseline year has been selected, energy consumption data from that period can be used to calculate carbon emissions using conversion factors published by the Department for Energy Security and Net Zero<sup>6</sup>. Energy and carbon performance metrics such as Energy Use Intensity (kWh/m<sup>2</sup>/yr) and Carbon Intensity (CO<sub>2</sub>/m<sup>2</sup>/yr) should be calculated for purposes of comparison with appropriate sector and industry benchmarks, and to set appropriate targets for a pathway to net zero. Other performance metrics can be considered appropriate to the building type, capacity and usage. For example, energy use per occupant/pupil place/hospital bed. This will enhance the benchmarking of energy and carbon performance of an asset by reference to assets with similar levels of utilisation, and will support the ongoing monitoring of decarbonisation where utilisation of the asset may vary in future periods. The Net Zero Estate Playbook<sup>7</sup> provides guidance on the calculation and reporting of emissions, and the setting of baselines and targets.

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

7 <https://www.gov.uk/government/publications/net-zero-estate-playbook>

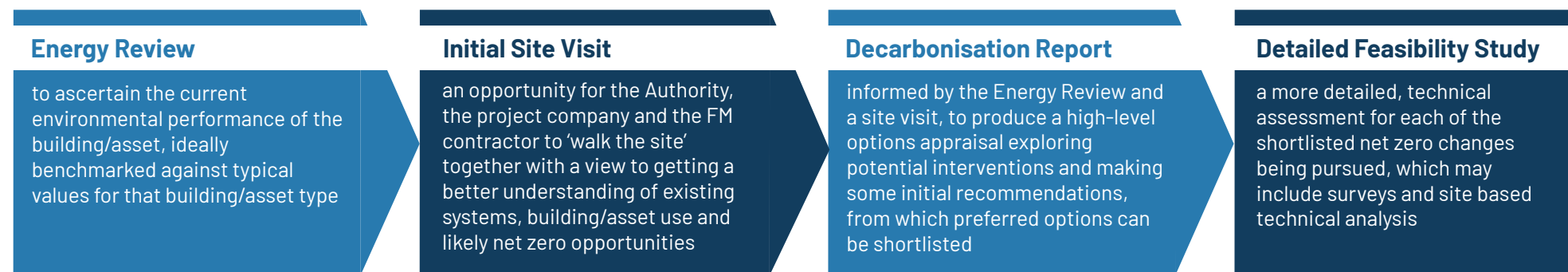
8 <https://www.architecture.com/about/policy/climate-action/2030-climate-challenge>

9 <https://www.leti.uk/cedg>

When setting targets for decarbonisation, reference should be made to existing decarbonisation strategies and commitments that may have been made by the relevant Authority or sponsoring department. If there is no pre-existing strategy or target, reference can be made to published target energy use intensity (“EUI”) metrics and operational energy use targets for different building typologies including domestic properties, offices and schools that have been published by bodies such as RIBA<sup>8</sup> and LETI<sup>9</sup>. Whilst these are intended as a design guide for new build properties, they nonetheless provide useful reference points as part of target setting for existing buildings.

## Assessing and shortlisting the options

Whilst every project will need to be considered on its own merits, typically we anticipate that in order to successfully deliver a net zero change a number of studies or appraisals will be needed at different points in the process, namely:



The Authority will need to engage closely with the project company, in particular with management services and facilities management providers, to develop decarbonisation plans for their PFI estate. Authorities and their project partners - the investors, management services providers and facilities management teams - are likely to have experience of the delivery of decarbonisation projects in other built environment assets which they can bring to bear. The MSP and FM teams can also contribute their technical knowledge of the specific systems and equipment installed in the project building. Externally sourced decarbonisation advice can be costly, and it is recommended that before procuring specialist studies, the Authority should first engage with project partners, and with any experts that may already work in other parts of the Authority organisation, to form a clearer view of the current energy consumption of the project and potential energy efficiency and decarbonisation opportunities. As a first step it

is recommended that contracting authorities walk the site with their project partners to discuss and identify the largest uses of energy and areas where it may be beneficial to explore opportunities to reduce energy consumption and increase energy efficiency. A periodic Energy Review may already be provided as an existing contract requirement, which will further inform the site inspection.

As a next step, a Decarbonisation Report should be prepared to set out short-, medium- and long-term opportunities for decarbonisation. At this stage, the intention is to be aspirational and identify all potential options, and not to develop detailed assessments for all options. A high-level opportunity survey of this kind can use available energy consumption data from the Energy Review to highlight the baseline carbon emissions position, to identify areas of potential excess energy consumption or low energy efficiency (for example by reference to applicable sectoral standards for energy consumption per sqm or

per occupant or other utilisation factors), and the potential scale of carbon reduction that may be targeted from a number of possible interventions. The report can also usefully identify the potential technical, commercial and other delivery issues specific to the site that will need to be considered in more detail at the next stage. The report should provide enough information to allow the project and Authority to review and shortlist the preferred options that will be taken to a feasibility assessment stage.

Feedback from operational projects and decarbonisation specialists indicates that Decarbonisation Reports will have most value where a site visit has first been made by the author of the report, so that options identified take into consideration site characteristics and evident features of building and equipment use and condition. While this is likely to be more expensive than a desktop report, feedback indicates that time and resources can be wasted evaluating generic options on a desktop basis that a site visit would confirm as not practical for a specific project. For example, a desktop study may recommend solar PV panel installation where a site visit would have identified that a property is poorly oriented or shaded in a way that makes solar power generation not viable.

Prior to progressing shortlisted options, a Detailed Feasibility Study should be commissioned to enable consideration of details including detailed specifications, costs, technical performance information, carbon reduction assumptions, and commercial and delivery proposals (including programming), and will inform value for money analysis. In addition to upfront costs of equipment and of installation, care is needed to consider the impact on ongoing costs, for example the potential increase in energy unit costs when moving from gas to

electric heating systems, and changes to the assumed frequency or intensity of maintenance services compared with systems that are being replaced. Any electricity supply infrastructure impacts should be considered as a priority, if larger electrical supplies would be required to support new plant and equipment (e.g. heat pumps), given the high potential costs and long lead times that may be required to apply for a local network connection upgrade. A Detailed Feasibility Study should also consider the compatibility of the proposal with existing contract requirements, for example are LED installation lumens levels consistent with contract specification, so that consideration can be given to potential contract change requirements.

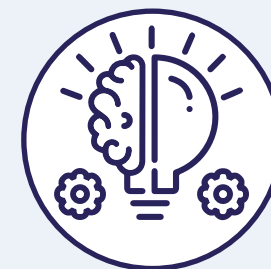
Detailed Feasibility Studies can be undertaken for a group or programme of shortlisted projects, enabling economic, commercial and implementation issues to be considered together for interventions to be delivered as a bundle. Recommendation is made elsewhere in this handbook for externally produced reports (such as the Decarbonisation Reports and Feasibility Studies referred to above) to be jointly commissioned by the public and private sector partners wherever practical to do so. Externally produced surveys and studies are costly and it makes sense to reduce the duplication of cost and effort and to share the learning gained from these reports and maximise the value that may be taken from them. As an example, opportunities may exist to streamline delivery of decarbonisation interventions by taking into consideration in an options assessment the timing and supply arrangements of works that may be carried out in other parts of the Authority's or project investors' portfolios. This might include the potential to reduce costs by procuring works and/or professional services (including preparation of surveys and technical studies) across a portfolio of projects or sites.

It may also be the case that a Authority wishes to include proposed interventions in business case analysis for a wider programme of decarbonisation activity. This might enable costs and benefits to be assessed as part of wider estate plans and potentially over a longer timeframe than the remaining contract term of the project, reflecting a realistic extended period of planned asset use. This may also be a helpful approach in order for an Authority to make a positive value for money case across a programme of planned interventions.

If an Authority is considering applying for grant funding for a decarbonisation programme (such as the Public Sector Decarbonisation Scheme or Green Heat Network Fund), the information requirements for the application should be reflected in the scope of any reports, surveys or other expert advice that is commissioned.

**As part of assessing the carbon reduction potential of alternative options, choosing the right measurement metrics can help empower decision making. Some of the main metrics to consider are:**

- absolute energy consumption (kWh for electricity, gas and any other fossil fuel used)
- absolute carbon emissions (tonnes of CO<sub>2</sub>e)
- unit energy and carbon intensity (kWh/m<sup>2</sup> /yr & tonnes of CO<sub>2</sub>e /m<sup>2</sup>/yr)
- a capacity or utilisation related metric, such as energy consumption per occupant/pupil place/hospital bed
- cost of implementing a net zero change per tonne of direct CO<sub>2</sub>e saved (noting that Public Sector Decarbonisation Scheme eligibility references a maximum carbon cost threshold for the funding requirement to save a tonne of direct carbon over the lifetime of the proposed project £/tCO<sub>2</sub>e)



## Using external advisers

Depending on the skills and capacity of each of the relevant parties (Authority, FM contractor, contract manager etc.), some of the work described above may well be capable of being prepared using existing, internal resources. The project company and delivery partners should have a good knowledge of existing plant and equipment age and performance and of the current equipment lifecycle replacement timetable. Alternatively, where existing expertise is not available, there may be a need to bring in external consultants, particularly at the Detailed Feasibility Study stage and to consider changes of a more complex nature. If external expertise is required, Authorities and their delivery partners should consider whether there may be benefit from any external studies and reports being commissioned jointly by the Authority and the Project Company. In addition to reducing duplication of effort and cost, this approach has the benefit that both parties can rely on the advice and share a common understanding of the options under consideration.

Procurement of external consultancy, design and delivery services through existing Crown Commercial Service or other public sector frameworks should be considered where relevant to access standardised terms and competitive pricing<sup>10</sup>. In all cases regard is due to procurement rules and commercial strategies applicable to the procuring body.

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<sup>10</sup> <https://www.crowncommercial.gov.uk/buy-and-supply/how-to-buy/>

<sup>11</sup> <https://ukgbc.s3.eu-west-2.amazonaws.com/wp-content/uploads/2019/04/08140941/Net-Zero-Carbon-Buildings-A-framework-definition.pdf>

## Offsetting

The reports prepared during the above stages may identify that it will not be possible to reach a net zero carbon position through deliverable interventions. The UKGBC Net Zero Carbon Buildings Framework<sup>11</sup> recommends that offsetting options for residual carbon positions can be considered only after deliverable intervention options have been exhausted. If offsetting is considered at that time, then any indirect offsets should use a recognised framework that can demonstrate additionality and verify carbon offsets. It may be helpful to note that if projects are able to successfully electrify their building systems then the ongoing transition of the UK's electricity networks to zero carbon will over time contribute to the reduction of a project's scope 2 emissions related to purchased energy. Continual monitoring of a project's progress along a pathway to net zero over time will enable changes to the expected residual carbon position to be taken into consideration with reference to any future offsetting strategy.

## When to implement a net zero change?

Once the preferred decarbonisation options have been identified, the best timing for implementing changes will be influenced by a number of factors, including:

- the nature of the asset
- the age and efficiency of existing plant and equipment and upcoming scheduled lifecycle replacement or maintenance interventions
- the period left to run under the PFI contract
- the nature of the proposed net zero change, including associated benefits, but also delivery and performance risk factors
- the upfront cost versus the long-term savings
- what happens to the asset on expiry (note that some assets remain in private sector ownership or are only transferred to the Authority on payment of a residual value sum)
- the Authority's wider decarbonisation strategy, including for non-PFI assets (e.g. has the Authority committed to achieving net zero prior to the Government's 2050 deadline and is it already delivering decarbonisation programmes that the PFI asset could be aligned with)
- the Authority's wider estates strategy and major capital projects programme, which may present additional opportunities
- the regulatory backdrop to the proposed net zero change, including the applicability of Part L of the Building Regulations 2010 which relates to 'Conservation of fuel and power'

- the availability of funding, including a review of proposed lifecycle investment over the remaining project life, and availability and timetable of applicable grants programmes

Typically net zero changes are likely to be considered by projects and Authorities at one of the following points in the contract period:

- as soon as possible, to maximise the benefit of the net zero change – this may be as a result of it securing funding (grant for example)
- at the same time as (or as an alternative to) planned maintenance or lifecycle replacement works
- as an alternative to a major piece of reactive maintenance due to be carried out (for example, a boiler fails and needs to be replaced), depending upon the urgency of replacement and the lead times of alternative options
- as part of the expiry/handback process, taking into account the handback condition requirements and whether these remain consistent with the Authority's estate strategy and priorities, or whether changes to the requirements may enable investment to be redirected to meet decarbonisation objectives.

In determining when to implement a net zero change, there is a balance to be struck between maximising the period of positive operational carbon savings and the negative impact of the embedded carbon cost of the fabric/plant being replaced and of the new installation. Circular economy ideals point to equipment not being replaced unless the operational energy efficiency gain will be greater than the embedded carbon cost of the new plant and of retired plant not capable of re-use. However, information about the embedded carbon values of new plant and equipment and other construction

materials is not yet readily available, making it difficult for projects and authorities to make this assessment. Instead, a pragmatic common-sense approach is to say that low carbon alternatives should be considered at every planned lifecycle intervention point. This is in any event consistent with assumptions made in project budgets, and so is likely to maximise the proportion of decarbonisation costs that can be met from existing project budgets, and to minimise additional costs of decarbonisation for contracting authorities.

It is also worth noting that there will be a cut-off point by which decisions on the replacement of large plant needs to have been made. Towards the end of an item's planned life, there is little incentive (and considerable risk) for the project company to choose to delay the like-for-like replacement whilst alternative solutions are being considered. Therefore, the potential alternative solution needs to be considered well in advance to avoid like-for-like replacements becoming inevitable simply to avoid increasing operational risk.

As noted earlier in this chapter, where applicable, it is also helpful to consider the timing of planned interventions in the context of a wider portfolio works programme that may exist for the Authority and/or the private sector delivery partners, to enable alignment of project implementation with other planned maintenance works, and to streamline procurement, reduce costs, and facilitate the assessment of business cases for works planned to be delivered as part of a broader decarbonisation programme.



# Appendix

## Template Project Greenhouse Gas Emissions Questionnaire

PART 1. PROJECT FUNDAMENTALS	
1.1	Reporting Year
1.2	Project Description
1.3	Project Company Name
1.4	Management Services Provider
1.5	General Manager
1.6	Please specify the number of sites within the asset
1.7	Gross Internal Area of Building(s)
1.8	Gross Internal Area of Management Services Provider Project space
1.9	If asset is a Hospital, please state designed bed capacity
1.10	If asset is a School, please state designed pupil capacity
1.11	If asset is a Road, please state number of km covered by road
1.12	If asset is Rail, please state number of km covered by tracks
1.13	If asset is none of the above please state Industry recognised metric dependant on asset class, examples being; Prison - Metric = Nr of cells, Courts - Metric = Nr of Court Rooms


PART 2. ROLES & RESPONSIBILITIES	
2.1	Who is responsible (Authority/Trust/FM Co/Project Co/Shared) for the procurement of energy in:
	<ul style="list-style-type: none"> <li>New build estates</li> <li>Retained estates</li> <li>Carparks</li> <li>Offices</li> <li>Warehouses/depots</li> <li>Service stations</li> <li>Toll plazas</li> <li>Other assets/areas</li> </ul>
2.2	Who is responsible for the energy price risk in:
	<ul style="list-style-type: none"> <li>New build estates</li> <li>Retained estates</li> <li>Carparks</li> <li>Offices</li> <li>Warehouses/depots</li> </ul>



	Service stations Toll plazas Other assets/areas
2.3	Who is responsible for the energy volume risk in:
	New build estates Retained estates Carparks Offices Warehouses/depots Service stations Toll plazas Other assets/areas
2.4	Who is responsible for lifecycle (i.e., financial risk) in:
	New build estates Retained estates Carparks Offices Warehouses/depots Service stations Toll plazas Other assets/areas


2.5	Internal area breakdown (m <sup>2</sup> )
	New build estates Retained estates Carparks Offices Warehouses/depots Service stations Toll plazas Other assets/areas

### PART 3. SCOPE 1 EMISSIONS

	<b>FOSSIL FUELS</b>
3.1	Does the asset generate electricity, heat or steam <i>on-site</i> from the combustion of fossil fuels, e.g. boilers or furnaces?
3.2	If yes, please specify the fuel type and volume consumed
3.2.1	Natural Gas?
3.2.2	LPG?
3.2.3	Gas Oil?
3.2.4	Fuel Oil?
3.2.5	Burning Oil?
3.2.6	Diesel?


3.2.7	Petrol?
3.2.8	Industrial Coal?
3.2.46	Wood Pellet?
	<b>OTHER</b>
3.3	How many metering points are there?
3.4	Does the project company operate its own vehicles to transport materials, waste and/or employees?
3.5	If yes, what distance was travelled in petrol vehicles?
3.6	If yes, what distance was travelled in diesel vehicles?

#### PART 4. SCOPE 2 EMISSIONS

	<b>ELECTRICITY CONSUMPTION (SCOPE 2) (if yes, enter kWh units consumed)</b>
4.2	Mains Standard Grid Electricity?
4.3	Mains Green Tariff Electricity?
4.4	EfW (Energy from Waste) Electricity Import?
4.3.1	If yes to 4.3, what was the % of renewable energy purchased?
4.3.2	If yes, what is the contract type? (e.g., standard green tariff, PPA, REGO-backed, certified 100% renewable, etc.)
4.3.3	If yes, what is the mix? (% of Hydro/Wind On-shore/Wind Off-shore/Solara/Wood/Geothermal/Other bioenergies)
4.5	How many metering points are there?

4.6	Does the project company have its own electric vehicles that require the purchase of electricity? (if yes enter kWh units consumed)
4.7	What proportion of the electricity was sourced external to the project (i.e., is unaccounted for in the site's electricity consumption above?)
4.8	Does the site have Combined Heat & Power (CHP)? (if yes enter kWh units generated)
4.8.1	What is the type of CHP?
4.8.2	Does the CHP plant deploy heat recovery boilers?
4.8.3	If yes to 4.8.1, is it used to raise steam or hot water? (if yes enter kWh units generated)
4.9	Does the site, either wholly or in part import Heat from waste recovery, i.e. Energy from Waste, that is owned or controlled by an organisation other than the reporting company?
4.9.1	If yes to 4.9. state consumption kWh
4.10	Is the site, either wholly or in part on a district heat or steam scheme?
4.10.1	If yes to 4.10, is it heat or steam supplied to the site? (enter kWh units)

#### PART 5. SELF GENERATED ENERGY

	<b>(if yes, enter kWh units generated)</b>
5.1	Solar Panels?
5.2	Solar water heating?
5.3	Heat Pumps (Ground, Air & Water Source types)?
5.4	Other?

**PART 6. OFFSETTING**

6.1	Does the project offset any carbon?
6.1.1	If yes, give details of recognised offsetting framework
6.1.2	Are offsets removal (neutralisation) and/or avoidance (compensation) types
6.1.3	What is the annual amount of offsets
6.1.4	Cost per tonne of CO <sub>2</sub> e:

**PART 7. SELLING ELECTRICITY BACK TO THE GRID**

7.1	Has any electricity been sold back to the grid?
7.1.1	If yes, state how much (units kWh)

**PART 8. F-GAS EMISSIONS (SCOPE 1)**

8.1	Does the project company operate air-conditioning or refrigeration units on site for which it holds responsibility to check leaks?
8.2	Have the air-conditioning units been 'topped-up' in the calendar year that this survey relates to? (Yes/No)
8.3	If yes, please provide information on the total annual 'top-up' amount for the refrigerant emissions sources identified. Please include information on the refrigerant top-up type and amount topped up in kg.
8.4	Other emissions with a Global Warming Potential type and top-up amount
8.5	Other emissions with a Global Warming Potential type and top-up amount

**PART 9. WATER CONSUMPTION (SCOPE 3)**

9.1	Water Source (Mains/Watercourse)
9.2	Water Supply (cubic metres consumed)
9.3	Water Treatment (cubic metres consumed)

**PART 10. VALUE CHAIN ACTIVITIES (SCOPE 3)**

10.1	Business Travel
	<p>Did the asset require project company employee business travel (not already captured in Scope 1 or Scope 2)? Note that this is in vehicles not owned or controlled by the project company, i.e. hire vehicles, taxis, trains, buses etc.</p> <p>Please enter the distance travelled by car</p> <p>Please enter the distance travelled by train</p> <p>Please enter the distance travelled by short-haul flight</p> <p>Please enter the distance travelled by long-haul flight</p> <p>How much was spent on business travel (car)? Please only fill this in if you could not provide 100% of business travel by car in km in the previous question.</p> <p>How much was spent on business travel (train)? Please only fill this in if you could not provide 100% of business travel by train in km in the previous question.</p> <p>How much was spent on business travel (short-haul flight)? Please only fill this in if you could not provide 100% of business travel by short-haul flight in km in the previous question.</p> <p>How much was spent on business travel (long-haul flight)? Please only fill this in if you could not provide 100% of business travel by long-haul flight in km in the previous question.</p>

10.2	Waste
	<p>Does the project company manage any waste for the asset?</p> <p>Please enter the total waste value per type of waste: Construction</p> <p>Please enter the total waste value per type of waste: Refuse</p> <p>Please enter the total waste value per type of waste: Electrical items</p> <p>Please enter the total waste value per type of waste: Metal</p> <p>Please enter the total waste value per type of waste: Plastic</p> <p>Please enter the total waste value per type of waste: Paper</p> <p>Please enter the total waste value per type of waste: Hazardous/ Medical</p> <p>Please enter the total waste value per type of waste: Other</p> <p>Please enter the total waste value per type of waste: Unknown (or total, if breakdown is not available)</p> <p>If some (or all) information about weight is not available, please enter the outstanding (or total, as applicable) amount spent on waste in relation to the asset. Important note: this is for waste that was not captured within the tonnages/kgs detailed above.</p> <p>Does the project company manage waste that they don't produce?</p> <p>Please select the waste type that is managed but not produced by the asset</p> <p>Please comment further if you have chosen 'Other'</p>

10.3	Leased space
	<p>Did the asset lease out building space?</p> <p>Please provide the m<sup>2</sup> for inland transport</p> <p>Please provide the m<sup>2</sup> for water transport</p> <p>Please provide the m<sup>2</sup> for retail</p> <p>Please provide the m<sup>2</sup> for office</p> <p>Please provide the m<sup>2</sup> for service</p> <p>Please provide the m<sup>2</sup> for warehouse and storage</p> <p>Please provide the m<sup>2</sup> for vacant</p> <p>Please provide the m<sup>2</sup> for manufacturing</p> <p>Please provide the m<sup>2</sup> for electrical equipment space</p> <p>Please provide the m<sup>2</sup> for other</p> <p>Please comment further if you have populated the m<sup>2</sup> for 'other'</p>
10.4	General information
	<p>How many staff (full time equivalents) worked for the asset? Please include the staff of the project company and direct service providers only, exclude client staff and those in tier 2 supply chain.</p> <p>Please add any relevant comments / information about Scope 3 emissions in the box below</p>