

Carbon Reduction Plan 2023

Working towards
net zero carbon

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Cover photo: BAM working with the British Antarctic Survey at Rothera Wharf, Antarctica

Introduction

Our business

BAM UK & Ireland is a division of Royal BAM Group, a construction enterprise operating in Europe and internationally that has over 16,000 employees. In the UK and Ireland, BAM has established itself as a leading tier 1 contractor spanning the entire lifecycle of the built environment, comprising the design, delivery and operation of public and private infrastructure and construction projects. Our 6,600+ strong workforce delivers in excess of £2.7bn worth of work across 200+ projects each year. More about what we do can be found on our website <https://ukandireland.bam.com/>

Decarbonisation is one of the 6 key themes in our sustainability strategy, 'Building a sustainable tomorrow' (figure 1). This integrated carbon reduction plan (ICRP) details our decarbonisation pathway towards net zero including what our carbon reduction targets are and how we are progressing against them.

BAM UK & Ireland has formed a central environmental sustainability enabling service who provide overarching support to all entities on our sustainability strategy, including decarbonisation, and have a network of individuals embedding in each entity driving the sustainability strategy through every part of the organisation.

Organisational structure

The UK & Ireland division is not in of itself an operating company, it is the parent to all the legal entities of BAM operating within the jurisdictions of the UK and Ireland. Managing directors and Executive directors from each of the legal entities sit on the BAM UK & Ireland board alongside a Chief Operating Officer and directors for shared services such as Finance, HR, ICT, Transformation, Delivery services and communications. This ICRP has been developed to satisfy the legal and statutory requirements of all BAM UK & Ireland subsidiaries, whilst also streamlining our carbon reporting and associated disclosures to all our stakeholders. The organisational structure in figure 2 (overleaf) shows all the operational companies within the BAM UK & Ireland division.

Our ICRP shows both the aggregated carbon emissions data at division level and for key operating companies which require carbon disclosures within their own right, these being; BAM Nuttall Ltd, BAM Construction & Ventures Ltd, BAM Ireland Ltd and BAM FM Ltd (UK only). BAM UK & Ireland has formed a central environmental sustainability enabling service who provide overarching support to all entities on our sustainability strategy, including decarbonisation, and have a network of individuals embedding in each entity driving the sustainability strategy through every part of the organisation. This central team also includes specialist leads for sustainability topics such as decarbonisation and data administration and analysis resources operating across the entire division. Our decarbonisation strategy, commitment to delivering net zero by 2050 and associated carbon reduction projects apply to all entities within BAM UK & Ireland. Therefore all commitments and targets (unless otherwise stated) apply equally to each legal entity in the division.

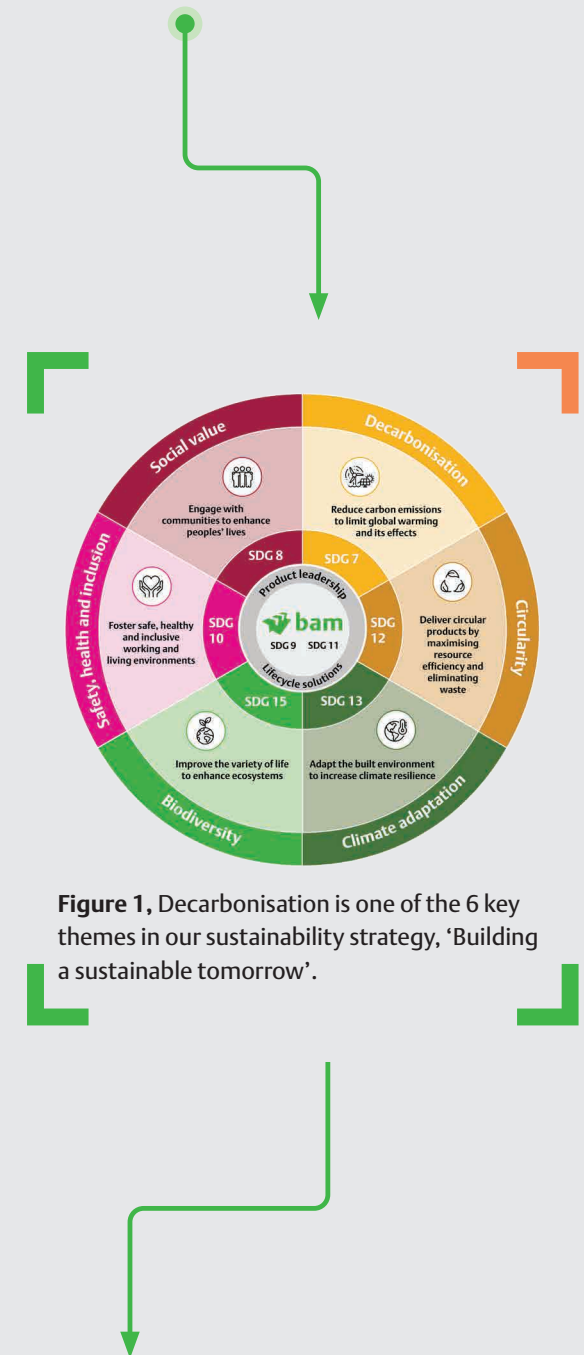


Figure 1, Decarbonisation is one of the 6 key themes in our sustainability strategy, 'Building a sustainable tomorrow'.

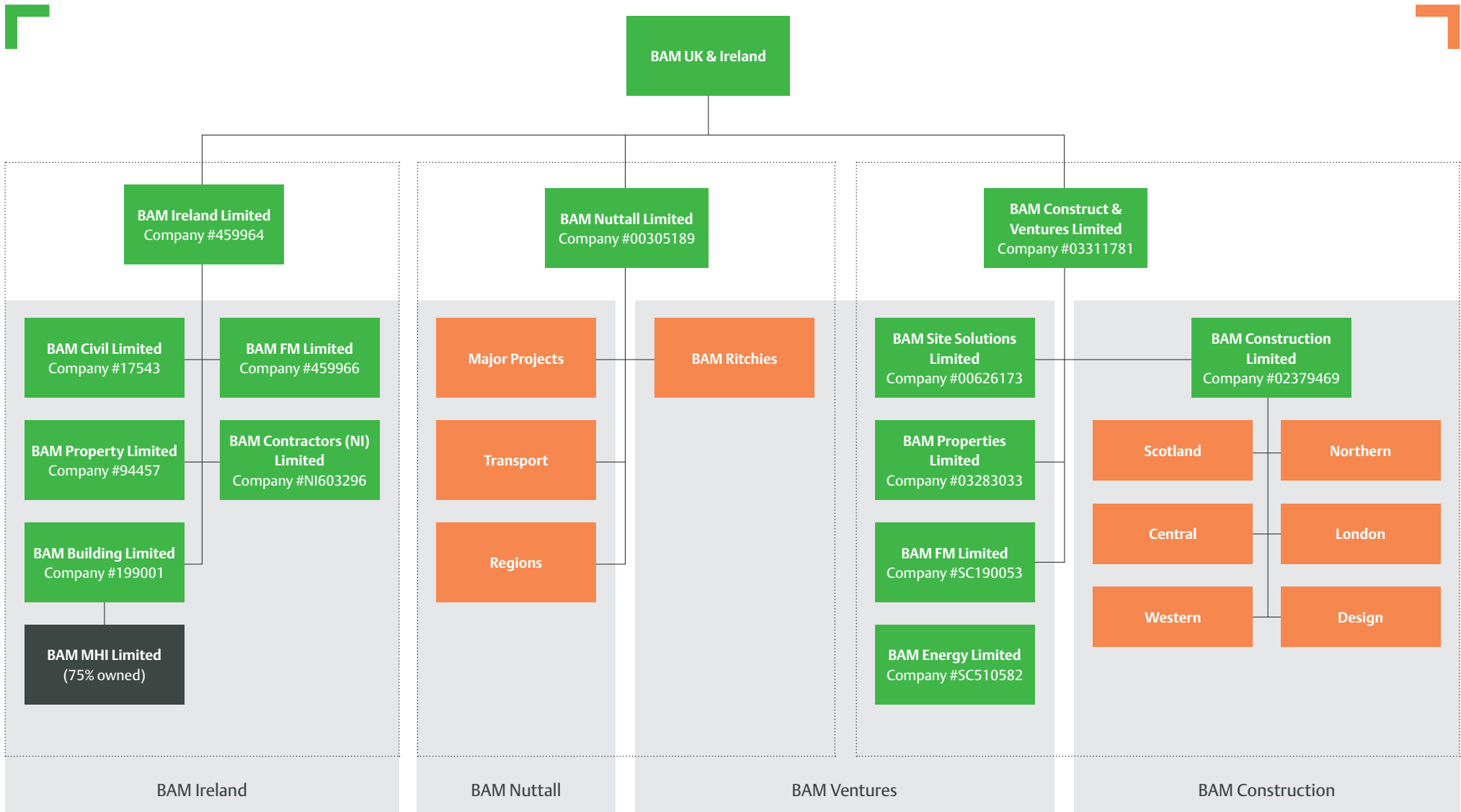
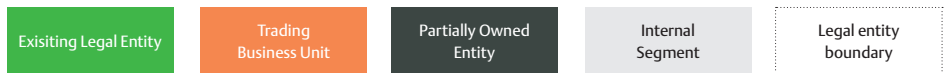


Figure 2: BAM UK & Ireland Division



Commitment to achieving Net Zero

Reducing carbon emissions is at the heart of our organisations sustainability strategy. We are committed to halving the impact of operations in our direct control by 2023 from 2015 levels and **achieving net zero emissions in our scope 1, 2 and selected scope 3 emissions by the end of 2026**. Furthermore, BAM is committed to reaching net zero across the entirety of its value chain by 2050.

Since 2008 we have had a mature and robust carbon measurement and reporting system which has helped us demonstrate substantial reductions year on year. Delivering low carbon solutions not only helps us reduce our clients carbon footprint, it generates cost benefits for them and our own business as well as helping to build our brand and reputation, and to achieve our objectives against our sustainability strategy – Building a Sustainable Tomorrow. It also helps us meet Government and legal requirements, such as the Energy Savings and Opportunities Scheme (ESOS), the Energy Efficiency Directive (EED), Streamlined Energy and Carbon Reporting (SECR) and the drive globally to become net zero carbon by 2050.



“Climate change is the greatest challenge of our time. As a responsible business we have a proven track record of driving out carbon from the built environment and are committed to working collaboratively with clients, peers and our supply chain to realise a net zero carbon future. Only by working together can we achieve the required carbon emissions reductions to meet the net zero carbon goals of our UK government, industry and globally.”

John Wilkinson, Chief Operating Officer, BAM UK & Ireland

Proven track record

BAM UK & Ireland has been instrumental in supporting Royal BAM Groups continued CDP ‘A list’ status having achieved a 48% reduction in direct CO₂e emissions intensity from our 2015 baseline. Royal BAM Group participates in the CDP climate program each year and has been placed in the leadership index (the ‘A list’) for the last six years. It is an ongoing strategic target of Royal BAM to rank among the leading companies globally and the BAM Group CDP response can be found [here](#).

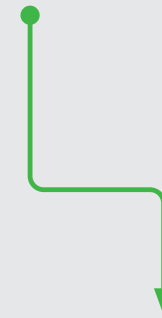
In addition to this, in 2023 we secured the Carbon Reduce schemes (ISO14064:2018) Gold award for ongoing carbon reductions year on year compared to our 2015 baseline.

Further to our net zero carbon target, in 2019 Royal BAM Group ratified its carbon reduction targets with the Science Based Targets Initiative and was one of the first companies in the construction sector to do so. Our reduction pathway is in line with the 1.5°C scenario and demonstrates our carbon reduction efforts are sufficient to meet this key objective. More on our Science Based Targets can be found [here](#).

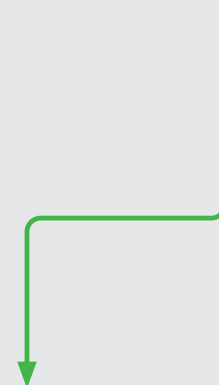
In order to support the drive to a net zero carbon built environment, BAM became a founding partner of the UK Green Building Council Advancing Net Zero Carbon Buildings Program in 2018. This industry leading program has created the standards which are now widely being used to define how we achieve net zero carbon buildings across their whole life. More information can be found [here](#).



Following the work with ANZ, in 2019, BAM signed the World Green Building Councils Net Zero Carbon Buildings Commitment. As a signatory, we have committed to only occupy and develop net zero carbon buildings by 2030. In addition, we also endorse the Ireland Green Building Council’s (IGBC) Net Zero Ireland commitment. You can find our commitment scope [here](#).



BAM UK & Ireland has been instrumental in supporting Royal BAM Groups continued CDP ‘A list’ status having achieved a 48% reduction in direct CO₂e emissions intensity from our 2015 baseline.



BAM is a founding signatory and creator of Contractors Declare, a voluntary initiative led by 8 founding main contractors and linked to the wider Built Environment Declares movement. The aim is to catalyse collective action to raise awareness of action on climate change and biodiversity loss, especially amongst the supply chain and smaller businesses in the sector.



BAM supported an industry led proposal for a new addition to UK building regulations. Part Z would mandate the measurement of embodied carbon as part of planning and in time, set limits for total allowable embodied carbon. BAM have supported the launch and ongoing push for this to become part of UK regulations.



The Supply Chain Sustainability School was founded to accelerate take up of sustainable practices in the construction industry and to upskill the entire supply chain. As a partner to the school BAM supports all its programmes of work. In 2020 the climate action group was formed with the purpose of raising awareness of and improving data on carbon emissions within the supply chain. A free to access tool has been created to support the supply chain to measure and report their emissions, which BAM actively promotes to its key supply partners across the UK.



In 2021 BAM was accepted on to the Construction Leadership Councils (CLC) CO2nstruct Zero initiative. This initiative builds on the UK governments 10-point plan for the green industrial revolution set out in 2020 although its focus is across the entire built environment sector. CO2nstruct Zero sets out roadmaps to decarbonise 9 priority areas and as an accepted “business champion” for the initiative, we must demonstrate alignment to these roadmaps and report back on an annual basis.



Our carbon expertise

BAM UK & Ireland has a long-established environmental and sustainability culture which includes a dedicated function for managing carbon. Our Net Zero Carbon Lead, Sarah Jolliffe manages the companies interests which impact upon our decarbonisation efforts.

To ensure our carbon accounting is robust and accurate, BAM UK & Ireland has a team of data analysts making sure our carbon data is robust and complete. Securing highly granular and high quality data gives us a thorough understanding of our carbon impact and where the key emissions sources are. This influences where we deploy focussed carbon reduction measures in areas of our business that achieve the greatest impact. Across the business, every employee, and many of our delivery partners have carbon literacy training. Nominated individuals on each project are responsible for carbon and sustainability matters.

Across the UK and Ireland, BAM works closely with institutional partners to help us collaborate with all members of our value chain. BAM was one of the founding partners to the UK Green Building Councils (UKGBC) Advancing Net Zero programme which seeks to accelerate the drive towards net zero buildings. In Ireland, we are platinum members to the UKGBC’s sister organisation the Irish Green Building Council (IGBC). Our other affiliates pertinent to sustainable development and decarbonisation include the Institution of Civil Engineers (ICE), Construction Leadership Councils (CLC) CO2nstruct Zero initiative and several special interest working groups with the Supply Chain Sustainability School (SCSS) who we have also partnered with.



“Climate change is the greatest existential threat we face and industries such as ours have a huge role to play to mitigate our own emissions and influence carbon reduction throughout the built environment. I am proud to be at the forefront of driving real change and setting an example in one of the most sustainable construction companies in the UK and Ireland”.

Sarah Jolliffe, Net Zero Carbon Lead, BAM UK & Ireland

Emissions report

Reporting scope

BAM UK & Ireland has measured its direct carbon emissions since 2008 and, since then, has developed comprehensive and efficient ways of handling the data and presenting it back to all our stakeholders. Our direct emissions inventory includes all GHG scope 1 & 2 emissions and additionally includes carbon arising from select scope 3 emissions;

- Staff transport in non-company owned vehicles, Air travel and Rail travel
- Third party procured fuels and energy (including Well to Tank impacts)
- Hotel stays
- Water use
- Waste arising from our operations
- Upstream transport of goods and services
- Well to Tank emissions arising from all Scope 1 & scope 2 emissions sources.

For scope 2 emissions accounting, despite the fact that over 75% of our directly procured electricity utilises REGO-backed supplies, we always report the true emissions from our electricity use using the location-based methodology. We feel this is the most appropriate way to account for this emissions source.

In addition, it is recognised that biofuels and bioenergy are beginning to play a role in decarbonising our business and indeed the sector at large. We have chosen to disclose the GHG protocol defined *out of scopes* emissions associated with the use of these energy vectors – known as Biogenic emissions. However, as these are not deemed a net contributor to global carbon emissions, they are not included in BAM UK & Irelands total net emissions.

Upstream transportation data has the greatest uncertainty as there is very limited primary data available. However, we have been able to generate our own bespoke financial conversion factor which is based on measured bulk material purchases and is therefore more accurate than the use of the industry standard environmentally-extended input output (EEIO) conversion factors¹. We will continue to review this methodology over time and may result in re-baselining in the future.

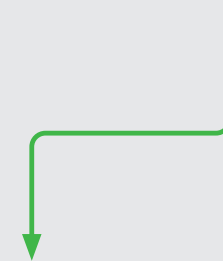
The reason we have chosen to disclose a sub-set of scope 3 emissions and not the full scope 3 inventory is due to the lack of reliable data. Whilst it is possible to generate carbon emissions based solely on financial assessments for all scope 3 emissions, we do not feel that this approach is appropriate to enable us to confidently report our performance against. That said our parent company Royal BAM Group has undertaken high level financial-based analysis which gives an indication that the total scope 3 emissions of the BAM UK & Ireland division will be between 750ktCO₂e and 1,500ktCO₂e. We also anticipate that purchased goods and services and use of sold product will be the 2 dominant sources of emissions across the division. We are already implementing carbon reduction initiatives division-wide through our sustainability strategy to drive down these emissions on a project by project basis. The carbon reducing projects section of this ICRP showcases example where we have achieved significant emissions reduction.

Over the course of 2023 we will continue to refine our methodologies and work towards full scope 3 emissions disclosures when appropriate.



Transparent reporting

Despite the fact that over 75% of our directly procured electricity utilises REGO-backed supplies, **we always report the true emissions from our electricity use using the location-based methodology.**



1. [Scope3_Calculation_Guidance_0.pdf \(ghgprotocol.org\)](#)

BAM UK & Ireland



The emissions from upstream transportation dominate the total emissions footprint of the division accounting for 68% of all the categories we disclose. These emissions stem from the many thousands of HGVs and LGVs used to deliver goods and services to our project sites each year, including but not limited to, delivery of construction materials, spoil removal and waste management, site consumables and plant hire.

Liquid fuels (primarily Gas Oil and diesel) are by far the largest contributor to the divisions direct emissions making up over half of the total for scope 1 and 2, they are therefore a key focus of our management and reduction plan and by their nature are in our direct control to influence. The bulk of these emissions are dictated by the amount and type of civil engineering projects being undertaken at any given time.

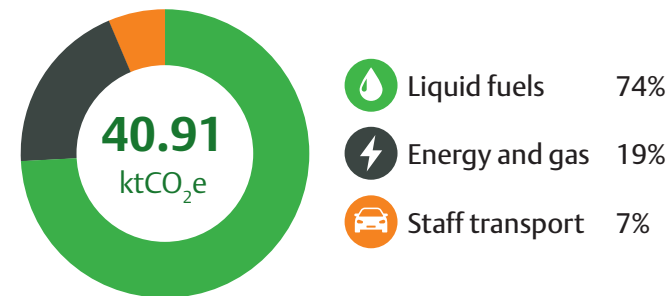
Emissions from the other sources listed in the inventory such as electricity, natural gas, third party supplied fuels and energy, waste, hotel use, water and staff transportation are all significant although tend to be more consistent each year and have been consistently falling year on year as a result of the decarbonisation of the grid, deploying more efficient construction methods and the electrification of heat and company vehicles. All of these sources are supported with excellent and granular activity data.

Emissions reporting and comparison to baseline

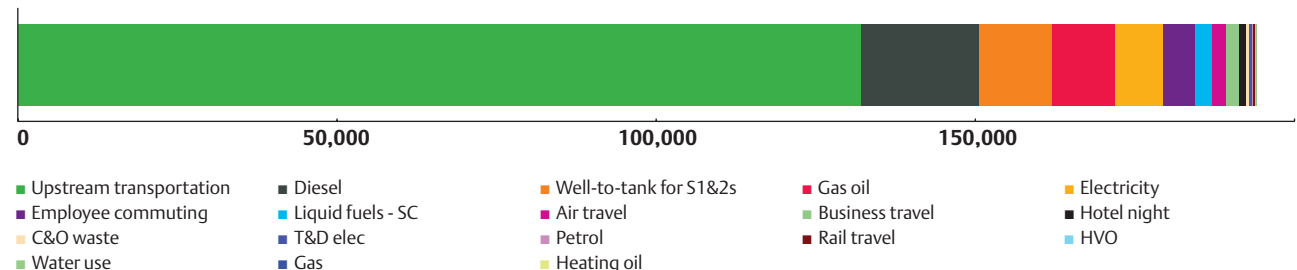
| Emissions scope | Baseline emissions 2015 | | 2022 emissions | | Variance | |
|--------------------------------|-------------------------|-----------------------|---------------------|-----------------------|--------------|--------------|
| | ktCO ₂ e | tCO ₂ e/£M | ktCO ₂ e | tCO ₂ e/£M | Absolute | Intensity |
| Scope 1 | 47.12 | 24.17 | 33.41 | 12.5 | ⊖ 29% | ⊖ 48% |
| Scope 2 | 10.92 | 5.53 | 7.63 | 2.85 | ⊖ 29% | ⊖ 48% |
| Total S1 & 2 | 57.77 | 29.63 | 40.91 | 15.31 | ⊖ 29% | ⊖ 48% |
| Scope 3 ^[2] | 132.81 | 68.12 | 153.92 | 57.59 | ⊕ 16% | ⊖ 15% |
| Total S1, 2 & 3 | 190.36 | 97.64 | 194.75 | 72.87 | ⊕ 2% | ⊖ 25% |
| <i>Out of scopes emissions</i> | - | - | 6.65 | 2.72 | - | - |

Table 1, Emissions inventory BAM UK & Ireland 2015 and 2022

2022 scope 1 & 2 emission sources



2022 scope 1, 2 and 3 emission sources



2. Excludes, purchased goods and service and use of sold product

BAM Nuttall



BAM Nuttall exclusively delivers civil engineering projects which have a comparably higher carbon footprint compared to all other business activities across BAM UK & Ireland. This is due to the large quantities of earthworks and bulk material installations that occur with this type of work. Not surprisingly, upstream transportation and the use of gas oil and diesel used in the plant and equipment used on these projects is responsible for over 75% of the emissions in 2022. Given their significance, in 2022 we began switching site gas oil and diesel to the low carbon biodiesel alternative known as Hydrotreated Vegetable Oil (HVO) which delivers a 90%+ reduction in scope 1 emissions. Emissions from upstream transportation are more difficult to influence although there are good examples of where we have optimised construction methodologies and opted for lower carbon modes of transport in the case study section of this ICRP.

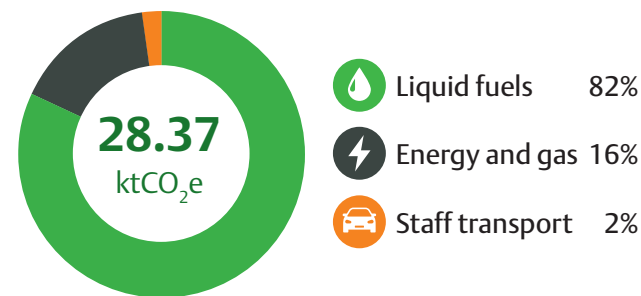
Major projects in excess of £100M tend to dominate BAM Nuttall's emissions footprint, particularly those with significant earthworks within their scope. Therefore to aid our analysis, we also split the emissions into 'general civils' and 'heavy civils' with the latter being defined as projects with total excavation activities exceeding 500,000 tonnes over their duration. This helps identify underlying emissions trends that are hidden when analysing total emissions combined. Large earth moving projects tend to have a carbon footprint more than double that of the 'general civils' activities and more than quadruple that of a commercial building project. Through this analysis we have seen a year of year reduction in emissions in general civils and has decarbonised at a faster and steadier rate than heavy civils. The graph on the right illustrates the long term carbon intensity trends for each category.

Emissions reporting and comparison to baseline

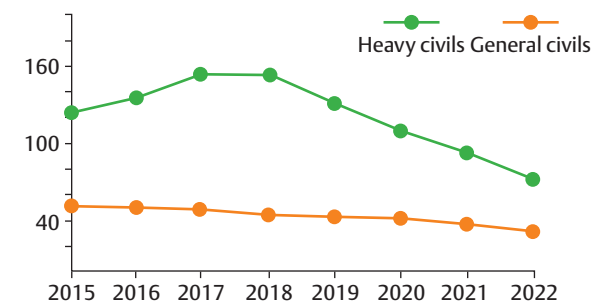
| Emissions scope | Baseline emissions 2015 | | 2022 emissions | | Variance | |
|--------------------------------|-------------------------|-----------------------|---------------------|-----------------------|--------------|--------------|
| | ktCO ₂ e | tCO ₂ e/£M | ktCO ₂ e | tCO ₂ e/£M | Absolute | Intensity |
| Scope 1 | 36.26 | 46.77 | 23.78 | 21.12 | ⊖ 34% | ⊖ 55% |
| Scope 2 | 4.11 | 5.30 | 4.59 | 4.08 | ⊕ 12% | ⊖ 23% |
| Total S1 & 2 | 40.37 | 52.07 | 28.37 | 25.2 | ⊖ 30% | ⊖ 52% |
| Scope 3 | 70.02 | 90.32 | 92.4 | 82.09 | ⊕ 32% | ⊖ 9% |
| Total S1, 2 & 3 | 110.80 | 142.92 | 122.60 | 132.89 | ⊕ 9% | ⊖ 25% |
| <i>Out of scopes emissions</i> | - | - | 6.28 | 5.58 | - | - |

Table 2, Emissions inventory BAM Nuttall 2015 and 2022

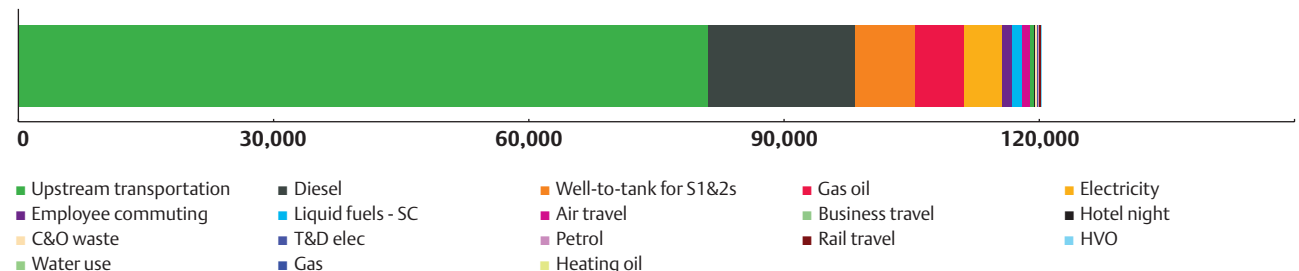
2022 scope 1 & 2 emission sources



5 year average tCO₂e/£m turnover (inflation applied)



2022 scope 1, 2 and 3 emission sources



BAM Construct & Ventures



BAM Construct & Ventures predominantly deliver commercial building projects but also have a number of subsidiaries delivering specific services in areas such as Plant hire, FM, Design and property services. The emissions footprint is comparably lower compared to all other business activities across BAM UK & Ireland. This is because fewer materials are required in the delivery of this type of work compared to civil engineering projects thus reducing upstream transportation impacts, and due also to the vast majority of projects being located in urban areas which typically have good availability of a grid electricity supply thus eliminating the need for diesel powered generators.

Upstream transportation and the use of gas oil and diesel used in the plant and equipment used on these projects is responsible for over 75% of the emissions in 2022. Given their significance, in 2022 we began switching site gas oil and diesel to the low carbon biodiesel alternative known as Hydrotreated Vegetable Oil (HVO) which delivers a 90%+ reduction in scope 1 emissions. Emissions from upstream transportation are more difficult to influence although there are good examples of where we have optimised construction methodologies and opted for lower carbon modes of transport in the case study section of this ICRP.

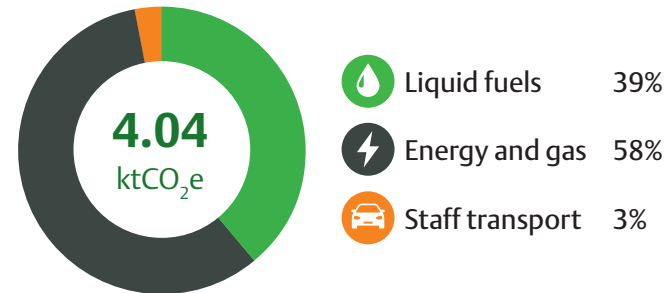
Within BAM Construct & Ventures is the BAM Site Solutions business which operates 4 regional depots all of which are directly controlled by BAM. The combined energy emissions from these assets is significant accounting for 25% of the total direct scope 1 and 2 emissions in 2022 mostly as a result of electricity and natural gas usage.

Emissions reporting and comparison to baseline

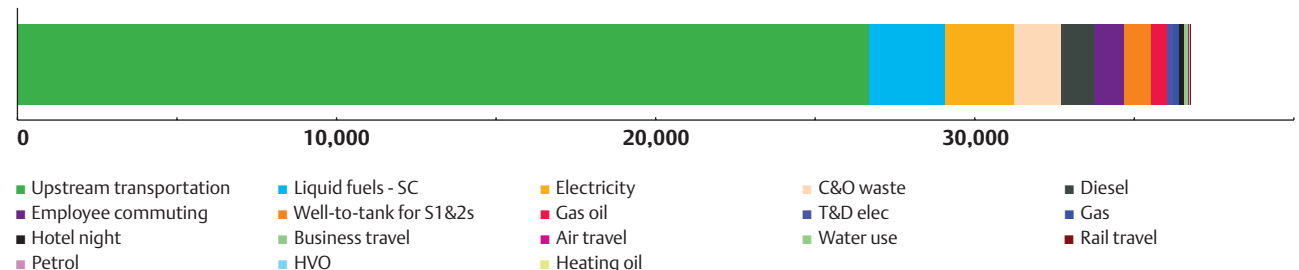
| Emissions scope | Baseline emissions 2015 | | 2022 emissions | | Variance | |
|--------------------------------|-------------------------|-----------------------|---------------------|-----------------------|--------------|--------------|
| | ktCO ₂ e | tCO ₂ e/£M | ktCO ₂ e | tCO ₂ e/£M | Absolute | Intensity |
| Scope 1 | 3.71 | 4.54 | 1.88 | 1.83 | ⊖ 49% | ⊖ 60% |
| Scope 2 | 5.21 | 6.37 | 2.16 | 2.11 | ⊖ 58% | ⊖ 67% |
| Total S1 & 2 | 8.91 | 10.91 | 4.04 | 3.93 | ⊖ 55% | ⊖ 64% |
| Scope 3 | 44.03 | 53.9 | 32.74 | 31.87 | ⊖ 26% | ⊖ 41% |
| Total S1, 2 & 3 | 52.95 | 64.81 | 36.78 | 35.8 | ⊖ 31% | ⊖ 45% |
| <i>Out of scopes emissions</i> | - | - | 0.37 | 0.36 | - | - |

Table 3, Emissions inventory BAM Construct & Ventures 2015 and 2022

2022 scope 1 & 2 emission sources



2022 scope 1, 2 and 3 emission sources



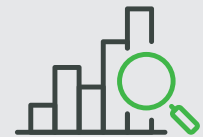
BAM Ireland

BAM Ireland deliver a mixed portfolio of commercial building projects and civil engineering schemes but also have a number of subsidiaries as illustrated in figure 1 who deliver services such as FM, Property management, small-scale modular homes manufacture and plant hire. The emissions footprint is broadly consistent per business line with that of the UK-based operating companies of BAM Nuttall and BAM Construct & Ventures although emissions results year do fluctuate considerably depending on the proportion of work being delivered in either discipline.

Upstream transportation and the use of gas oil and diesel used in the plant and equipment accounts for over 70% of the emissions in 2022. Upstream transportation is difficult to influence but there are examples of where the business has reduced its transport impacts by opting for more in the way of modular construction practices and optimised material handling. Implementing these ways of working also helps to reduce diesel and gas oil usage by way of an improvement in productivity.

To further reduce emissions from fuel use, the business is expected to switch to HVO biodiesel in 2023 which has 90%+ fewer carbon emissions than diesel or gas oil.

3. BAM Ireland carbon intensities are presented in GBP instead of EURO to remain consistent with BAM UK&I level disclosures. The relevant exchange rates have been applied to the annualised revenue data.



Emissions reporting and comparison to baseline

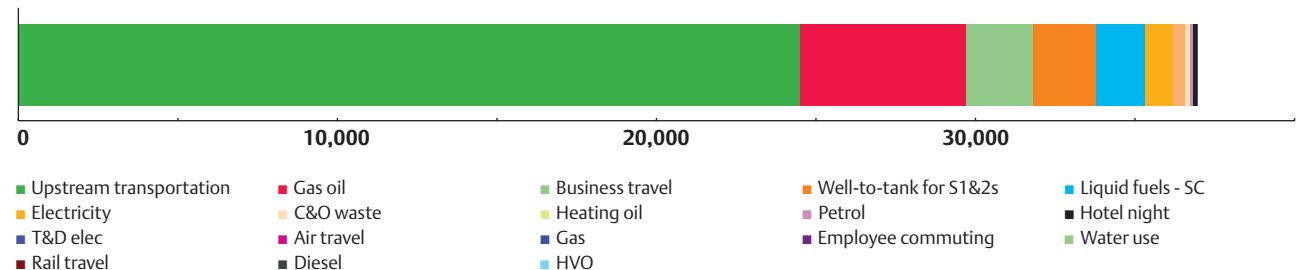
| Emissions scope | Baseline emissions 2015 | | 2022 emissions | | Variance | |
|--------------------------------|-------------------------|--------------------------------------|---------------------|-----------------------|-------------|-------------|
| | ktCO ₂ e | tCO ₂ e/£M ^[3] | ktCO ₂ e | tCO ₂ e/£M | Absolute | Intensity |
| Scope 1 | 7.01 | 20.27 | 7.63 | 12.86 | +9% | -37% |
| Scope 2 | 1.48 | 4.27 | 0.87 | 1.47 | -41% | -66% |
| Total S1 & 2 | 8.48 | 24.55 | 8.50 | 14.33 | +0% | -42% |
| Scope 3 | 18.53 | 53.62 | 28.70 | 48.38 | +55% | -10% |
| Total S1, 2 & 3 | 27.02 | 78.17 | 37.2 | 62.71 | +38% | -20% |
| <i>Out of scopes emissions</i> | - | - | - | - | - | - |

Table 4, Emissions inventory BAM Ireland 2015 and 2022

2022 scope 1 & 2 emission sources



2022 scope 1, 2 and 3 emission sources



BAM FM (UK)

BAM FM deliver a range of facilities management services to public and private sector clients in the UK. Some of the sites managed by BAM FM are part of a BAM PPP/PFI project and therefore will operate for in excess of 20 years. BAM FM provide energy management services to sites (including schools, hospitals, police headquarters and local authority buildings).

The use of diesel in company vehicles and the commercial van fleet account for over 80% of the emissions in 2022. Significant reductions have been made through the switching of diesel powered vehicles over to fully electric versions and it is expected that by 2030, the entire fleet of company and commercial vehicles will be fully electric. The remainder of emissions come from the fixed premises through electricity and natural gas use.

Emissions from waste and energy used at BAM FM operated sites are not included in our emissions footprint as they arise from our clients activities and are therefore outside of our reporting scope.

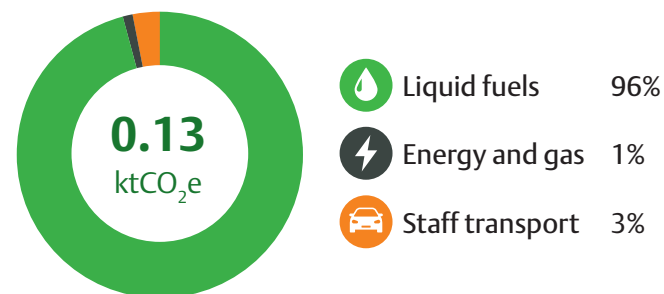


Emissions reporting and comparison to baseline

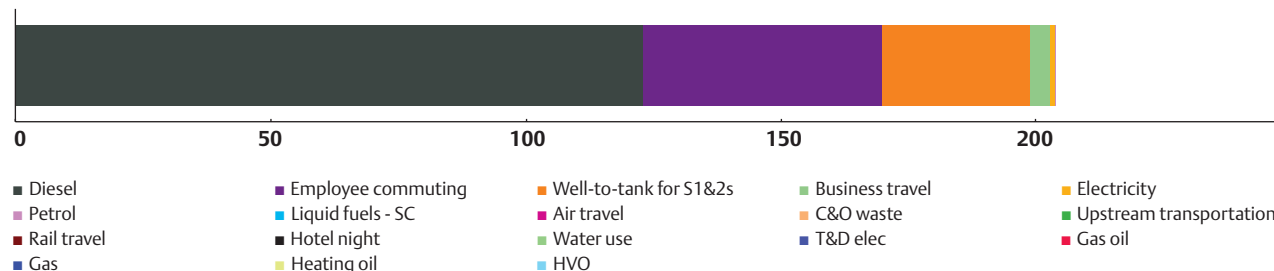
| Emissions scope | Baseline emissions 2015 | | 2022 emissions | | Variance | |
|--------------------------------|-------------------------|-----------------------|---------------------|-----------------------|--------------|--------------|
| | ktCO ₂ e | tCO ₂ e/£M | ktCO ₂ e | tCO ₂ e/£M | Absolute | Intensity |
| Scope 1 | 0.14 | 2.83 | 0.13 | 1.56 | ⊖ 11% | ⊖ 45% |
| Scope 2 | 0.00 | 0.00 | 0.001 | 0.01 | NA | NA |
| Total S1 & 2 | 0.14 | 2.83 | 0.13 | 1.57 | ⊖ 10% | ⊖ 44% |
| Scope 3 | 0.22 | 4.39 | 0.08 | 0.93 | ⊖ 66% | ⊖ 79% |
| Total S1, 2 & 3 | 0.37 | 7.21 | 0.20 | 2.51 | ⊖ 44% | ⊖ 65% |
| <i>Out of scopes emissions</i> | - | - | - | - | - | - |

Table 5, Emissions inventory BAM FM 2015 and 2022

2022 scope 1 & 2 emission sources



2022 scope 1, 2 and 3 emission sources



Data capture and carbon calculation

Carbon data management is complex with emissions originating from a large number of sources, activities and processes. Table 6 (overleaf) describes our approach and scope for each emissions inventory item including an indicative data uncertainty ranking (high, medium or low depending on our ISO14064 report) which applies across all BAM UK & Ireland operating companies.

Wherever possible, we collect activity data at its most granular – often from transaction level goods and services reports, to ensure we are using the best quality and most accurate sources of data. Where we are unable to obtain supplier data, nominated individuals complete data returns via app-based measurement tools, BAMSite, BAM Smart and Microsoft Forms. All 3 tools perform the same function in enabling a seamless digital interface in which users can enter their data whenever activities take place. For example, when a waste transfer or material delivery occurs, an entry is made to the tools and the data is automatically sent to the central database. The reason 3 tools exist is due to the fact that each of the major operational companies in the UK and Ireland (BAM Nuttall, BAM Construction & Ventures and BAM Ireland) prior to the formation of BAM UK & Ireland all had their own approaches. In 2023 we are working towards streamlining our site-based data capture tooling so that all entities across UK and Ireland use a common platform.

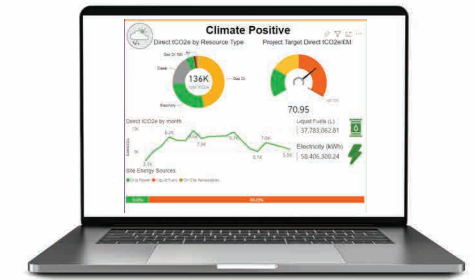
When we work in joint venture with other companies, we report the equity share of carbon emissions as given in the commercial terms for each partner within the joint venture.

The application of carbon data is made in line with the most reliable and robust emissions factors or each emissions inventory item. Primarily, this entails the use of the DEFRA carbon emissions conversion tables which are published and updated annually. A portion of our emissions are calculated using bespoke methodologies. For example, for staff transport in road vehicles, we calculate emissions using the specific vehicles data, therefore we are able to calculate a more accurate total than we would if using the DEFRA tables alone.

Carbon data assurance

Our carbon data is externally verified twice annually at corporate level in line with ISO14064:2018 under the Carbon Reduce scheme and the GHG protocol as part of our parent companies annual integrated reporting. Both our auditors, Ernst & Young and Achillies have praised our approach to carbon management and ensures that our carbon data is of high quality. At project level, we undertake detailed carbon audits which support our compliance with ESOS legislation and gives our projects targeted guidance on how they can reduce carbon specific to their situation.

Both our auditors, Ernst & Young and Achillies have praised our approach to carbon management and ensures that our carbon data is of high quality.



Our focus on capturing data at a granular level has enabled greater insights into our footprint and gives us the ability to take more meaningful and targeted actions to improve performance. We publish carbon and sustainability performance to all our stakeholders via power BI.

| Emissions inventory item | Unit of measure | Carbon conversion factor source | Primary data source | Data type | Data Uncertainty | Emissions Scope | Comments |
|--|-------------------------|---------------------------------------|--|------------|------------------|-----------------|--|
| Liquid fuels; Gas Oil, HVO, Diesel, Petrol, LPG, Natural Gas | Litres | DEFRA <appendix link> | Supplier transaction reports | Measured | ● | 1 | Liquid fuels are supplied via preferred suppliers from which we receive transaction reports on a monthly Fuel purchased basis. This covers direct purchases only. |
| Business travel in company vehicles | Miles | Based on actual vehicle CO2 emissions | Company expense returns | Measured | ● | 1 | Staff transport in company vehicles is captured via the central expenses reporting systems. The carbon emissions are calculated based on the total distance travelled multiplied by the average carbon emission factors of our fleet vehicles as given by the manufacturer. |
| Electricity | kWh | DEFRA <appendix link> | Energy supplier transaction reports | Measured | ● | 2 | Electricity data is obtained from our electricity providers energy reports on a monthly basis. Energy provided by third parties is captured at project level and submitted via our in-house measurement tool. |
| Waste | Tonnes | DEFRA <appendix link> | Project level submissions via applications | Measured | ● | 3 | Waste transactions are captured at site level where data is entered in to the appropriate application for each company. |
| Employee commuting in private vehicles | Miles | Based on actual vehicle CO2 emissions | Company expense returns | Measured | ● | 3 | Staff transport in private vehicles is captured via the central expenses reporting system. The carbon emissions are calculated based on the total distance travelled multiplied by the average carbon emission factors of privately owned vehicles as given by the manufacturer |
| Staff transport via Air, Rail and Sea | Miles | DEFRA <appendix link> | Company travel providers database | Measured | ● | 3 | BAMs travel provider collects all data from employees using rail, air or sea travel. Reports are collected every month with additional data coming from our expenses system. |
| Hotel accommodation | number | DEFRA <appendix link> | Company travel providers database | Measured | ● | 3 | BAMs travel provider collects all data from employees using accommodation services. The number of nights in Hotels is reported each month using the suppliers portal. |
| WTT emissions associated with Scope 1 & 2 emissions | As per emissions source | DEFRA <appendix link> | Calculation applied to primary data | Measured | ● | 3 | WTT emissions are calculated against our measured scope 1 & 2 emissions sources using the DEFRA conversation factors. |
| Upstream transport of purchased goods and services | Financial indicator | Bespoke | Bespoke | Calculated | ● | 3 | Upstream transport of goods and services is calculated by applying average haul distances to existing procurement data and supplier transaction reports to determine a total haulage distance from which carbon emissions can be determined. This is then converted into a bespoke financial conversion factor and applied to each entity. The updated methodology has been applied retrospectively to our previous years. |

● High ● Medium ● Low

| Emissions inventory item | Unit of measure | Carbon conversion factor source | Primary data source | Data type | Data Uncertainty | Emissions Scope | Comments |
|--|-----------------|---------------------------------|--|------------|------------------|-----------------|--|
| Downstream transport of purchased goods and services | n/a | n/a | n/a | n/a | n/a | 3 | Our business does not have any emissions for this category and as such is exempt from our inventory. |
| Third party procured fuels | Litres | DEFRA <appendix link> | Calculation applied to partial Project level submissions | Calculated | ● | 3 | Third party procured fuels are reported in the BAM Construct and Ventures business via the BAM Smart application. Using this data, a calculation has been derived to estimate the total emissions from this category across all BAM UK & Ireland companies. |
| Water | m ³ | DEFRA <appendix link> | Project level submissions via applications | Measured | ● | 3 | Water data is captured via meter readings and entries made to our above mentioned applications. |
| Biogenic emissions | Litres | DEFRA <appendix link> | Supplier transaction reports | Measured | ● | 'out of scopes' | Biogenic emissions from the use of biofuels (HVO) are disclosed but not deemed a net contribution to GHG emissions as per the definition given in the GHG protocol. |
| Purchased goods and services | | | | | | | For these remaining scope 3 emissions categories, we are in the process of refining a methodology, and whilst we have secured many of the primary data sets, they are not yet robust enough to enable a confident disclosure. BAM UK & Ireland and its subsidiaries intends to include insights on these categories in future years. |
| Use of sold product | | | | | | | |
| Cloud computing | | | | | | | |
| Home working | | | | | | | |

Table 6, emissions sources data collection, exclusions and calculation rationale

Emissions Reduction Targets

BAM UK & Ireland is committed to achieving net zero carbon by the end of 2026 from activities arising from its own operations, and inclusive of all, fuels, energy and staff transport used to deliver our projects. Underneath this overarching objective, we have several targets which are listed in table 7 and apply equally to all operating companies within the division.

Carbon reduction target



Reduce scope 1 and 2 GHG emissions intensity by **50%** by 2023.
Reduce scope 1 and 2 GHG emissions intensity by **80%** by 2026.

Performance in 2022



We reduced our scope 1 & 2 CO2 emissions intensity by **48%** compared to 2015 levels.



Reduce absolute scope 3 GHG emissions by **50%** by 2030.



Compared to 2015, we have seen an increase in our disclosed scope 3 emissions of **16%** since 2015. However, this doesn't yet include all scope 3 categories (such as purchased goods and services, and use of sold product) and are highly correlated to the type of work BAM undertakes year to year. On an intensity basis however, we have seen our disclosed scope 3 emissions reduce by **15%** compared to 2015 levels.



Reduce GHG emissions intensity from commercial fleet and staff transport by **30%** by 2023.



Commercial fleet and staff transport was **29%** lower than 2015 levels with the most significant reductions seen in air and rail travel due to the impact of Covid-19 restrictions. We estimate that around **15%** of the overall reduction in travel emissions is attributed to improvements in vehicle efficiency and reduced mileage.

Table 7, Schedule of carbon reduction targets

Progress against our net zero strategy

Our net zero decarbonisation pathway shown in figure 2 illustrates how we plan to reduce emissions - ultimately towards net zero carbon by the end of 2026. Our net zero carbon target covers the breadth of our direct emissions including, liquid fuels, electricity, natural gas and staff transport in company vehicles. We have chosen to include location-based carbon emissions for our electricity use in line with our ISO14064 certified emissions inventory. In addition to direct scope 1 and scope 2 emissions, we also include the scope 3 staff transport emissions associated with private vehicles, rail and air travel, and extending further to emissions from hotel usage, third party procured fuels and the well-to-tank emissions associated with fuel and energy consumption. The pathway in figure 2 shows where the emissions reductions will occur and also shows the residual emissions reductions to be achieved through credible and robust carbon offsetting measures.

2022 saw direct emissions drop from 2021 levels and continue to trend downwards in alignment with our net zero pathway. The total litres of liquid fuels used increased

however due to a greater proportion of earthworks schemes compared to the previous year, however the resultant rise in emissions was abated thanks to the increase in the use of Hydrotreated Vegetable Oil (HVO), a fuel derived from waste cooking oil and is >90% reduced whole life carbon emissions compared to diesel. In 2022 the use of this fuel mitigated 6.7ktCO₂e across the division.

We saw continued reductions in transport emissions despite actual mileage travelled returning to near pre-covid levels. Besides ongoing working from home arrangements for some, the switch to full electric company vehicles is having a notable impact in reducing emissions with over 40% of all company cars now fully electric.

The spike in emissions from electricity in 2021 was from electricity used on our tunnelling project in Brisbane (Australia) but has since reduced owing to the tunnelling phase of that project coming to an end. However, we do expect actual electricity usage to increase over time as more and more of our vehicles and site plant and equipment being moving to electric-based systems. Resultant emissions

however should continue to decline owing to continued rapid grid decarbonisation. This explains why emissions from electricity do not decline as quickly as other emissions sources.

Moving forwards we are confident that emissions will continue to fall sharply due to ongoing remote working practices, our electric vehicle transition, continued use of fossil fuel alternatives such as HVO along with introduction of electric-based solutions and more efficient construction practices. Longer term we expect hydrogen-based plant and equipment to become more widely available and we will seek to adopt those technologies at the earliest opportunity.

BAMs position on the use of biofuels

Since mid 2021, BAM declared that it would begin to switch the use of diesel and gas oil in favour of the biofuel Hydrotreated Vegetable Oil (HVO) as a transitional step towards hydrogen and electric driven equipment. At that time we undertook a thorough review of its suitability and were were satisfied that the fuel did not result in adverse environmental effects either directly or indirectly. This led to us successfully switching almost a quarter of our fuel in 2022 mitigating 6.7ktCO₂e of scope 1 emissions from our operations. However throughout 2022 and into 2023, concerns surrounding the indirect land use change effects of scaling up the use of biofuels have been raised, particularly those sourced from outside the EU. The primary concern is that there is a potential for unsustainable land use practices to occur (i.e. de-forestation) due to the increasing demand for biofuel feedstocks. This prompted us to undertake further due diligence to better understand the risks and resulted in the publication of a position paper. This position paper outlines BAMs reasoning for using biofuels as part of its decarbonisation strategy making it clear that the role of biofuels will be carefully monitored and treated as a transitional fuel towards fully electric and hydrogen-based solutions to power our operations.

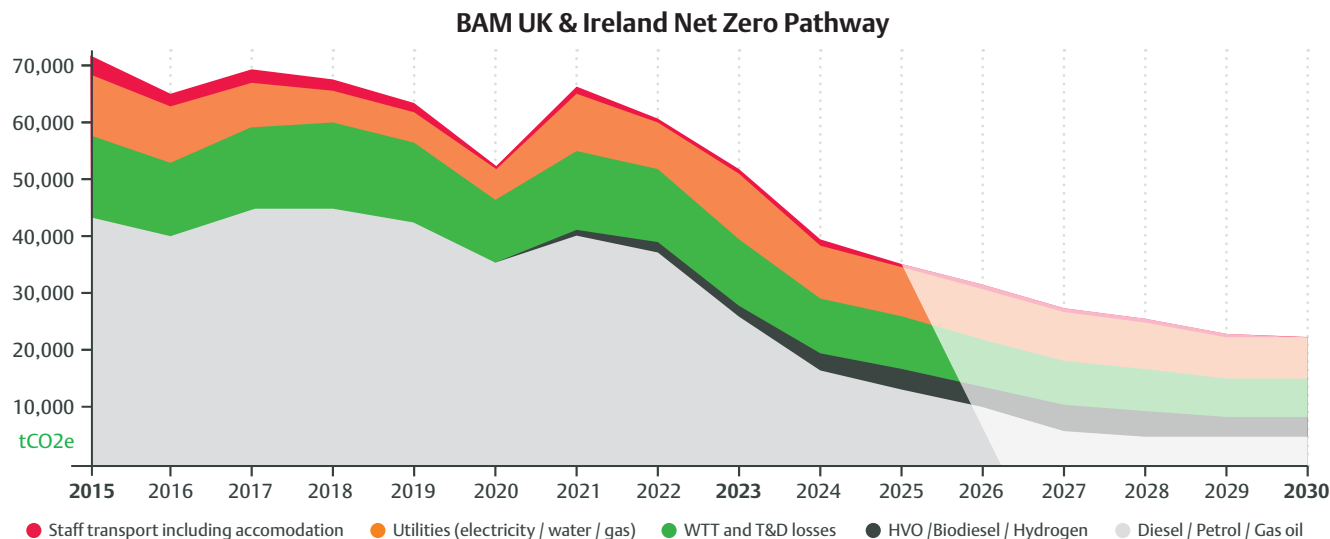


Figure 2, Net Zero Carbon reduction pathway by emissions source

Direct emissions reduction projects (scope 1 and 2)

We have taken consistent action to decarbonise our activities over the past decade and always strive to undertake work in using low carbon solutions. Each intervention we make to reduce carbon is captured and in 2022, we documented over 100 individual actions that led to an absolute carbon reduction in excess of 25,000tCO₂e. The following are examples that made a notable contribution to our carbon reduction efforts in 2022.



GAP supplied Ecosmart Zero Hydrogen welfare cabin at the Glasgow BGS project



Geopura HPU delivery to the EKFB joint venture



Hydrogen

Hydrogen has long been touted as a fuel for the future and in recent years there have been many positive developments supporting the use of this energy vector both from government policies and private sector investments making it more tangible than ever. In 2020 BAM used its first hydrogen powered welfare unit known as the Ecosmart Zero. This unit comprised a small hydrogen fuel cell, solar PV and batteries to provide a complete and portable energy solution for small welfare set ups. The use of this was successful and resulted in a reduction of several tens of tonnes of carbon emissions, but scaling these has been challenging due to market supply and demand.

In 2022, BAM in conjunction with its JV partners for the HS2 C2/3 main works project, put a proposal together for the use of a much larger hydrogen power solution,

again utilising fuel cell technology to power site accommodation and welfare. This business case has since been approved, and in 2023 two 250kVa Hydrogen Power Units (HPU's) from Geopura will be operational at two of the 6 main compounds for the project. Their substantial size means they are expected to generate a carbon reduction of approximately 600tCO₂e/annum and supports further proliferation of hydrogen powered equipment in the future.

To further drive the adoption of hydrogen, In 2022, BAM was successful in securing government match funding under the Red Diesel Replacement competition (RDR) to undertake a feasibility study into how BAM could generate its own supply of green hydrogen. This first phase of the scheme concluded in early 2023, and due to the limitations on installing on-shore wind power generation in England, we concluded that the case to make our own hydrogen at

this time wasn't viable. However, in 2023 we have entered into the 2nd phase of the RDR competition in which we have been successful again and are instead focussing on the logistical aspects of using hydrogen including transport, storage and on-site application of hydrogen in all non-road mobile machinery (NRMM).

In 2022, BAM was successful in securing government match funding under the Red Diesel Replacement competition (RDR) to undertake a feasibility study into how BAM could generate its own supply of green hydrogen.



22t Hybrid excavator in action at the M8 footbridge scheme



45kVa solar pod at the Stubbington Bypass project



BAM FM fully electric van



EV's in use at the Leeds FAS project

Hybrid plant

Earthworks are a common activity on many of our projects and by virtue of this the carbon impact is high. Large excavators are commonly employed to undertake this activity and can use upwards of 25 litres of diesel per hour. In 2022, we deployed hybrid excavators on several projects which incorporate a combined battery and kinetic energy recovery system resulting in fuel savings. Across their use and coupled with HVO fuel use we estimated a carbon reduction of 60tCO₂e has been achieved over the course of the year.

Off-grid renewable power

Each project we undertake requires varying levels of welfare facilities and office space to enable safe places for staff to rest, eat, wash, store equipment and work from. The aim on every project is to power these temporary buildings with grid electricity, avoiding the use of diesel generators. Where grid connections are not practical, we turn to off-grid alternatives such as solar, battery storage and even hydrogen to deliver low or zero carbon power solutions. In 2022, we utilised over 20 Solarpods or their equivalents across the business mitigating emissions by using solar panels and batteries. The combined, use of these solar solutions in 2022 has resulted in a carbon reduction of over 1ktCO₂e

Electric vehicle transition

In 2021, BAM made changes to its company car policy and eliminated combustion engine only vehicles from the list entirely. Since the introduction of this policy, over 400 EVs have been brought into the company fleet displacing fossil fuel powered equivalents. This has resulted in a carbon reduction of approximately 200tCO₂e in 2022 with reductions expected to accelerate further in 2023 and beyond. Due to the implementation this policy, BAM's fleet will be fully transitioned away from combustion engine only vehicles by 2026.

Within the BAM Construct and Ventures business, they have established an EV charging business known as BAM Charging Solutions and are working hard to ensure every project and office has the facility for EV users to recharge their vehicles. The company also supports staff opting for an EV with a financial subsidy to install charge points at their home. Furthermore, employees on car allowance receive a 20% uplift if they opt to purchase an EV privately.

Within our commercial fleet of LGV's the FM business unit has committed to transitioning all of it's vans to full battery electric by 2026 with 30% of those being transitioned in 2023. The implementation of these alone in 2023 will save approximately 70tCO₂e/annum.

At the end of 2022, over 40% of our entire company car fleet has moved to battery or hybrid electric types mitigating approximately 200tCO₂e

Embodied and operational carbon (scope 3)

The creation, maintenance and renewal of the built environment accounts for some 40% of global GHG emissions. Therefore BAM has a key role to play in minimising emissions from not only from its direct impacts, but its indirect impacts as well through the materials we use to the operation and maintenance of assets. BAM UK & Ireland has long supported clients to reduce the carbon impact of their buildings and infrastructure and is committed to supporting them to achieve whole life net zero carbon assets in the future. Below are several examples of where BAM has made substantial carbon reductions in this area.



Plaza Cinema steel recycled locally from demolition work into new steel

Low carbon steel

In 2022 the grade II listed and derelict Plaza Cinema in Port Talbot was renovated by BAM after being disused since 1999. The scheme involved the demolition and renewal of a large steel trussed roof which ordinarily would have involved the removal of the steel and the procurement of new steel trusses from abroad. However, BAM identified an opportunity to work with the Celsa steel works also located in Port Talbot, to receive the scrap steel trusses and remanufacture the steel into new reinforcement bar to be used on the scheme. In doing this, the project was able to demonstrate a 32tCO₂e saving and also demonstrate key principles of PAS 2080 concerning the use of lower carbon alternatives and collaboration with the supply chain.



Stourton park and ride, Leeds

Zero operational carbon assets

In 2022, BAM completed the Stourton Park and Ride scheme in Leeds, a new park and ride facility that incorporates a 1.2MW solar PV array and 500kW battery storage system. This flagship scheme is the first fully solar-powered and zero operational carbon park and ride in the UK and will mitigate at least 471tCO₂e annually. A similar venture which BAM has had a long term involvement with is the Wharfedale Hospital in Leeds. BAM constructed the hospital in 2004 and have been managing the asset for the NHS ever since. In 2023, BAM was successful in delivering a substantial solar PV solution to decarbonise the hospital towards fully net zero in operation. BAM installed 464kWp PV array on car parking canopies similar to the approach used at the Stourton Park and Ride scheme. This will generate a carbon reduction of 169tCO₂e/annum displacing the use of gas boilers.



3D render of Southam College

Passivhaus construction

BAM is delivering Southam College for the Department for Education (DfE) to create a pathfinder college, which will be used to set the standard for how schools are built in the future. The college is designed to use minimal energy in operation and achieve net zero carbon in use, as well as adopting passive and biophilic design elements. It will also be designed for climate resilience and to support end user health and wellbeing. Going beyond DfE's target to measure embodied carbon at RIBA Stage 4 and 6, BAM assessed embodied carbon from RIBA Stage 3 and has targeted an as built impact of 550kgCO₂e/m², aiming to save 831 tCO₂e from the assessed baseline.



EQ in Bristol

Design for performance

We are increasingly working with clients to take a design for performance approach to new building and refurbishment projects. This is a crucial step for the industry to take, where focus shifts from only meeting building regulations compliance, towards taking full account of all the energy buildings use over their lifetime. This also extends to better understanding of how buildings perform in use, working with clients and end users to optimise performance over time.

EQ in Bristol, is a design for performance project. Being delivered for developer CEG, the BREEAM Outstanding building will be able to operate with net zero carbon emissions over its life. Enhanced energy modelling has been carried throughout the design and construction process. The building will be all electric, utilising heat pumps and onsite Solar PV.



Trains used to transport aggregate on the HS2 C2/3 joint venture

Reducing upstream transportation

Upstream transportation is the largest component to our total disclosed emissions in 2022 and it is one of the most challenging to influence. None the less, our efforts to reduce this impact consider many aspects such as; using local supply chains, reducing overall material consumption and opting for alternative modes of transport. The latter often yields the largest carbon reduction and there have been several examples of where BAM has made a conscious choice to opt for these alternative. For example, movement of steel piling on our marine projects often utilises barges instead of trucks which is more efficient and much lower in emissions. Movement of spoil and aggregates are also a key focus in the pursuit of lowering transport emissions. In 2022, the HS2 C2/3 main works project successfully moved 1 million tonnes of aggregate using the rail network saving over 10ktCO₂e emissions, and taking over 100,000 trucks off the roads greatly lessening local air and noise pollution.



Ultra low-carbon concrete being placed at the Dawlish sea wall project

Low carbon concrete

BAM championed the use of low carbon concrete and was instrumental in supporting the Environment Agency's mandate to use low carbon concrete. Throughout 2022, use of Low carbon and ultra-low carbon concretes has begun to increase, and we are now able to benchmark our progress using the ICE's low carbon concrete roadmap. The roadmap sets out a clear grading scale from A – G making it easier for us and the wider industry to understand where to focus its decarbonisation efforts within concrete. One of BAM's largest uses for ultra-low carbon concrete in 2022 was the Dawlish Sea Wall project. The £80M scheme is to replace a large stretch of sea wall protecting the town of Dawlish and the Great Western Railway line from flooding. The project involved mass fill of concrete between the new and old walls, with the project team opting for in excess of 20,000M³ of ultra-low carbon concrete delivering a carbon saving of over 2,000tCO₂e.



Cheshire police HQ

Carbon reduction in existing buildings

Our BAM FM business manages energy and building services for a growing number of clients. As standard, all BAM FM sites install BAM's own digital energy monitoring and targeting systems, providing real time data on energy consumption. Each site has a sustainability management plan, and our energy managers assess opportunities for improvement. Lighting has been a key area of focus and between 2018-2020, we have retrofitted client buildings with modern LED lighting and controls. At our Cheshire Police HQ, we saved 1,000,000kWh's per annum (20% of site total energy consumption), at Redcar Council Offices we saved 85,000kWh's per annum (30% of site total) and at Redcar Seaford House, we saved 70,000kWh's per annum (40% of site total).

Our BAM FM business help clients to improve the energy efficiency of existing buildings and unlock much needed investment and capital to fund energy.



Digital machine control helps optimise material handling avoiding over-digging



Installation of the 3D printed concrete staircase at M8 footbridge



Render of the Waterford public infrastructure project



Render of Sky studios

Reuse of demolition and excavation materials

Demolition and earthworks on all BAM projects are always optimised to reuse as much of the existing material as possible thus ensuring costs and carbon are kept to a minimum. However, it isn't always possible to reuse existing material due to its suitability as structural fill or landscaping. In many cases, this means we need to both dispose of unsuitable material and import new material increasing the cost and carbon of a project.

The M8 footbridge scheme in Glasgow exemplifies BAM's approach to improving direct reuse of these materials. The project demonstrated a 359tCO₂e saving through several excavated material optimisations including, reprocessing and reusing demolition arisings from the old bridge on site, direct reuse of 50,000t of material within the landscaping and avoiding 20,000t of double handling of material by optimising the projects work flow and layout.

3D printed concrete

Also in relation to the M8 footbridge scheme was the installation of the UK's largest use of 3D printed concrete. BAM has been heavily involved in the development of 3D printed concrete over the past few years and has taken the opportunity to utilise it on some projects for applications such as access stairs and culvert head walls. The latest example at the M8 footbridge scheme used 28 sections each weighing 1.5t which is 40% less than traditional pre-cast alternatives. This in turn saved approximately 3tCO₂e and further reduced emissions for the installation team as they were lighter thus requiring smaller lifting equipment.

Applying PAS 2080 principles

BAM has recently started work on the €170m Waterford North Quays Public Infrastructure Project, which includes a new transport hub and a sustainable transport bridge that will connect the city's relocated train station with so called 'greenways'. On this project, we will make use of low carbon steel in bridges, use low carbon concrete throughout the works and use local suppliers. PV panels have also been installed on the temporary project office and car charging points are also in place for staff travelling to site using electric vehicles. The carbon savings have yet to be quantified, however it is a project that demonstrates the principles of PAS 2080 are being applied at every stage of this scheme.

Another scheme demonstrating a whole project approach to decarbonisation was the Sky Studios project in Elstree, London. Working with developer Legal and General and Sky, the project is aiming to be the most sustainable film studios in the world. BAM helped develop the sustainability strategy for the project which aims to

minimise carbon emissions as far as possible. All buildings on the site will be fully electric and use air source heat pumps for all heating and cooling. Energy demand has been driven down below building regulation requirements and an extensive onsite solar PV installation will provide over 20% of energy requirements.

Embodied carbon has been assessed from RIBA Stage 2 with a target of 15% reduction. Following BAM's involvement from RIBA Stage 3 and by end of RIBA Stage 4, a 24% reduction in embodied carbon had been achieved, totalling 12,300 tCO₂e. A significant proportion (11%) has been achieved through redesign and optimisation of structures across the site.

Declaration

This Carbon Reduction Plan has been completed in accordance with PPN 06/21 and associated guidance and reporting standard for Carbon Reduction Plans.

This plan applies to BAM UK & Ireland including all of its subsidiaries as follows; BAM Nuttall Ltd and its subsidiaries, BAM Construct & Ventures Ltd and its subsidiaries, BAM FM Ltd, BAM Ireland Ltd and its subsidiaries, Broadland Environmental Services Ltd, BAM Rail M & E Ltd and BAM International Australia Pty Ltd.

Emissions have been reported and recorded in accordance with the published reporting standard for Carbon Reduction Plans and the GHG Reporting Protocol corporate standard^[4] and uses the appropriate Government emission conversion factors for greenhouse gas company reporting.^[5]

Scope 1 and Scope 2 emissions have been reported in accordance with SECR requirements along with a subset of Scope 3 emissions as required by the reporting standard for Carbon Reduction Plans and the Corporate Value Chain (Scope 3) Standard.^[6]

This Carbon Reduction Plan has been reviewed and signed off by the board of directors at BAM UK & Ireland and will be reviewed annually.

Signed on behalf of BAM UK & Ireland Ltd:



John Wilkinson
Chief Operating Officer
BAM UK & Ireland

4 September 2023

4. <https://ghgprotocol.org/corporate-standard>

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

6. <https://ghgprotocol.org/standards/scope-3-standard>