AD NET ZERO

THE GLOBAL MEDIA SUSTAINABILITY FRAMEWORK

OOH Implementation Guide

Introduction

For more context on the development of this Out-Of-Home (OOH) Implementation Guide, and on the concept of data guidance more generally, please see the GMSF Playbook. This Implementation Guide has been developed and refined based on lessons learned from our OOH Data Guidance working group, which involved many OOH stakeholders (see the following page), ensuring workflows reflect current best practices.

Digital was the first channel to have data guidance within the GMSF, and as a result, is further ahead of other channels in its development. The practical implications of this are that GMSF users might notice differences in the appearance of Digital formulae, compared to other channels such as TV, OOH, and Print. It is the intention of the GMSF team in future versions to update all formulae to match the Digital format, and in doing so improve consistency and simplicity for users.

This document includes specific guidance for Classic OOH, as well as Digital OOH. Please see the links below to navigate to the relevant section.

- Classic OOH Implementation Guidance
- Digital OOH Implementation Guidance

WORLD OUT OF HOME ORGANIZATION

How did we construct this Implementation Guide?

With the support of the World Out of Home Organisation (WOO) and its members, Ad Net Zero led industry discussion on OOH data guidance. The work began by analysing the OOH channel emissions workflow and formulae from v1.2 of the Global Media Sustainability Framework and identifying areas for improvement - sections where methodological adjustments and additional guidance and/or data were required to meet objectives for the standard. This group compiled the following proposals over the course of several months.

Ad Net Zero engaged external technical experts and industry participants to validate the proposed data guidance. All industry data received was aggregated, anonymised, and processed independently by Ad Net Zero to ensure no company-specific operational data is disclosed. Individual participants did not have access to each other's data contributions, and no individual company information influenced the final factors. The feedback received was then used to further refine the proposals, before undergoing Steer Team and Climate Science Expert Group review. The Ad Net Zero team intends that this data guidance will continue to evolve in the years ahead as our understanding grows and more data and further contributions are received.

Contributors to the OOH Implementation Guide include:

51toCarbonZero. · Alight Media · Bauer Media Outdoor · blowUP media · Broadsign · bynd · WPP

CARBON QUOTA · Cedara · DAKTRONICS · dentsu · DIMPACT · DK · GARLAND TECHNOLOGY · TALON_

global · Good-Loop · HAVAS · impact Plus · JCDecaux · LVMH · NET ZERO MEDIA · Scope3

North Star SUSTAINABILITY · OCEAN · OMA · OMNICOM · Posterscope · ppa · outdoorlink · OUTSMART · PUBLICIS GROUPE

Important notice for users

While the GMSF is a voluntary framework, organisations should implement it in compliance with applicable competition and antitrust laws in their jurisdictions.

Specifically, organisations should be aware that:

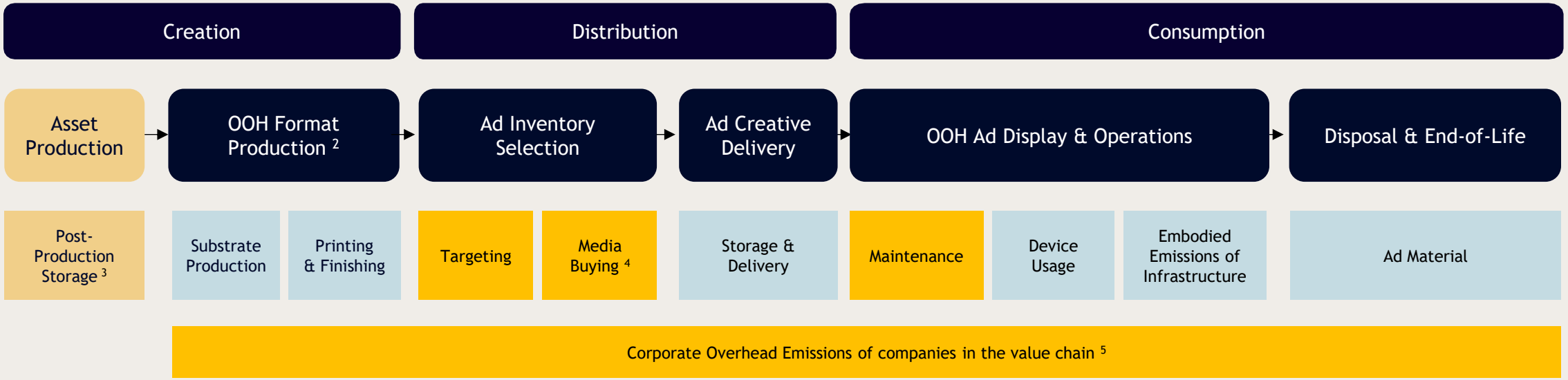
- Implementation should remain independent. Competitors should not coordinate or align their approaches with each other.
- Sensitive commercial information should not be exchanged in the context of GMSF implementation.
- Any data-sharing mechanisms should be structured to prevent coordinated purchasing or supplier discrimination.
- Organisations should consult legal counsel if GMSF implementation raises competition law questions.
- Organisations are solely responsible for ensuring their use of this framework complies with all applicable laws.
- Adoption of the GMSF does not preclude or discourage the use of alternative emissions calculation methodologies.
- Corporate Overhead data sharing: When sharing Corporate Overhead Emissions data with counterparties (buyers, sellers, or third parties), organisations can individually disclose aggregated emissions data suitable for their specific reporting purposes.

This Implementation Guide provides methodologies for calculating OOH campaign emissions. It does NOT require organisations to:

- Contribute operational or financial data to a central GMSF repository.
- Share campaign-specific inputs (number of placements, surface area, material specs) with competitors or third parties.
- Mandate disclosure of internal calculations or allocation methodologies to external parties.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Classic OOH Channel Emissions Workflow footnotes

[1] Transit refers to ad formats that are not in one fixed location, such as Bus wraps, Bus supersides, Bus t-sides, Taxi wraps and train panels.

[2] Classic OOH Format Production is dedicated to a single campaign (e.g., the creation of ad campaign specific posters). To keep Classic OOH consistent with the Print process, Classic OOH Format Production is considered in the Creation phase for Classic OOH.

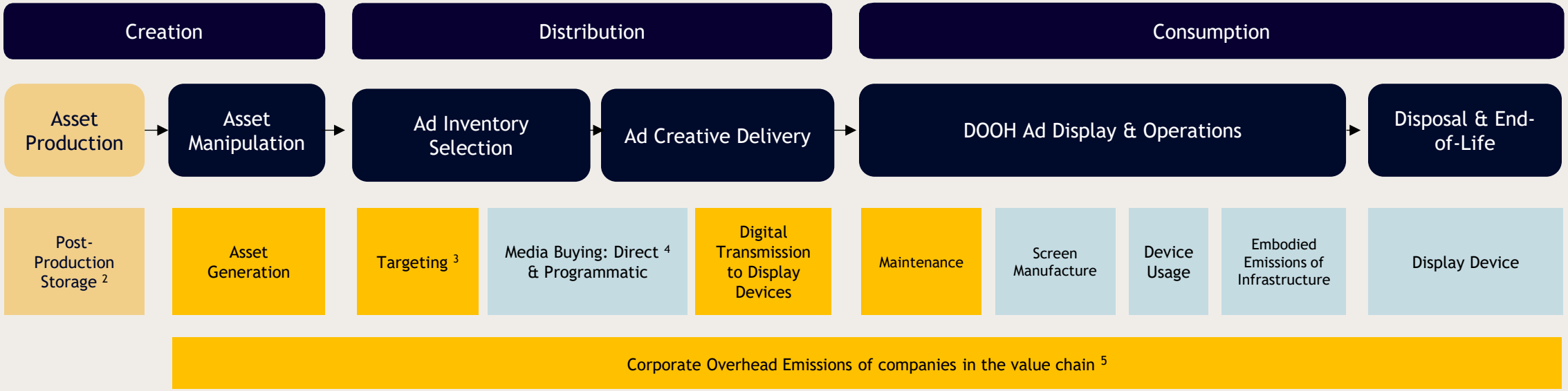
[3] Previously included but now out of scope due to advertising production specific frameworks and calculator tools including these emissions. See the GMSF Playbook for further information.

[4] Media Buying refers to the process of a media buyer purchasing ad inventory with a media owner. Targeting and Media Buying should be included in the corporate overhead emissions allocation methodology (see footnote 5) as these practices can vary widely and are more easily estimated via the corporate overhead methodology.

[5] Corporate Overhead Emissions should cover the emissions from the Targeting and Media Buying steps, as well as overhead functions not allocated to specific campaigns, such as the ongoing maintenance of screens and sites, and the installation of ad formats. Other non-channel-specific corporate overhead activities include marketing/sales, client support teams, business travel, HR, legal, accounting and product development, which is particularly important in the AI era.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



Digital OOH Channel Emissions Workflow footnotes

[1] Transit refers to ad formats that are not in one fixed location, such as Bus wraps, Bus supersides, Bus t-sides, Taxi wraps and train panels. Whilst in many cases and in many markets, these are not digital formats, we recognise that the technology and the feasibility of this does exist and could be more commonplace in the future.

[2] Previously included but now out of scope due to advertising production specific frameworks and calculator tools including these emissions. See the GMSF Playbook for further information.

[3] Targeting should be included in the corporate overhead emissions allocation methodology (see footnote 4) as these practices can vary widely and are more easily estimated via the corporate overhead methodology.

[4] Media Buying: Direct should be included in Corporate Overhead Emissions as part of the Ad Inventory Selection process (see page 51).

[5] Corporate Overhead emissions should cover the emissions from the Targeting and Digital Transmission to Display Devices steps, as well as overhead functions not allocated to specific campaigns, such as the maintenance of screens and sites, and the installation of ad formats. Other non-channel-specific corporate overhead activities include marketing/sales, client support teams, business travel, HR, legal, accounting, and product development, which is particularly important in the AI era.

A note on operational formulae

Monetary emission factors

When activity data is unavailable or incomplete, GHG emissions can be estimated by voluntarily applying monetary emission factors (EF) to financial spend, converting expenditure directly into kgCO2e. This approach requires no granular data collection and can cover a broad scope rapidly. However, it comes with a significant limitation: monetary EFs are averages, calibrated at sector or industry level. They do not reflect the specific conditions of a given workflow, supplier mix, or operational context — and therefore cannot support a step-by-step emissions breakdown across the value chain.

The intention is to update Level 0 by introducing spend-to-usage conversion factors by format, enabling a more granular estimation. As with all aspects of the GMSF, use is voluntary and on an individual company basis.

When this approach is used, the emissions can be calculated as follows:

$$\text{Step(s) Covered}^{1}\ \text{Emissions} = \text{amount\_spent}^{2}_{\text{channel}}\ \text{(local currency unit)} \times \text{EF\_spend}_{\text{channel}}\ \text{(kg CO2e / local currency unit)}$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

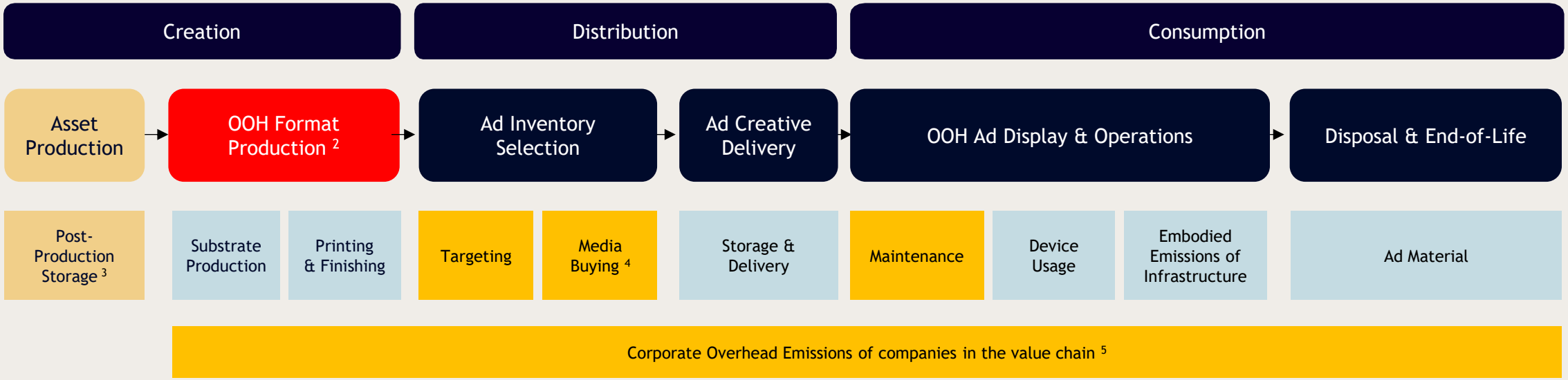
[1] Steps covered by this formula depend on the sectoral and supply chain scope of the monetary emission factor applied. A broader EF scope may substitute multiple activity-based calculations across the workflow.

Classic OOH

Defined as any non-digital OOH screen, such as a static, rotating, or scrolling poster or a billboard

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

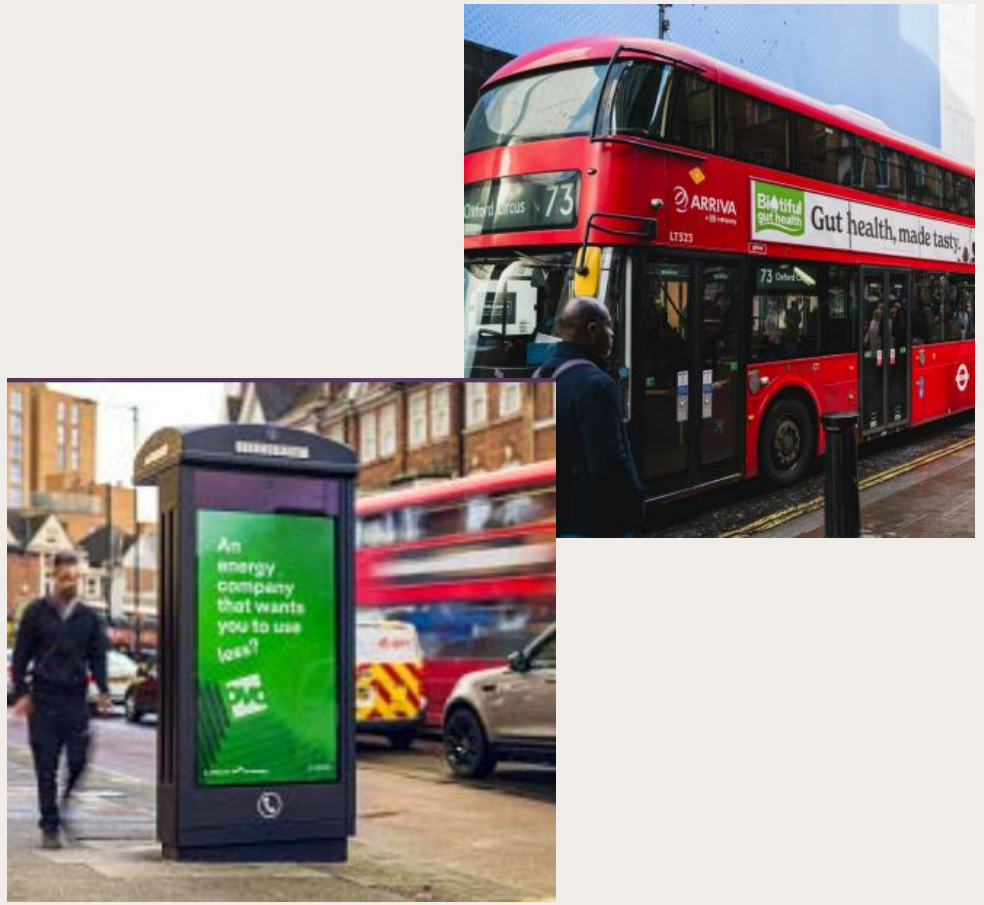
Step context

Out-of-home (OOH) advertising refers to any visual marketing strategy that reaches consumers outside their homes, targeting them in public spaces, transit areas, or commercial environments. Classic OOH refers to any non-digital OOH screen, such as a static poster or billboard as listed below.

Common Classic formats (excluding digital OOH formats) include:

- **Posters and Wallscapes**: Printed on paper, fabric, or mesh, and affixed to walls or buildings for urban visibility.
- **Billboards**: Large, static displays along highways or urban areas, often made from vinyl.
- **Transit Ads**: Advertisements on buses, trains, or taxis, typically printed on paper, vinyl, or adhesive materials.
- **Street Furniture**: Ads on bus shelters, kiosks, or benches, typically printed on paper.

There is currently no universal list of formats, as variations differ widely across markets and many formats are bespoke or highly specialised. However, several commonly used materials have been identified, including paper, polyester, vinyl, and polyethylene.



Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

Operational formulae

Intermediate calculation (composite EF):

For type of format with different raw materials produced in a given country, apply for each format, based on the list of materials:

$$EF\_OOH\_Format\_Production\_composite_{manufacturing,\ Classic\ OOH,\ country}\ (kg\ CO2e\ /\ kg\ of\ final\ product) =$$

$$\sum_{materials} material\_split^{1}_{format}\ (\%) \times (EF\_material\_production^{2}_{material,\ country\ raw\ material}\ (kg\ CO2e\ /\ kg\ of\ raw\ material) + upstream\_distance_{material}\ (km) \times EF\_upstream\_transportation^{3}_{material,\ vehicle\ type\ (}kg\ CO2e\ /\ kg\ of\ raw\ material.km))$$

Step calculation:

$$OOH\_Format\_\ Production_{manufacturing,\ Classic\ OOH} =$$
$$number\_placements^{4}_{format}\ (dimensionless) \times surface_{format}\ (sqm) \times grams\_per\_square\_metre^{5}_{format,\ material}\ (g\ /\ sqm)\ /\ 1000\ (conversion\ to\ kg) \times production\_loss\_ratio^{6}_{format,\ material\ (}dimensionless) \times (EF\_OOH\_Format\_Production\_composite^{7}_{manufacturing,\ Classic\ OOH,\ country}\ (kg\ CO2e\ /\ kg\ of\ final\ product) + EF\_manufacturing\_process^{8}_{format,\ country\ production}\ (kg\ CO2e\ /\ kg\ of\ final\ product))$$

Legend

- *required inputs*
- *default values*
- *emission factors*

Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

Operational formulae (footnotes)

[1] The material_split parameter breaks down the format into its component materials by mass, especially for multi-material formats.

[2] Emission factors covering production of raw material (e.g., paper, vinyl). For the same materials, emission factors may vary by geographical region, depending on where the material was produced: energy used, etc.
In the absence of robust, media-owner-specific data, the default recycled content share for OOH formats is set to 0% as a conservative assumption, to avoid overstating the use of recycled materials in manufacturing and underestimating related emissions.

[3] Emission factors covering upstream transportation of raw material (e.g., paper, vinyl). For the same materials, emission factors may vary by geographical region, depending on how the material was transported: vehicle type, etc.

[4] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign.

[5] Grams per square metre (gsm) is an important parameter to convert surface into weight.

[6] Ratio taking into account the losses in the production processes for different materials and steps, reflecting the waste of the final product (e.g., trimmings, bad batches/calibration runs). Can be used when using a bottom-up approach (where the input is the final product rather than the total quantity of material that was bought.

[7] See above intermediate calculation.

[8] Emission factors covering the manufacturing process of the final product. The scope of this EF should include energy used during the process (e.g., printing), process consumables (e.g., inks, varnish, plates, cylinders, etc.). Corporate overhead emissions allocation is covered in the specific guidance section.

Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

Required inputs and data levels (1/2)

The number of placements and surface area are inputs which should be specific to the campaign studied. With emission factors, given the high maturity of using them across parts of the OOH industry, we have crafted data levels accordingly. Recycled material emission factors may be considered if consistent with the cut-off approach (see 'Disposal & End-of-Life').

Required inputs

Variable	Unit	Source
number_placements[1] $_{format, country}$	Integer (Dimensionless)	Pre-Campaign RTB or Post-Campaign Report.
surface $_{format}$	Square metre (sqm)	Media Owners.
grams_per_square_metre$_{format, material}$ (gsm) material_split (%)[2]	Grams per square metre (g / sqm) and split	Media Owners.

Data levels - EF_material_production $_{material, country\ raw\ material}$ **and EF_upstream_transport** $_{material, vehicle\ type}$

Level	Method	Notes
0	Monetary data[4]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend-based average.
1	Default EF for top formats	Average emission factor calculated for top formats, calculated with level 2 method with average market data when available.
2	Approach based on materials and size[3]	Modelling approach based on format size and materials, and average type of transportation.
3	Country-level material and transportation	Modelling approach based on country-level EFs for materials and type of transportation.
4	Product-specific EF based on supplier data[3]	Company provided figure based on PCF (Product Carbon Footprint) or LCA (Life Cycle Analysis). Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

[1] Data at different levels of granularity are acceptable for GMSF implementation. If only spend data is available rather than the number of placements, an average ratio may be used. All data levels are valid for GMSF implementation. In most cases, the number of placements and formats is accessible, and organisations may choose to use these if available.
[2] The average grams per square metre, multiplied by the material split percentage, gives the grams per square metre for a given material.
[3] Most formats follow a similar process (manufacturing, transportation, installation). In some cases, more specific formats (large-scale murals, graffiti's, double-sided formats etc.) may differ from the suggested level one approach and include more specific steps, to be covered within a level 2 LCA approach, for example.
[4] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

Required inputs and data levels (2/2)

Regarding the emission factor of the manufacturing process, given the potential variety of products and processes involved, these factors must be constructed with a top-down approach: it must be calculated by comparing the total emissions for the scope with the corresponding kg of finished products (e.g., over one year). It is important that all emission factors respect the same scope to be comparable, which is why we provide an initial list of emission items to be considered. The most significant factor is the quantity and type of energy, which is why there is an intermediate level for specifying this value.

Proposed parameter - EF_manufacturing_process[1] format, country production

Variables Included	Details
Energy	Energy consumption (type and quantity) associated with the production process of OOH products.
Consumables (inks[1]…)	Consumable purchased for the process, including inks, varnish, offset/heat-set plates, gravure cylinders, packaging.

Variable Excluded: Waste management	Already considered through the loss ratio in manufacturing and end-of-life steps.

[1] Further hacks may come in future versions, such as considering those process through a ratio allowing conversion to the main surface input variable in the formula (e.g., inking rate, glazing thickness for certain products).
[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Data levels - EF_manufacturing_process[1] format, country production

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratio is accessible, and it is recommended to use these rather than a spend based average.
1	Default EF	Average emission factor calculated based on contributed data, subject to improvement.
2	Semi-specific EF (energy)	EF using specific value of energy (type and quantity) but using average values to cover full perimeter.
3	N/A	
4	Product-specific EF based on supplier data	Company provided figure based on PCF (Product Carbon Footprint) or LCA (Lifecycle Analysis). Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

Classic OOH > Creation > OOH Format Production > Substrate Production + Printing & Finishing

Example inputs

Variable	Unit	Value
Number of placements	Integer (Dimensionless)	6,000
Type of material	/	Printed paper
Format	/	Printed 6sheet paper
Surface	Square metre (sqm)	2.15
Grams per square metre	Grams per square metre (g/sqm)	150
Location	Country	UK

Example emission factors

Name	Unit	Value	Source
Printed paper recycled EF (UK)	kg CO2e / kg of raw material (incl. upstream transportation)	1.05	See GMSF OOH Emissions Data Sources.
Production loss ratio	/	1.1 (e.g., 10% loss)	
Paper: printing process (EU)	kg CO2e / kg of final product	0.257	

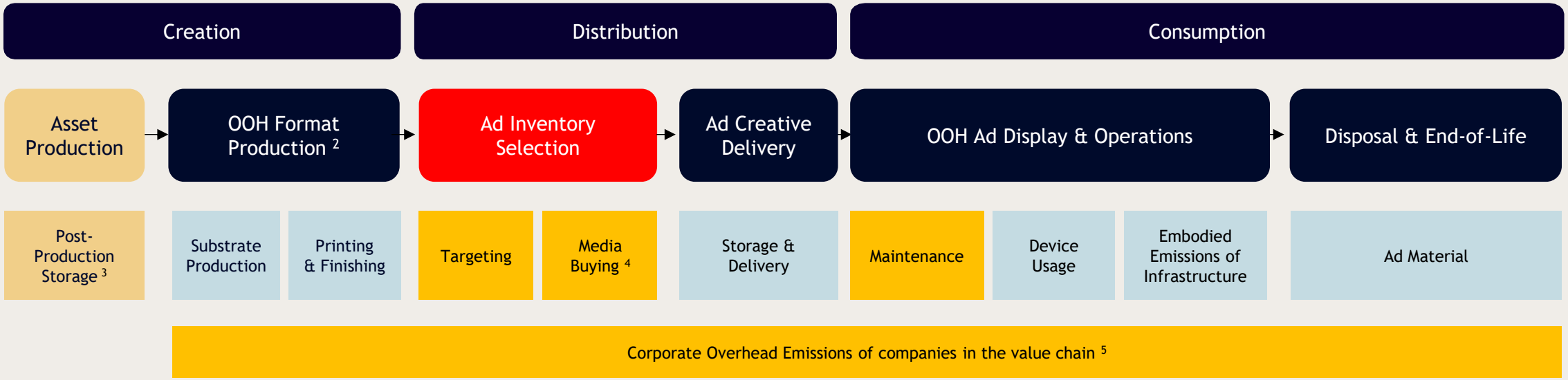
EF_physical_production_composite = sum(material_split * EF_manufacturing_material) = 100% (monomaterial) x 1.05 = 1.05 kg CO2e/ kg of final product

Classic_OOH_manufacturing_emissions = number_placements_UK * surface * grams_per_square_metres * production_loss_ratio * (EF_physical_production_composite + EF_manufacturing_process)
= 6,000 placements * 2.15sqm * (150 g/sqm / 1000) * 1.1 loss ratio * (1.05 kg CO2e/ kg of final product + 0.257 kg CO2e / kg of final product)
= **2,781 kg CO2e**

Values are illustrative only, and this example represents Level 1 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Excluded from workflow boundaries

Included in workflow boundaries with guidance provided

Covered in Corporate Overhead Emissions for ease of implementation

Denotes the focus of the following section of implementation guidance

Classic OOH > Distribution > Ad Inventory Selection > Targeting + Media Buying

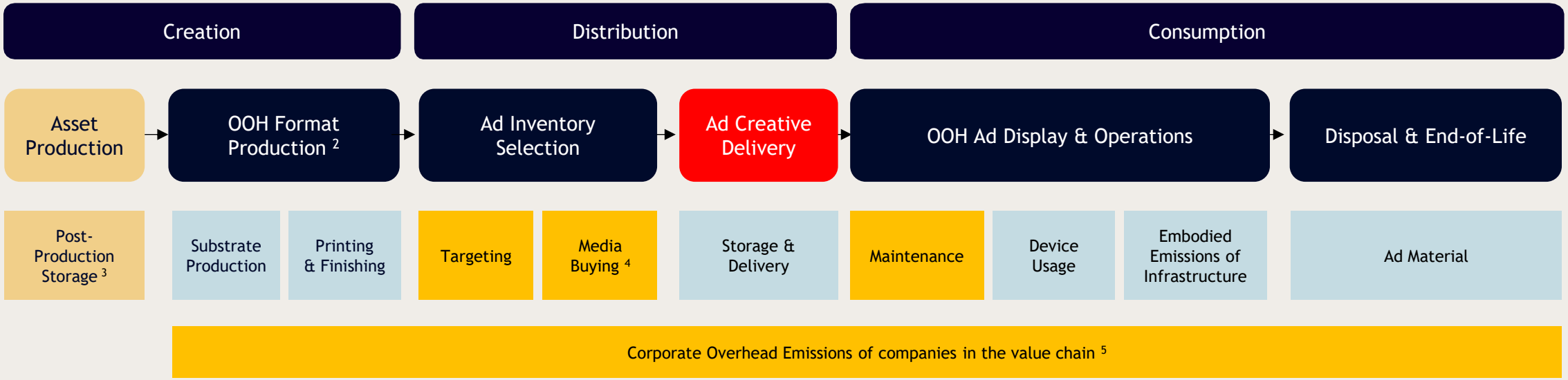
Within Corporate Overhead Emissions

This framework treats Targeting and Media Buying as corporate overhead activities, recognising that these vary widely across organisations. However, organisations may choose to calculate and report these activities separately if they deem them material to their operations or sustainability positioning. Where organisations elect to allocate these emissions to corporate overhead rather than campaign-level, the Corporate Overhead approach is provided for ease of implementation.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Targeting and Media Buying related emissions accordingly.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Step context

Managing the transportation, storage, and installation of Out-of-home (OOH) advertising formats presents significant logistical challenges, especially given the vast number of sites spread across each respective market.

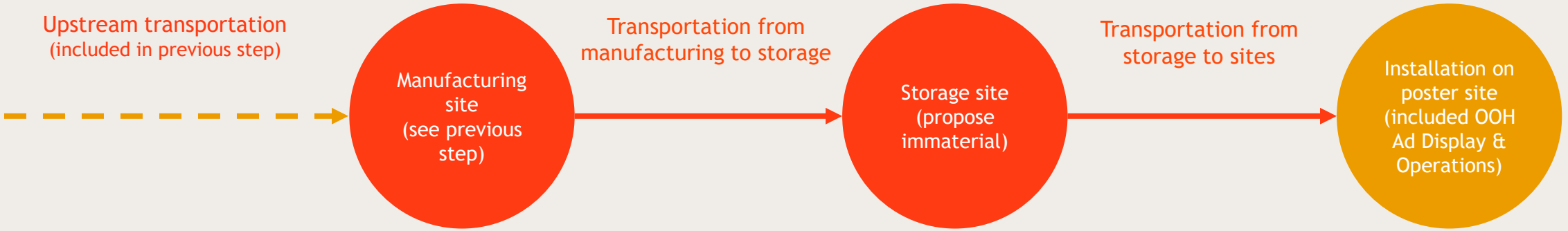
With transportation, different types of vehicles can be used depending on the distance and location.

With storage, though a part of the conceptual workflow, based on industry expertise in this channel, emissions associated with storage were categorised as immaterial pending future data and evidence.

With installation, media owners usually have dedicated teams to install and maintain formats. The use of adhesives needs to be considered, and for formats with low accessibility, cherry pickers / mounting machines can be used and their impact considered. However, given the considerable variability of this component (depending on sites, formats, countries, vandalism rate, etc.), it was recommended that the installation would be covered within the corporate overhead emissions.

Therefore, this section only details an operational formula for transportation.

Mounting machine example



Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Operational formulae

$$\text{Ad Creative Delivery}^{1}_{\text{Delivery, Classic OOH, manufacturing to storage}} = \text{total\_mass\_carried}^{2}_{\text{format}}\ \text{(tonnes)} \times \text{trip\_distance}_{\text{manufacturing to storage}}{}^{3}{}_{\text{, country}}\ \text{(km)} \times \text{EF\_transportation}_{\text{vehicle type, shared, manufacturing to storage}}\ \text{(kg CO2e / t.km)}$$

$$\text{Ad Creative Delivery}^{4}_{\text{Delivery, Classic OOH, storage to sites}} = \text{number\_placements}_{\text{format}}\ \text{(dimensionless)} \times \text{average\_distance\_fleet\_per\_format}^{4}_{\text{format, storage to sites}}\ \text{(vehicle.km)} \times \text{EF\_transportation}_{\text{vehicle type, dedicated, storage to site}}\ \text{(kg CO2e / vehicle.km)}$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The ideal approach to estimate delivery would be to gather the total t.km (e.g., mass transported over a certain distance) to install the number of placements/posters associated to the campaign, from manufacturing to storage, and storage to sites. This depends on the total distance travelled to install all posters (usually done by batch), as well as mass of posters. However, the ability to collect granular data for distance has been recognised as a current industry challenge, therefore needing a simplified approach for lower levels.
For instance: total t.km $_{\text{manufacturing to storage}}$ = number of trips * mass carried per trip (t) * manufacturing to storage trip distance (km)
As the mass per trip (t) = total_mass_carried (t) / number of trips, the above results in: total t.km $_{\text{manufacturing to storage}}$ = total_mass_carried (t) * manufacturing to storage trip distance (km), where the total_mass_carried (t) can be calculated based on the number of placements (total number of different ad formats placed across the different OOH sites in the campaign) * gsm * surface (see Physical production step formula).
[2] The total mass carried can be calculated following formula from physical manufacturing step, using number of placements, average gsm and surface.
[3] Transportation to storage is data that may be supplied by printers, whereas transportation to site is usually data collected from media owners, with a higher rate of fleet electrification (EVs) which has not been considered in default data.
[4] Delivery from storage to sites generally happens through dedicated vehicle fleet from media owners. The total distance travelled by dedicated vehicles should be allocated to a single format, the number of formats installed per tour, which can obviously highly vary depending on the variety of sites and formats.
Note: in the absence of robust data, a standard overhead estimation (e.g., multiply total emissions excluding this step by a ratio) is suggested as a level 0 approach in this step.

Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Required inputs and data levels (1/2)

Number of placements are straightforward inputs, which should be specific to the campaign.

Weight should be estimated based on the surface and grammage per square metre of the studied material.

Required inputs

Variable	Unit	Source
$total\_mass\_carried_{format}$	Tonnes	Media owners (can be estimated by number x surface x grams per square metre with scaling factor in tons).
$number\_placements_{format,\ country}$	Integer (Dimensionless)	Pre-Campaign RTB or Post-Campaign Report.

Data levels - $average\_trip\_per\_placement_{manufacturing\ to\ storage,\ country}$ and $average\_distance\_fleet\_per\_format_{format,\ storage\ to\ sites}$

Level	Method	Notes
0	Average overhead in the absence of data	As per a usual low materiality on this topic, in the absence of data, a standard overhead estimation (e.g., multiply total emissions excluding this step by a ratio) is suggested as a level 0 approach in this step.
1	Global average distances	Global company average trip distance per placement (all countries).
2	Regional average distances	Company regional average distance trips per placement.
3	N/A	
4	Complete freight reporting	Campaign-specific value.

Guidance on this topic is still expected to be challenged and improved by stakeholders as data maturity increases. Future versions may incorporate industry-wide average data to support improved accuracy, provided such data is aggregated and anonymised to protect individual participant confidentiality.

Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Required inputs and data levels (2/2)

Number of placements are straightforward inputs, which should be specific to the campaign.

Weight should be estimated based on the surface and grammage per square metre of the studied material.

Required Inputs

Variable	Unit	Source
$total\_mass\_carried_{format}$	Tonnes	Media owners (can be estimated by number x surface x grams per square metre with scaling factor in tons).
$number\_placements_{format,\ country}$	Integer (Dimensionless)	Pre-Campaign RTB or Post-Campaign Report.

Data levels - $EF\_transportation_{manufacturing\ to\ storage}$ and $EF\_transportation_{storage\ to\ site}$

Level	Method	Notes
0	Average overhead in the absence of data	As this is usually low materiality, in the absence of data, the full formulae may be replaced by an overhead estimation based on market data.
1	Global average vehicle type[1]	Global company average vehicle type allowing to select from reference databases (all countries).
2	Regional average vehicle type	Company regional average vehicle type allowing to select from reference databases.
3	N/A	
4	Supplier-specific emission factor	Supplier provided emission factor. Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

1 'Vehicle' refers not only to land-based delivery methods but also shipping or freight.

Guidance on this topic is still expected to be challenged and improved by stakeholders as data maturity increases. Future versions may incorporate industry-wide average data to support improved accuracy, provided such data is aggregated and anonymised to protect individual participant confidentiality.

Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Calculation example

Example inputs

Variable	Unit	Value
Number of placements	Integer (Dimensionless)	2000
Type of material	/	Printed paper
Format	/	Printed 6 sheet paper
Surface	Square metre (sqm)	2.15
Grams per square metre	Grams per square metre (g/sqm)	150
Location	Country	UK (London)

Example emission factors

Name	Unit	Value	Source
trip_distance manufacturing to storage	Kilometres (km)	200	See GMSF OOH Emissions Data Sources.
EF_transportation manufacturing to storage	kg CO2e / t.km	7.92E-01	
average_distance_fleet_per_format storage to sites	Vehicle.km	0.7	
EF_transportation storage to sites	kg CO2e / vehicle.km	2.56E-01	

Total_mass_carried = number_placements_UK * surface * grams_per_square_metres
= 2000 placements * 2.15sqm * (150 g/sqm / 10^6) = 0.645 tonnes

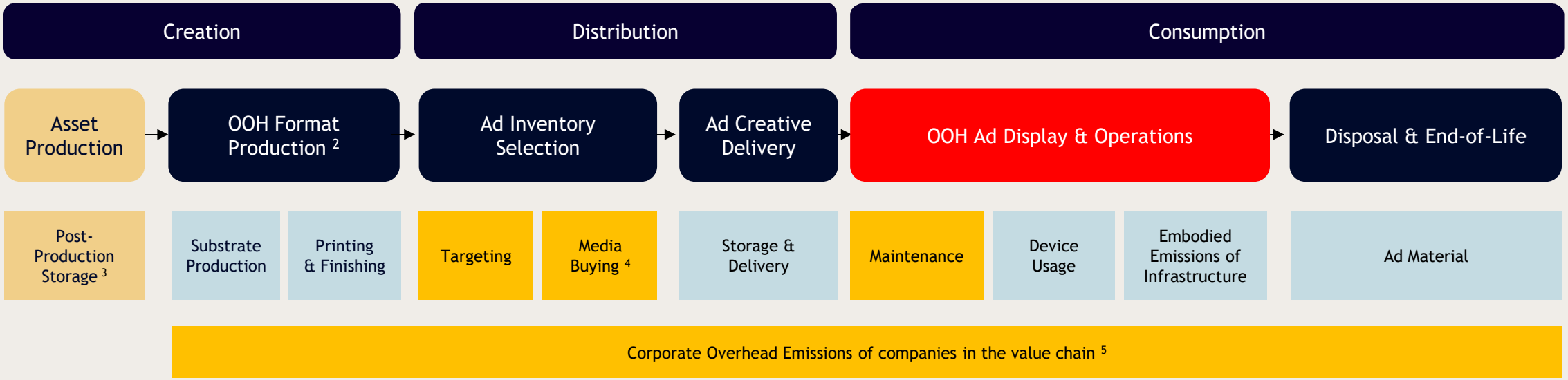
Classic_OOH_transportation_emissions (manufacturing to storage)
= total_mass_transported * average_trip_to_storage * EF_transportation (manufacturing to storage)
= 0.645 tonnes * 200 km * 0.792 kg CO2e / t.km = **102 kg CO2e (manufacturing to storage)**

Classic_OOH_transportation_emissions (storage to sites)
= number_placements_UK * average_distance_fleet_per_format * EF_transportation (storage to sites)
= 2000 * 0.7 km * 0.256 kg CO2e / km = **358 kg CO2e (storage to sites)**

Values are illustrative only. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Classic OOH > Consumption > OOH Ad Display & Operations > Maintenance

Within Corporate Overhead Emissions

This framework treats Maintenance as a corporate overhead activity, recognising that this can vary widely across organisations. However, organisations may choose to calculate and report this activity separately if they deem it material to their operations or sustainability positioning. Where organisations elect to allocate these emissions to corporate overhead rather than campaign-level, the Corporate Overhead approach is provided for ease of implementation.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Maintenance related emissions accordingly.

Classic OOH > Consumption > OOH Ad Display & Operations > Device Usage

Step context

While some Classic OOH formats have no energy consumption involved in the ongoing display of the format, some formats can be actively illuminated with lighting, or rotating, both consuming energy.

Different technologies are currently being used in the market:

- Timers: devices that allow the setting of specific schedules for turning lights on and off, for example illuminating in the early evening and turning off overnight.
- Photocells: light-sensitive devices that detect changes in ambient light levels, allowing automatic lights on at dusk and off at dawn.
- Intelligent controls: real-time energy monitoring allowing more granular control of the energy, usually for larger formats only.

The different formats can use backlighting or front illumination (usually for bigger formats). The lighting impact will differ dependent on the type of energy used to produce the electricity to power the lighting. Some OOH media owners in some markets can subscribe to renewable energy contracts on the sites they own. For more information, please see the Market-based vs Location-based guidance in the GMSF.

Front illumination example

Classic OOH > Consumption > OOH Ad Display & Operations > Device Usage

Operational formula

The resulting formula would then be:

$$\text{Ad Display and Operations}_{\text{Classic OOH, Device Usage}} = \text{number\_placements}^{1}_{\text{format, country}}\ (\text{dimensionless}) \times \text{number\_days}_{\text{format, country}}\ (\text{dimensionless}) \times \text{daily\_consumption}^{2}_{\text{format, country}}\ (\text{kWh}) \times \text{drop-down\_factor}^{3} \times \text{EF\_electricity}^{4}_{\text{country}}\ (\text{kg CO2e/kWh})$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign.

[2] Daily consumption can include the energy consumed by a motor for active systems (e.g., rotary) and lighting. It can be estimated with average power and daily illumination time (sometimes called daily burn time), if those parameters are known.

[3] Allocation ratio with value <1 when considering drop-down systems allowing some Classic OOH displays to show several campaigns at the same time.

[4] In the case of renewable energy contracts, please refer to the general principles outlined in the introduction regarding market-based emission factors.

Classic OOH > Consumption > OOH Ad Display & Operations > Device Usage

Required inputs and data levels

Number of placements and days per format are straightforward inputs, which should be specific to the campaign studied. Regarding daily consumption, different levels of data have been identified.

Required inputs

Variable	Unit	Source
number_placements format, country	Integer (Dimensionless)	Campaign report.
number_days format, country	Integer (Dimensionless)	Campaign report.

Data levels - daily_consumption format, country

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend based average.
1	Default average time per format of illuminated OOH	Averages based on market data. Default kWh / sqm are provided, estimated with average power and daily illumination time (sometimes called daily burn time).
2	Global average duration	Global company average per format (all countries).
3	Regional average duration	Global company regional average per format.
4	Site-specific figure for duration	Specific measurement for sites[1] where the campaign has been displayed.

[1] Metered energy on sites is becoming increasingly common in the industry. If such data is only available for a group of devices, the allocation rule should be specified, especially if the infrastructure supporting the ads is also being used for other purposes, such as displaying public transport information or providing USB ports for charging smartphones, etc.
[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Classic OOH > Distribution > Ad Creative Delivery > Storage & Delivery

Calculation example

Example inputs

Variable	Unit	Value
Number of placements	Integer (Dimensionless)	1000
Number of days	Days	60
Location	Country	UK
Format	Format	Printed paper posters

Conversion factors and example emission factors

Variable	Unit	Value	Source
Daily burn time	Hours	5	Market data & Electricity generated / T&D, UK, DEFRA 2025. See GMSF OOH Emissions Data Sources.
Average power per format	kW	0.3	
UK Electricity EF (location-based)	kg CO2e per kWh	0.1955	

Classic_OOH_energy_consumption_emissions = number_placements_UK * number_days *daily_burn_time * power * EF_electricity_UK
= 1000 placements * 60 days * 5h * 0.3 kW * 0.1955 kg CO2e/kWh
= **17,597 kg CO2e**

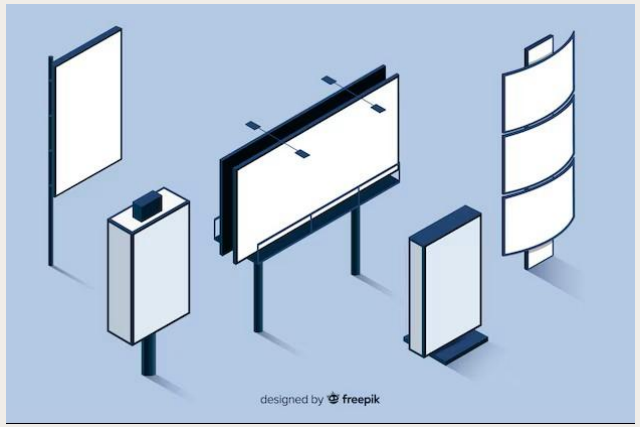
Values are illustrative only, and this example represents Level 0 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

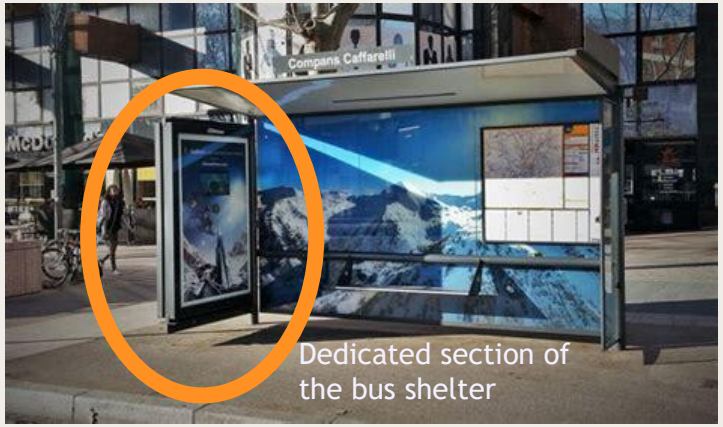
Classic OOH > Consumption > OOH Ad Display & Operations > Embodied Emissions of Infrastructure

Step context

Out-of-home formats can use existing infrastructure (e.g., subway wall) / vehicle (e.g., bus), or a dedicated one. **The impact of infrastructure and vehicle is only considered material if it is dedicated to advertising.**

Below is an example of dedicated infrastructure for Classic OOH:





Note about bus shelters: as can be seen above, the advertising placement is usually built differently (heavy metal structure) from the other glass side (wind stopper), therefore this section ought to be considered as dedicated (not the entire bus shelter).

Depreciation over the useful life: While the ad format (poster) is usually dedicated to the campaign, the infrastructure has a longer lifetime. The carbon impact associated with manufacturing and other steps is amortised over the entire lifetime of the infrastructure. It is then allocated solely to the functional unit period (the specific advertising campaign).

This step should cover all embodied emissions associated with the infrastructure: manufacturing of materials, upstream transportation, construction, end-of-life.

Classic OOH > Consumption > OOH Ad Display & Operations > Embodied Emissions of Infrastructure

Operational formula

$$\text{Ad Display and Operations}_{\text{Classic OOH, Embodied Infrastructure Emissions}} =$$
$$\text{number\_dedicated\_placements}^{1}{}_{\text{format, country}}{}^{2} \text{ (dimensionless)}$$
$$\times \text{ campaign\_duration (days)}$$
$$\times \text{ drop-down\_factor}^{3}$$
$$\times \text{ EF\_embodied\_infrastructure\_intensity}^{4}{}_{\text{format, country}}{}^{2} \text{ (kg CO2e / days)}$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign.

[2] Emission factors for the same materials may vary by geographical region.

[3] Allocation ratio with value <1 when considering drop-down systems allowing some Classic OOH displays to show several campaigns at the same time.

[4] Infrastructure emission factors should account for the total lifespan of the dedicated infrastructure, covering all embodied emissions associated to the infrastructure: manufacturing of materials, upstream transportation, construction, end-of-life. The allocation principle is time-based (campaign duration over infrastructure lifespan); specific guidelines on calculating intensity-based allocation ratios will improve and evolve as the GMSF develops, working with OOH stakeholders.

Classic OOH > Consumption > OOH Ad Display & Operations > Embodied Emissions of Infrastructure

Required inputs and data levels

Number of dedicated placements per format should be provided in the pre-campaign RTB or the post-campaign report.

Required inputs

Variable	Unit	Source
number_dedicated_placements format, country	Integer (Dimensionless)	Campaign report.
campaign_duration	Days	Campaign report.

[1] Infrastructure emission factors should account for the total lifespan of the dedicated infrastructure, covering all embodied emissions associated to the infrastructure: manufacturing of materials, upstream transportation, installation / construction, end-of-life. The allocation principle is time-based (campaign duration over infrastructure lifespan); specific guidelines on calculating intensity-based allocation ratios will be improved and evolve as the GMSF develops, working with OOH stakeholders.

As the framework evolves, aggregated industry-wide data on infrastructure characteristics may be developed to support improved methodology. Any such data collection will be managed to ensure individual company operational data remains confidential.

[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Data levels - EF_embodied_infrastructure_intensity format, country

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio should be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend based average.
1	Average EF based on market data	Averages based on market existing LCAs; allocated per day.
2	Approach based on main materials quantity and lifespan	Calculation based on the weight of main materials used to produce the dedicated infrastructure (e.g., steel, concrete) and other average defaults (transportation, end-of-life), divided by the total lifespan in days for a final result in intensity per day[1].
3	N/A	
4	Product-specific EF based on supplier data	Calculation based on the supplier data / emission-factor for the infrastructure, to be allocated per day[1].

Classic OOH > Consumption > OOH Ad Display & Operations > Embodied Emissions of Infrastructure

Calculation example

Example inputs

Variable	Unit	Value
Number of dedicated placements	Integer (Dimensionless)	1000
Number of days	Days	60
Drop-down factor	Integer (Dimensionless)	1/3 (3 faces drop-down)
Location	Country	UK
Format	Format	Printed paper posters

Conversion factors and example emission factors

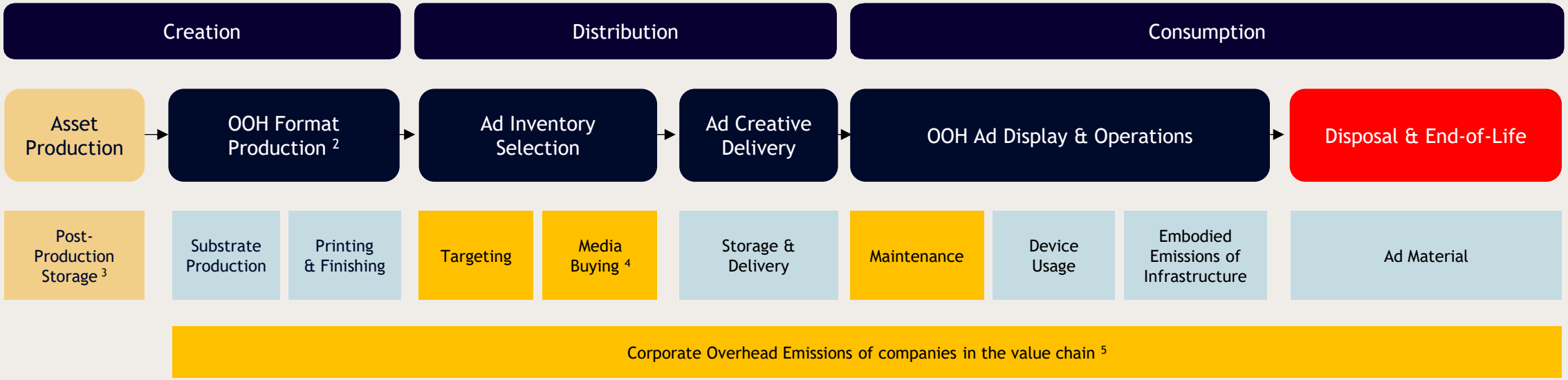
Variable	Unit	Value	Source
2 sqm / 6-sheet infrastructure (drop-down/static)	kg CO2e / format.days	6.3E-2	See GMSF OOH Emissions Data Sources.

Classic_OOH_embodied_emissions_infrastructure = number_placements_UK * number_days * drop-down factor * EF_embodied infrastructure_intensity
= 1000 placements * 60 days * 1/3 drop-down * 6.3E-2 kg CO2e/format.days
= **1,260 kg CO2e**

Values are illustrative only, and this example represents Level 0 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Excluded from workflow boundaries

Included in workflow boundaries with guidance provided

Covered in 'Corporate Overhead emissions' for ease of implementation

Denotes the focus of the following section of implementation guidance

Classic OOH > Consumption > Disposal & End-of-Life > Ad Material

Step context

The end of life of ad material products refers to the stage after the material has been used in-market, when it enters its disposal or recovery pathway. At that point, the ad materials may be retained, reused, refurbished, recycled, or discarded, depending on local waste practices and the material composition of the display or campaign material.

Processing types:

Different end-of-life routes are generally reflected in environmental datasets and may vary by country. Typical processing routes include:

- Recycling: collection, sorting, transport, and recycling of paper and other recoverable materials.
- Incineration: thermal treatment of waste, with or without energy recovery.
- Landfill: final disposal of waste without material recovery.

Benefits captured:

The suggested model uses average country-level end-of-life rates to reflect the distribution of these treatment routes in practice. This keeps the end-of-life calculation simple while still capturing the effect of national waste-management performance.

Note that the environmental benefits associated with recycling are only captured here to a limited extent, through end-of-life factors that are lower than the average treatment route; however, the main lifecycle benefit of using recycled materials is already accounted for upstream in the manufacturing emission factors.

Classic OOH > Consumption > Disposal & End-of-Life > Ad Material

Operational formulae

Intermediate calculation (composite EF):

$$EF\_eol\_composite_{\text{disposal and end-of-life, physical}}$$

$$_{OOH}(\text{kg CO2e / kg of final product}) = \sum_{\text{materials}} material\_split^{1}{}_{format}\ (\%) \times EF\_eol\_material_{material,\ eol\ process,\ country}{}^{2}\ (\text{kg CO2e / kg})$$

Step calculation:

$$\text{Disposal and end-of-life}_{\text{Classic OOH, Ad Material}} = number\_placements^{3}{}_{format,\ country}\ (\text{dimensionless}) \times surface_{format}\ (\text{sqm}) \times grams\_per\_square\_metre^{4}{}_{format,\ material}\ (\text{g / sqm}) / 1000\ (\text{conversion to kg}) \times EF\_eol\_composite^{5}{}_{\text{disposal and end-of-life, Classic OOH}}(\text{kg CO2e / kg of final product})$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The material split parameter breaks down the format into its component materials by mass, especially for multi-material formats.
[2] Emission factors for the same materials may vary by geographical region.
[3] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign.
[4] Grams per square metre (gsm) is an important parameter to convert surface into weight. The material split parameter allows splitting of the global average mass per type of material for a given format.
[5] See above intermediate calculation.
Emissions associated with the end-of-life treatment of material waste generated during the production process (not accounted for in the above calculation) is neglected due to low materiality.

Classic OOH > Consumption > Disposal & End-of-Life > Ad Material

Required inputs and data levels

Number of placements is a straightforward input, which should be specific to the campaign being calculated. With weight, it should be estimated based on the surface and grams per square metre of the material being used.

Regarding recycling, level 0 default considers a geographical average when available, unless a specific rate is specified (level 1 and above).

Required inputs

Variable	Unit	Source
number_placements $_{format, country}$	Integer (Dimensionless)	Pre-Campaign RTB or Post-Campaign Report.
surface $_{format}$	Square metre (sqm)	Media Owners.
grams_per_square_metre $_{format, material}$ (gsm) material_split (%)	Grams per square metre (g / sqm) and split	Media Owners.

Data levels - $EF\_eol\_material_{country}$

Level	Method	Notes
0	Default end-of-life processing without recycling	In the absence of data, default assumption should consider a geographical average rate of recycling per material, when available.
1	Global average breakdown	Emission factors used should reflect global company average breakdown of waste streams (all countries).
2	Regional average breakdown	Emission factors used should reflect regional company average breakdown of waste streams.
3	N/A	
4	Verified closed-loop	Emission factors based on a contractually established and independently verified recovery or takeback scheme, where the end-of-life pathway is known and traceable. This represents the highest confidence level, though closed-loop systems of this kind remain uncommon at commercial scale and require significant supply chain coordination to implement.

Classic OOH > Consumption > Disposal & End-of-Life > Ad Material

Required inputs and data levels

Number of placements is a straightforward input, which should be specific to the campaign being calculated. With weight, it should be estimated based on the surface and grams per square metre of the material being used.

Regarding recycling, level 0 default consider a geographical average when available, unless a specific rate is specified (level 1 and above).

Required inputs

Variable	Unit	Source
number_placements $_{format, country}$	Integer (Dimensionless)	Pre-Campaign RTB or Post-Campaign Report
surface $_{format}$	Square metre (sqm)	Media Owners
grams_per_square_metre $_{format, material}$ (gsm) material_split (%)	Grams per square metre (g / sqm) and split	Media Owners

Data levels - $EF\_eol\_material_{country}$

Level	Method	Notes
0	Default end-of-life processing without recycling	In the absence of data, default assumption should consider a geographical average rate of recycling per material, when available.
1	Global average breakdown	Emission factors used should reflect global company average breakdown of waste streams (all countries).
2	Regional average breakdown	Emission factors used should reflect regional company average breakdown of waste streams.
3	Supplier-specific emission factor	Supplier provided emission factor for end-of-life process. Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

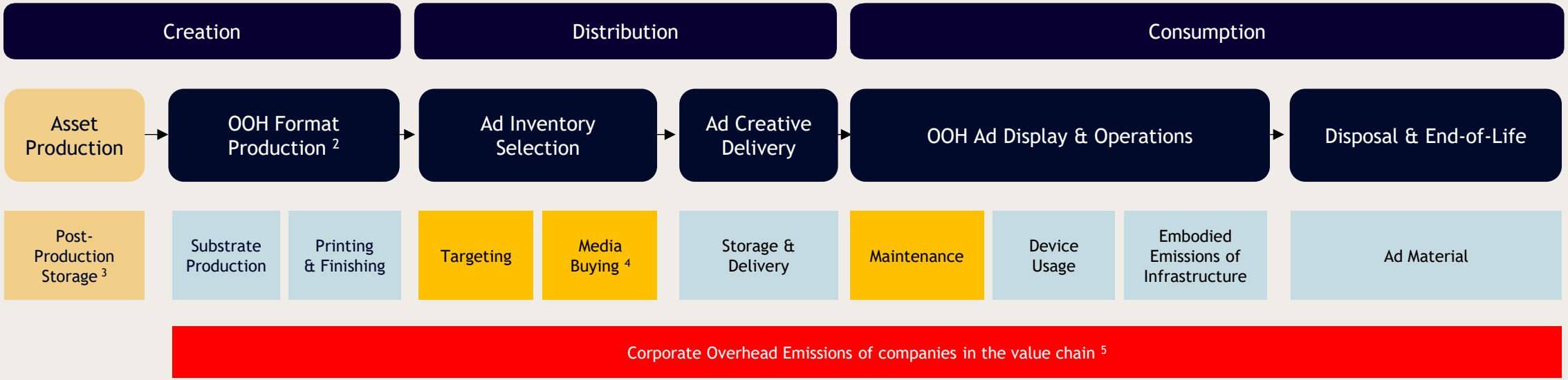
EF_eol_composite = sum(material_split * EF_eol_material) = 100% (monomaterial) x 4.69E-3 kg CO2e/kg = 4.69E-3 kg CO2e/ kg of final product

Classic_OOH_EOL_emissions
= number_placements_UK * surface * grams_per_square_metres * production_loss_ratio * EF_eol_composite
= 2,000 placements * 2.15 sqm * (150 g/sqm / 1 000) * 1.1 loss ratio * 4.69E-3 kg CO2e/kg of final product
= **3.3 kg CO2e**

Values are illustrative only. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Classic Out-Of-Home (OOH): Channel Emissions Workflow

Classic OOH (including Transit) [1]



Excluded from workflow boundaries

Included in workflow boundaries with guidance provided

Covered in Corporate Overhead Emissions for ease of implementation

Denotes the focus of the following section of implementation guidance

Classic OOH > Corporate Overhead Emissions

Step context

Corporate overhead emissions are:

- Emissions caused by processes that are not already captured in the unit process formulae.
- Generally organised into ‘fixed’ and ‘dedicated’ (that can vary by client and ad campaign).

Methodology:

Subtract all emissions that would be reported under the GMSF formulae from the overall Corporate Overhead emissions to estimate the total annual corporate overhead emissions (TCOE). The expectation is that all scope 1 and 2 emissions (e.g., associated with office buildings) and all the relevant scope 3 emissions (e.g., business travel, purchased goods and services for marketing/administration) will be included and accurate.

Allocate the TCOE using one of the following approaches, depending on what data is available and appropriate to the organisation's circumstances:

a. By labour (e.g., person hour worked; FTE) so there is a kg CO2e/person-hour figure; or
b. By revenue, so there is a kg CO2e/$ figure
c. By output (e.g., kg CO2e/1000 impressions)

Estimate either corporate overhead per ad campaign by labour or revenue or output including both the fixed and the dedicated types of resources.

Estimate the corporate overhead emissions by multiplying the figures from steps 2 and 3.

For further information and background on the challenges of Corporate Overhead methodologies, please see the GMSF Playbook. Organisations are not required to disclose enterprise-level revenue, turnover, or cost data to external parties in order to implement the Corporate Overhead Emissions methodology. These calculations should be performed internally by each organisation using their own financial and emissions data. The result may be shared with clients or buyers, but the underlying financial metrics and allocation factors need not be disclosed.

Classic OOH > Corporate Overhead Emissions

Operational formula

For each entity of the ad value chain in a given GHG reporting year:

Enterprise GHG inventory (kg CO2e) - GMSF emissions reported via formulae (kg CO2e) = Total Corporate Overhead emissions (TCOE) (kg CO2e)

Allocate by revenue, FTE or impressions to create emission factor (EF) – in the most common case by revenue:

TCOE-EF = TCOE/revenue for GHG reporting year (kg CO2e/$)

Multiply TCOE-EF by the invoiced value for the ad campaign being estimated (Campaign Corporate Overhead emissions, CCOE):

CCOE (kg CO2e) = TCOE-EF (kg CO2e/$) * campaign invoice ($)

Legend:
- *required inputs*
- *emission factors*

Classic OOH > Corporate Overhead Emissions

Required inputs and data levels

Required inputs

For a specific entity of an ad campaign value chain, do you have:	
A	Enterprise emissions inventory, including AI emissions (third-party verified).
B	Total of all emissions reported elsewhere in the GMSF (credible & documented).
C	The TCOE unitised by enterprise revenue, enterprise FTE, or output unit (credible & documented).
D	The corresponding figure of revenue, FTE, or output unit for the specific activity for the ad campaign emissions being estimated (credible & documented).

Data levels

Level	Method
0	If only D is available (or is estimated) a revenue, FTE and output unit EF will be provided by the GMSF.
1	If there are GMSF default values for C by the type of enterprise and activity as well as geography, use those emission factors.
2	If only A and D are available, use standard overhead % provided by the GMSF to estimate TCOE which is unitised by revenue (or FTE, output) to estimate C.
3	If A, B, and C are available but D is only approximately estimated.
4	If YES to all.

Note: to facilitate the estimation of the emissions reported elsewhere in the GMSF (input B), please see the corporate overhead emissions by scope guidance which is ordered by emission scope 1, 2 and 3 to indicate which emissions categories are most likely to be included in the overhead estimate and which are likely already captured elsewhere by the GMSF.

A greyed-out box denotes an area of the GMSF under current development.

Classic OOH > Corporate Overhead Emissions

Calculation example

For a given organisation in a GHG reporting year:

Total enterprise GHG inventory = 10,000 kg CO2e
GMSF-reported emissions = 8,000 kg CO2e
Total Corporate Overhead Emissions (TCOE) = 2,000 kg CO2e

If allocating by output (e.g., 1,000,000 impressions delivered in the year):

TCOE EF = 2,000 kg CO2e / 1,000,000 impressions = 0.002 kg CO2e per 1,000 impressions

For the campaign being estimated (50,000 impressions):

CCOE = 0.002 kg CO2e/1,000 impressions × 50 = 0.1 kg CO2e

Values are illustrative only, and this example represents Level 4 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Data Uncertainty

As noted in the playbook, the assessment and communication of Data Uncertainty is an important last step in the GMSF process.

Assessing uncertainty is a key principle in carbon accounting and is important in the GMSF context for several reasons:

- It encourages practitioners to use the most accurate data available.
- It provides a roadmap for better data development.
- It provides context for users of GMSF based estimates.

The uncertainty assessment in GMSF v1.3 is designed to be as simple as possible to implement by relying only on the percentage of Level 0 and Level 1 approaches used in the calculation. The overall level of uncertainty is simply based on that percentage as noted below.

For more information on Data Uncertainty, including context and challenges, please see the GMSF Playbook.

Uncertainty Level (UL) = (Count of all level 0, 1)/(Total Count)

UL = % of all data estimates using level 0 or level 1
for a specific channel

Lower level of accuracy	< 30% use of Level 0 + Level 1 approaches
Increased level of accuracy	between 30% and 60% use of Level 0 + Level 1 approaches
Higher level of accuracy	> 60% use of Level 0 + Level 1 approaches

Data Uncertainty

Calculation example

For an OOH campaign for the launch of Product X, the following data levels were used, depending on the available data:

Level	Number of times utilised within Channel Workflow
0	9
1	3
2	2
3	0
4	1

Uncertainty Level = 12/15 = 80% High uncertainty (as > 60%)

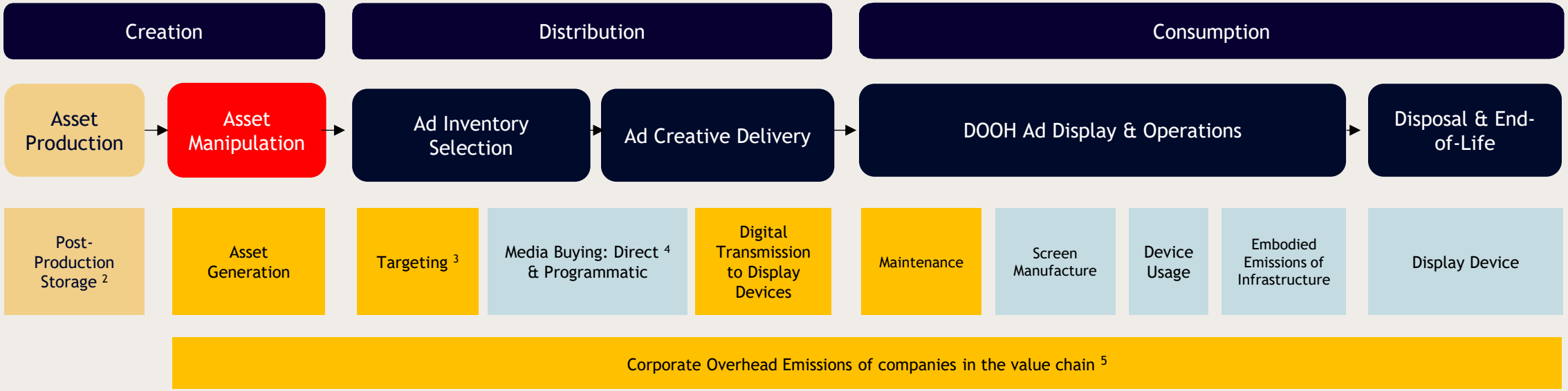
Values are illustrative only.

DIGITAL OOH

Defined as any OOH format that can be delivered digitally on an electronic screen

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



Digital OOH > Creation > Asset Manipulation > Asset Generation

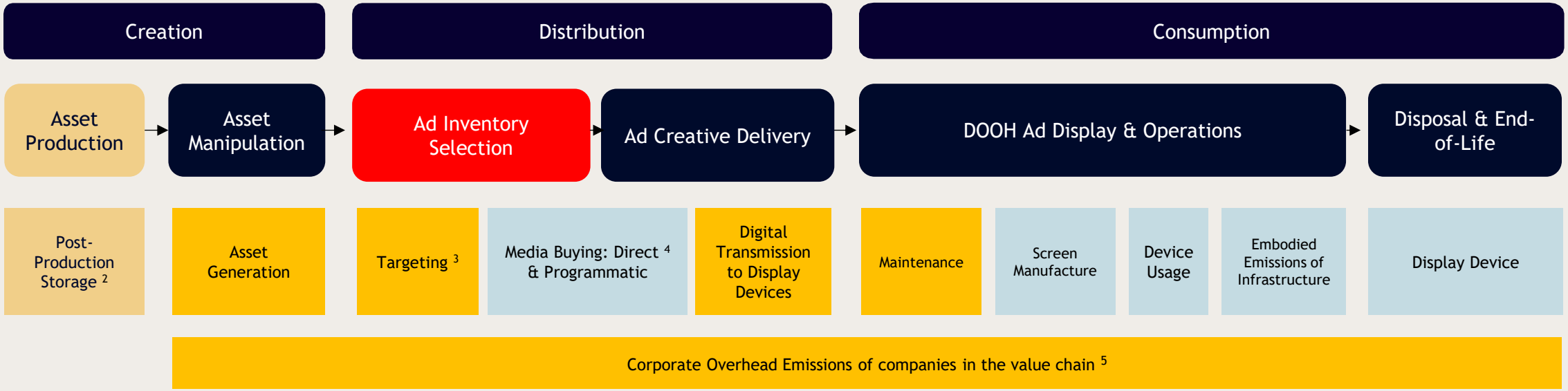
Within Corporate Overhead Emissions

Asset Generation refers to the changes made to advertising copy once the master version has already been produced, including dynamic creative optimisation and AI-enabled personalisation. Organisations may allocate Asset Generation emissions either to individual campaigns or to corporate overhead, depending on their business model and data capabilities. For those choosing to allocate to corporate overhead for ease of implementation, the Corporate Overhead approach is provided. Organisations that invest in efficient, low-emission asset generation technology are encouraged to calculate and report these benefits at the campaign level where feasible, as this supports innovation in sustainable practices.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Asset Generation related emissions accordingly.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



Excluded from workflow boundaries

Included in workflow boundaries with guidance provided

Covered in Corporate Overhead Emissions for ease of implementation

Denotes the focus of the following section of implementation guidance

Digital OOH > Distribution > Ad Inventory Selection > Targeting

Within Corporate Overhead Emissions

This framework treats Targeting as a corporate overhead activity, recognising that this can vary widely across organisations. However, organisations may choose to calculate and report this separately if they deem it material to their operations or sustainability positioning. Where organisations elect to allocate these emissions to corporate overhead rather than at the campaign-level, the Corporate Overhead approach is provided for ease of implementation.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Targeting related emissions accordingly.

Digital OOH > Distribution > Ad Inventory Selection > Media Buying

Step context

The selection stage accounts for the activity required to buy and sell DOOH ad inventory. Two main modes usually happen in a DOOH context:

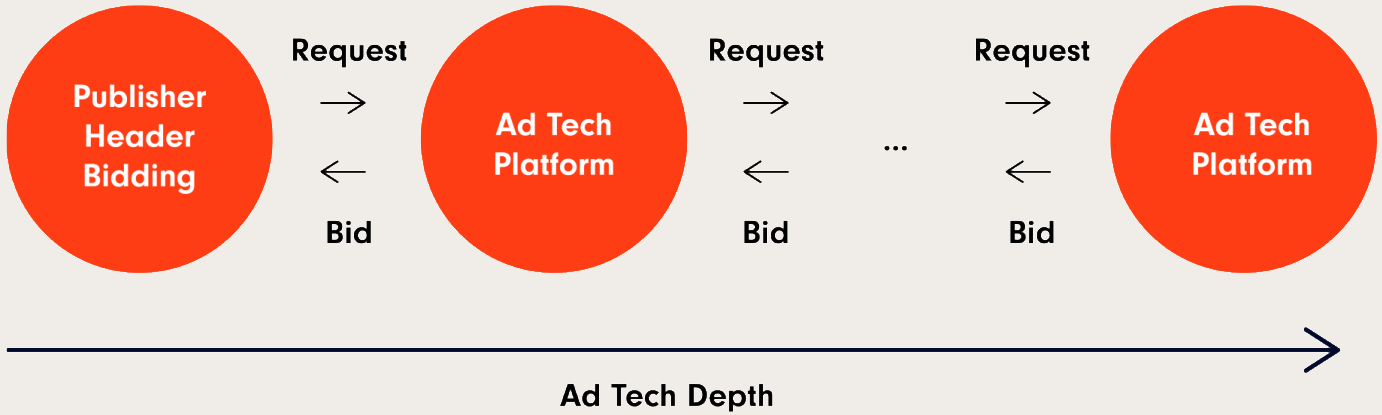
Direct is inventory sold based on data-driven DOOH statistics and demographics, usually human-guided. In the case of Direct buying, this should be included in Corporate Overhead Emissions as part of the Ad Inventory Selection process.

Programmatic Digital Out-of-Home (pDOOH) is the automated buying, selling, and delivery of advertising on digital screens in public spaces, such as billboards, transit shelters, and retail kiosks, allowing for precise, real-time campaign management. Instead of manual, long-term booking, pDOOH leverages technology platforms (DSPs) to bid on inventory based on data triggers like time of day, weather, or location, often in a one-to-many format where one screen serves multiple viewers.

Unlike online programmatic, which relies on personal cookies and tracking for one-to-one targeting, pDOOH utilises aggregated audience mobility data and contextual relevance to reach consumers in the real world. Furthermore, it offers creative agility, allowing marketers to change, pause, or optimize campaigns instantly, a major contrast to the more static nature of traditional OOH, while delivering measurable impressions.

The pDOOH supply chain has different structural characteristics than the programmatic Digital ecosystem. While both share core components (DSP, SSP, Exchange), pDOOH involves specialised physical infrastructure and different technology requirements. As a result, the emissions methodology for pDOOH differs from the digital channel methodology to reflect these distinct operational characteristics.

Diagram extracted from the digital channel guidance :



Digital OOH > Distribution > Ad Inventory Selection > Media Buying

Operational formulae

Legend:
- *required inputs*
- *default values*
- *emission factors*

$$\text{Ad Inventory Selection}_{\text{programmatic DOOH, Data centres, Use Phase Emissions}} = \text{number\_programmatic\_playouts}^{1}{}_{\text{format, country}} \times \text{server\_number\_per\_playout}^{2} \times \text{EF\_datacenters\_use\_phase\_intensity}\ (\text{kWh / ad opportunity}) \times (\text{share\_servers\_local}\ (\%) \times \text{EF\_electricity\_local}_{\text{country}}\ (\text{kgCO2e / kWh}) + \text{share\_servers\_abroad}\ (\%) \times \text{EF\_electricity\_abroad}_{\text{country}}(\text{kgCO2e / kWh}))$$

$$\text{Ad Inventory Selection}_{\text{programmatic DOOH, Data centres, Embodied Emissions}} = \text{number\_programmatic\_playouts}^{1}{}_{\text{format, country}} \times \text{server\_number\_per\_playout}^{2} \times \text{EF\_datacenters\_embodied\_intensity}\ (\text{kWh / ad opportunity})$$

$$\text{Ad Inventory Selection}_{\text{programmatic DOOH, Networks, Use Phase Emissions}} = \text{number\_programmatic\_playouts}^{1}{}_{\text{format, country}} \times \text{call\_number\_per\_playout}^{3} \times \text{RTB\_size\_per\_call}^{4}\ (\text{MB}) \times \text{EF\_networks\_use\_phase\_intensity}^{5}\ (\text{kWh / MB}) \times (\text{share\_servers\_local}\ (\%) \times \text{EF\_electricity\_local}_{\text{country}}\ (\text{kgCO2e / kWh}) + \text{share\_servers\_abroad}\ (\%) \times \text{EF\_electricity\_abroad}_{\text{country}}(\text{kgCO2e / kWh}))$$

$$\text{Ad Inventory Selection}_{\text{programmatic DOOH, Networks, Embodied Emissions}} = \text{number\_programmatic\_playouts}^{1}{}_{\text{format, country}} \times \text{call\_number\_per\_playout}^{3} \times \text{RTB\_size\_per\_call}^{4}\ (\text{MB}) \times \text{EF\_networks\_embodied\_intensity}^{5}\ (\text{kgCO2e/ MB})$$

[1] Total number of programmatic playouts (proof-of-play logs) for the given ad format and country, i.e. the number of actual programmatic ad insertions served on screen, which is lower than or equal to the number of ad requests generated from available screen opportunities.
[2] Scaling factor that converts the observed number of programmatic playouts into the effective number of servers involved in ad selection for DOOH, reflecting a simpler, more centralised stack than typical web/display programmatic (fewer hops, fewer intermediate platforms).
[3] Scaling factor that converts programmatic playouts into the *total number of programmatic requests* (RTB calls, retries, forecasting calls, logging calls, etc.) implied by the DOOH bidding workflow, including upstream and downstream ad-tech.
[4] Average data volume (e.g., in bytes or kilobytes) of a single programmatic request/response transaction in DOOH RTB, including bid request, bid response, any ancillary headers or metadata.
[5] Assuming the use of the simplified network model.

Digital OOH > Distribution > Ad Inventory Selection > Media Buying

Required inputs and data levels

Unlike digital channels where an ads.txt-based proxy may be used to estimate supply levels, this approach is not relevant for programmatic DOOH. As there is no equivalent industry-standard file or hierarchy for this channel, no comparable data-level concept is applied for an ads.txt equivalent; instead, the total number of programmatic playouts is directly considered as a required input.

Required inputs

Variable	Unit	Source
number_programmatic_playouts format, country	Integer	Media buy data (prerequisite for applying the formula is that the relevant data is available in the buy-side media data, so that programmatic playouts can be identified and measured.)
Location	Country	

Data levels - EF_datacentres_use_phase_intensity and EF_datacentres_embodied_intensity (per ad opportunity)

Level	Method	Notes
0	Monetary data[1]	If only spend data is available, then an average monetary emissions factor can be used.
1	Default value	Based on lifecycle assessment of VMs and assumptions.
2	Allocation from global data	Based on contributed data on the impact of server operations, allocated to the impression level from global, regional, or data centre level.
3	N/A	
4	Campaign specific data	Based on contributed data at a campaign level.

[1] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is most readily available or appropriate to their circumstances. All data levels are valid for GMSF implementation and should not create competitive disadvantage. uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Digital OOH > Distribution > Ad Inventory Selection > Media Buying

Example conversion factors and values

For the level 1 methodology on active paths, the working group suggest a simple and practical approach that improves upon previous work from the Digital channel, adapted to a DOOH context.

Unlike digital channels where an ads.txt-based proxy may be used to estimate supply levels, this approach is not relevant for programmatic DOOH. As there is no equivalent industry-standard file or hierarchy for this channel, no comparable data-level concept is applied for an ads.txt equivalent; instead, the total number of programmatic playouts is directly considered as a required input.

Industry-wide benchmarks for server usage and network activity were derived from independently aggregated and anonymised technical data. These factors represent market averages and do not reflect any individual company's infrastructure or operational characteristics. Implementation of these factors does not require disclosure of company-specific server architecture, network configuration, or performance data. This can be multiplied with the number of programmatic playouts to estimate the **number of activated servers** and **number of RTB calls** (requests/responses) respectively.

Conversion factors and default values*

Variable	Unit	Source
server_factor_per_playout	Integer	GMSF OOH Working Group.
call_factor_per_playout	Integer	GMSF OOH Working Group.
RTB_size_per_call	MB	Consistent with digital channel.
EF_datacentres_use_phase_intensity EF_datacentres_embodied_intensity	kg CO2e per ads requests	Consistent with digital channel.
EF_networks_use_phase_intensity	kWh per KB	Fixed network assumption for RTB calls. Refer to 'Network Emissions Model' section of the GMSF OOH Emissions Data Sources database.
$EF\_networks\_embodied\_intensity_{country}$	kg CO2e per KB	
$EF\_electricity\_local_{country}$	kg CO2e per kWh	Refer to the 'Grid emission factors' section of the GMSF OOH Emissions Data Sources database.
$EF\_electricity\_abroad_{country}$	kg CO2e per kWh	Refer to the 'Foreign Server Emission Factors' section of the GMSF OOH Emissions Data Sources database.

*Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources. Values above are illustrative only. Specific values in this example may not match the GMSF OOH Emissions Data Sources because these values will be periodically updated.

Digital OOH > Distribution > Ad Inventory Selection > Media Buying

Calculation example

Example inputs

Variable	Unit	Value
Number of playouts	Integer (Dimensionless)	210,500
Location	Country	UK
Format	Format	Outdoor totem

Conversion factors and example emission factors

Variable	Unit	Value	Source
Server factor per playout - DOOH	Dimensionless	16.00	See GMSF OOH Emissions Data Sources.
EF_datacentres_use_phase_intensity	kWh per ad opport.	3.41E-07	
EF_datacentres_embodied_intensity	kg CO2e per ad opport.	1.5E-08	
Call factor per playout – DOOH	Dimensionless	39.43	
RTB size per call	MB	0.003	
EF_networks_use_phase_intensity (fixed networks, simplified model)	kWh per MB	1.65E-05	
EF_networks_use_phase_intensity (fixed networks, simplified model)	kg CO2e per MB	2.14E-06	
UK Electricity EF (location-based)	kg CO2e per kWh	0.1955	
EU average Electricity EF (location-based)	kg CO2e per kWh	0.242	

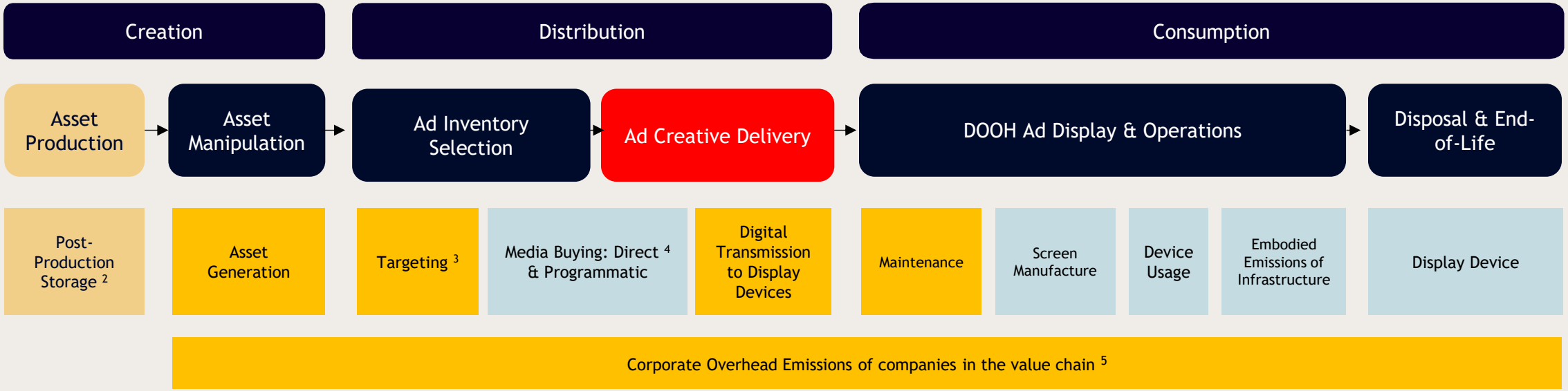
DOOH_programmatic_datacenters = number_playouts * server_factor_per_playout
* (EF_datacenters_use_phase_intensity * (share_servers_local * EF_electricity_local + share_servers_abroad * EF_electricity_abroad) + EF_datacenters_embodied_intensity)
= 210,500 playouts * 16.00 * (3.41E-07 * (50% * 0.1955 + 50% * 0.242) + 1.5E-08)
= **0.30 kg CO2e**

DOOH_programmatic_networks = number_playouts * call_factor_per_playout * RTB_size_per_call
* (EF_networks_use_phase_intensity * (share_networks_local * EF_electricity_local + share_networks_abroad * EF_electricity_abroad) + EF_networks_embodied_intensity)
= 210,500 playouts * 39.43 * 0.003 * (1.65E-05 * (50% * 0.1955 + 50% * 0.242) + 2.14E-06)
= **0.14 kg CO2e**

The example emissions factors are provided solely for the purpose of emissions calculation accuracy. This example represents Level 0 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



- Excluded from workflow boundaries
- Included in workflow boundaries with guidance provided
- Covered in Corporate Overhead Emissions for ease of implementation
- Denotes the focus of the following section of implementation guidance

Digital OOH > Distribution > Ad Creative Delivery > Digital Transmission to Display Devices

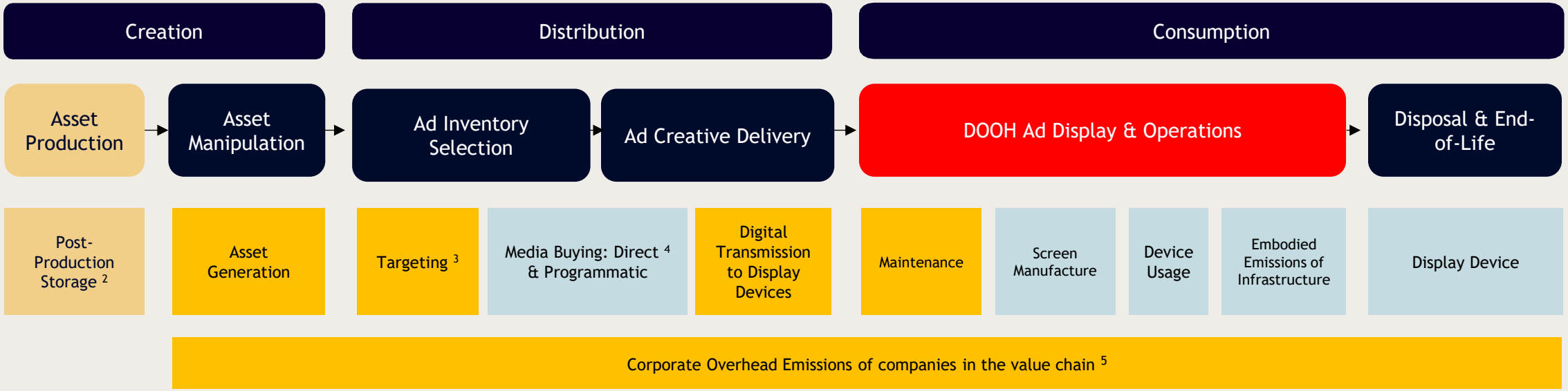
Within Corporate Overhead Emissions

Digital transmission to display device refers to how the ad is transmitted to the DOOH site. This is usually transferred as a single download of a file to each DOOH device, before the creative is then played from local storage on that device. For this reason, the emissions impact of this step when viewed alongside the wider campaign is likely to be immaterial. Organisations may still choose to calculate digital transmission emissions at the campaign level or allocate them to corporate overhead, depending on the significance of this activity in their operations and their sustainability strategy. For organisations electing to treat digital transmission as part of corporate overhead for simplicity, the Corporate Overhead methodology is available. Organisations developing innovative, low-emission transmission infrastructure are encouraged to calculate and report these campaign-level benefits to support market recognition of sustainability investments.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Digital Transmission related emissions accordingly, including reviewing its materiality if this becomes evident.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



- Excluded from workflow boundaries
- Included in workflow boundaries with guidance provided
- Covered in Corporate Overhead Emissions for ease of implementation
- Denotes the focus of the following section of implementation guidance

Digital OOH > Consumption > DOOH Ad Display & Operations > Maintenance

Within Corporate Overhead Emissions

This framework treats Maintenance as a corporate overhead activity, recognising that this can vary widely across organisations. However, organisations may choose to calculate and report this activity separately if they deem it material to their operations or sustainability positioning. Where organisations elect to allocate these emissions to corporate overhead rather than campaign-level, the Corporate Overhead approach is provided for ease of implementation.

As industry practices and data maturity evolve, the Framework will continue to develop its treatment of Maintenance related emissions accordingly.

Digital OOH > Consumption > DOOH Ad Display & Operations > Screen Manufacture

Step context

Digital Out-of-Home (DOOH) refers to dynamic, screen-based advertising displayed in public spaces — such as billboards, transit hubs, or shopping malls — using digital technology. It enables real-time content updates, targeted messaging, and interactive experiences, making it more flexible and measurable than traditional Out-of-Home ads. DOOH leverages data and connectivity to deliver relevant ads to audiences on the go.

Common DOOH formats use different technologies:

- **Outdoor formats with totems:** Digital screens mounted on standalone structures (totems) in high-traffic outdoor areas like streets, plazas, or parks. , usually using LCD technology.
- **Indoor formats without totems:** Wall-mounted or freestanding digital screens in indoor public spaces such as airports, malls, or office buildings, usually using LCD technology.
- **Indoor shop formats:** Digital displays integrated within retail environments, such as checkout screens, aisle-end displays, or interactive kiosks, usually using LCD technology.
- **Outdoor formats without totems:** Large-scale LED screens on buildings, highways, or public squares, offering high visibility and dynamic content.

No internationally standardised list of formats currently exist, due to the numerous variations of different formats, depending on countries. However small portraits/landscapes (< 2sqm), D6 (Digital 6 sheet) and D48 (Digital 48 sheet) are the most common formats, though this may vary by country. Note that other formats (in-taxi tablets…) may fall into this category, but default values are provided only for the most common formats.

Outdoor totem

Indoor shop

Indoor, no totem


Large outdoor format, no totem

Digital OOH > Consumption > DOOH Ad Display & Operations > Screen Manufacture

Operational formula

$$\text{Ad Display and operations}_{\text{DOOH, Screen Manufacture}} = \text{number\_playouts}^{1}_{\text{format, country}}\ (\text{dimensionless}) \times \text{spot\_duration}\ (s) \times \text{EF\_manufacturing\_intensity}^{2}_{\text{format, country}}\ (\text{kg CO2e} / s)$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of playouts corresponds to the number of times an ad spot has been played on a screen (playouts = creative insertion x number of screens). Another name used for playouts in some markets is ‘logs’.

[2] Corresponds to the digital Display manufacturing emissions (cradle-to-gate, including raw materials and manufacturing process), allocated to the full lifespan. Contrary to Classic OOH ad material, the digital display is used across different campaigns, hence the allocation.

Digital OOH > Consumption > DOOH Ad Display & Operations > Screen Manufacture

Required inputs and data levels

Number of playouts and spot duration are straightforward inputs, which should be specific to the campaign studied.

Regarding emission factors, contrary to the Classic OOH formats, it was not possible to craft a model based on materials, size and technology at this stage[1], therefore for Level 1 some market average emission factors are provided.

Required inputs

Variable	Unit	Source
number_playouts$_{format,\ country}$	Integer (Dimensionless)	Campaign report.
spot_duration	Seconds	Campaign report.

Data levels - EF_manufacturing_intensity[1] $_{format,\ country}$

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratio is accessible, and it is recommended to use these rather than a spend based average.
1	Default EF for top formats	Average EF based on market data.
2	N/A	
3	N/A	
4	Product-specific EF based on supplier data	Company provided figure based on PCF (Product Carbon Footprint) or LCA (Lifecycle Analysis). Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

[1] This EF should be allocated based on **total active lifespan** (time during which the screen was switched on during its lifetime), to ensure consistency with device allocation in the digital channel. The total number of playouts x spot duration results in at time allocation of the display manufacturing impact.
[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Digital OOH > Consumption > DOOH Ad Display & Operations > Screen Manufacture

Calculation example

Example inputs

Variable	Unit	Value
Number of playouts	Integer (Dimensionless)	210,500
Spot duration	Seconds	10
Location	Country	France
Format	Format	Outdoor totem

Conversion factors and example emission factors

Variable	Unit	Value	Source
EF outdoor with totem 75” LCD screen manufacturing emissions and infrastructure	kg CO2e / s	2.49E-05	ADEME, 2024 (based on 7-year lifespan). See GMSF OOH Emissions Data Sources.

DOOH_display_manufacturing_emissions + DOOH_embodied_emissions_infrastructure[1]
= number_playouts_France * spot_duration * (EF_panel_manufacturing_emissions + EF_embodied_infrastructure_intensity)
= 210 500 playouts * 10 s * 2.49E-05 kg CO2e/s
= **52.4 kg CO2e**

[1]To prevent double-counting of Display manufacturing and embodied infrastructure emissions, practitioners are encouraged to verify the scope of factors used in calculations.

Values are illustrative only. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Digital OOH > Consumption > DOOH Ad Display & Operations > Device Usage

Step context

DOOH displays are active devices which consume electricity when used.

DOOH screen technologies primarily use LED and LCD screens to display dynamic content in public spaces. LED displays consume less energy than traditional LCDs and can use 20-50% less power due to backlight efficiency, precision control, reduced heat production.

The main challenge remains being able to identify the different technologies in the portfolio of formats.

It is also worth noting that certain sites are metered, allowing granular tracking of energy consumption, though the infrastructure supporting the ads can also be used for other purposes, such as displaying public transport information or providing USB ports for charging smartphones, therefore requiring an allocation rule.

The devices electricity consumption have a carbon impact that will depend on the type of energy used to produce the electricity. OOH Media owners sometimes can subscribe to renewable energy contracts on the sites they own (see location-based / market-based guidance within the GMSF). There is the potential for solar powered/battery systems on OOH formats, which would get zero emissions operations credit which would not be part of the market-based accounting, yet would still require some level of assurance/verification.

Digital OOH > Consumption > DOOH Ad Display & Operations > Device Usage

Operational formula

$$\text{Ad Display and operations}_{\text{DOOH, Device Usage}} = \text{number\_playouts}^{1}_{\text{country}}\ (\text{dimensionless}) \times \text{spot\_duration}\ (s) \times \text{consumption\_intensity}_{\text{format}}\ (\text{kWh} / s) \times \text{EF\_electricity}^{2}_{\text{country}}\ (\text{kg CO2e/kWh})$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of playouts corresponds to the number of times an ad spot has been played on a screen (playouts = creative insertion x number of screens). Another name used for playouts in some markets is logs.

[2] In the case of renewable energy contracts, please refer to the general principles outlined in the introduction regarding market-based emission factors.

Digital OOH > Consumption > DOOH Ad Display & Operations > Device Usage

Required inputs and data levels

Number of playouts and spot duration are straightforward inputs, which should be specific to the campaign studied. Regarding power, different levels of data have been identified. Though some parameters were identified as first-order parameter of energy consumption (brightness, etc.), a top-down approach based on metered consumption was preferred as it allows these factors to be considered directly.

Required inputs

Variable	Unit	Source
$number\_playouts_{format,\ country}$	Integer (Dimensionless)	Campaign report.
spot_duration	Seconds	Campaign report.

Data levels - $consumption\_intensity_{format}$ (kWh / s)

Level	Method	Notes
0	Monetary data[1]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend based average.
1	Default average power per format of digital OOH	Averages based on market data.
2	Global annual average power	Global company average per format (all countries).
3	Annual average power by region	Global company regional average per format.
4	Site-specific figure for power	Specific measurement for sites[2] where the campaign has been displayed.

[1] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.
[2] Metered energy on sites is becoming increasingly common in the industry. If such data is only available for a group of devices, the allocation rule should be specified, especially if the infrastructure supporting the ads is also being used for other purposes, such as displaying public transport information or providing USB ports for charging smartphones, etc. Further guidance on allocation for multi-use formats is to follow in an updated version.

Digital OOH > Consumption > DOOH Ad Display & Operations > Device Usage

Calculation example

Example inputs

Variable	Unit	Value
Number of playouts	Integer (Dimensionless)	210,500
Spot duration	Seconds	30
Location	Country	UK
Format	Format	Outdoor totem

Conversion factors and example emission factors

Variable	Unit	Value	Source
D48 screen	kWh / s	6.83E-4	ADEME, 2024.
UK Electricity EF (location-based)	kg CO2e per kWh	0.1955	Electricity generated, UK, DEFRA 2025 & T&D- UK electricity, DEFRA 2025.

DOOH_display_energy_consumption_emissions
= number_playouts_UK * spot_duration *time_conversion* power * EF_electricity_UK
= 210,500 playouts * 30 s *6.83E-4 kWh/s * 0.1955 kg CO2e/kWh
= **843.2 kg CO2e**

Values are illustrative only. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Digital OOH > Consumption > DOOH Ad Display & Operations > Embodied Emissions of Infrastructure

Step context

The considerations for DOOH infrastructure are similar to that of classic/Classic OOH. DOOH formats can use an existing infrastructure / vehicle, or a dedicated one. **The impact of associated infrastructure and any transient vehicle is only considered, if it is dedicated solely to advertising.**

Below is an example of dedicated infrastructure for DOOH:

Note about bus shelters: as can be seen above, the advertising placement is usually built differently (heavy metal structure) from the other glass side (wind stopper), therefore this section ought to be considered as dedicated (not the entire bus shelter).

Depreciation over the lifetime use: the infrastructure for DOOH usually has a longer lifetime than the specific display device. The carbon impact associated with manufacturing and other steps is amortised over the entire lifetime of the infrastructure. It is then allocated solely to the functional unit period (the duration of the advertising campaign).

This step should cover all embodied emissions associated to the infrastructure (manufacturing of materials, upstream transportation, construction, end-of-life), including any specific electronics that were added to allow the functioning of the display device.

Digital OOH > Consumption > DOOH Ad Display & Operations > Embodied Emissions of Infrastructure

Operational formula

$$\text{Ad Display and Operations}_{\text{DOOH, Embodied Infrastructure Emissions}} = \text{number\_playouts}^{1}_{\text{country}}\ \text{(dimensionless)} \times \text{spot\_duration (s)} \times \text{EF\_embodied\_infrastructure\_intensity}^{2}_{\text{format, country}}{}^{3}\ \text{(kg CO2e / s)}$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign.

[2] Infrastructure emission factors should account for the total lifespan of the dedicated infrastructure, covering all embodied emissions associated to the infrastructure: manufacturing of materials, upstream transportation, construction, end-of-life.

[3] Emission factors for the same materials may vary by geographical region.

Digital OOH > Consumption > DOOH Ad Display & Operations > Embodied Emissions of Infrastructure

Required inputs and data levels

Number of playouts and spot duration are straightforward inputs, which should be specific to the campaign studied.

Guidance on this step will be improved and evolved as the GMSF develops, working with OOH stakeholders. Development of future methodologies may draw on aggregated, anonymised industry data where appropriate, with safeguards to protect individual company confidentiality.

Required inputs

Variable	Unit	Source
number_playouts $_{\text{format, country}}$	Integer (Dimensionless)	Campaign report.
spot_duration	Seconds	Campaign report.

Data Levels - EF_embodied_infrastructure_intensity[1] $_{\text{format, country}}$

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend based average.
1	Average EF based on market data	Averages based on market existing LCAs.
2	Approach based on main materials quantity and lifespan	Calculation based on the weight of main materials used to produce the dedicated infrastructure (e.g., steel, concrete) and averages for other steps (transportation, etc.), divided by the total active lifespan[1] in days for a final result in intensity per second.
3	N/A	
4	Product-specific EF based on supplier data	Calculation based on the supplier data / emission-factor for the infrastructure.

[1] Similarly to Display Manufacturing emissions, this EF should be allocated based on **total active lifespan** (time during which the screen was switched on during its lifetime), to ensure consistency with device allocation in the digital channel. The total number of playouts x spot duration results in at time allocation of the infrastructure impact.
[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Digital OOH > Consumption > DOOH Ad Display & Operations > Embodied Emissions of Infrastructure

Calculation example

Example inputs

Variable	Unit	Value
Number of playouts	Integer (Dimensionless)	210,500
Spot duration	Seconds	10
Location	Country	France
Format	Format	Outdoor totem

Conversion factors and example emission factors

Variable	Unit	Value	Source
EF outdoor with totem 75" LCD screen manufacturing emissions and infrastructure	kg CO2e / s	2.49E-05	ADEME, 2024 (based on 7 years lifespan). See GMSF OOH Emissions Data Sources.

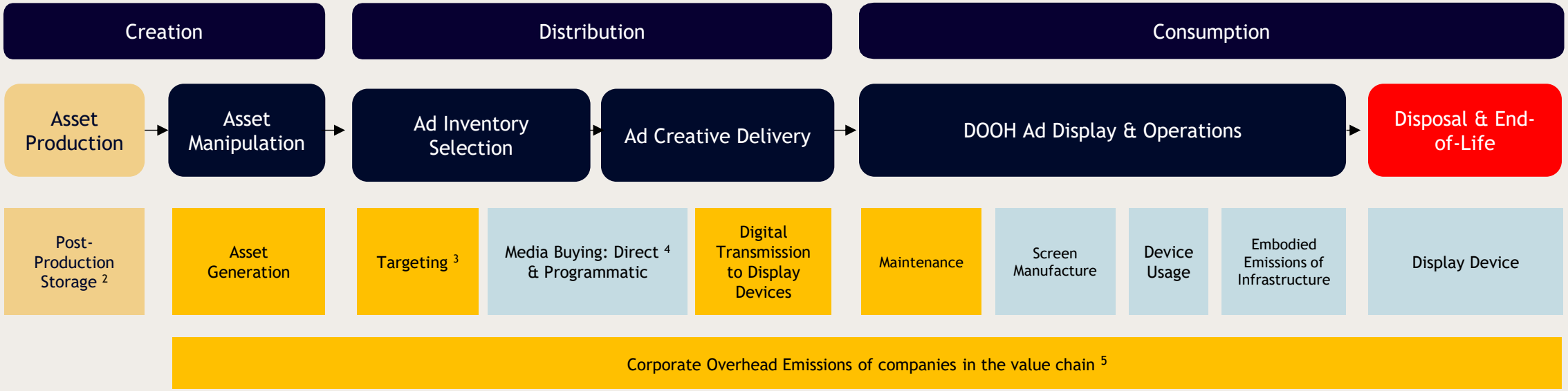
DOOH_display_manufacturing_emissions + DOOH_embodied_emissions_infrastructure1
= number_playouts_France * spot_duration * (EF_panel_manufacturing_emissions + EF_embodied_infrastructure_intensity)
= 210,500 playouts * 10 s * 2.49E-05 kg CO2e/s
= **52.4 kg CO2e**

[1] Practitioners can individually confirm whether factors cover Display manufacturing, embodied infrastructure, or both, to prevent double-counting.

Values are illustrative only, and this example represents Level 0 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



Digital OOH > Consumption > Disposal & End-of-Life > Display Device

Step context

The end of life of Digital OOH refers to the stage when hardware components and associated electronics, reach the end of their operational life and enter a disposal or recovery pathway. Unlike OOH ad materials which cycle through multiple campaigns, this end-of-life event occurs only once in the product lifecycle, hence its contribution per campaign impression is amortised across the full operational lifespan of the asset. At that point, components may be refurbished, redeployed, harvested for parts, recycled, or discarded, depending on local waste regulations, take-back schemes, and the material composition of the hardware.

Processing types:
Different end-of-life routes are generally reflected in environmental datasets and may vary by country. Given the electronic and mixed-material nature of DOOH hardware, typical processing routes include:

- **WEEE recycling:** collection, sorting, transport, and specialist recycling of electronic and electrical equipment, recovering metals, plastics, and other materials.
- **Metal recovery:** recovery and smelting of structural components such as steel and aluminium frames and enclosures.
- **Incineration:** thermal treatment of non-recoverable waste fractions, with or without energy recovery.
- **Landfill:** final disposal of residual waste without material recovery.
- **Other local routes:** such as component reuse programs, manufacturer take-back schemes, or mixed industrial waste treatment, where relevant.

Benefits captured:
The suggested model uses average country-level end-of-life rates to reflect the distribution of these treatment routes in practice. This keeps the end-of-life calculation simple while still capturing the effect of national waste-management performance.
Note that the environmental benefits associated with recycling and material recovery are only captured here to a limited extent, through end-of-life factors that are lower than the average treatment route; however, the main lifecycle benefit of using recycled materials is already accounted for upstream in the manufacturing emission factors.

Digital OOH > Consumption > Disposal & End-of-Life > Display Device

Operational formula

$$\text{Disposal and end-of-life}_{\text{DOOH, Display Device}} = \text{number\_playouts}^{1}_{\text{format, country}}\ \text{(dimensionless)} \times \text{spot\_duration (s)} \times \text{EF\_eol\_intensity}^{2}_{\text{format, country}}\ \text{(kg CO2e / s)}$$

Legend:
- *required inputs*
- *default values*
- *emission factors*

[1] The number of placements corresponds to the total number of different ad formats placed across the different OOH sites in the campaign. Note that this variable is used for calculation purposes of the total carbon footprint, but for Carbon Intensity of the format, calculators should take into account the number of impacts and calculate accordingly.

[2] Corresponds to the digital display end-of-life emissions (transport and process, following cut-off method), allocated per second based on its total active lifespan. Contrary to Classic OOH ad material, the digital display is used across different campaigns, hence the allocation (see calculation example). Number of playouts x spot duration results in a time-allocation input which is consistent with such an EF.

Digital OOH > Consumption > Disposal & End-of-Life > Display Device

Required inputs and data levels

Number of playouts and spot duration are straightforward inputs, which should be specific to the campaign being calculated.

Regarding emission factors, contrary to the Classic OOH formats, it was not possible to craft a model based on materials, therefore for lower data levels, some market average emission factors are provided.

Required inputs

Variable	Unit	Source
Number_playouts $_{\text{format, country}}$	Integer (Dimensionless)	Campaign report.
Spot_duration	Seconds	Campaign report.

Data levels - EF_eol_intensity[1] $_{\text{format, country}}$

Level	Method	Notes
0	Monetary data[2]	If only spend data is available rather than the circulation volume, an average ratio can be used. We recognise in most cases the circulation and formats ratios are accessible, and it is recommended to use these rather than a spend based average.
1	Default EF for top formats	Average EF for EoL of digital devices based on market data.
2	N/A	
3	N/A	
4	Product-specific EF based on supplier data	Company provided figure based on PCF (Product Carbon Footprint) or LCA (LifeCycle Analysis) for end-of-life processing. Such figures should follow the GHG Protocol Product Standard (incl. 3rd party verification).

[1] This EF should be allocated based on **total active lifespan** (time during which the screen was switched on during its lifetime), in order to ensure consistency with device allocation in the digital channel. The total number of playouts x spot duration results in at time allocation of the display end-of-life processing impact.
[2] In this step Level 0 uses monetary emission factors (kgCO2e per currency unit) applied to financial spend data. Organizations may select Level 0 where spend-based data is appropriate to their circumstances. All data levels are valid for GMSF implementation.

Digital OOH > Consumption > Disposal & End-of-Life > Display Device

Calculation example

Example inputs

Variable	Unit	Value
Number of playouts	Integer (Dimensionless)	21,500
Spot duration	Seconds	30
Location	Country	UK
Format	Format	Outdoor totem

Conversion factors and example emission factors

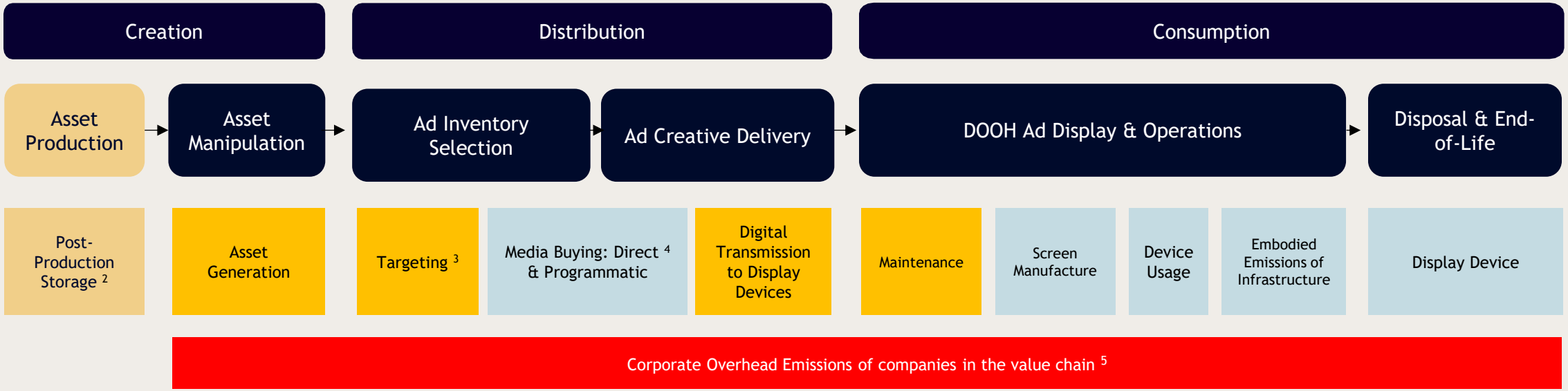
Variable	Unit	Value	Source
Display weight	kg	43.5	Samsung 75" Smart Signage Display.
Lifespan	Seconds	2.21E+08	7 years lifespan, market data.
EF WEEE end-of-life, open-loop recycling	kg CO2e per kg	4.69E-03	WEEE – mixed, open-loop recycling, DEFRA 2025.
Calculated EF DOOH display end-of-life, recycling, allocated per second, UK	kg CO2e / s	9.23E-10	Calculated from above.

DOOH_EOL_emissions
= number_playouts_UK * spot_duration * EF_EOL_intensity
= 21,500 placements * 30s * 9.23E-10 kg CO2e/s
= **6.0E-04 kg CO2e**

Values are illustrative only. Please refer to GMSF OOH Emissions Data Sources for latest reference on values and sources.

Digital Out-Of-Home (DOOH): Channel Emissions Workflow

DOOH (including Transit) [1]



Excluded from workflow boundaries

Included in workflow boundaries with guidance provided

Covered in Corporate Overhead Emissions for ease of implementation

Denotes the focus of the following section of implementation guidance

Digital OOH > Corporate Overhead Emissions

Step context

Corporate overhead emissions are:

- Emissions caused by processes that are not already captured in the unit process formulae.
- Generally organised into ‘fixed’ and ‘dedicated’ (that can vary by client and ad campaign).

Methodology:

Subtract all emissions that would be reported under the GMSF formulae from the overall corporate emissions to estimate the total annual corporate overhead emissions (TCOE). The expectation is that all scope 1 and 2 emissions (e.g., associated with office buildings) and all the relevant scope 3 emissions (e.g., business travel, purchased goods and services for marketing/administration) will be included and accurate.

Allocate the TCOE using one of the following approaches, depending on what data is available and appropriate to the organisation's circumstances:

a. By labour (e.g., person hour worked; FTE) so there is a kg CO2e/person-hour figure; or
b. By revenue, so there is a kg CO2e/$ figure
c. By output (e.g., kg CO2e/1000 impressions)

Estimate either corporate overhead per ad campaign by labour or revenue or output including both the fixed and the dedicated types of resources.

Estimate the corporate overhead emissions by multiplying the figures from steps 2 and 3.

For further information and background on the challenges of Corporate Overhead methodologies, please see the GMSF Playbook. Organisations are not required to disclose enterprise-level revenue, turnover, or cost data to external parties in order to implement the Corporate Overhead Emissions methodology. These calculations should be performed internally by each organisation using their own financial and emissions data. The result may be shared with clients or buyers, but the underlying financial metrics and allocation factors need not be disclosed.

Digital OOH > Corporate Overhead Emissions

Operational formula

For each entity of the ad value chain in a given GHG reporting year:

Enterprise GHG inventory (kg CO2e) - GMSF emissions reported via formulae (kg CO2e) = Total Corporate Overhead emissions (TCOE) (kg CO2e)

Allocate by revenue, FTE or impressions to create emission factor (EF) – in the most common case by revenue:

TCOE-EF = TCOE/revenue for GHG reporting year (kg CO2e/$)

Multiply TCOE-EF by the invoiced value for the ad campaign being estimated (Campaign Corporate Overhead emissions, CCOE):

CCOE (kg CO2e) = TCOE-EF (kg CO2e/$) * campaign invoice ($)

Legend:
- *required inputs*
- *emission factors*

Digital OOH > Corporate Overhead Emissions

Required inputs and data levels

Required inputs

For a specific entity of an ad campaign value chain, do you have:	
A	Enterprise emissions inventory, including AI emissions (third-party verified).
B	Total of all emissions reported elsewhere in the GMSF (credible & documented).
C	The TCOE unitised by enterprise revenue, enterprise FTE, or output unit (credible & documented).
D	The corresponding figure of revenue, FTE, or output unit for the specific activity for the ad campaign emissions being estimated (credible & documented).

Data levels

Level	Method
0	If only D is available (or is estimated) a revenue, FTE and output unit EF will be provided by the GMSF.
1	If there are GMSF default values for C by the type of enterprise and activity as well as geography, use those emission factors.
2	If only A and D are available, use standard overhead % provided by the GMSF to estimate TCOE which is unitised by revenue (or FTE, output) to estimate C.
3	If A, B, and C are available but D is only approximately estimated.
4	If YES to all.

Note: to facilitate the estimation of the emissions captured elsewhere in the GMSF (input B), please see the corporate overhead emissions by scope guidance which is ordered by emission scope 1, 2 and 3 to indicate which emissions categories are most likely to be included in the overhead estimate and which are likely already captured elsewhere by the GMSF.

A greyed-out box denotes an area of the GMSF under current development.

Digital OOH > Corporate Overhead Emissions

Calculation example

For a given organisation in a GHG reporting year:

Total enterprise GHG inventory = 10,000 kg CO2e
GMSF-reported emissions = 8,000 kg CO2e
Total Corporate Overhead Emissions (TCOE) = 2,000 kg CO2e

If allocating by output (e.g., 1,000,000 impressions delivered in the year):

TCOE EF = 2,000 kg CO2e / 1,000,000 impressions = 0.002 kg CO2e per 1,000 impressions

For the campaign being estimated (50,000 impressions):

CCOE = 0.002 kg CO2e/1,000 impressions × 50 = 0.1 kg CO2e"

Values are illustrative only, and this example represents Level 4 Data. Please refer to the GMSF OOH Emissions Data Sources for latest reference on values and sources.

Data Uncertainty

As noted in the playbook, the assessment and communication of Data Uncertainty is an important last step in the GMSF process.

Assessing uncertainty is a key principle in carbon accounting and is important in the GMSF context for several reasons:

- It encourages practitioners to use the most accurate data available.
- It provides a roadmap for better data development.
- It provides context for users of GMSF based estimates.

The uncertainty assessment in GMSF v1.3 is designed to be as simple as possible to implement by relying only on the percentage of Level 0 and Level 1 approaches used in the calculation. The overall level of uncertainty is simply based on that percentage as noted below.

For more information on Data Uncertainty, including context and challenges, please see the GMSF Playbook.

Uncertainty Level (UL) = (Count of all level 0, 1)/(Total Count)

UL = % of all data estimates using level 0 or level 1
for a specific channel

Lower level of accuracy	< 30% use of Level 0 + Level 1 approaches
Increased level of accuracy	between 30% and 60% use of Level 0 + Level 1 approaches
Higher level of accuracy	> 60% use of Level 0 + Level 1 approaches

Data Uncertainty

Calculation example

For an OOH campaign for the launch of Product X, the following data levels were used, depending on the available data:

Level	Number of times utilised within Channel Workflow
0	9
1	3
2	2
3	0
4	1

Uncertainty Level = 12/15 = 80% High uncertainty (as > 60%)

Values are illustrative only.

Further resources

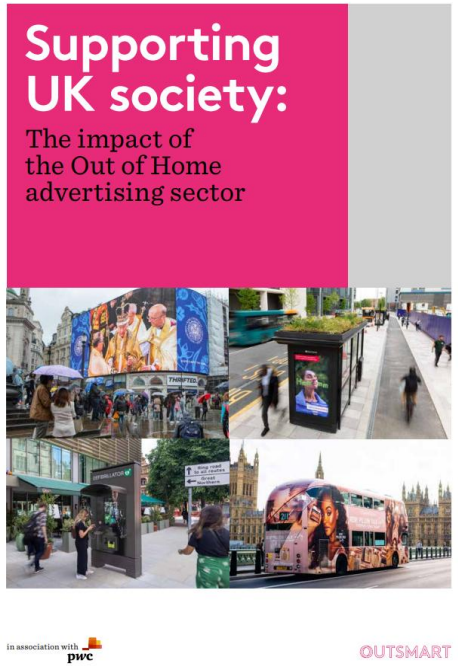
Associated GMSF resources

GMSF OOH Emissions Data Sources

GMSF OOH Emissions Data Request Form

Other industry resources

Outsmart_LowCarbon_LowPower_kpmg.pdf



Outsmart_Supporting_UK_Society_pwc.pdf

Ad Net Zero Compliance Statement

Ad Net Zero is an advertising industry climate action plan to decarbonise emissions in ad development, production, and media placement, and accurately promote more sustainable products, services and behaviours

It represents the interests of the advertising industry. It acts as a forum for legitimate contacts between supporters of the advertising industry. It is the policy of Ad Net Zero that it will not be used by any company, industry grouping or individuals to further any anti-competitive or collusive conduct, or to engage in other activities that could violate any antitrust or competition law, regulation, rules or directives of any country, or otherwise impair full and fair competition.

Supporters acknowledge that being a supporter of Ad Net Zero is subject to the competition law rules and they agree to comply fully with those laws. Supporters agree that they will not use Ad Net Zero, directly or indirectly, (a) to reach or attempt to reach agreements or understandings with one or more of their competitors; (b) to obtain or attempt to obtain, or exchange or attempt to exchange, confidential or proprietary information regarding any other company other than in the context of a bona fide business; (c) to further any anti-competitive or collusive conduct; or (d) to engage in other activities that could violate any antitrust or competition law, regulation, rule or directives of any country or otherwise impair full and fair competition.

Organisations are not precluded from using competing, alternative, or supplementary sustainability calculation frameworks or methodologies in addition to or instead of the GMSF. Use of the GMSF does not require exclusive adoption. Use of simplified default approaches should be a fallback, where primary data is unavailable or prohibitively difficult to obtain, not a preferred methodology.

The GMSF is designed to be scalable and accessible to organisations of varying sizes and capabilities. Organisations with limited resources may adopt simplified approaches using Level 0 data or select elements of the Framework. No organisation should be disadvantaged in the market for choosing to implement the GMSF in a simplified manner.

Organisations participating in GMSF development or data contribution processes do so under confidentiality protections.

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