Sustainable Games Standard - Scope 3, Category 11

GHG emissions- Use of sold products (Console)

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Top-level summary

Emissions from:	• End-user gameplay on console devices • System components required for gameplay (screens, audio, etc) • Energy losses from device charging inefficiencies (for mobile or handheld consoles)

Examples:	• Gameplay on home consoles (PlayStation/Xbox)
	• Gameplay on hybrid consoles (Nintendo Switch 1/2, Steamdeck, etc.)
	• Gameplay on VR headsets connected to consoles
	• **EXCLUDES**:
	  • Consideration of complex system changes from VR headset use (treats VR headsets as 100% additional energy use on top of existing system)
	  • Losses from charging controllers

Data sources:	• In-game or platform analytics • System reported device (name/model) and/or specifications • Hardware partner data
Data types:	• Player duration total (hours) • Player location (country/region) • Device name (model/SKU)

Consult with other SGA resources

Understanding the requirements and nature of this component of the GHG emissions standard may be aided by consulting the relevant data input spreadsheet to see the overall structure and major sections before reading the standard specification.

Overview

The SGA standard methodology for Scope 3 Category 11 “Use of sold products (Console)” aims to improve upon the advice in the GHG Protocol “direct use-phase emissions from products that directly consume energy” for games that are played on console devices. For the purposes of this Standard, game consoles that operate in a hybrid manner as both “handheld” and “docked” consoles are to use the current method.

The SGA Standard adopts a platform-specific approach to calculating and specifying the emissions from end-users of games, requiring developers to report energy consumption and GHG emissions from end-users (i.e. players) on console devices. The SGA Standard considers any device used to play games with an internal battery and screen to be a mobile device – however those mobile devices that can also be used in a ‘docked’ mode, connected to a TV, are considered *hybrid devices*. This distinction highlights the potential differences in system components for consoles that are operated in handheld and docked modes, and the importance of system components in calculations.

As in other parts of the standard, multiple methodologies are permitted for use depending on the availability of data, with users of the standard encouraged to improve their data collection practices over time to enable them to move towards accurate, truthful measurement of their players' impacts and interventions that can reduce those impacts.

Specification

Measurement of greenhouse gas emissions from Scope 3, Category 11 “Use of sold products (Console)” shall employ methods to achieve the comprehensive measurement of console energy consumption. Due to the unique nature of console hardware, specifications, and data

collection being within the control of hardware platform owners, they have a unique role in facilitating accurate measurement of end user emissions on devices.

Importance of Charger Efficiency and Losses

See the discussion of this issue in the S3.11 use of sold products 'mobile' component of the Standard for a discussion of the importance of charger energy losses in calculating total energy consumption and emissions. The same applies to console devices with internal batteries that need periodic recharging, and controllers with batteries (though this is currently out of scope in this version of the Standard) and as such charger losses are to apply to those devices.

The standard does not currently consider, but may at a future date account for:

- The ***time of charge*** undertaken by the end-user and the specific emissions factor at that time (e.g. Xbox carbon aware updates)
- Embodied emissions in the device being used to play the game
- Complex or altered system boundaries when VR headsets are connected to consoles (VR headsets are treated as entirely an *additional* energy consumption on top of the existing console systems)

System Boundaries

The basic system elements for the measurement of the energy consumption and emissions from console gameplay are to reflect the mode of operation of the device it is being played on. For devices that have no internal battery and screen for handheld/portable operation, then system components are to include:

- The device the game is being played on
- An average screen
- An average connected speaker
- At least one controller

- A VR headset + VR controllers (if VR compatible; to be considered in proportion to measured or estaimted VR gameplay hours as a percentage of total)

For hybrid consoles that have an internal battery and screen, and can be operated either in handheld mode or in a “docked” configuration, the system components are to be considered separately for each mode of operation. For docked mode, the same system components as stationary console devices are to apply. For portable mode the following system components are to include:

- The device the game is played on
- Energy losses due to charger inefficiency

Methodologies for calculating end-user energy consumption (Console)

Three options for end-user energy consumption totals are permitted. The first involves utilising data sharing from the hardware partner, where an appropriate system of measurement of the energy consumption of the device exists. The second is a method that unifies measurement across all console devices, relying on the input of regional play duration totals, and in the case of hybrid devices, a measurement (or estimate where measurements do not exist) of the percentage of end user play duration that occurrs in “docked” mode. The third option is a low data method, similar to the S3.11 (mobile) “option 4” method, for developers who are not currently collecting, or who do not have access to play duration data, instead producing an estimate based on the total number of sales and either an expected play duration or a total game length.

The first option is informed by the Microsoft Xbox end user energy measurement sytem, which measures a sample of real-world energy consumption on Xbox Series X/S devices in near real-time. These measurements are then extrapolated via an Xbox hardware model to the entire player-base, producing energy consumption and emissions totals for a specific

title. The SGA considers this an ideal approach for game developers to measure the "use of sold product" on console devices, provided that appropriate additional system components are included in addition to the direct console device energy consumption.

For users of the SGA Standard, the process of using Xbox collected measurement involves logging into the Xbox Partner Centre, downloading a full export of measurements produced by the system, and copy+pasting them into the specific SGA data input sheet tab, which will auto-calculate the total for the entire system boundaries as required. As other hardware platforms add this type of functionality for their own corporate disclosures and game development partners, whether based on direct measurements or other appropriate methodologies, the SGA will aim to work with platform owners to facilitate the use of this data appropriately in the standard.

The second option is a methodology based on collected player duration data, and which is the expected level for most users of the standard until platform specific reporting is available for all devices. In this instance, users of the standard are to collect player-duration data, aggregated by country/region, and (where relevant for specific consoles) data regarding the percentage of playtime in docked vs handheld modes. For this method, console device energy consumption will energy consumption information provided by the Energy Efficient Game Consoles self-regulatory initiative to produce energy consumption estimates.

The third and final option is for low-data scenarios, where play-duration information is not available. This may include games available on certain subscription services, if subscription owners do not provide play duration figures. In this case, users of the standard are to supply either an expected game length, or an estimated average playtime figure (based on either studio playtesting, observations, or other sources of information). This approach is similar to the Option 4 methodology in the S3.11 use of sold products (mobile) component of this standard.

Users of the standard are encouraged to aim for higher accuracy methods in this Standard component, and to communicate their needs for data sharing and transparency of methodologies with their platform partners who may not be currently have collection or data sharing systems in place currently.

Option 1 – Platform-specific measurement + system components

This method shall involve accessing platform-specific data collected by the console platform owner regarding energy consumption and/or emissions. As the method of data collection and presentation may differ, consult the instructions for the specific platforms in the relevant SGA data input sheet. For example, the Microsoft Xbox platform collects and allows partners to output data in 19 columns, for as many regions & titles as there is player data. The current SGA data input sheet is arranged so as to enable simple copy+paste of the full exported output from Xbox partner centre download, and apply the additional system components automatically. Users of the standard are reminded to ensure that the column headings in system exports match those in the data input sheet and to contact the SGA if there are any issues or discrepancies between the two.

Total energy consumption for all devices, across all regions, shall be the sum of the platform collected console emissions totals, as well as the additional system component totals, provided they both utilise the most appropriate regional emissions factors available.

Example Application of Option 1

See the SGA S3.11 (console) data input sheet tab labelled '[EX2. Xbox platform imports]'.

Option 2 – Estimated consumption by measured play duration

This is the expected method for first-time reporters, as it requires the most accessible data; howeve, this approach remains **estimate-based**, and there is a need to improve upon this approach to facilitate levers of control over emissions. Play-duration measurement does not by itself provide capacity to reduce emissions other than by reducing *total play duration*, potentially undesirable for both developers and end-users. Therefore, this method is offered as a provisional stop-gap, while platform holders improve their data collection and transparency efforts with partner developers.

This method shall involve collecting play duration data, aggregated by country or region, which is to be combined with energy consumption assumptions from existing research sources. For example, the current best research on console energy consumption is maintained by the EU's Energy Efficient Games Console Self-Regulatory Initiative, with testing conducted by an independent contractor according to an established testing methodology.

Alongside energy consumption estimates, a figure for the measured (or estimated) percentage of total play time spent in docked mode by players shall be provided. This may be based on research or observation of typical player behaviour, with sources for docked mode percentage being platform holders, developers' own metrics (if available) or, as a last resort, an SGA default value. For stationary consoles without a built-in screen or internal battery, the docked mode is to be considered 100%.

Collected play duration data for hybrid devices, aggregated by region, is to be proportionally allocated into separate pools of docked and handheld modes, respectively, to reflect the different system components required for gameplay in these different modes. In cases where hybrid console devices have different expected energy consumption in docked vs handheld

modes, separate energy consumption figures (in Watts) for each mode are to be used in the calculations (where available) of their respective pool's energy consumption.

For handheld mode, the system boundaries are considered to be the device itself, plus an allowance for charger inefficiency similar to S3.11 use of sold products (mobile). For docked modes, the system boundaries are to be considered the device itself, plus an average screen, an average connected audio device, and one controller.

Example Application of Option 2 Method

Example A: Players in France played a game on an Xbox Series X for a cumulative total of 12,000 hours over the reporting period. As the console does not have a handheld mode, the percentage considered to be spent in "docked" mode is 100%, and the game is not VR compatible so now allowance for a VR headset is included in the system boundaries. Total energy consumption is 12,000 hours of usage an average screen (92 Watts), an average audio device (30 Watts), one controller (1 Watt) and the device itself (153 Watts):

> Screen (12,000 x 92 Watts) + Audio (12,000 x 30 Watts) + Controller (12,000 x 1 Watts) + Device (12,000 x 153 Watts) = 1,104 kWh + 360 kWh + 12 kWh + 1,836 kWh = 3,312.00 kWh

Apply the most accurate regional emissions factor:

> 3,312.00 x 44.18 (gCO_2e – France 2024) = 146,324.16 gCO_2e = 0.146 tCO_2e

Example B: Players in Denmark played a Nintendo Switch 2 game for a total of 86,000 hours in the reporting period. Built-in metrics within the game indicate that players spent 43% of total playtime in docked mode, and is not VR headset compatible. Total energy consumption for the game is calculated in two parts, with docked energy consumption of 19 watts, and handheld energy consumption of 8 watts.

The docked portion of gameplay (43% of total hours = 36,980 hours) is calculated:

Screen (36,980 x 92 Watts) + Audio (36,980 x 30 Watts) + Controller (36,980 x 1 Watt) + Device (36,980 x 19 Wattts) = 3,818 kWh + 1,245 kWh + 41.5 kWh + 788.5 kWh = 5,893.00 kWh

The handheld portion of gameplay (57% of total hours = 49,020 hours) is calculated:

Device (39,020 x 8 Watts) / 70% (charger efficiency rating) = 474.29 kWh

Apply the most accurate regional emissions factor:

Docked: 5,893.00 kWh * 143.3 gCO2e/kWh = 0.84 tCO2e

Handheld: 474.29 kWh * 143.3 gCO2e/kWh = 0.07 tCO2e

Total: 0.91 tCO2e

Option 3 – Estimated power consumption by sales data or install data

This method is only recommended for cases where measured play duration data is not available, as it involves the largest degree of uncertainty and produces the least actionable insight. It should only be used when measured play duration data is not available (for example, when platform or service limitations are in place that prevent the collection of this data, such as subscription game services, etc.).

This method shall involve collecting proxy data such as sales data, total installs, monthly/daily-average-user data, and applying assumptions about either the total duration of the game, or an assumed median play duration. In either case, the expected play duration or expected total game length shall be multiplied by the number of total installs in a given region, for each of the same system components as in Option 2.

Example Application of Option 4 Method:

A studio develops a AAA 60 hour RPG that is a PS5 exclusive, and game game that is made available through the PlayStation subscription service. The game is single-player open-world

RPG, and is PSVR2 enabled . The studio estimates that the VR mode is used for about 8% of total gameplay hours.

*** FINISHED EXAMPLE TBC **

Total Reportable Scope 3 Category 11

The reportable results for Scope 3 Category 11 console emissions will be the sum of the results of the chosen methodology for calculating emissions, plus the results of the Multiplayer Module if the game is multiplayer and gameplay requires or involves internet data transmission between end user client and a “server” (including P2P multiplayer, where another player is simply the “server”).

Further examples & comparisons across 3 Options

HAVE NOT UPDATED

	Option 1	Option 2	Option 3	Option 4
Type of emissions source	Mobile users in country/region, measured via battery level observation	Mobile users in country/region, measured by battery level % change	Mobile users in country/region, measured by play duration	Mobile users in country/region, estimated via sales or install numbers & expected duration
Data source(s)	Battery charge readings (mWh/mAh) at start and end of play session, region information (from analytics)	Battery % change at start and end of session, and associated model name (iPhone 12, Samsung Galaxy S12)	Internal player metrics (from analytics)	Sales data, App store sales or install data, estimates of typical total play duration.
Data type(s)	mWh, kWh (when aggregated for final reporting)	Percentage of total battery charge level consumed (%), Total battery capacity (mAh/mWh)	Play duration totals (hours) per region	Total sold copies of game, total users, total installs (all per region)
Collected data:	Individual Finnish play session start/end difference: 500 mAh All Finnish players: 345 kWh	All Finnish iPhone 16 players: 6700% battery consumption	All Finnish players duration: 18,000 hours.	1,455 installs in Finland. Average expected play duration: 5 hours.
Adjustment for charger losses	+30%	+30%	+30%	+30%
Type of	Grid EF	Grid EF	Grid EF	Grid EF

emissions factor				
Example emissions factor	72.25 (gCO2e per kWh) (EMBER)	72.25 (gCO2e per kWh) (EMBER)	72.25 (gCO2e per kWh) (EMBER)	72.25 (gCO2e per kWh) (EMBER)
Calculation method	Multiplication (energy x emissions factor)	Multiplication (battery percentage * device battery capacity/100 x emissions factor)	Multiplication (total play duration in a region x low/high device energy consumption assumptions x emissions factor)	Multiplication (Total installs/players/ etc x expected play duration low/high device energy consumption assumptions x emissions factor)
Example calculation	345 kWh x 72.25 gCO2e/kWh	6700% battery consumption x 1.3561 Wh [derived from 3,561mAh] / 1000 x 72.25 gCO2e/kWh	18,000 hours x (3 watts/1000) x 72.25 gCO2e/kWh also 18,000 hours x (5 watts/1000) x 72.25 gCO2e/kWh	1,455 players x 5 hrs x (3 watts/1000) x 72.25 gCO2e/kWh also 1,455 hours x (5 watts/1000) x 72.25 gCO2e/kWh
Result	24.92 (kg CO2e)	0.656 (kg CO2e)	0.3901 (kg CO2e; low) 0.6502 (kg CO2e; high)	0.31537 (kg CO2e) 0.52562 (kg CO2e)

Appendix – References and Equations

Resources that have informed this draft:

- GESI ICT Sector Guidance for measuring software energy consumption (Ch6)

GHG Protocol Direct use-phase emissions method, for reference:

Calculation formula [11.1] **Direct use-phase emissions from products that directly consume energy (fuels or electricity) during use**

CO_2e emissions from use of sold products =

sum across fuels consumed from use of products:
∑ (total lifetime expected uses of product × number sold in reporting period
× fuel consumed per use (kWh) × emission factor for fuel (kg CO_2e/kWh))
+
sum across electricity consumed from use of products:
∑ (total lifetime expected uses of product × number sold in reporting period
× electricity consumed per use (kWh) × emission factor for electricity (kg CO_2e/kWh))
+
sum across refrigerant leakage from use of products:
∑ (total lifetime expected uses of product × number sold in reporting period
× refrigerant leakage per use (kg) × global warming potential (kg CO_2e/kg))

Total Reportable Emissions Sum Equation

None

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Sum of device measurement (Options 1, 2, 3 or 4) and Multiplayer
Module (if relevant)
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