



● METHODOLOGY · VERSION 1.0

Animation Calculator Methodology

How greenhouse gas emissions are quantified for animation productions and animation studios in the Canadian film and television industry.

STANDARDS

GHG Protocol Corporate Standard & Corporate Value Chain (Scope 3) Standard

COVERAGE

Scope 1, Scope 2, and upstream Scope 3 Categories 1–7

STATUS

Self-assessment tool. Outputs are unverified estimates.

Contents

This methodology sets out the boundaries, calculation approaches, emission factor sources, and data quality expectations that sit behind the Animation Calculator.

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Methodology Overview

This methodology describes the approach used to quantify greenhouse gas (GHG) emissions associated with animation productions and animation studios operating within the Canadian film and television industry. The calculator is designed to primarily align with the Greenhouse Gas Protocol and the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Standard, while reflecting the operational characteristics of animation production environments.

A category or emission source is treated as material to this methodology if it is reasonably expected to represent a significant share of a production's or studio's total footprint, or if its omission could meaningfully change the conclusions drawn from the results. Categories excluded on materiality grounds are documented in the relevant section below.

- **This calculator is a self-assessment tool. P4P does not review, verify, or validate user-submitted inputs or outputs.**

The methodology prioritizes consistency, transparency, and practicality, enabling animation productions and studios to measure emissions using available operational data while maintaining methodological alignment with internationally recognized GHG accounting standards.

The calculator quantifies emissions across Scope 1, Scope 2, and the most relevant upstream Scope 3 categories (Categories 1–7).

Permitted Claims and Appropriate Use

The following describes appropriate use of calculator outputs:

- Outputs are estimates based on self-reported, unverified activity data and are not suitable for offsetting, carbon-neutral, or net-zero claims.
- Results are not comparable between productions or studios (see Data Quality Hierarchy).
- If a user publishes a figure derived from calculator outputs, they should state the tool, version, reporting period, and boundary used.

The methodology recognizes that the GHG Protocol does not currently prescribe a fixed list of mandatory Scope 3 categories. Organizations are expected to include categories that are material and relevant to their operations. For animation production, the most significant upstream sources typically include purchased goods and services, capital goods, fuel- and energy-related activities, transportation of goods, waste generated in operations, business travel, and employee commuting.

Downstream categories (Scope 3 Categories 9–15) and Scope 3 Category 8 (upstream leased assets) are excluded from this methodology because animation productions are service-based operations and these categories are generally not applicable or meaningful at the production or studio level.

Organizational and Operational Boundaries

Organizational boundaries follow the operational control approach defined by the Greenhouse Gas Protocol Corporate Standard. Emissions sources are included where the reporting entity has operational control over activities or where emissions are generated through activities required to deliver animation production services.

Production-level assessments may differ from corporate-level footprints where equipment, facilities, or infrastructure are owned by a parent company rather than the production entity itself. In such cases, emissions associated with assets not purchased or controlled by the production entity are excluded from the production-level footprint and the exclusion is documented.

The reporting period corresponds to the studio's operational year or the lifecycle of a specific animation production project. Emissions for a production can be estimated by attributing emissions to a specific production season, rather than the entire studio's footprint. A proportional allocation method can be used. This calculation applied would apply a factor to the total studio emissions to estimate the seasonal footprint.

This factor can be derived using a full-time equivalent (FTE) or time-based allocation approach. Under an FTE approach, the share of total studio personnel dedicated to a given production is calculated relative to the total workforce across all concurrent productions during the reporting period. Alternatively, a time-based approach (e.g., total labour hours or production hours) may be used, where the proportion of total hours attributable to the production is calculated relative to overall studio activity.

DO NOT DOUBLE COUNT

This proportional allocation approach applies only when a production-level footprint is being derived from an existing studio-level inventory. It should not be combined with the category-specific “report zero” provisions described in Scope 3.2 and Scope 3.6 below: for a given category, a production either (a) uses studio-level allocation, in which case that category is not separately assigned or zeroed at the production level, or (b) directly assigns and reports (or zeroes) that category at the production level. The two mechanisms must not both be applied to the same category for the same production, as doing so would double count emissions — for example, production-specific travel counted directly together with an FTE-based share of studio-wide travel.

This proportional share is then applied to the studio’s total emissions to estimate the portion attributable to the specific production. This approach ensures that emissions are allocated in a manner that reflects actual resource use and operational activity, enabling a fair and representative distribution of shared energy consumption across multiple productions.

General Calculation Approach

Emissions are calculated using the following general formula:

$$\text{Emissions (kg CO}_2\text{e)} = \text{Activity Data} \times \text{Emission Factor}$$

Where:

- Activity data represents a quantified unit of activity (e.g., kWh of electricity, km travelled, CAD spent) with the specific data type varying by scope and category. Further detail on the required data types for each scope and category is provided in the sections below.
- Emission factors represent greenhouse gas emissions per unit of activity

All calculations are performed using consistent units. Where necessary, unit conversions are applied prior to emissions calculations.

Global warming potentials (GWPs) are applied consistently across the full inventory from Intergovernmental Panel on Climate Change (IPCC).

Emission Factor Selection Approach

Emission factors are selected based on geographic relevance, methodological credibility, and alignment with recognized governmental or peer-reviewed datasets.

Preference is given to Canadian datasets where available. The emission factor selection hierarchy is as follows:

01	Canadian National Inventory Report
02	Provincial Data sets
03	Canadian based EF databases (e.g., stats Canada, Open IO etc)
04	US EPA Factors
05	US EPA spend based supply chain factors
06	International Government databases

Figure 1. Emission factor selection hierarchy, highest preference first.

Where no Canadian dataset exists for a given category, the following named substitutions apply ahead of the general hierarchy above: purchased goods and services (Scope 3.1) and waste (Scope 3.5) use UK Government GHG Conversion Factors, selected for their category-specific granularity, in preference to the US EPA tiers. Any other substitution made outside this hierarchy is documented at the point of use.

Canadian emission factors are primarily sourced from Environment and Climate Change Canada (ECCC). Where Canadian emission factors are not available or do not provide sufficient methodological detail, internationally recognized government datasets are used.

Links to emission factor datasets should be maintained within the calculator documentation to allow annual updates. Emission factors should be reviewed annually and updated when new datasets are released by the relevant sources.

Sources and Licensing

Emission factor datasets used in this methodology are published under open licences that require attribution. UK Government GHG Conversion Factors are published under the Open Government Licence v3.0; Statistics Canada datasets are published under the Statistics Canada Open Licence; and Environment and Climate Change Canada datasets are published under the Open Government Licence – Canada. All three require attribution to the source. This methodology and the accompanying calculator attribute each dataset to its publishing source and licence at the point of use, consistent with these licence terms.

SECTION FOUR

Emission Factor Update Process

Emission factors are reviewed on an annual basis to ensure alignment with the most recent datasets published by primary sources. Detailed information on emission factor datasets, including dataset names, table locations within source documents, units, and links for annual updates, is provided in the Calculator. These tabs should be consulted when reviewing or updating emission factors used within the calculator.

When new emission factors are released, updated versions of the calculator will be issued to users. Reporting entities will be required to transition their data into the updated version to ensure the most current emission factors are applied. The calculator includes functionality to capture emissions across multiple years, allowing productions that span more than one reporting year to input and track data accordingly.

Data Quality Hierarchy

The calculator prioritizes higher-quality activity data wherever available. Data sources follow a hierarchy consistent with the Greenhouse Gas Protocol guidance.

TIER 1	Supplier-specific or measured activity data
TIER 2	Primary operational data such as invoices, or internal travel records
TIER 3	Distance-based or weight-based estimates using known operational parameters
TIER 4	Spend-based estimates using economic input-output emission factors

Where higher-tier data is unavailable, lower-tier estimation approaches may be used. All assumptions and estimation methods must be documented.

Scope and Category Summary

SCOPE	WHAT IT COVERS	CALCULATION METHOD
Scope 1	Natural gas, company vehicle fuel, on-site generators, fugitive refrigerants, fire suppression leakage	Activity-based
Scope 2	Purchased electricity for offices, studios, render facilities, and server infrastructure	Activity-based; location-based and market-based
Scope 3.1	Purchased goods and services, including cloud and render compute and outsourced animation	Spend-based for services; mass-based for goods
Scope 3.2	Capital goods: computers, monitors, servers, storage, furniture, animation hardware	Spend-based
Scope 3.3	Upstream extraction, production, and transport of fuels and electricity	Activity-based
Scope 3.4	Inbound and outbound transport of purchased goods, courier and freight	Spend-based by mode
Scope 3.5	Treatment and disposal of waste from office or studio operations	Activity-based
Scope 3.6	Business travel: flights, rail, taxis, rental vehicles, hotel accommodation	Activity-based
Scope 3.7	Employee commuting and work from home	Survey-based activity data

Table 1. Scopes and categories in the calculator. Scope 3 Category 8 and Categories 9–15 are excluded, as described in Section One.

SECTION SIX

Scope 1 — Direct Emissions

Scope 1 includes direct greenhouse gas emissions from sources owned or controlled by the production or studio.

Typical Scope 1 sources in animation production include natural gas used for office or space heating, fuel used in company-owned or leased vehicles, and fuel used in on-site generators for studio level footprints, fugitive refrigerant emissions from HVAC and chiller systems, and fire suppression system leakage.

Calculation method: activity-based.

Required data inputs include fuel consumption quantities such as litres of gasoline or diesel and cubic metres of natural gas from third-party invoices or receipts. Natural gas consumption may also be reported in gigajoules (GJ) as provided on energy invoices and converted to cubic metres where necessary.

If no Scope 1 emission sources exist, emissions are reported as zero with documented justification.

SECTION SEVEN

Scope 2 — Purchased Electricity, Steam, Heat, and Cooling

Scope 2 includes indirect emissions from the generation of purchased electricity consumed by the production or studio.

Electricity consumption typically occurs in offices, animation studios, render facilities, and server infrastructure.

Calculation method: activity-based using electricity consumption data.

Required data inputs include electricity consumption measured in kilowatt-hours (kWh) and the province or territory where electricity is consumed. The calculator maintains emission factors for all thirteen Canadian provinces and territories.

Location-Based Calculation

The location-based method reflects the average emissions intensity of the electricity grid in the province or territory where electricity is consumed.

Location-based emissions are calculated as:

$$\text{Electricity consumption (kWh)} \times \text{provincial grid emission factor (kg CO}_2\text{e/kWh)}$$

Market-Based Calculation

In alignment with the Greenhouse Gas Protocol Scope 2 Guidance, Scope 2 emissions are also calculated using the market-based method where applicable.

The market-based method reflects emissions associated with electricity that the reporting entity has purposefully chosen through contractual instruments such as supplier-specific emission factors or renewable energy certificates (RECs).

Market-based emissions are calculated using the following hierarchy:

- Where a supplier-specific emission factor is available, emissions are calculated using: Electricity consumption (kWh) × supplier-specific emission factor (for example, a supplier-specific factor obtained from an Alberta electricity retailer, or Ontario I-RECs applied to a portion of consumption)
- Where renewable energy certificates are purchased, emissions are calculated by applying zero emissions to the portion of electricity covered by RECs and applying the provincial grid emission factor to the remaining electricity consumption
- Where no contractual instruments or supplier-specific emission factors are available, market-based emissions default to the location-based result

Province-Specific Application

The applicability of market-based calculations varies across Canadian provinces due to differences in electricity market structures and the availability of contractual instruments.

In provinces with predominantly regulated and low-emission electricity grids and limited access to contractual instruments (e.g., British Columbia, Manitoba, Quebec, and Newfoundland and Labrador), market-based emissions are assumed to be equal to location-based emissions.

In provinces where electricity markets allow for supplier differentiation or the use of contractual instruments (e.g., Alberta and Ontario), it is consistent with GHG Protocol Scope 2 Guidance for users to report both location-based and market-based emissions. Where no contractual instruments are reported in these provinces, the market-based result defaults to the location-based result.

Scope 3 — Upstream Indirect Emissions (Categories 1–7)

Scope 3.1 Purchased Goods and Services

This category includes emissions associated with goods and services purchased by the production or studio, including software subscriptions, cloud services, outsourced animation services, professional services such as legal and accounting services, and other operational expenditures.

Cloud computing and render-farm compute, together with outsourced animation services, can represent a significant share of a production's Scope 3.1 footprint. For these two sub-categories, the calculator applies a dedicated data hierarchy: supplier-reported, customer-level emissions data (for example, from a cloud provider's own carbon reporting tools) is used where available, with the spend-based EEIO calculation described below used only as the default where supplier-reported data cannot be obtained.

Emissions from services are calculated using a spend-based approach due to limited availability of lifecycle emissions data for service-based purchases. While purchased goods emissions such as paper, plastics, and sheet metal are calculated using mass data (kg).

Spend-based (EEIO) emission factors are expressed per dollar of economic output in a specific base year. Spend reported in current-year dollars is deflated to that base year using an appropriate price index before the emission factor is applied, and factors are applied on the same price basis (basic price or purchaser price) on which they were published. The base year and price basis used for each factor are documented in the calculator's factor library.

Required data inputs include total spend by category measured in Canadian dollars or weight (kg).

Emission factors for purchased services are derived from Statistics Canada environmentally extended input-output datasets and expressed as emissions per dollar of economic output for relevant industries such as motion picture and sound recording industries, legal services, and software publishers. Spend-based methods are considered appropriate for service-dominated sectors such as animation where supplier-specific emissions data is rarely available. Purchases of computer hardware and peripheral equipment are treated as capital goods under Scope 3.2, not as Scope 3.1 purchased services, to avoid double counting between categories.

Emission Factors for purchased goods are derived from UK Government GHG Conversion Factors.

Scope 3.2 Capital Goods

Capital goods include long-life assets purchased by the production or studio during the reporting period such as computers, monitors, servers, storage equipment, furniture, and specialized animation hardware.

Calculation method: spend-based using capital expenditure data.

Required data inputs include the purchase cost of capital equipment in Canadian dollars. Where supplier- or vendor-specific greenhouse gas emissions data is available, this data may be used in place of the default spend-based calculation. Supplier-specific emissions data may include product-level lifecycle emissions data, supplier-reported emissions associated with the purchased service, or other verified emissions information provided by the vendor. When supplier-specific data is used, it should correspond to the purchased quantity and reporting period and the data source should be documented. Supplier-specific data is considered a higher-quality data source within the calculator's data quality hierarchy. Where such data is unavailable, the default spend-based calculation using Statistics Canada emissions intensity factors should be applied.

If emissions are calculated at the production level and the production entity does not purchase capital goods specifically for the project, Scope 3.2 emissions are reported as zero. This direct-assignment rule applies only where Scope 3.2 has not already been captured through the studio-level allocation approach described above.

Scope 3.3 Fuel- and Energy-Related Activities

This category includes upstream emissions associated with the extraction, production, and transportation of fuels and electricity already reported under Scope 1 and Scope 2.

Calculation method: activity-based using energy consumption quantities already collected for Scope 1 and Scope 2.

Required data inputs include electricity consumption and natural gas consumption.

Upstream electricity emission factors are sourced from Environment and Climate Change Canada datasets where available. Upstream natural gas emission factors are sourced from peer-reviewed literature or regional datasets where Canadian national data is unavailable.

Scope 3.4 Upstream Transportation and Distribution

This category includes emissions from inbound and outbound transportation of purchased goods and equipment including courier and freight shipping.

Calculation method: Spend-based by mode of transportation (rail, water, road, air).

A spend-based estimate is used to determine greenhouse gas emissions.

Freight and courier costs invoiced directly to the production or studio (for example, courier or freight invoices) are reported here, in Scope 3.4. Freight and shipping costs that are already embedded in a supplier's price for purchased goods are captured within the Scope 3.1 economic input-output (EEIO) factors and should not be reported again in Scope 3.4; each freight cost should be assigned to one category only to avoid double counting.

Scope 3.5 Waste Generated in Operations

This category includes emissions from treatment and disposal of waste generated during office or studio operations.

Calculation method: activity-based using waste quantities.

Required data inputs include waste quantities measured in kilograms and waste treatment type (landfill, recycling, compost).

Emission factors are sourced from UK Government Greenhouse Gas Reporting due to the absence of detailed Canadian waste-stream emission factors.

Waste generation in animation production environments is typically small compared with other sectors but is included for completeness and transparency.

Scope 3.6 Business Travel

This category includes emissions from employee travel for business purposes.

Travel modes include flights, rail travel, taxis, rental vehicles, and hotel accommodations.

Calculation method: activity-based.

Required data inputs include travel distance, travel mode, and number of nights for accommodation.

SHORT-HAUL

Less than 480 km

MEDIUM-HAUL

480 km – 3700 km

LONG-HAUL

3,700 km or more

Flight emissions are categorized as short-haul flights (less than 480 km), medium-haul flights (between 480 km and 3700 km) long-haul flights (greater than or equal to 3,700 km).

If emissions are calculated at the production level and the production entity does not undertake or fund any business travel specifically for the project, Scope 3.6 emissions are reported as zero. As with Scope 3.2, this direct-assignment rule applies only where Scope 3.6 has not already been captured through the studio-level allocation approach described above.

Scope 3.7 Employee Commuting and Work From Home

This category includes emissions associated with employee travel between home and the workplace as well as emissions from remote work.

Calculation method: survey-based activity data combined with mode-specific emission factors.

Required data inputs include commuting distance, commuting frequency, transportation mode, and employee home province.

For work-from-home emissions, required data inputs include the number of remote working days and the province of residence.

Work-from-home emissions include estimated electricity and heating energy used during working hours.

WORK-FROM-HOME ALLOCATION

Assumptions include an eight-hour workday and a proportional allocation of household electricity and heating consumption attributable to working hours. An eight-hour workday represents one-third of a 24-hour day. To account for baseline household energy use that would occur regardless of working from home, it is assumed that 50% of energy consumed during working hours is attributable to work-from-home activities. As a result, approximately 17% of total daily household electricity and heating energy is allocated to work-from-home emissions.

Work-from-home emissions are calculated by applying this proportional allocation to estimated daily household energy consumption and multiplying by the number of reported work-from-home days and the applicable province-specific emission factors.

Additional assumptions are used to estimate household heating energy for work-from-home emissions where the primary heating fuel of employees is unknown. These assumptions are based on national household energy use data published by Statistics Canada and supplemented. The values represent the approximate proportion of households using each primary heating fuel type and are used to allocate heating-related emissions within the calculator.

Governance and versioning

Every calculation the tool produces should carry the calculator's own tool version (for example, v1.2) and the vintage of the emission-factor set applied — that is, which annual factor release was in effect when the calculation was run. Because emission factors are refreshed on their own schedule, separate from changes to the tool itself, a result calculated in one year and revisited the next could otherwise look inconsistent for reasons that have nothing to do with the methodology — it may simply reflect an updated electricity grid intensity or a revised StatCan factor. Stamping both the tool version and the factor vintage on every output resolves that confusion at a glance. As a related default, a production that completed its reporting under a given tool version and factor vintage should stay reported under that combination; new factors apply only to work going forward.

Factor updates and methodology changes should also be governed differently, since they carry different weight. A routine factor refresh, the annual update described earlier, will be announced with a changelog at the time it's released, stating the date, the factor vintage, and what changed.

Methodology changes, a new category, a changed allocation rule, will require approval from someone above staff.