

Water Damage Restoration: Scope 3 Emissions Mapping and Calculation Guide

THE AGENCY *PLAYBOOK*

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This guide is the working document for calculating Scope 3 greenhouse gas emissions from water damage mitigation jobs under the Restoration Carbon Protocol. It contains the actual emission factors, the calculation methodology for each Scope 3 category, and a complete worked example from a real job type. A contractor who follows this guide will produce a per-job carbon figure that is defensible in a third-party ESG audit.

Job Classification: Why It Matters Before You Calculate



Job classification — why it matters before you calculate.

Your emissions total will vary by a factor of 10 or more depending on water category and drying class. Before calculating, classify the job correctly using IICRC S500 definitions:

CATEGORY	SOURCE	EMISSIONS DRIVER	TYPICAL TOTAL RANGE
Cat 1 / Class 1-2	Clean supply water, limited area	Transportation dominant	0.1–0.5 tCO ₂ e
Cat 2 / Any class		Materials + transportation	0.3–1.5 tCO ₂ e

	Gray water (washing machine, dishwasher, toilet overflow without feces)		
Cat 3 / Any class	Black water (sewage, floodwater, standing water)	Hazmat disposal + transportation	1.0–8.0 tCO ₂ e
Cat 3 / Class 3–4	Black water, large affected area requiring demolition	All four categories significant	3.0–12.0 tCO ₂ e

Category 4: Transportation Emissions



Category 4 — transportation emissions.

Transportation is typically the largest or second-largest emission source on water damage jobs. Calculate every vehicle separately.

Emission Factors (EPA Mobile Combustion, 2024)

VEHICLE TYPE	FUEL	KG CO2E PER MILE	SOURCE
Passenger car / cargo van	Gasoline	0.355	EPA Table 2
Light-duty truck (crew cab, work van)	Gasoline	0.503	EPA Table 2
Light-duty truck	Diesel	0.523	EPA Table 2
Medium-duty truck (equipment trailer)	Diesel	1.084	EPA Table 2
Heavy-duty truck (dump truck, tanker)	Diesel	1.612	EPA Table 2
Heavy-duty truck (loaded, waste hauling)	Diesel	2.25	EPA Table 2 + load factor

Calculation formula: Vehicle miles × emission factor = kg CO₂e. Convert to tCO₂e by dividing by 1,000.

What counts as “vehicle miles”: Round-trip distance from your facility or previous job to the loss site, multiplied by the number of trips. Include equipment pickup trips, progress check visits, and equipment retrieval trips. Do not include the vehicle miles of subcontractors — their emissions are captured in their own RCP calculation.

Category 1: Materials Emissions

Emission Factors for Common Water Damage Materials

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MATERIAL	UNIT	KG CO2E PER UNIT	SOURCE
Quaternary ammonium antimicrobial (liquid)	Liter	2.8	EPA EEIO — Chemical manufacturing
Hydrogen peroxide-based antimicrobial	Liter	1.9	EPA EEIO — Chemical manufacturing
Desiccant drying agent (silica gel)	kg	1.4	EPA EEIO — Chemical manufacturing
Disposable Tyvek suit (Category B)	Each	1.2	EPA EEIO — Apparel manufacturing
Nitrile gloves (pair)	Pair	0.3	EPA EEIO — Rubber/plastics
N95 respirator	Each	0.4	EPA EEIO — Medical equipment
P100 half-face respirator cartridge (pair)	Pair	0.8	EPA EEIO — Medical equipment
6-mil polyethylene sheeting	m ²	0.55	EPA EEIO — Plastics product manufacturing
HEPA filter (air scrubber, standard)	Each	3.2	EPA EEIO — Industrial machinery

Note on antimicrobial volumes: If you don't track liters applied per job, use these application rate proxies: Cat 2 jobs — 0.015 liters per sq ft of affected area. Cat 3 jobs — 0.025 liters per sq ft (double application typically required).

Category 5: Waste Emissions

Emission Factors by Waste Type and Disposal Method

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WASTE TYPE	DISPOSAL METHOD	TCO2E PER TON	SOURCE
Mixed C&D debris (non-hazardous)	Landfill	0.16	EPA WARM v16
Contaminated porous materials (Cat 2)	Landfill (standard)	0.18	EPA WARM v16 + contamination premium
Contaminated porous materials (Cat 3)	Landfill (regulated)	0.22	EPA WARM v16 + hazmat transport
Disposable PPE and consumables	Landfill	0.25	EPA WARM v16 — mixed plastics
Contaminated water (Cat 3)	Municipal wastewater treatment	0.000272 per liter	EPA WARM v16 — wastewater treatment
Contaminated water (Cat 3)	Permitted treatment facility (tanker)	0.000272 per liter + transport	EPA WARM + tanker transport

Estimating waste weight when you don't have disposal receipts: Use 2.5 lbs per sq ft of demolished drywall (standard 1/2" drywall), 3.0 lbs per sq ft of demolished flooring (carpet + pad), 0.8 lbs per sq ft of demolished wood subfloor. For Cat 3 contaminated water: estimate from extractor tank fill cycles × tank capacity.

Category 12: Demolished Building Materials

MATERIAL	TCO2E PER TON (LANDFILL)	TCO2E PER TON (RECYCLED)	SOURCE

Gypsum drywall	0.16	0.02	EPA WARM v16
Carpet + pad	0.33	0.05	EPA WARM v16
Hardwood flooring	-0.12 (carbon storage credit)	-0.18	EPA WARM v16
Vinyl/LVP flooring	0.28	0.08	EPA WARM v16 — plastics
Ceramic tile	0.04	0.01	EPA WARM v16 — inert material
Fiberglass batt insulation	0.33	0.05	EPA WARM v16
Cellulose insulation	0.06	-0.02	EPA WARM v16
Dimensional lumber (framing)	-0.07 (carbon storage credit)	-0.15	EPA WARM v16

Important: Negative values for wood-based materials reflect carbon storage credits under EPA WARM methodology — lumber and hardwood store carbon that is not immediately released when landfilled. Apply these credits only if the material is being landfilled rather than incinerated.

Complete Worked Example: Category 2, Class 3 Commercial Water Loss

Job profile: Washing machine supply line failure, 2,400 sq ft commercial office, second floor. Affected area includes cubicle space and server room (contents moved). Required demolition: 800 sq ft drywall, 600 sq ft carpet. Crew: 2 technicians, 3-day mitigation. Your facility is 24 miles from the job site.

Category 4 — Transportation

2 light trucks × 48 miles round trip × 4 trips (initial, day 2, day 3, equipment pickup) = 384 vehicle-miles

$384 \times 0.503 \text{ kg CO}_2\text{e/mile} = \mathbf{193 \text{ kg CO}_2\text{e}}$

1 equipment trailer (dehumidifiers, air movers) × 48 miles × 2 trips (drop-off + pickup) = 96 vehicle-miles

$96 \times 1.084 \text{ kg CO}_2\text{e/mile} = \mathbf{104 \text{ kg CO}_2\text{e}}$

1 dump truck for debris × 14 miles to transfer station × 1 trip = 14 vehicle-miles

$14 \times 2.25 \text{ kg CO}_2\text{e/mile} = \mathbf{32 \text{ kg CO}_2\text{e}}$

Equipment power source: building electrical supply (Scope 2 — property owner, not included here)

Category 4 total: 329 kg CO₂e = 0.33 tCO₂e

Category 1 — Materials

Quaternary ammonium antimicrobial: $2,400 \text{ sq ft} \times 0.015 \text{ L/sq ft} = 36 \text{ liters} \times 2.8 \text{ kg CO}_2\text{e/L} = \mathbf{101 \text{ kg CO}_2\text{e}}$

PPE: $2 \text{ technicians} \times 3 \text{ days} \times 2 \text{ Tyvek suits/day} = 12 \text{ suits} \times 1.2 \text{ kg} = 14 \text{ kg}$; $2 \times 3 \times 4 \text{ glove pairs} = 24 \text{ pairs} \times 0.3 \text{ kg} = 7 \text{ kg}$; $2 \times 3 \times 2 \text{ N95} = 12 \text{ respirators} \times 0.4 \text{ kg} = 5 \text{ kg}$.

PPE total: 26 kg CO₂e

HEPA filter replacement (2 air scrubbers, 1 filter change each): $2 \times 3.2 \text{ kg} = \mathbf{6 \text{ kg CO}_2\text{e}}$

Category 1 total: 133 kg CO₂e = 0.13 tCO₂e

Category 5 — Waste

C&D debris (wet materials, Cat 2 contaminated): estimated 1.2 tons (800 sq ft drywall at 2.5 lbs/sq ft = 1,000 lbs; carpet remnants ~400 lbs)

$$1.2 \text{ tons} \times 0.18 \text{ tCO}_2\text{e/ton} = \mathbf{0.22 \text{ tCO}_2\text{e}}$$

$$\text{Disposable PPE and consumables: } \sim 0.05 \text{ tons} \times 0.25 \text{ tCO}_2\text{e/ton} = \mathbf{0.01 \text{ tCO}_2\text{e}}$$

Category 5 total: 0.23 tCO₂e

Category 12 — Demolished Building Materials

$$800 \text{ sq ft drywall demolished: } 800 \times 2.5 \text{ lbs} = 2,000 \text{ lbs} = 0.91 \text{ tons} \times 0.16 \text{ tCO}_2\text{e/ton} = \mathbf{0.15 \text{ tCO}_2\text{e}}$$

$$600 \text{ sq ft carpet + pad: } 600 \times 3.0 \text{ lbs} = 1,800 \text{ lbs} = 0.82 \text{ tons} \times 0.33 \text{ tCO}_2\text{e/ton} = \mathbf{0.27 \text{ tCO}_2\text{e}}$$

Category 12 total: 0.42 tCO₂e

Job Total

CATEGORY	TCO ₂ E
Category 4 — Transportation	0.33
Category 1 — Materials	0.13
Category 5 — Waste disposal	0.23
Category 12 — Demolished materials	0.42
Total	1.11 tCO₂e

This figure — 1.11 tCO₂e — is what goes in the Category 4, 1, 5, and 12 rows of the RCP Job Carbon Report delivered to the property manager. The spend-based estimate for a \$28,000 job like this (using EPA Services to Buildings factor of approximately 0.10 kg CO₂e per dollar) would produce 2.8 tCO₂e — more than 2.5x the actual calculated figure. This is why primary data matters.

What is the single most important data point to capture for accurate water damage Scope 3 calculation?

Vehicle mileage. Transportation is typically the largest single emission source and is the most accurately calculated when mileage is documented. All other data points can be estimated from proxies, but vehicle mileage should be captured from actual dispatch records or GPS fleet data for every job.

Can I use the same emission factors for all antimicrobial products?

The EPA EEIO factor for chemical manufacturing (2.8 kg CO₂e/liter for quaternary ammonium compounds) is an appropriate default for most antimicrobial treatments. Hydrogen peroxide-based products have a lower factor (1.9 kg CO₂e/liter). If your company has specific product lifecycle assessment data, use that in place of the EEIO factor and note the source in your data quality section.

How do I handle a multi-week job that spans two calendar years?

Calculate total emissions for the full job and report the portion attributable to each calendar year based on the percentage of work performed in each year. For most clients, the simpler approach is to report the full job total in the year the job was completed — check with your client's ESG team which convention they prefer for their Scope 3 inventory.

Antimicrobial and Chemical Emission Factors: Updated Methodology

The EPA EEIO chemical manufacturing factor used in the Category 1 table above is an economic input-output proxy — useful for estimation but not sourced to the actual chemistry. The following replaces or supplements those values where peer-reviewed lifecycle data now exists.

Hydrogen Peroxide-Based Antimicrobials

H₂O₂ is the only restoration antimicrobial with published lifecycle assessment data. The anthraquinone auto-oxidation production process yields **1.33 kg CO₂e per kg of active H₂O₂** (ACS Omega, 2025); theecoinvent European market average is **1.79 kg CO₂e per kg** based on eight producers. For diluted restoration products (typically 3–7.5% concentration), the per-liter emission scales proportionally. A gallon of 7.5% H₂O₂ antimicrobial contains approximately 0.28 kg of active ingredient, yielding roughly **0.37–0.50 kg CO₂e per gallon of diluted product** — substantially lower than the EPA EEIO proxy of 1.9 kg CO₂e/liter previously used. Update your calculations accordingly.

Quaternary Ammonium Compounds (QACs)

No cradle-to-gate lifecycle assessment has been published for quaternary ammonium compound production as of April 2026. QACs are petrochemical-derived surfactants manufactured via chloromethane reactions with tertiary amines. The EPA EEIO factor of 2.8 kg CO₂e/liter remains the only available proxy. **Flag all QAC calculations as EPA EEIO estimated** in the data_quality section of any RCP Job Carbon Report delivered to clients facing SBTi or CSRD verification requirements. The RCP will update this factor when manufacturer-specific LCA data becomes available.

Botanical Antimicrobials (Thymol-Based Products)

Products such as Benefect Decon 30 (thymol active ingredient) carry USDA BioPreferred certification and UL EcoLogo status but no published LCA emission factor as of April 2026. Essential oil distillation is energy-intensive with extremely low extraction yields (1–2% from plant material). The RCP treats botanical antimicrobials as a **data gap requiring manufacturer EPD documentation**. In the absence of manufacturer data, apply the QAC proxy (2.8 kg CO₂e/liter) and flag as estimated.

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Truck-Mounted Extraction Unit: Fuel Consumption Reference Data

Truck-mounted extraction units operate on dedicated gasoline or diesel engines separate from the vehicle drivetrain. The fuel consumed during extraction operations is a direct Domain 2 Category 4 emission source. Manufacturer specifications and field-reported consumption rates:

UNIT / ENGINE	FUEL	CONSUMPTION RATE	KG CO ₂ PER HOUR
Prochem Peak 500 (Kawasaki FD851D-DFI, 31 HP)	Gasoline	~1.0 gal/hr	8.9
Prochem Everest 870HP (Kubota 75 HP)	Gasoline	1.5–2.5 gal/hr	13.3–22.2
Standard slide-in truckmount (industry consensus)	Gasoline	~1.0 gal/hr	8.9
PTO-driven van-powered (e.g., HydraMaster CDS 4.8)	Gasoline	+1–2 gal/hr above idle	8.9–17.8 (incremental)

RCP proxy for truck mount extraction: 1.0 gallon gasoline per hour of extraction unit operation (8.9 kg CO₂ per hour). A 4-hour extraction job on a standard truckmount generates approximately **35.5 kg CO₂** from the unit alone — independent of the vehicle transportation emissions calculated in Domain 2. Log extraction start/stop times in the job record.

Capture actual fuel consumption from fuel receipts where possible. Where runtime-only is documented, apply the proxy. Flag as proxy in the data_quality section.



Refrigerant Considerations: LGR Dehumidifiers and Fugitive Emissions

Commercial LGR dehumidifiers contain refrigerant charges that are potential Scope 3 emission sources if units are serviced, recharged, or have fugitive leaks. This is not a required RCP data point in v1.0 but is disclosed here for methodological completeness and for contractors with SBTi-committed clients.

Refrigerant Charge Data by Unit Type

UNIT	REFRIGERANT	GWP-100 (AR6)	APPROX. CHARGE
Phoenix DryMAX XL (125 ppd)	R-410A	2,256	~0.68 kg
Phoenix DryMAX (80 ppd)	R-410A	2,256	~0.54 kg
Dri-Eaz Revolution LGR (140 ppd)	R-410A	2,256	~0.60 kg
Dri-Eaz LGR 6000i	R-32	771	Not published

The **Dri-Eaz LGR 6000i** is the first major restoration dehumidifier using R-32, a refrigerant with a GWP of 771 under IPCC AR6 — representing a 63–67% reduction in refrigerant climate impact compared to R-410A units. This is relevant for the RCP Carbon Reduction Playbook: equipment replacement cycles that prioritize R-32 or R-454B (GWP ~530) units over R-410A materially reduce the fugitive emission exposure of a restoration fleet.

Fugitive emission screening: The EPA default annual leak rate for sealed hermetic refrigeration equipment (residential/commercial A/C) is 10% of charge capacity. For a Dri-Eaz Revolution LGR with 0.60 kg R-410A at the 10% screening rate, the annual fugitive contribution would be $0.06 \text{ kg} \times 2,256 \text{ GWP} = \mathbf{135 \text{ kg CO}_2\text{e per unit per year}}$. Actual leak rates for sealed hermetic dehumidifier compressors are likely 1–5% annually. Contractors are not required to calculate refrigerant emissions under RCP v1.0 but should document unit refrigerant type for RCP v1.1 compliance.



Wastewater Extraction: Methodological Note

Extracted water discharged to municipal sanitary sewer generates indirect emissions at the wastewater treatment facility. Based on Metropolitan Water Reclamation District energy intensity data (Elevate Energy, 2018), the national average wastewater treatment energy intensity is approximately **1,978 kWh per million gallons treated**, yielding **0.00074 kg CO₂e per gallon discharged** at the national grid emission factor. A typical water damage extraction of 500–2,000 gallons produces only **0.37–1.48 kg CO₂e** for wastewater treatment — under 0.5% of total job emissions on most jobs. The RCP excludes this source from required calculation in v1.0 but acknowledges it here for methodological completeness and CSRD-grade reporting contexts.

CONTINUE READING

- [Fire and Smoke Restoration: Scope 3 Guide](#)
- [Mold Remediation: Scope 3 Guide](#)
- [Biohazard and Trauma Scene Cleanup: Scope 3 Guide](#)

SEE ALSO

- [RCP Emission Factor Reference Table](#)
- [RCP Proxy Estimation Guide](#)
- [The 12 Data Points Every Job Ticket Needs](#)

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