Ontoly

The Carbon Registry Built for Buildings

ONTOLY_RETROFIT_EEFS-1.3

Existing Building Methodology

Energy Efficiency and Fuel Switching for Buildings

An Approved BERS Methodology

Version 1.3 | Final | Sectoral Scope: 03

Date of Entry into Force: 2 November 2026

This methodology shall be read in conjunction with the most recent Building Emissions Reduction Standard (BERS)

1. Introduction

This Approved BERS Methodology (the "Methodology") establishes the quantification, monitoring, and reporting procedures for energy efficiency and fuel switching retrofit projects in existing buildings under the Ontoly Building Emissions Reduction Standard (BERS) Program.

This Methodology was developed with reference to the Clean Development Mechanism **AMS-II.E (Small-scale Methodology: Energy efficiency and fuel switching measures for buildings, Version 12.0)** and has been adapted and enhanced to meet the requirements of the BERS Standard, the Integrity Council for the Voluntary Carbon Market (ICVCM) Core Carbon Principles, and applicable ISO standards.

This Methodology shall be read in conjunction with the most recent BERS, which establishes the definitive rules, requirements, and procedures for the monitoring, verification, registration, and issuance of Building Emissions Reduction Units (BERUs). Where this Methodology and the BERS Standard conflict, the BERS Standard shall prevail.

1.1 Required Components Addressed

In accordance with BERS Standard Section 1.2, this Methodology addresses all required components of an Approved BERS Methodology:

- **Applicability and Eligibility Criteria** (Section 2)
- **Project Boundary** (Section 3)
- **Determination of Additionality** (Section 4)
- **Baseline Methodology** (Section 5)
- **Quantification of GHG Emission Reductions** (Section 6)
- **Conservativeness and Uncertainty** (Section 7)
- **Monitoring Requirements** (Section 8)

1.2 Methodology Review Cycle

This Methodology shall be reviewed at a minimum of every five (5) years in accordance with BERS Standard Section 1.2.2 to ensure continued relevance, scientific rigor, and alignment with the ICVCM Core Carbon Principles. Amendments may only be made through Ontoly's formal Methodology Development and Review Process, including public consultation.

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1.3 Methodology Key Elements

Element	Description
Typical Projects	Installation of, replacement of, or retrofit of existing equipment with energy efficiency measures (e.g., higher-efficiency technologies for lighting, insulation, HVAC) and optional fuel switching (e.g., natural gas to electricity) in existing residential, commercial, or institutional buildings.
Type of Mitigation	Energy efficiency: Electricity and/or fuel savings through energy efficiency improvement. Fuel switching: Fossil fuel(s) to electricity or another lower-emissions fuel.
GHG Scope	CO_2, CH_4, N_2O, and any other GHGs explicitly included. Fluorinated gases (HFCs), including refrigerant emissions (e.g., those associated with heat pump installations or refrigerant-containing equipment), are excluded from this versions. This exclusion reflects: (a) the absence of reliable, publicly available data on refrigerant leakage rates by retrofit technology type at the individual building level; (b) the BERS Program's commitment to quantification based on real, metered data from utility bills rather than estimation or modelling approaches, which precludes the use of default refrigerant emission factors that cannot be verified against measured data; and (c) the conservative principle that emission sources shall not be included where they cannot be quantified with sufficient accuracy and integrity. Ontoly is committed to the highest standards of data integrity and will incorporate refrigerant emission quantification in a future version of the BERS Methodology when reliable measurement approaches and building-level data sources become available.
Geographic Scope	Canada and the United States of America. Additional jurisdictions may be requested via info@ontoly.org.
Crediting Period	Maximum ten (10) years, subject to regulatory surplus assessment. Crediting period is fixed at the time of first BERU issuance.
Quantification Approach	Ex-post monitoring of actual metered utility consumption against a baseline adjusted by Ontoly for weather and occupancy using the Ontoly GHG Quantification Model.

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2. Scope, Applicability, and Eligibility

2.1 Scope

2.1.1 The scope of this Methodology includes project activities that implement energy efficiency measures (including savings of electricity and fuel) and/or fuel switching in existing residential, commercial, or institutional building units or groups of building units. A non-binding list of building categories is presented in Appendix 1.

2.1.2 New buildings are excluded from the scope of this Methodology. Only retrofit projects involving existing buildings are eligible. An existing building consists of at least twelve (12) consecutive months of operational and energy consumption data prior to the project start date.

2.1.3 This Methodology covers project activities aimed primarily at energy efficiency, including technical energy efficiency measures (such as efficient appliances, better insulation, optimal arrangement of equipment, and Building Energy Management Systems) and fuel switching measures (such as switching from natural gas to electric heating or cooling systems).

2.1.4 The technology scope requires the building to conduct a retrofit, defined as the replacement of existing incumbent physical equipment or technology with new physical equipment or technology. The incumbent technology shall be retired and shall not be transferred to another use or building, in accordance with the leakage prevention requirements in BERS Standard Section 11.

2.1.5 Ontoly conducts a granular project quantification approach—thus, to ensure data quality. the definition of aggregated buildings project is defined as a maximum of 5 buildings for this version of the methodology. Further, this aggregation is only available for buildings that conform to the by definition in the BERS, which defines a 'Aggregated Building Project' to mean:

(a) all buildings are located within the same property boundary; and

(b) all buildings have the same Building Owner; and

(c) energy consumption and performance data are reported on an aggregated basis through shared utility accounts or equivalent metered systems.

2.2 Applicability

2.2.1 This Methodology is applicable to project activities where it is possible to directly measure and record the utility energy use within the project boundary (e.g., electricity and/or fossil fuel consumption pre- and post-project implementation).

2.2.2 This Methodology is applicable to project activities where the impact of the measures implemented by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal-to-noise ratio). Other variables that may affect energy and emissions reductions include, but are not limited to, weather, occupancy rate, and occupant behaviour. Ontoly shall apply standardized normalization procedures to isolate the retrofit impact from exogenous variables.

2.2.3 Project activities that involve the installation of renewable energy technologies to generate electricity for self-consumption (e.g., rooftop solar PV panels) or district energy are not eligible under this Methodology.

2.2.4 In accordance with BERS Standard Section 4.1, all project activities must result in measurable, verifiable reductions in building energy consumption and associated GHG emissions, quantified through a comparison of pre-retrofit and post-retrofit utility data.

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2.3 Eligibility Criteria

To be eligible for BERU issuance under this Methodology, a project shall meet all of the following criteria:

- The building must be an existing building located within Canada or the United States of America.
- The project must involve the physical replacement or installation of energy efficiency and/or fuel switching equipment (behavioural-only programs are excluded per BERS Standard Section 4.6).
- A minimum of twelve (12) months and up to thirty-six (36) months of historical, metered pre-retrofit utility data must be available for baseline determination.
- The building must not be registered or claiming emission reductions under another carbon crediting program or compliance market (per BERS Standard Section 12).
- The project must pass the Regulatory Surplus Assessment and the NPV Financial Additionality Test as defined in the BERS Standard Sections 10.1–10.3.
- Eligible Validation Documentation (e.g., IPMVP Report, IREE certification report, or equivalent professional engineering report) must be provided as per BERS Standard Section 6.
- The project must have received a positive Validation Statement from an accredited Validation Body in accordance with BERS Standard Section 6 and the BERS Validation and Verification Standard.

2.4 Scientific Advisory Consultation & Entry into Force

2.4.1 An independent scientific advisory panel was engaged throughout 2025 in the development of this Methodology, led by Ontoly. The scientific advisors were engaged in the development of this Methodology through three feedback sessions. They reviewed and provided comments on a draft of this Methodology starting in early 2025 through September 2025. Their final input on this Methodology draft was collected by 24 November 2025 and incorporated by February 15 2026.

Scientific experts engaged in the advisory process include:

- Riley Beise
- Menush Akbari
- Mohammad Fakoor

These experts were selected based on their engineering backgrounds and expertise in building decarbonization design and emissions impact assessment.

2.4.2 The Methodology first entered into force on 11 March 2026. Version 1.3 enters into force on 2 November 2026.

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3. Project Boundary

3.1.1 The project boundary is the physical, geographical site of the building(s) and relates only to operational GHG emissions reductions.

3.1.1A Where the Building Owner is a Tenant under BERS Standard Section 2.7.1A, the project boundary is the Tenant's building unit, consistent with BERS Standard Section 4.5.1A. Baseline and monitoring data shall come from meters serving only that building unit, or from whole-building meters where the Tenant's building unit is the entire building.

3.1.2 In accordance with BERS Standard Section 4.5, the project boundary shall encompass all GHG sources, sinks, and reservoirs under the control of the Project Proponent that are reasonably expected to be affected by the retrofit.

3.1.3 The project boundary is limited to Scope 1 (direct fossil fuel combustion) and Scope 2 (purchased electricity) operational emissions. Scope 3 emissions (upstream and downstream) are excluded as per BERS Standard Section 11.1.5.

3.1.4 For Aggregated Building Projects, the project boundary may encompass multiple buildings subject to the conditions set out in BERS Standard Section 4.5.2, including common ownership, shared property boundary, and aggregated utility reporting.

3.1.5 The project boundary shall remain identical pre- and post-retrofit.

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4. Demonstration of Additionality

Additionality is assessed at the individual building level. Additionality shall be demonstrated in accordance with the BERS Standard Sections 10.1–10.6. This Methodology adopts the BERS Standard's two-part additionality framework in full:

4.1 Regulatory Surplus Assessment

4.1.1 The project must demonstrate that the GHG emission reductions exceed any reductions required by applicable local, provincial/state, or federal laws, regulations, or legally binding mandates (BERS Standard Section 10.1.1).

4.1.2 Ontoly shall apply its Jurisdictional Regulatory Model, a continuously updated database of mandatory building codes, minimum efficiency standards, building performance standards, and climate regulation across all eligible jurisdictions. This database is verified annually by the contracted third-party Verification Body (BERS Standard Section 10.1.3).

4.1.3 The regulatory surplus evaluation shall be conducted once, evaluating legislation legally binding as of January 1 of the year the Preliminary Ex-Ante BERU Assessment Report is requested. The crediting period shall not be shortened if new or stricter regulations are implemented after the Project Start Date (BERS Standard Section 10.1.4).

4.1.4 Where BERUs are expressly recognized as an eligible compliance mechanism under an applicable regulatory program or building performance standard, such use shall not negate regulatory surplus, provided the project otherwise meets all BERS requirements (BERS Standard Section 10.1.2).

4.2 NPV Financial Additionality Test

4.2.1 Every project shall undergo a standardized Financial Additionality Assessment conducted by Ontoly, consisting of:

- **(A) NPV Financial Additionality Test (Pass/Fail):** A mandatory binary test determining whether the project has a negative net present value without carbon credit revenue. A project passes where the NPV of the project without carbon revenue is less than zero (NPV < 0), subject to sensitivity analysis. A project fails where the NPV of the project without carbon revenue is greater than or equal to zero (NPV ≥ 0).
- **(B) Financial Additionality Rating (1–5 Scale):** For all projects that pass the NPV test, Ontoly assigns a Financial Additionality Rating based on the magnitude of its funding gap (Section 4.4 and BERS Standard Section 10.4), providing a transparent signal of the degree of financial additionality.

4.2.2 The NPV test formula, variable definitions, and detailed procedures are set out in BERS Standard Sections 10.3.1–10.3.9. Key variables include:

- Capital cost (CAPEX), annual energy cost savings by fuel type, upfront incentives, incremental O&M costs, standardized discount rate, fuel price escalation rates, and average economic useful life.

4.2.3 All fuel types applicable to the project (e.g., natural gas, electricity, fuel oil, propane, district steam, district chilled water) shall be individually parameterized with their own unit of measurement, base year price, and escalation rate as specified in the Ontoly Public Parameter List.

4.3 Sensitivity Analysis

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4.3.1 In accordance with BERS Standard Section 10.3.6 and ICVCM Core Carbon Principles Criterion 8.5, Ontoly shall conduct a standardized sensitivity analysis for every project that passes the NPV Financial Additionality Test.

4.3.2 The sensitivity analysis shall test, at minimum, the following parameters: capital cost (CAPEX), annual energy cost savings, the standardized discount rate, and upfront incentives. The specific variation ranges applied to each parameter shall be defined in the Ontoly Public Parameter List, calibrated to reflect realistic estimation uncertainty for building retrofit projects, and reviewed as part of the minimum five-year methodology review cycle.

4.3.3 A project shall be deemed to have a robust additionality determination where the NPV remains negative (NPV < 0) for the majority of sensitivity scenarios (at least two of three sensitivity analyses) tested. Where the NPV becomes positive under more than one scenario, Ontoly shall flag the project for supplementary review (BERS Standard Section 10.3.8).

4.3.4 The sensitivity analysis parameters and their application to the project shall be assessed by the Validation Body as part of validation. The parameter ranges themselves shall be subject to annual third-party verification as part of Program-Level Verification (BERS Standard Sections 6 and 10.3.7).

4.4 Financial Additionality Rating

4.4.1 For every project that passes the NPV test, Ontoly assigns a Financial Additionality Rating from 1 to 5 based on the magnitude of the funding gap: the share of total retrofit capital cost (Capex) not covered by the present value of the project's benefits, calculated as −NPV ÷ Capex in accordance with BERS Standard Section 10.4.

Funding Gap (% of Capex)	Qualitative Determination	Rating
60% or more	Very High Additionality: Profound financial barriers; project highly unlikely without carbon finance	5
40% to less than 60%	High Additionality: Substantial financial barriers; technology proven but not widely adopted due to cost	4
25% to less than 40%	High-Moderate Additionality: Marginal investment case; carbon finance is a key enabling factor	3
15% to less than 25%	Moderate Additionality: Moderate capital constraints	2
Less than 15%	Lower Additionality: Passes NPV test; capital constraints remain but could be deemed modest	1

4.5 Data Submission Requirements

4.5.1 The Building Representative shall submit the Financial Additionality Data Submission Form, including per technology retrofit measure: (a) estimated capital cost; (b) estimated annual energy savings by fuel type (positive for savings, negative for cost increases); (c) anticipated incentive or rebate amounts; (d) where available, estimated annual O&M Savings (positive for savings, negative for cost increases); and (e) modeled energy reductions by utility type.

4.5.2 Financial data submitted to Ontoly shall align with the engineering design and validation documentation prepared and signed by a licensed Professional Engineer. All financial data inputs, and the Financial Additionality Assessment derived from them, shall be assessed by the Validation Body as

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part of validation (BERS Standard Sections 6 and 10.5). Financial data inputs remain confidential under BERS Standard Section 10.5.2 and are made available to the Validation Body on the same basis as to the Verification Body.

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5. Baseline Methodology

5.1 Establishment of the Baseline Scenario

5.1.1 The baseline scenario represents the GHG emissions that would have occurred in the absence of the BERS project activity. The baseline is calculated using twelve (12) to thirty-six (36) months of actual, historical, metered utility data for the building, drawn from the period most immediately preceding the Project Start Date and reflective of the building's normal operating conditions.

5.1.2 Where baseline data from the period immediately preceding the Project Start Date is unavailable, incomplete, or not representative of normal building operations (e.g., due to extended vacancy, major renovation, pandemic-related shutdowns, or metering failures), Ontoly may, at its sole discretion and following a documented reasonableness assessment, accept utility data from an alternative period that more accurately reflects the building's typical operational profile. Any substitution shall be clearly disclosed in the public Project Description Report on the Ontoly Registry.

5.1.3 The baseline shall be established in a conservative manner, consistent with ICVCM requirements, including by: (a) considering existing government policies and legal requirements in determining the baseline scenario; and (b) ensuring that the overall degree of conservativeness in baseline quantification is proportionate to the level of overall uncertainty.

5.2 Monitoring & Verification

5.2.1 Ex-post (after the retrofit is complete), the Building Representative is required to monitor and report monthly fuel and electricity consumption to Ontoly on a yearly basis for: (a) a minimum of twelve (12) months pre-project (baseline period); and (b) annually thereafter post-project for the entirety of the crediting period (up to ten years of post-retrofit data reporting).

5.2.2 The Building Representative shall also complete all forms required by Ontoly, including accurate quantitative reporting of Gross Floor Area (in m^2) and annual average occupancy rates for the building (expressed as a percentage of use).

5.2.3 Building Representatives may be required to provide evidence of all quantitative variables, including proof of occupancy or square footage.

5.2.4 Utility bill samples shall be required as evidence and must be submitted to Ontoly according to the timelines outlined in the BERS Standard (Annual Monitoring Report due by March 31; see BERS Standard Section 5.5.1).

5.2.5 Building Representatives may be selected for verification audit to confirm the accuracy of actual utility performance data by the Verification Body, based on a sampling approach identified by the Verification Body.

5.3 Baseline Determination for Retrofit Projects

5.3.1 For project activities involving the retrofit of an existing building, for example unit j, the baseline period comprises the metered electricity and fuel consumption of the existing building unit over the thirty-six (36) months immediately prior to the Project Start Date or, where fewer than thirty-six (36) months of metered data exist for that period, all consecutive months available immediately prior to the Project Start Date, with a minimum of twelve (12) months.

This metered data is used for two purposes:

(a) Ex-ante quantification (Preliminary Ex-Ante BERU Assessment Report). The baseline electricity ($EC_{BL,j}$) and baseline fuel ($FCF_{BL,f,j}$) are the average annual electricity consumption and the

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average annual energy content of each fuel consumed over the baseline period, without weather normalization.

(b) Ex-post quantification (Annual Monitoring Report and BERU issuance, Section 6). EC_BL,j and FCF_BL,f,j are determined for each monitoring year under Appendix 2 §A2.1.3. Where a fuel's baseline regression shows a significant weather relationship, the regression is applied to that year's actual weather (Pathway A). Otherwise, the mean monthly baseline consumption is used, with no weather adjustment (Pathway B). In both cases, the baseline covers only the monitoring months with usable or substituted data.

5.3.2 The baseline period is set by Section 5.3.1, or by an alternative period accepted under Section 5.1.2, and is fixed before the baseline regression tests in Appendix 2 §A2.1.4 are run. The Building Representative shall submit all metered months available in that period. The baseline period shall not be shortened, extended or moved to improve the result of a test.

5.3.3 If the baseline building consumes more than one type of fuel, the parameter EF_CO2,f,BL shall represent the weighted average CO_2 emission factor of the different fuels.

5.3.4 Data on the type of fuel and quantities consumed by existing buildings shall be submitted to Ontoly through the Ontoly Portal. Building Representatives are required to submit all forms and supporting documentation as outlined in the portal for Ontoly to complete Project Description Reports on the Building Representative's behalf, in accordance with the BERS Standard and ICVCM requirements.

5.4 Conditions for Fixed Baseline Parameters

5.4.1 The baseline parameters EC_BL,j and ECF_BL,j shall remain fixed throughout the project lifetime (for ex-post quantification, the baseline regression coefficients and the weather normalization pathway are fixed at validation, and the baseline is evaluated for each monitoring year under Appendix 2 §A2.1.3) provided all of the following conditions are met:

- **Occupancy (Residential):** For residential building units, the building unit's j average annual occupancy rate (percentage of use) (Occupancy_j,y) during the crediting period is not below, and is no more than 10% above, the average baseline building unit's j occupancy (Occupancy_j,BL) over the last three (3) years prior to the Project Start Date.
- **Operating Hours (Commercial/Institutional):** For commercial and institutional building units, the average weekly operating hours of unit j in year y (h_OP,y) are not below the average weekly operating hours over the baseline period (h_OP,BL).

5.4.2 Where any of the above conditions are not met, the baseline parameters shall be treated under the occupancy and operating-hours procedures in Appendix 2 §A2.2, consistent with ASHRAE Guideline 14 and the International Performance Measurement and Verification Protocol (IPMVP) Option C for whole-building energy analysis.

5.4.3 Weather is not a condition for fixing the baseline parameters. For ex-post quantification, weather is addressed in every monitoring year under Appendix 2 §A2.1.

5.5 Occupancy and Use Change Attestation

5.5.1 The Building Representative shall provide an annual attestation of occupancy and use changes as part of each Annual Monitoring Report. This attestation shall include:

- The current occupancy rate expressed as a percentage of the baseline occupancy.
- Disclosure of any material changes in building use, tenant mix, or operating patterns that may affect energy consumption.

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- Where the occupancy rate has changed by more than ±10% from the baseline, a detailed explanation of the change and its expected impact on energy consumption.

5.5.2 Where the occupancy rate is below the baseline, or more than 10% above it, the occupancy procedure in Appendix 2 §A2.2.1 applies, ensuring that credited emission reductions are attributable to the retrofit activity and not to changes in occupancy or use.

5.5.3 The Validation Body may request evidence of baseline occupancy data, and the Verification Body may request evidence of occupancy data for the monitoring period, including but not limited to lease records, property management reports, or building access data. Failure to substantiate occupancy claims may result in conservative adjustments to credited emission reductions.

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6. Quantification of GHG Emission Reductions

The Ontoly GHG Quantification Model conducts standardized emission reductions calculations for ex-post fuel and electricity consumption data. All quantification is centralized and performed by Ontoly using standardized formulas and verified datasets, in accordance with BERS Standard Section 2.1.2.

6.1 Total Emission Reductions

Emissions reductions are determined as the sum of the emission reductions associated with the savings of electricity, savings of fuel, and fuel switching by the project building j during the crediting period y, compared to the baseline period:

Equation 1:

$$ER_y = \sum_j \left(ER_{Elec}\,Savings, j, y + ER_{Fuel}\,Savings, j, y \right)$$

Where:

- ER_y = total emission reductions in monitoring year y (tCO_2e)
- ER_Elec Savings,j,y = emission reductions from electricity for building unit j in monitoring year y (tCO_2e), determined under Equation 2 (Section 6.2)
- ER_Fuel Savings,j,y = emission reductions from fuels for building unit j in monitoring year y (tCO_2e), determined under Equation 3 (Section 6.3)
- j = building unit
- y = monitoring year

6.2 Emission Reductions from Electricity Savings

Emission reductions from electricity savings are calculated as the difference between the electricity that would have been consumed by the baseline building unit (EC_BL,j) and the electricity consumed by building unit j during the crediting period, multiplied by the CO_2 emission factor:

Equation 2:

$$ER_{Elec}\,Savings, j, y = \left(EC_{BL}, j - EC_{metered}, j, y \right) \times EF_{EL}, k$$

Where:

- EC_BL,j = Electricity that would have been consumed by the baseline building unit j (kWh). For ex-ante quantification, determined as the average of annual electricity consumption across up to three baseline years, each comprising a minimum of 12 months of metered data prior to the Project Start Date. For ex-post quantification, determined for each monitoring year y in accordance with Appendix 2 §A2.1.3: the baseline regression evaluated at the actual monthly weather of year y (Pathway A), or the mean monthly baseline consumption where no weather adjustment applies (Pathway B), summed over the same monitoring months as EC_metered,j,y.
- EC_metered,j,y = Electricity consumed by project building unit j in year y (kWh), as metered, after the data-gap treatment in Section 8.6.3. Weather is accounted for in EC_BL,j (Appendix 2 §A2.1.3), so this value is not itself weather-adjusted. For ex-ante quantification, forecast consumption is substituted in place of EC_metered,j,y, without weather normalization.

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- EF_EL,k = Weighted average CO_2e emission factor from jurisdiction k that supplies electricity to building unit j (tCO_2e/kWh), excluding renewable energy technologies. The emission factor is fixed at the value established at project registration and does not update annually, to ensure no double counting of Scope 2 electricity emission reductions with electric utility providers.

The electricity sources in jurisdiction k shall be from the electric grid tied to the building. EF_EL,k shall be collected from reputable government agency sources by Ontoly.

Note: The grid electricity emission factor for a given jurisdiction shall remain constant throughout the crediting period to ensure no double counting of Scope 2 emissions reductions attributable to grid decarbonization (BERS Standard Section 12.1.4). Transmission and distribution losses are excluded from the quantification framework, as the methodology uses site-level metered consumption data, which inherently reflects energy delivered to the building boundary.

For ex-post quantification, EC_BL,j and EC_metered,j,y relate to the same weather and the same monitoring months: EC_BL,j is evaluated at the actual weather of year y or, where consumption shows no significant weather relationship, needs no weather adjustment, such that the difference between them isolates the effect of the retrofit from weather variation.

6.3 Emission Reductions from Fuel Savings

Emission reductions from fuel savings are calculated as the difference between the energy content of the fuel that would have been consumed by the baseline building unit (ECF_BL,j) and the energy content of the fuel(s) consumed by building unit j during the crediting period, multiplied by the CO_2e emission factor:

Equation 3:

$$ER_{Fuel}Savings, j, y = \sum_{f} \left[\begin{array}{c} \left(FCF_{BL}, f, j - FCF_{metered}, f, j, y\right) \times \\ \left(EF_{CO2}, f, k \times GWP_{CO2} + EF_{CH4}, f, k \times GWP_{CH4} \right. \\ \left. + EF_{N2}O, f, k \times GWP_{N2}O\right) \end{array} \right]$$

Where:

- FCF_BL,f,j = energy content of fuel type f that would have been consumed by the baseline building unit j (GJ). For ex-ante quantification, averaged over the baseline period. For ex-post quantification, determined for each monitoring year y in accordance with Appendix 2 §A2.1.3: the baseline regression for fuel f evaluated at the actual monthly weather of year y (Pathway A), or the mean monthly baseline consumption where no weather adjustment applies (Pathway B), summed over the same monitoring months as FCF_metered,f,j,y.
- FCF_metered,f,j,y = energy content of fuel type f consumed by project building unit j in year y (GJ), as metered, after the data-gap treatment in Section 8.6.3; weather is accounted for in FCF_BL,f,j (Appendix 2 §A2.1.3). For ex-ante quantification, forecast consumption is substituted, without weather normalization.
- EF_CO_2,f,k = CO_2 emission factor for fuel type f in jurisdiction k (tCO_2/GJ)
- EF_CH_4,f,k = CH_4 emission factor for fuel type f in jurisdiction k (tCH_4/GJ)
- EF_N_2O,f,k = N_2O emission factor for fuel type f in jurisdiction k (tN_2O/GJ)
- GWP_CH_4, GWP_N_2O = 100-year global warming potential values per IPCC Sixth Assessment Report (AR6)
- f = fuel type (e.g. natural gas, propane, fuel oil). If the project does not monitor the consumption of different fuels separately, the source with the lowest CO_2e emission factor shall be used (conservative approach).

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- k = jurisdiction

6.4 Emission Factors by Source

6.4.1 All emission factors used in the quantification of GHG emission reductions under this Methodology are sourced, maintained, and annually updated by Ontoly. The grid electricity emission factor applied to a project is the value current at its registration and is fixed for the crediting period (Section 6.2); annual updates apply to projects registered after the update. The specific data sources and citation references for each emission factor parameter are published in the Ontoly Public Parameters List, which is subject to annual QA/QC by the contracted third-party Validation and Verification Body (BERS Standard Section 7.7).

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7. Conservativeness and Uncertainty

In accordance with BERS Standard Section 1.3.1 (Conservativeness principle) and ICVCM Core Carbon Principles, where uncertainties cannot be fully eliminated, conservative assumptions, values, and procedures shall be used to ensure that GHG emission reductions are not overestimated.

7.1 Systematic Approach to Conservativeness

7.1.1 In accordance with ICVCM Assessment Framework requirements, this Methodology employs a systematic approach to ensuring the conservativeness of quantification. The following approaches are considered to enable conservativeness and robust quantification:

- **Conservative Emission Factors:** Where fuel consumption cannot be monitored by type separately, the fuel source with the lowest CO_2e emission factor shall be used in calculations (emissions factor will be same for baseline and project emissions scenarios),
- **Conservative Baseline:** The baseline scenario is derived from actual metered historical utility data. For ex-post quantification it is adjusted for weather only through a regression fitted to that metered data and tested under Appendix 2. Where adjustments are required (e.g., due to occupancy changes), normalization procedures are applied with conservative assumptions.
- **Weather and Occupancy Normalization:** Ontoly applies standardized weather and occupancy normalization procedures consistent with ASHRAE Guideline 14 and the International Performance Measurement and Verification Protocol (IPMVP) Option C for whole-building energy analysis. The baseline is adjusted to each monitoring year's actual weather using a per-fuel Heating Degree Day (HDD) and Cooling Degree Day (CDD) regression where that regression shows a statistically significant weather relationship; where it does not, no weather adjustment is applied, with additional occupancy and operational variables incorporated where relevant. This regression-based approach isolates retrofit impacts from climate variability and occupancy fluctuations, ensuring credited reductions reflect measurable improvements in building performance attributable to the retrofit (see Appendix 2).

7.2 Overall Uncertainty Assessment

7.2.1 The overall uncertainty of emission reductions shall be assessed considering all causes of uncertainty, including: (a) assumptions (e.g., baseline scenario); (b) estimation equations or models; (c) parameters (e.g., representativeness of default values); and (d) measurements (e.g., accuracy of utility metering). The overall uncertainty shall be assessed as the combined uncertainty from individual causes.

7.2.2 It is likely that quantified emission reductions from projects using this Methodology are not overestimated, taking into account overall uncertainty. It is very unlikely that emission reductions can be very significantly overestimated, consistent with ICVCM quantification requirements.

7.3 Attributability

7.3.1 In accordance with ICVCM requirements for attributability of quantified emission reductions to the mitigation activity, this Methodology ensures that credited emission reductions result from the implementation of the retrofit activity and not from changes in exogenous factors unrelated to the project (e.g., weather patterns, grid decarbonization, occupancy shifts). The quantification methodology and related program documents ensure that the credited emission reductions result from the implementation of the mitigation activity and not from changes in exogenous factors that are not related to the mitigation activity. This is achieved through:

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- Annual occupancy and use change attestation by the Building Representative.
- Standardized weather and occupancy normalization procedures, aligned with ASHRAE Guideline 14 and IPMVP Option C, applied as set out in Appendix 2: weather adjustment in every monitoring year where a significant weather relationship exists, and occupancy and operating-hours adjustment of the base load for any decrease (§A2.2).
- Fixed grid emission factors throughout the crediting period, so grid decarbonization is not credited (BERS Standard Section 12.1.4).

7.4 Quality Assurance and Quality Control

7.4.1 In accordance with BERS Standard Section 7.7, Ontoly shall conduct internal QA/QC procedures on all submitted monitoring data, including automated completeness checks, cross-referencing against public benchmarks and weather data, and flagging of anomalous patterns for manual review.

7.4.2 All Ontoly-managed datasets (emission factors, HDD/CDD data) shall be subject to annual QA/QC by the contracted third-party Validation and Verification Body.

7.4.3 A plan for conservative treatment and deduction of emission reductions shall be applied in case of unexpected interruption or errors in monitoring equipment or procedures. The procedures for classification, substitution and exclusion of monitoring intervals, and their effect on credited emission reductions, in respect of incomplete or unreliable monitoring data are set out in Section 8.6.3.

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8. Monitoring Methodology

8.1 Monitoring Obligations

8.1.1 In accordance with BERS Standard Sections 5.5 and 7, the Building Representative shall establish an operational and management plan for monitoring that addresses the assignment of responsibilities and the operational process of monitoring. This plan shall be documented as part of the project registration process.

8.1.2 The Building Representative shall collect and submit an Annual Monitoring Report to Ontoly via the Ontoly Portal no later than March 31 of the calendar year immediately following the monitoring year.

8.1.3 All data submitted shall consist solely of actual metered performance data, submitted without weather normalization or other adjustments. Ontoly applies all required normalizations using standardized methodologies, including the conversion of billing periods to calendar months (Appendix 2 §A2.1.2).

8.1.4 Monitoring data may be submitted using the Annual Monitoring Report template or through ENERGY STAR Portfolio Manager where the data meets all BERS requirements (see BERS Standard Section 5.3.2).

8.2 Monitoring Report Content

8.2.1 Each Annual Monitoring Report shall include, at minimum:

- Actual metered utility or energy consumption data for the full monitoring period (calendar year basis).
- Sub-metered or building-level energy data where applicable.
- Disclosure of percentage change in occupancy levels compared to the baseline period.
- Disclosure of any non-routine adjustments, operational changes, fuel source changes, or known data gaps.

8.3 Mandatory Attestations

8.3.1 Each Monitoring Report shall include a signed declaration that the submitted data are complete, true, and accurate, and the following mandatory attestations:

- **Leakage Prevention:** All replaced or displaced equipment has been permanently retired or disposed of sustainably and was not resold for continued use elsewhere (per BERS Standard Section 11.1.4).
- **Permanence of Measures:** Installed GHG-reducing equipment has remained installed and operational and has not been reversed or replaced with higher-emitting alternatives (per BERS Standard Section 11.1.2).
- **Change of Ownership:** Attestation of whether the property has changed ownership or, where the Building Owner is a Tenant, whether the lease relied on under BERS Standard Section 2.7.1A has been assigned, surrendered, terminated, expired or materially amended during the monitoring period (per BERS Standard Section 7.6).
- **No Double Counting:** The project does not and will not issue carbon credits under another program for the same emission reductions, and no utility provider, government agency, or other program is claiming credit for the same reductions (per BERS Standard Section 12).

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- **Occupancy and Use Change:** Annual attestation of occupancy/use changes as described in Section 5.5.

8.4 Evidence Requirements

8.4.1 The Building Representative shall retain supporting records, including utility bills, meter data, and occupancy data, for a period of no less than seven (7) years, must supply copies upon request from Ontoly, the Validation or Verification Body (BERS Standard Section 7.5).

8.4.2 Failure to provide requested evidence within thirty (30) calendar days may result in suspension of the validation or verification engagement, an adverse validation or verification conclusion, and denial of BERU issuance.

8.5 Change of Ownership During Monitoring

8.5.1 If legal ownership of the building changes during the monitoring period, the Building Representative must notify Ontoly in writing within ninety (90) days. Ongoing participation is contingent upon continuous designation of a valid Building Representative and acceptance of all BERS obligations by the new owner, unless a Tenant is the Building Owner and its lease continues (BERS Standard Section 7.6).

8.5.2 Where the Building Owner is a Tenant, the Building Representative must notify Ontoly in writing within ninety (90) days of any assignment, sublease, surrender, termination, expiry or material amendment of the lease relied on under BERS Standard Section 2.7.1A. BERUs are issued only for periods in which that Section was met (BERS Standard Sections 2.7.1C and 7.6.2).

8.6 Late or Interrupted Monitoring

8.6.1 Projects that fail to submit the Annual Monitoring Report by March 31 may be suspended. Late submissions may be permitted at Ontoly's sole discretion (BERS Standard Section 5.5.6).

8.6.2 Where specific monitoring data inputs are unavailable due to circumstances beyond the Building Representative's reasonable control (e.g., utility provider delays, metering failures), Ontoly may accept alternative data inputs in accordance with BERS Standard Section 5.5.5.

8.6.3 Incomplete monitoring data. Where measured data for any monthly interval is unavailable or unreliable, Ontoly shall apply one of the two treatments below. The treatments are mutually exclusive with respect to any given interval.

(a) Where comparable measured data exists. The missing interval shall be substituted using measured data for the same calendar month from another period of the same project, adjusted for the difference in degree-day conditions:

$$E_{substitute,m} = \text{mean}(E_{donor\ months}) + \beta \times [\, DD_m - \text{mean}(DD_{donor\ months}) \,]$$

Where:

- **$E_{substitute,m}$** — substituted energy consumption for missing month m, for the relevant fuel
- **$\text{mean}(E_{donor\ months})$** — mean measured consumption across the donor months, being months of the same calendar month as m from other years of the same period
- **DD_m** — actual degree days for month m
- **$\text{mean}(DD_{donor\ months})$** — mean degree days across the donor months

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- **β** — the degree-day coefficient for that fuel, determined under Appendix 2 §A2.1.2 (zero under Pathway B of Appendix 2 §A2.1.3 and for a degree-day term that is not retained)

For electricity, the adjustment term shall be applied separately for heating and cooling degree days using the respective coefficients. For a monitoring interval, the degree-day adjustment term is applied only where it increases E_substitute,m.

Donor months for a baseline interval shall be drawn from the baseline period. Donor months for a monitoring interval shall be drawn from prior monitoring years of the same project and shall not be drawn from the baseline period, which does not represent post-retrofit operating conditions. Substitution is therefore unavailable during the first monitoring year.

Substituted intervals shall be excluded from the count of data points and from the goodness-of-fit statistics used to determine savings uncertainty under Appendix 2 §A2.1.4. No reduction to credited emission reductions applies to a substituted interval.

(b) Where comparable measured data does not exist.

(i) Exclusion. The interval shall be excluded from the analysis. A monitoring interval may be excluded only where metered data is unavailable or unreliable for a documented reason (for example, utility confirmation of missing data or a meter fault). An interval with valid measured data that has been excluded for a documented cause shall not be substituted under paragraph (a).

(ii) Effect on savings. An excluded interval contributes no savings: a fuel's savings are summed only over the monitoring months with usable or substituted data (Appendix 2 §A2.1.3) and are not scaled up. Positive savings for a fuel shall not be credited for a monitoring year with fewer than nine (9) months of measured data; substituted months do not count toward this minimum.

(iii) Effect on increases. Excluding intervals would also understate an increase in a fuel's consumption. Where a fuel's summed savings for the monitoring year are negative (metered consumption exceeds the baseline), the negative savings shall be multiplied by twelve (12) and divided by the number of months with usable or substituted data. The scaled value is used as (EC_BL,j − EC_metered,j,y) or (FCF_BL,f,j − FCF_metered,f,j,y) in Section 6.

8.6.4 Disclosure. The Annual Monitoring Report and BERU Issuance Report shall disclose, for each fuel: the intervals affected and the reason for each; the donor months used for any substitution; the months excluded and the savings counted for the fuel; and the weather normalization pathway (A or B) applied to each fuel.

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9. Monitoring Data Parameters

The following tables define all parameters required for the quantification of emission reductions under this Methodology, including their data sources, monitoring frequency, and QA/QC procedures.

Table 9.1: Electricity Consumption

Data / Parameter	EC_j,y / EC_BL,j
Data Unit	kWh
Description	EC_j,y: Electricity consumed by the project building unit j in year y. EC_BL,j: Electricity that would have been consumed by the baseline building unit j.
Source of Data	Submitted by the Building Representative via the Ontoly Portal.
Measurement Procedures	Utility bills or direct utility provider data submission to Ontoly. ENERGY STAR Portfolio Manager submissions are accepted per BERS Standard Section 5.3.2.
Monitoring Frequency	Monthly values, reported annually, for the baseline period under Section 5.3.1 (12 to 36 months immediately before the Project Start Date) and for all years post-project for the entirety of the crediting period.
Verification Procedures	Ontoly requires utility bill evidence. The Validation and Verification Body shall conduct sampling-based audits of input data.
Comments	Electricity consumption shall be reported separately for each building where a group of buildings is involved. The baseline regression for EC_BL,j is fixed at validation; EC_BL,j is evaluated for each monitoring year under Appendix 2 §A2.1.3 from monthly degree days and requires no additional monitoring by the Building Representative.

Table 9.2: Grid Electricity Emission Factor

Data / Parameter	EF_EL,k
Data Unit	tCO_2e/kWh
Description	Weighted average CO_2e emission factor of jurisdiction k that supplies electricity to the building unit j, fixed at the value current at project registration for the crediting period (Section 6.2; BERS Standard Section 12.1.4).
Source of Data	Ontoly collects and manages a dynamic dataset of grid electricity factors for all eligible jurisdictions.
Measurement Procedures	Data reported by provincial and state government agencies, annually.
Monitoring Frequency	Ontoly updates its dataset of grid electricity emission factors annually. Updated values apply to projects registered after the update; a registered project's value does not change during its crediting period, including where a published factor is later revised.
QA/QC Procedures	The Validation and Verification Body conducts annual QA/QC of

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	electricity grid factors to ensure compliance with the BERS Standard and this Methodology.

Table 9.3: Fuel Emission Factors

Data / Parameter	EF_CO2,f,BL / EF_CO2,AVG-f,y
Data Unit	tCO_2e/GJ
Description	EF_CO2,f,BL: Average CO_2e emission factor of baseline fuel types. EF_CO2,AVG-f,y: Average CO_2e emission factor of fuel types consumed in year y.
Source of Data	Ontoly collects and manages a dynamic dataset of fuel emission factors.
Measurement Procedures	Data collected from national government agencies.
Monitoring Frequency	Ontoly annually updates emission factors. No retroactive adjustments applied to prior calculations.
QA/QC Procedures	The Validation and Verification Body conducts annual QA/QC of emission factors.

Table 9.4: Fuel Consumption

Data / Parameter	FC_f,j,y
Data Unit	Mass or volume units
Description	Quantity of fossil fuel type f consumed by the building unit j in year y.
Source of Data	Reported by the Building Representative.
Measurement Procedures	Direct submission via Ontoly Portal or ENERGY STAR Portfolio Manager.
Monitoring Frequency	Monthly values, reported annually for each 12-month interval after the retrofit project is complete.
Verification Procedures	The Validation and Verification Body may sample buildings for audit verification of fuel consumption data.

Table 9.5: Baseline Occupancy

Data / Parameter	Occupancy_j,BL

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Data Unit	percentage of use)
Description	Baseline occupancy of the building unit j.
Source of Data	Reported by the Building Representative.
Measurement Procedures	Direct submission via Ontoly Portal.
Monitoring Frequency	Determined once and fixed through the project lifetime.
QA/QC Procedures	The Validation and Verification Body may request evidence of occupancy data during sampling audits.

Table 9.6: Annual Occupancy

Data / Parameter	Occupancy_j,y
Data Unit	Percentage of use
Description	Average yearly occupancy of the building unit j in year y.
Source of Data	Reported by the Building Representative.
Measurement Procedures	Direct submission via Ontoly Portal.
Monitoring Frequency	Annually. The Building Representative is responsible for reporting changes exceeding ±10% from the baseline.
QA/QC Procedures	The Validation and Verification Body may conduct sampling audits and request evidence of this parameter.

Table 9.7: Operating Hours

Data / Parameter	h_OP,y / h_OP,BL
Data Unit	Hours
Description	Average weekly operating hours of the commercial/institutional building unit j in monitoring year y (h_OP,y) and over the baseline period (h_OP,BL).
Source of Data	Reported by the Building Representative.
Monitoring Frequency	Annually.

Table 9.8: Cooling Degree Days

Data / Parameter	CDD_y / CDD_BL
Data Unit	Degree-days
Description	CDD_y: Cooling Degree Days of the region where building unit j is

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	located during year y. CDD_BL: Baseline Cooling Degree Days.
Source of Data	Ontoly collects and manages a dynamic dataset of CDD for all regions. Source: degreedays.net or equivalent.
Monitoring Frequency	CDD_y: Monthly values for each monitoring year. CDD_BL: Monthly values for the baseline period, fixed at validation.
Comments	The base temperature used to determine CDD_y and CDD_BL shall be the same.

Table 9.9: Heating Degree Days

Data / Parameter	HDD_y / HDD_BL
Data Unit	Degree-days
Description	HDD_y: Heating Degree Days of the region where building unit j is located during year y. HDD_BL: Baseline Heating Degree Days.
Source of Data	Ontoly collects and manages a dynamic dataset of HDD for all regions. Source: degreedays.net or equivalent.
Monitoring Frequency	HDD_y: Monthly values for each monitoring year. HDD_BL: Monthly values for the baseline period, fixed at validation.
Comments	The base temperature used to determine HDD_y and HDD_BL shall be the same.

Table 9.10: Baseline Regression and Weather Normalization Pathway

Data / Parameter	α_BL,f, β_BL,f (β_1_BL,elec and β_2_BL,elec for electricity), base load BL_f and weather normalization pathway (A or B)
Data Unit	Energy unit of the fuel per month (α); per degree-day (β)
Description	Coefficients and base load of the baseline regression for each fuel f and the pathway selected by Test 2 (Appendix 2 §A2.1.2 to §A2.1.4).
Source of Data	Determined by Ontoly from the baseline-period monthly metered data and monthly degree days (base temperature 18°C) from the weather station fixed at validation.
Monitoring Frequency	Determined once at validation and fixed for the crediting period.
Comments	Results of Tests 1 to 3, the residual autocorrelation coefficient ρ used in Test 4 and the cause of every excluded baseline month are recorded in the project file and assessed by the Validation and Verification Body.

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10. Crediting Period

10.1 Crediting Period Duration

10.1.1 In accordance with BERS Standard Sections 10.7, the standard crediting period shall be ten (10) years or less. The crediting period commences on the Project End Date (retrofit completion date).

10.1.2 In future versions of the BERS, the crediting period may be restricted due to Ontoly's assessment of legally mandated technologies or building performance standards applicable to the building's jurisdiction.

10.1.3 To provide financial certainty, the length of the crediting period is fixed at the time of the first BERU issuance. Ontoly evaluates regulatory surplus only once—at the start of the retrofit project—and does not shorten the crediting period if new laws or building performance standards are introduced later (BERS Standard Section 10.1.4).

10.1.4 The most recent version does not provide for crediting period renewal.

10.1.5 The average economic useful life of the retrofit technology, as required for NPV calculations, shall be defined in the Ontoly Public Parameter List for this Methodology.

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11. Validation Requirements

11.1 Validation of projects applying this Methodology is governed by Section 6 of the BERS Standard and the BERS Validation and Verification Standard. This Methodology does not restate those requirements.

11.2 Where the BERS Standard requires the Validation Body to assess project eligibility, the baseline scenario, and Ontoly's ex-ante quantification, the applicable technical requirements of this Methodology are those set out in Section 2.3 (eligibility criteria), Section 5 (baseline determination), Section 9 (parameters and data sources), and Appendix 2 (weather normalization and regression acceptance criteria).

11.3 The baseline regression required under Appendix 2 is developed from pre-retrofit data and is assessed at validation, together with the results of Tests 1 to 3 and the weather normalization pathway (A or B) for each fuel under Appendix 2 §A2.1.4. No post-retrofit regression is developed. Verification assesses the application of the validated baseline regression to the monitoring-period weather and metered data, the data-gap treatment under Section 8.6.3, and Test 4 (savings uncertainty).

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12. Leakage

12.1.1 In accordance with BERS Standard Section 11, leakage risk is managed through the following provisions:

- **Equipment Retirement:** Transferring incumbent building technology to another activity is prohibited. Building Representatives shall attest, as part of each Annual Monitoring Report, that incumbent technology has been permanently retired or disposed of in an environmentally responsible manner and has not been resold, relocated, or redeployed for continued operational use at another facility. Ontoly reserves the right to request supporting evidence of equipment disposal.
- **Activity-Shifting Leakage:** Because BERUs are issued exclusively on the basis of actual, metered utility performance data within the project boundary, any increase in energy consumption resulting from activity shifting would be reflected in the monitored data and would reduce or eliminate BERU issuance for the affected period.
- **Market Leakage:** Not applicable to building retrofit projects. Building retrofits do not displace economic activity to other locations or create market-driven increases in emissions elsewhere.
- **Ecological Leakage:** Not applicable. Building retrofits do not involve land-use changes or ecosystem disturbance.

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13. Roles and Responsibilities

13.1 Building Representative Responsibilities

The Building Representative (or Building Owner where no secondary party is designated) shall be responsible for:

- Completing all forms and data submissions as mandated by Ontoly in the Ontoly Portal, including the Building Intake Form with detailed building attribute and owner information.
- Submitting monthly pre- and post-retrofit utility data, reported annually, for electricity and fossil fuel consumption.
- Submitting the Financial Additionality Data Submission Form and the Data Quality & Safeguard Attestation Form.
- Providing Eligible Validation Documentation (e.g., IPMVP Report, IREE Report, or equivalent).
- Providing the Building Owner Attestation & Representative Authorization (per BERS Standard Section 2.7).
- Submitting Annual Monitoring Reports by March 31 each year with all required attestations.
- Retaining supporting records for a minimum of seven (7) years and cooperating with validation and verification audits.
- Notifying Ontoly within ninety (90) days of any change in building ownership or, where the Building Owner is a Tenant, of any assignment, sublease, surrender, termination, expiry or material amendment of its lease.

13.2 Ontoly Responsibilities

The Building Representative shall acknowledge that Ontoly will conduct the following assessments on the Building Owner's behalf, using standardized formulas, internal datasets, and analysis tools aligned with the BERS Standard and verified by the third-party Validation and Verification Body:

- **Ontoly GHG Quantification Model:** To determine the standardized baseline and calculate emission reductions for energy efficiency and fuel switching measures, including calculation of baseline and project CO_2 emissions from fossil fuel combustion and electricity consumption, and calculation of greenhouse gas emission factors.
- **Ontoly Financial Model:** To calculate financial additionality of project activities in accordance with BERS Standard Sections 10.2–10.3.
- **Ontoly Jurisdictional Regulatory Model:** To calculate regulatory surplus of project activities in accordance with BERS Standard Section 10.1.
- **Weather and Occupancy Normalization:** All required normalizations using standardized methodologies (BERS Standard Section 5.5.2).
- **Internal QA/QC:** Automated and manual quality assurance checks on all submitted monitoring data (BERS Standard Section 7.7).

13.3 Validation Body Responsibilities

Ontoly shall hire and contract an independent, accredited third-party Validation Body (per BERS Standard Sections 2.1.3 and 6). The Validation Body shall be responsible for:

- Assessing project eligibility under this Methodology and the BERS Standard.

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- Assessing the baseline scenario, the baseline data period, and any alternative baseline data accepted by Ontoly.
- Assessing Ontoly's Regulatory Surplus Assessment and Financial Additionality Assessment, including the financial data inputs submitted under Section 4.5 and the sensitivity analysis parameters applied under Section 4.3.
- Assessing the Data Quality & Safeguard Attestation Form and supporting disclosures.
- Assessing the monitoring plan and the parameters identified in Section 9 as fixed at validation.
- Assessing Ontoly's ex-ante quantification as presented in the Preliminary Ex-Ante BERU Assessment Report.
- Producing a Validation Report and Validation Statement in accordance with BERS Standard Section 6 and the BERS Validation and Verification Standard.

13.4 Verification Body Responsibilities

Ontoly shall hire and contract an independent, accredited third-party Verification Body (per BERS Standard Sections 2.1.3 and 8). The Verification Body shall be responsible for:

- Reviewing Ontoly’s standardized formulas, models, parameters, and datasets for alignment with the BERS Standard and applicable ISO standards.
- Conducting verification of annual ex-post utility data submitted by the Building Representative, through a sampling approach as determined by the Verification Body.
- Annual QA/QC of Ontoly-managed datasets including electricity emission factors, fuel emission factors, and weather data.
- Annual verification of Ontoly’s Jurisdictional Regulatory Model, utility price datasets, and sensitivity analysis parameters.
- Producing Verification Reports for each Verification Cohort in accordance with BERS Standard Section 8.4.

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14. Environmental and Social Safeguards

14.1.1 In accordance with BERS Standard Section 13, the Building Representative shall complete and submit the Data Quality & Safeguard Attestation Form declaring conformance with all applicable safeguard principles, including: labour rights and working conditions, land acquisition and resettlement, sustainable management of resources, indigenous peoples and cultural heritage, fair treatment and non-discrimination, resource efficiency and pollution prevention, gender equality, and stakeholder consideration.

14.1.2 Where the Building Representative has assessed that the project poses risks of negative environmental and/or social impacts, information on mitigation measures shall be included in each Monitoring Report.

14.1.3 Projects shall assess the compatibility of the retrofit with the transition to net zero by reference to the net zero objectives of the host country, in accordance with BERS Standard Section 13.5.

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15. Definitions

In addition to the definitions contained in the BERS Standard Section 3, the following definitions apply for the purpose of this Methodology:

Building Unit: A distinct space in a building allotted to a specific user (tenant or owner). If a building has more than one tenant/owner, a building unit is a subordinate structure rented by one tenant or used by an owner. If a building is used by a single tenant/owner, the building unit is equal to the entire building. For example, schools occupied by a single owner (e.g., municipality) are treated as a single building unit.

Gross Floor Area (GFA): Area occupied by internal walls and partitions of a building unit, reported in m². If a building unit contains common service areas within its physical boundary (meeting rooms, corridors, lift wells, plant and machinery), include GFA of common service areas. Otherwise, exclude them.

Heating Degree Days (HDD): A measure of how much (in degrees), and for how long (in days), the outside air temperature was below a certain level. Ontoly controls for HDD in models relating to the energy consumption required to heat buildings.

Cooling Degree Days (CDD): A measure of how much (in degrees), and for how long (in days), the outside air temperature was above a certain level. Ontoly controls for CDD in models relating to the energy consumption required to cool buildings.

Appendix 1: List of Building Unit Categories

The following provides recommended criteria for building unit types eligible under this Methodology.

A1.1 Residential Building Units

Building units used for dwelling purposes:

- **Single-family (low-rise or high-rise):** Bungalows, cottages, stand-alone houses, semi-detached houses, town houses, and row houses.
- **Multi-family (low-rise or high-rise):** Apartments in buildings comprising more than two units, sub-divided by: 1–5 units; 5–10 units; 10–20 units; and more than 20 units.

A1.2 Commercial Building Units

Building units used for commercial activities:

- **Office:** Administrative and professional offices, government offices, banks and financial institutions.
- **Hotel:** Hotels, motels, guest houses.
- **Warehouse & Storage:** Distribution and shipping centres.
- **Mercantile & Service:** Retail (shopping stores, showrooms), food sales (grocery stores, convenience stores), service (auto repair, post offices, beauty parlours), and other mercantile.
- **Food Service:** Restaurants, cafeterias, fast food, bars, reception halls, catering services.
- **Entertainment:** Cinemas, sports arenas, casinos, night clubs.

A1.3 Institutional Building Units

Building units used for not-for-profit services in the public interest:

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- **Education:** Preschools, day-care centres, schools, colleges, universities, vocational training.
- **Public Assembly:** Community centres, meeting halls, convention centres, museums, theatres, religious worship, recreation facilities.
- **Health Care:** Hospitals, clinics, rehabilitation centres, nursing homes, assisted living centres.
- **Public Order and Safety:** Police and fire stations, prisons, courthouses.
- **Institutional Lodging:** Retirement homes, shelters, military barracks.

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Appendix 2: Guidance for Normalization

This Appendix sets out the standardized normalization procedures Ontoly applies to adjust baseline energy consumption for weather variability and occupancy changes. These procedures are aligned with ASHRAE Guideline 14-2023 (Measurement of Energy, Demand, and Water Savings) and the International Performance Measurement and Verification Protocol (IPMVP) Option C for whole-building energy analysis, and follow the ENERGY STAR Portfolio Manager principle of applying a weather adjustment to a fuel only where a statistically adequate fit with degree days is found.

A2.1 Weather Normalization Procedure

Weather normalization ensures that credited savings reflect the retrofit and not a difference in weather between the baseline period and the monitoring year. Ontoly applies the avoided energy use approach of IPMVP Option C and ASHRAE Guideline 14-2023: a regression fitted to the baseline-period data for each fuel predicts what the building would have consumed under the actual weather of each monitoring month (the weather-adjusted baseline), and savings are the weather-adjusted baseline minus metered consumption.

A weather adjustment is applied to a fuel only where its baseline regression shows a statistically significant relationship between consumption and weather (§A2.1.4, Test 2). Where no such relationship exists, there is no weather effect to remove, and that fuel's savings are determined from metered consumption without weather adjustment. Ex-ante quantification is not weather normalized (Section 5.3.1).

A2.1.1 Ontoly shall obtain Heating Degree Day (HDD) and Cooling Degree Day (CDD) data for the weather station nearest to the building's location from a recognized source (e.g., degreedays.net or the equivalent national meteorological service). The same base temperature of 18°C shall be used for all HDD and CDD calculations across the baseline and monitoring periods. The weather station and data source are fixed at validation and used for the baseline and every monitoring year. Degree days for a month are usable where valid temperature readings are available for at least 90% of the days in that month.

A2.1.2 Regression Model

Regressions shall be developed separately for each fuel type for which the building has metered consumption. Per-fuel regression accommodates the different weather sensitivities of electric and combustion loads and is consistent with ASHRAE Guideline 14-2023, §4.3.2.1.

The regression form shall be specified by fuel type as follows:

- Heating fuels: $E = \alpha + \beta \cdot HDD$. Cooling Degree Days are not included in heating-fuel regressions because heating-fuel consumption does not respond to cooling load.
- Electricity: $E = \alpha + \beta_1 \cdot HDD + \beta_2 \cdot CDD$. Both heating- and cooling-driven electrical loads are modelled. Where either coefficient fails Test 2 in §A2.1.4, the HDD-only and CDD-only models are each fitted and tested. A single-variable model that passes Test 2 is retained; where both pass, the one with the lower CV(RMSE) is used. Where neither passes, no degree-day variable is retained.
- Where no degree-day variable is retained for a fuel, the model is $E = \alpha$, being the mean monthly consumption of the baseline months used in the regression.

Where:

- **E**: energy consumption of the fuel in a single monthly interval, in a common energy unit for the fuel;

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- **α**: the regression intercept, being modelled monthly energy consumption independent of heating and cooling degree days, in the same unit as E per month;
- **β**: the heating degree day coefficient, being the modelled change in monthly consumption per heating degree day;
- **β_1, β_2**: for electricity, the heating and cooling degree day coefficients respectively;
- **HDD, CDD**: heating and cooling degree days for the same monthly interval as E, determined under §A2.1.1.

Subscript BL denotes the coefficients of the baseline regression, subscript f denotes the fuel (elec for electricity) and subscript m denotes a monthly interval. Subscript j denotes the building unit, as in Section 6; where a project includes more than one building unit, the procedures in this Appendix are applied to each building unit separately.

Each regression is developed from monthly observations. The coefficients α, β, β_1 and β_2 are therefore expressed on a monthly basis, and application of a regression to any period other than a single month shall be performed month by month, with the monthly results summed.

Metered consumption billed over periods that do not coincide with calendar months shall be converted to calendar months before it is used for the baseline or a monitoring year. Each bill's consumption is allocated to the calendar months it covers in proportion to the number of days of the billing period falling in each month, consistent with ENERGY STAR Portfolio Manager. A calendar month has metered consumption only where billing periods cover every day of that month.

Only a baseline regression is developed. It is fitted once for each fuel from the baseline period (the twelve (12) to thirty-six (36) consecutive months immediately preceding the Project Start Date, Section 5.3.1), assessed at validation, and fixed for the crediting period. No post-retrofit regression is developed. Data requirements are set out in §A2.1.4, Test 1.

A2.1.3 Weather-Adjusted Savings

Savings are determined month by month, for each fuel f and each monitoring month m of monitoring year y, under one of two pathways set by Test 2 in §A2.1.4. The pathway for each fuel is determined at validation and fixed for the crediting period.

Pathway A — Weather-adjusted. Applies where the baseline regression for the fuel passes Test 2. The baseline for each monitoring month is the baseline regression evaluated at that month's actual degree days:

$$\text{Heating fuels: } E_{BL,f,m} = \alpha_{BL,f} + \beta_{BL,f} \times HDD_m$$

$$\text{Electricity: } E_{BL,elec,m} = \alpha_{BL,elec} + \beta_{1_BL,elec} \times HDD_m + \beta_{2_BL,elec} \times CDD_m$$

Pathway B — No weather adjustment. Applies where the baseline regression for the fuel fails Test 2, meaning that consumption shows no significant relationship with weather. The baseline for each monitoring month is the mean monthly baseline consumption, with no weather term:

$$E_{BL,f,m} = \alpha_{BL,f} \text{ (the mean monthly consumption of the baseline months used in the regression)}$$

Under either pathway, the savings for fuel f in monitoring year y are:

$$E_{savings,f,y} = \Sigma_m \left(E_{BL,f,m} - E_{metered,f,m} \right)$$

Where:

- $E_{BL,f,m}$ is the baseline consumption of fuel f for monitoring month m, from Pathway A or Pathway B;

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- E_metered,f,m is the metered consumption of fuel f in monitoring month m;
- HDD_m and CDD_m are the actual heating and cooling degree days of monitoring month m, determined under §A2.1.1; and
- the sum runs over the monitoring months with usable data, including months substituted under Section 8.6.3(a). Other months without usable data are treated under Section 8.6.3(b).

For monitoring year y, Σ_m E_BL,f,m is the value of EC_BL,j or FCF_BL,f,j for building unit j used in Equations 1 to 3, and Σ_m E_metered,f,m is the value of EC_metered,j,y or FCF_metered,f,j,y. Where the occupancy adjustment in §A2.2 applies, it is applied to E_BL,f,m before savings are calculated.

For each fuel and monitoring year, the steps are applied in this order: (1) the monthly baseline under Pathway A or B; (2) the occupancy and operating-hours adjustment under §A2.2, where triggered; (3) savings summed over the monitoring months; (4) Test 4 in §A2.1.4, where savings are positive; (5) scaling of an increase under Section 8.6.3(b); and (6) the emission factors in Section 6.

A2.1.4 Baseline Regression Tests

Four tests apply. Tests 1 to 3 are applied once for each fuel, to the baseline regression at validation. Test 4 is applied for each fuel in each monitoring year.

Test 1 — Data sufficiency. The baseline covers at least twelve (12) consecutive months, and at least 75% of them, and never fewer than nine (9), are usable for the fuel. The usable months include at least two (2) in each calendar quarter (January to March, April to June, July to September and October to December), so that every season is represented in the regression.

A month is usable if it has metered consumption and usable degree days (§A2.1.1) and has not been excluded for a documented physical cause, such as a meter fault, billing correction, temporary vacancy or non-routine event (§A2.3). Months shall not be excluded only for being statistical outliers, and the cause of every exclusion shall be recorded, based on evidence independent of the regression results.

A month that is not usable may be substituted under Section 8.6.3(a), using donor months from the baseline period, to complete the baseline-year totals used for ex-ante quantification (Sections 6.2 and 6.3). Substituted months are estimates, not measurements, so they are not used in the regression or counted in Tests 1 to 4.

Test 2 — Weather relationship. Each degree-day coefficient retained in the regression is positive and statistically significant (p-value below 0.05). For electricity, where a term fails in the two-variable model, each single-variable model is tested as set out in §A2.1.2. Test 2 selects the pathway: where it is passed, Pathway A applies; where no degree-day term is retained, the fuel shows no weather relationship and Pathway B applies (§A2.1.3).

Test 3 — Model fit. The coefficient of variation of the root mean squared error, CV(RMSE), of the model used (the regression under Pathway A, or the mean monthly baseline under Pathway B) is no greater than 25%, consistent with ASHRAE Guideline 14-2023 for reporting periods of 12 to 60 months:

$$CV(RMSE) = \sqrt{[\,\Sigma\,(E_i - \hat{E}_i)^2 \div (n - p)\,]} \div \bar{E}$$

where E_i and Ê_i are the metered and modelled consumption of usable baseline month i, Ē is the mean of E_i, n is the number of usable baseline months and p is the number of model parameters (two (2) for E = α + β · HDD, three (3) for the two-term electricity model and one (1) for E = α).

Test 4 — Savings uncertainty. In each monitoring year in which a fuel's savings are positive, the fractional savings uncertainty calculated under ASHRAE Guideline 14-2023 is no greater than 50% of those savings at a 90% confidence level (ASHRAE Guideline 14-2023 sets 68% as the minimum):

$$FSU = t \times 1.26 \times CV(RMSE) \times \sqrt{[\,(n \div n')\,\times\,(1 + 2 \div n')\,\div\, m\,]} \div F$$

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where t is the two-tailed Student's t value at 90% confidence with (n − p) degrees of freedom, 1.26 is the ASHRAE Guideline 14-2023 correction for monthly data, m is the number of measured monitoring months (substituted months excluded), F is the savings divided by the baseline (Pathway A or B) over the same months, and n′ is the effective number of baseline months after correcting for autocorrelation of the residuals:

$$n' = n \times (1 - \rho) \div (1 + \rho) \text{ where } \rho \text{ is greater than zero; otherwise } n' = n$$

ρ is the lag-one autocorrelation coefficient of the baseline model residuals: the correlation between the residual of each usable baseline month and the residual of the preceding month, using pairs of consecutive usable months. ρ is calculated at validation and fixed with the baseline regression. Where ρ is zero or negative the correction does not apply, so it can only make Test 4 stricter, consistent with ASHRAE Guideline 14-2023.

Results of the tests.

- Tests 1 to 3 passed: savings for the fuel are quantified under the pathway selected by Test 2.
- Test 1 or Test 3 failed: where months available in the baseline period under Section 5.3.1 were not submitted, they shall be added and the tests re-run. Otherwise, positive savings for the fuel shall not be credited for the crediting period, unless the baseline is re-established under §A2.3. The baseline period shall not be shortened or moved to pass a test (Section 5.3.2).
- Test 4 failed in a monitoring year: positive savings for the fuel shall not be credited for that monitoring year. Positive savings are also not credited for a monitoring year with fewer than nine (9) months of measured data (Section 8.6.3(b)).
- An increase in a fuel's consumption relative to its baseline (for example, electricity in a fuel-switching project) shall always be counted in full, whatever the test results, using the baseline model selected by Test 2.

The coefficient of determination (R^2) is reported for information only and is not a test. The normalized mean bias error (NMBE) is not tested: for a least-squares regression with an intercept, it is zero by construction over the baseline data.

The test results, the pathway selected for each fuel and the cause of every excluded month shall be recorded in the project file and made available to the Validation and Verification Body.

A2.2 Occupancy Normalization Procedure

Occupancy normalization adjusts the baseline energy consumption to account for material changes in building occupancy or use patterns that are not attributable to the retrofit activity. This procedure is consistent with the multivariable regression approach in ASHRAE Guideline 14-2023 and IPMVP Option C, which accommodate occupancy and operational variables alongside weather parameters.

A2.2.1 Where the annual occupancy rate of building unit j in year y ($Occupancy_{j,y}$) is below the baseline occupancy rate ($Occupancy_{j,BL}$), as reported under Section 5.5, Ontoly shall reduce the base load of the monthly baseline by the occupancy scaling factor:

$$OSF_{j,y} = Occupancy_{j,y} \div Occupancy_{j,BL}$$

The base load is the portion of a fuel's monthly consumption that does not depend on weather, such as domestic hot water, cooking, lighting and plug loads. Under Pathway A, the base load BL_f is the larger of (a) the regression intercept $\alpha_{BL,f}$ (§A2.1.2), being the modelled consumption in a month with zero heating and cooling degree days, and (b) the mean metered consumption of the two usable baseline months with the fewest degree days of the kinds in the fuel's regression (HDD for heating fuels; HDD plus CDD for electricity). The intercept alone can be understated, or negative, where the building's balance point differs from the 18°C degree-day base. Under Pathway B, the whole mean monthly

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baseline α_BL,f is base load. BL_f is fixed at validation. The remaining portion of the baseline, the weather terms (β × HDD and, for electricity, β_2 × CDD), represents heating and cooling load.

Only the base load is scaled, because base load varies with the number of occupants, while heating and cooling load depends primarily on weather and the building envelope:

E_BL,adj,f,m = E_BL,f,m − BL_f × (1 − OSF_j,y), where E_BL,f,m is the monthly baseline under Pathway A or B (§A2.1.3); the weather terms are unchanged.

Where the occupancy rate is more than 10% above the baseline occupancy rate, no automatic adjustment applies. The Building Representative may request a non-routine adjustment under §A2.3, supported by documentary evidence.

A2.2.2 For commercial and institutional building units, where the average weekly operating hours in year y (h_OP,y) are below the average weekly operating hours over the baseline period (h_OP,BL), Ontoly shall reduce the base load of the monthly baseline in the same way as under §A2.2.1, using the operating hours factor OHF_j,y = h_OP,y ÷ h_OP,BL in place of OSF_j,y. Where both factors apply, the lower of OSF_j,y and OHF_j,y is used. An increase in operating hours is not adjusted automatically; the Building Representative may request a non-routine adjustment under §A2.3.

A2.3 Non-Routine Adjustments

A2.3.1 In exceptional circumstances where non-routine events materially affect building energy consumption (e.g., major water damage requiring partial vacancy, fire damage, or significant change in building use classification), Ontoly may engage a qualified decarbonization engineer to evaluate whether a non-routine adjustment to the baseline is warranted.

A2.3.2 Any non-routine adjustment shall be fully substantiated with documentary evidence, transparently disclosed in the quantification calculations, and subject to review by the Validation and Verification Body. Non-routine adjustments that would increase the baseline shall only be approved where the Building Representative provides clear evidence that the event was beyond reasonable control and had a material impact on energy consumption.

A2.3.3 Ontoly shall make a non-routine adjustment on its own initiative wherever an annual attestation under Section 5.5.1, or other evidence, shows a change that is not attributable to the retrofit and lowers the building's energy consumption, such as floor area taken out of use, equipment or amenities removed (for example a pool) or a change of use. The baseline is reduced by the documented or engineering-estimated consumption of the removed load, whether or not the Building Representative requests the adjustment.

A2.4 Normative References

- ASHRAE Guideline 14-2023, Measurement of Energy, Demand, and Water Savings (whole-building avoided energy use approach, CV(RMSE) limits and fractional savings uncertainty).
- International Performance Measurement and Verification Protocol (IPMVP), Efficiency Valuation Organization (EVO), 2022 (Option C: Whole Facility methodology for weather and occupancy adjustments).
- LEED v5 Operations and Maintenance (O+M), EA Credit: Optimized Energy Performance (weather-normalized site and source energy benchmarking for existing buildings).
- ENERGY STAR Portfolio Manager Technical Reference: Climate and Weather (monthly regression of energy consumption against degree days, applied for each fuel only where a fit is found).

Document History

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Version	Date	Description
0.1	15 September 2025	Pilot Version: Energy efficiency and fuel switching measures for buildings.
1.0	11 March 2026	Updated to align with the most recent BERS. Incorporated ICVCM requirements for monitoring, conservativeness, uncertainty, and attributability. Added occupancy/use attestation requirements, sensitivity analysis parameters, QA/QC procedures, and expanded roles and responsibilities.
1.1	11 May 2026	Added clarification on weather normalization statistical analyses. No major revisions.
1.2	29 July 2026	Updated ex-ante, third part validation requirements.
1.3	2 November 2026	Simplified weather normalization for ex-post quantification: one baseline regression per fuel, applied to each monitoring year's actual weather (avoided energy use, IPMVP Option C and ASHRAE Guideline 14-2023); no weather adjustment where a fuel shows no significant weather relationship; ratio method, post-retrofit regression, TMY normalization and weather range check removed; acceptance tests reduced from nine to four; Gap Coverage Factor replaced by a missing-month rule. Financial Additionality Rating (formerly Investment Analysis Rating) aligned with BERS Standard Section 10.4, based on the magnitude of the funding gap. Added a tenant project boundary and lease-event reporting where the Building Owner is a Tenant under BERS Standard Section 2.7.1A. Occupancy and operating-hours adjustments applied to the base load for any decrease (Appendix 2 §A2.2); Ontoly-initiated non-routine adjustments where a disclosed change lowers consumption (§A2.3.3); single-variable electricity models tested before Pathway B (§A2.1.2); positive savings require nine measured months (Section 8.6.3(b)). Baseline period fixed as the months immediately preceding the Project Start Date, with at least two usable months in each calendar quarter (Section 5.3, §A2.1.4); savings uncertainty corrected for autocorrelation (Test 4); billing periods converted to calendar months (§A2.1.2); grid emission factor fixed at registration (Section 6.2, Table 9.2); notation and references aligned.

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