NollCO$_2$

A NET ZERO CARBON FUTURE

Summary Manual 1.0

SWEDEN GREEN BUILDING COUNCIL

Contents

1. ABBREVIATIONS

Abbreviation	Reference in NollCO_2
A_{temp}	Conditioned floor area as defined by Swedish building regulations, including all interior floors, attics and basements heated above 10°C.
BTA	Total built floor area, including the thickness of the exterior envelope, as defined by Swedish standard, SS 21054:2009, “Area and volume for house buildings - Terminology and measurement rules”. Includes but is not limited to living areas and ancillary areas. Open area under carports and similar exterior structures are not included in BTA.
BTA, dark	Below-grade built floor area
BTA, light	Above-grade built floor area
BVD	Swedish abbreviation for construction product declaration (“Byggvarudeklaration”). Details comprehensive information on a building product, including proportions of various constituent materials.
BSAB 96	Code-based categorisation of building elements and their components according to the Swedish Construction Service (“Svensk Byggtjänst”). Used by NollCO_2 to set the system boundary for the building and its associated carbon calculations.
CO_2e	Carbon dioxide equivalents: a common scale for measuring the climate effects of different gases. Measured as the total units of CO2 which would warm the earth as much as a single unit of a gas greenhouse gases (e.g.CH_4, N_2O).
E_{bea}	Total building energy use (from the Swedish “Byggnadens energianvändning”)
EPD	Environmental Product Declaration
LCA	Life Cycle Assessment: a comprehensive environmental assessment of the entire life cycle of a product or service according to six impact categories: .
LCE	Life Cycle Emission: an analysis made according to the principles of LCA, but only considering climate impact.
PCR	Product category rules: reporting rules for an EPD performed under EN standard 15804:2012 + A2:2019
tkm	Tonne kilometre: one tkm corresponds to the transport of one tonne of goods over one kilometre. Used to factor a vehicle's emissions for the transport component of a building product’s climate impact.

A full glossary of terms can be found at SGBC.se.

2. INTRODUCTION

2.1 About SGBC

Sweden Green Building Council (SGBC) is Sweden's leading member organisation for sustainability in the built environment. Through certification, education, and advocacy, SGBC works for societal change that benefits both people and the environment. Read more about what we do at SGBC, including our certification systems, courses, and events at www.sgbc.se (only in Swedish).

2.2 NollCO_2

NollCO_2 is a certification system for buildings developed by SGBC and its member companies. The system consists of criteria for reducing climate impact during the design, construction, and operation phases of a building's service life, with additional measures for balancing the remaining climate impact down to net zero (offsets). Read more about NollCO_2's framework at SGBC.se (in Swedish).

2.3 The business case for NollCO_2

Certifying a building project under NollCO_2 means taking a leadership role in the building industry's climate work. NollCO_2 drives development along these main paths:

- NollCO_2 sets requirements for projects to reduce climate impact by using carbon limit values for the product stage A1-A3, and for construction stage A4-A5
- NollCO_2 sets a requirement for reduced climate impact associated with operational energy use by using an operational energy limit for the building energy use stage B6
- NollCO_2 requires the project to balance the outstanding climate impact with climate actions to a net zero climate impact

These measures are intended to encourage contractors and suppliers to take the initiative to reduce their individual impacts, and establishing a more robust market for low-carbon services and products.

2.4 NollCO_2 trademark

SGBC has the exclusive right to the registered trademark "NollCO_2". Clients developing and/or owning a NollCO_2 certified building have the right to use the NollCO_2 trademark on communications and marketing from the time of registration through to award of certification, NollCO_2 Certification may not be used, referred to or otherwise used in marketing in a misleading or otherwise impermissible manner.

2.5 NollCO_2 Summary Manual 1.0

This summary manual provides an abbreviated description of the NollCO_2 certification system. For a comprehensive description of certification processes, reporting requirements, and system boundary conditions please consult the full NollCO_2 Manual 1.0 available at SGBC.se.

3. CERTIFICATION PROCESS

NollCO$_2$ certification is administered by Sweden Green Building Council. After award, the certification continues to be valid provided that the criteria continue to be met, as verified every five years. Please refer to SGBC.se for an updated price list.

Interpretations and clarifications are periodically published on SGBC's website and are applicable if posted before the project's registration date. Interpretations and clarifications published after the project's registration date may be pursued at the project team's discretion.

3.1 Buildings eligible for certification under NollCO$_2$

A building is defined according to the Swedish Planning and Building Act (PBL) as a permanent structure for human occupancy consisting of a roof with or without walls which is either permanently placed on a slab-on-grade, crawlspace or basement foundation, or is permanently placed in a specific location on water.

Occupancies eligible for certification

NollCO$_2$ can be used for the following occupancies based on available baseline models:

- Office buildings
- Free-standing industrial and retail buildings
- Multi-unit buildings
- Elderly care homes
- Mixed-use residential and office
- Detached single family and duplex homes (under exploration for autumn 2020)

More occupancies may be added to NollCO$_2$ as relevant baselines are developed.

Extent of construction eligible for certification

NollCO$_2$ 1.0 can be used for the following project types:

- New construction, detached (defined in the Swedish Planning and Building Act, PBL, as the construction of a new building or the relocation of a previously constructed building to a new location)
- New construction, extension (defined in the Swedish Planning and Building Act, PBL, as a change of a building that entails an increase in the building's volume)

SGBC is considering the development of a version of NollCO$_2$ for existing buildings. Please check SGBC.se for updates on the ongoing development of NollCO$_2$.

3.2 Certification stages

Please find a detailed description of NollCO$_2$ certification stages at SGBC.se.

Registration

- Register the project in SGBC's certification platform Building Green Online (BGO)
- Enter project-specific information to confirm baseline and limit values for A1-A3
- Design and plan the building and construction processes to comply with limit values, using LCA tools climate data and NollCO$_2$ reporting tools (available at SGBC.se)
- Submit for preliminary certification within 3 years of registration.

Preliminary certification

- Upon completion of the design drawings, submit completed NollCO2 reporting tools, calculated energy performance, statements and drawings
- Verify that actual quantities and supplier choices do not exceed limit values. Confirm energy use of construction processes. Verify energy performance of the completed building.
- Preliminary certification is awarded. Submit for final certification within 3 years of preliminary certification.

Verification/ certification

- Submit completed NollCO2 reporting tools, calculated energy performance using measured values, statements, and drawings
- Record deviations in energy performance and take action to ameliorate. Verify that the requirements for the complementary certification are met.
- Certification is valid for five years. Complete periodic reporting every five years to maintain the certification.

Reporting every 5 years

- Submit completed NollCO2 reporting tools, calculated energy performance using measured values, certificate of complementary certification
- Record deviations in energy performance and take action to ameliorate. Report the amount of materials, products and systems replaced or added to the project during renovations and conversions. Adjust climate actions to achieve yearly and 2045 net zero goals.

Certification expiration

- The certification expires 50 years after occupancy, or until the building is decommissioned.

3.3 NollCO_2 reporting

Participation in SGBC's NollCO_2 Basics course is mandatory for the individual coordinating documentation and reporting to SGBC on behalf of the NollCO_2 project.

4. SYSTEM BOUNDARIES

4.1 Life cycle

NollCO_2 follows the standard SS-EN 15978:2011 for assessing the climate impact of a building. SS-EN 15978:2011 divides the building's life cycle into life cycle stages and modules. The four stages are:

A. Production stage, product stage (modules A1-A3) and construction stage (modules A4-A5)

B. Use stage (modules B1-B7)

C. End of life stage (modules C1-C4)

D. Benefits and loads beyond the system boundary (module D)

NollCO_2 includes the climate impact from the building's entire life cycle A-C. Climate impact outside the system boundary (module D) is not included in NollCO_2.

Calculation period

NollCO$_2$ uses a 50-year calculation period accordance with the Swedish National Board of Housing, Building and Planning's proposal to the Government regarding the climate declaration (Boverket's Report 2020: 13 “Development of rules on climate declaration of buildings”). The 50-year period starts upon building occupancy.

4.2 Building

Functional unit: kgCO$_2$e/m^2 BTA

NollCO$_2$ uses the functional unit kgCO$_2$e/m^2 BTA for reporting climate impact in line with the Swedish National Board of Housing, Building and Planning's proposal on climate declarations.

External physical system boundary

The applicable physical system boundary is defined according to SS-EN 15978:2011 and excludes construction and landscaping work outside the periphery of the building. Balconies and other protruding components of the building are included.

The climate impact of infrastructure for water supply outside the building's periphery is not included in the calculation of the building's climate impact A1-A3 but is included in B7.

All energy-producing units on the property where the building is located are included in the calculation of B6.

Building elements

Building elements, construction products and systems for inclusion in the scope of the NollCO$_2$ are illustrated in Figure 1. NollCO$_2$ uses Svensk Byggtjänst's BSAB 96 codes. A comprehensive list of building elements for inclusion or exclusion in NollCO$_2$ calculations and baseline modelling, as well as their anticipated service life values, can be downloaded at SGBC.se.

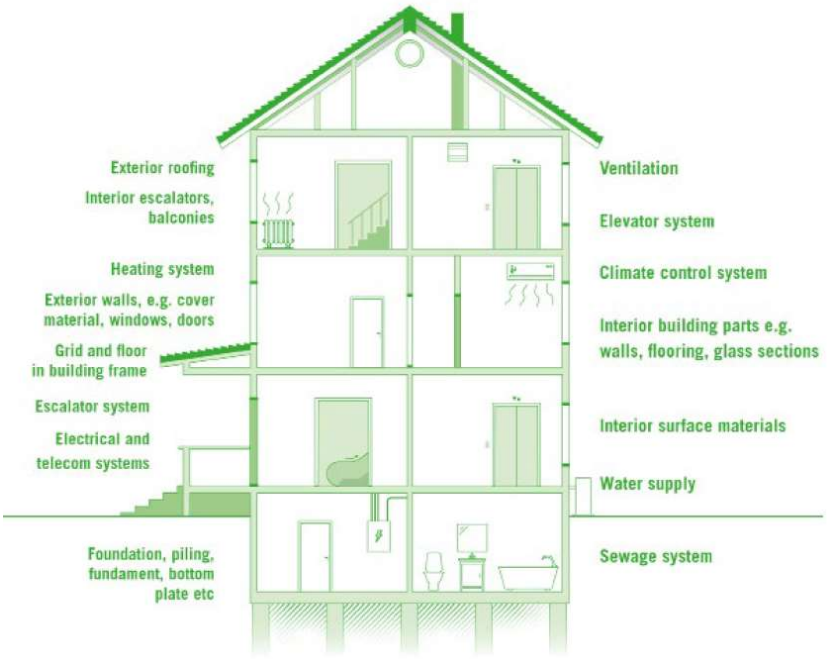

Figure 1 Illustration showing system boundaries for building components included in A1-A3 according to NollCO$_2$

5. INDICATORS

BASE

1 Complementary certification

Purpose

NollCO$_2$ shall be used in concert with a complementary building-level sustainability certification.

Assessment scope

A NollCO$_2$ building shall have a complementary building-level sustainability certification.

Criteria

1.1 Complementary building certification

- The project shall certify the building according to one of the following complementary certifications at the specified minimum level:
    - Miljöbyggnad minimum level Silver
    - BREEAM-SE minimum level Very Good
    - LEED minimum level Gold
    - Nordic Ecolabelling (Svanen) of single-family homes, apartment buildings and buildings for schools and preschools 089

Method

Occupancy (s) and their respective BTA, above and below ground, in the building are declared upon registration.

2 Legal requirements for chemical content, timber, and wood products

Purpose

To ensure that building elements, construction products and building service systems, in addition to having a low climate impact, also meet legal requirements for chemical content and legal harvest of timber and wood products.

Assessment scope

Building elements, construction products and building service systems must meet legal requirements for chemical content and legal harvest of timber and wood products according to EU regulations.

Criteria

2.1 Chemical products and goods

1. Building elements, construction products and building service systems comply with laws and regulations that apply to chemical products and goods according to the Swedish Chemicals Agency (KEMI)

2.2 Timber and wood products

2. Timber and wood products in the project meet the requirements of the EU Timber Regulation

Method

2.1 Chemical products and goods

- The Swedish Chemicals Agency's website https://www.kemi.se/lagar-och-regler describes laws and regulations applicable to chemical products and goods in Sweden

2.2 Timber and wood products

- Timber and wood products must meet the requirements of the EU Timber Regulation; please refer to the Swedish Forest Agency's website https://www.skogsstyrelsen.se/lag-och-tillsyn/timmerforordningen/ for applicable products. Products with a FLEGT licence and products covered by CITES are exempt from the requirements of the EU Timber Regulation

CLIMATE IMPACT

3 Product stages A1-A3

Purpose

To calculate and limit the climate impact associated with the manufacture of building elements, construction products and building service systems used for the construction of the building.

Assessment scope

The climate impact of the products under stage A1-A3 shall be less than the project's limit value for climate impact for A1-A3.

Criteria

3.1 Climate impact of the products stage A1-A3

3. The climate impact of products under stage A1-A3 shall not exceed the project-specific limit value expressed in $kgCO_2e/m^2$ BTA as confirmed at project registration.

Method

3.1 Climate impact of product stage A1-A3

Upon registration, SGBC will calculate a baseline and a limit value for the products stage A1-A3. These values are based on the following:

1. Building business type(s) and per business type:
    - Below-grade BTA
    - Above-grade BTA
    - Number of storeys above ground
    - Number of garage storeys above grade
    - Number of below-grade garage storeys
    - Number of stairwells in the building
2. Thickness of the basement slab or slab-on-grade.
3. Proportion of load-bearing inner wall versus outer wall in the below-grade garage floor.

4. Thickness of outer wall in the below-grade garage floor.

$$climate\ impact\ of\ dark\ BTA_{baseline} + 0{,}7 \cdot climate\ impact\ of\ light\ BTA_{baseline}$$

Based on this baseline and limit value, the project can analyse and calculate whether it meets the NolliCO_2 certification requirements for A1-A3 before proceeding with a preliminary certification.

The building elements, construction products and building service systems to be included in the calculation of A1-A3 are shown in Figure 1.

The climate impact of each construction product and building service system is factored based on the component's climate data (kgCO_2e/kg) and respective quantity (kg).

When the project has not specified a particular construction product or building service system or where an EPD is unavailable, calculations rely on *generic climate data*.

1. Where possible, the **Swedish National Climate Database** shall be used
2. If there is no suitable national climate data, climate data for the corresponding construction product or building service system can be retrieved from the Ökobaudat climate database
3. If there is no equivalent construction product or building service system in the national climate database nor in Ökobaudat, a simplified LCE analysis can be performed based on:
    3.1 information on constituent material and its quantities from a building product declaration (Byggvarudeklaration, BVD) for an equivalent construction product or building service system
    3.2 climate data for included materials such as 1) national climate data, or if national climate data are missing 2) Ökobaudat's climate data.

For reporting the climate impact of construction products with integrated technology for on-site energy production, the system limits described in the section *System boundaries* > *Building* shall apply.

If the project **has specified** a certain construction product or building service system and the manufacturer offers an EPD, the project shall use the climate data (GWP-GHG) in the EPD provided that:

1. The EPD has been produced in accordance with the standard SS-EN 15804: 2012 + A2: 2019 (alternatively for EPDs older than 2019, SS-EN 15804: 2012 + A1: 2013) and PCR 2019:14 Construction products
2. The climate data retrieved from the EPD shall be the climate impact GWP-GHG (without biogenic carbon) defined in PCR 2019:14 Construction products. GWP-GHG is equated with the GWP indicator in EN 15804:2012 + A1: 2013
3. The EPD is valid

If the project reuses construction products and/or building service systems, report the climate impact under A1-A3 attributable to the transport of recycled construction products or building service systems from its place of origin to the construction site, and the climate impact of the processes needed to restore the reused construction product or building service system to usable condition.

- Climate data of the reused construction product or building service system is reported as LCE calculated climate data in NolliCO_2's reporting tool:
    - climate data for transport according to the Method section in Indicator 4
    - climate data for energy use in restoration processes according to the Method section in Indicator 6

The project may use any LCA tool, but for reporting, nationally generic/EPD/LCE climate data together with quantities and information on EPD/LCE and the supplier is specified in SGBC's reporting tool.

- The project needs to transfer climate data from the national climate database/ Ökobaudat in parallel with the transfer of quantities from the LCA and/or design tools into the SGBC reporting tool.

The anticipated service life values of the construction products and building service systems in the reporting tool are taken from EU Level(s) and should not be revised by the project.

4 Construction stage A4-A5

Purpose

To calculate and reduce the climate impact of the transport of building elements to the construction site, transport of construction equipment to and from the construction site, and construction processes at the construction site, with the aim of influencing the project's suppliers and contractors to develop transport methods and construction processes with lower climate impact.

Assessment scope

Climate impact of transport of building elements, construction products and building service systems to the construction site, transport of construction equipment to and from the construction site, and construction processes at the construction site.

Criteria

4.1 Climate impact transport A4 and construction processes A5

- The climate impact of A4-A5 shall not exceed the limit value of 55 $kgCO_2e/m^2$ BTA

Method

4.1 Climate impact A4-A5

- A4 Transport
  - A4.1 transport of building elements, construction products and building service systems from the factory gate to the construction site
  - A4.2 transport of construction equipment for use on construction site, to and from the construction site
  - For both A4.1 and A4.2, calculations/ estimations of distance per planned mode of transport between factory gate/ storage location and construction site can be provided in lieu of actual transportation distances
  - Climate data for transport are to be declared in $kgCO_2e/tkm$: a product with 1 $kgCO_2e/tkm$ has a climate impact of 1 $kgCO_2e$ per 1,000 kg of shipped product and per km. If the project wants to report its own climate data for transport, project-specific data for emissions from transport shall be based on actual measurements of energy use and transport distances, including any empty runs/empty returns.
- A5 Construction processes
  - A5.1 Waste resulting from construction processes
    - The climate impact of A5.1 includes the generation of waste, transport from the construction site and waste disposal
    - Default values: waste for larger building service systems can be set to 0%. Waste for individually purchased products that are not further processed at the construction site (doors, windows, etc.) can be set at 2%. Waste for construction products that are used in large quantities and that are further processed on site (gypsum boards, wood, pipes, cables, etc.) can be set to 10%. Other waste can be set at 5%.
    - Climate data from "Ökobaudat" (https://www.oekobaudat.de/) for waste/final disposal of materials/products/systems may be used
    - If a product's EPD provides information on C1-C4, these values can be used as climate data for waste handling
  - A5.2 Materials that are only used during the construction process, including production, transport, and waste/final disposal
    - Applicable to products used for the construction and/or assembly of building elements "BSAB 16 bearing structures", and which are subsequently disposed of as waste

    - Climate data from "Ökobaudat" (https://www.oekobaudat.de/) for waste and final disposal of materials/products/systems may be used
    - If a product's EPD provides information on C1-C4, these values may be used as climate data for waste handling
- A5.3 Energy use at the construction site
    - Amount of energy/fuel (MWh or m^3) used at the construction site
    - EPDs for planned and/or signed energy contracts are to be reported
    - Thermal values (MWh/m^3) and mobile emission factors ($kgCO_2e$/MWh) for fuel use shall reference the Swedish Energy Agency's figures
- A5.4 Water use at the construction site
    - The volume of water (m^3) that is planned for use/ has been used at the construction site is to be reported
    - EPDs for planned and/or signed water delivery contracts are reported

5 Use stage B1-B5

Purpose

To increase knowledge and awareness of the climate impact of construction materials for replacement and renovation during the building's use stage.

Assessment scope

Climate impact of replacing and discarding building elements, construction products and building service systems.

Criteria

5.1 B4 Replacement

- Report the climate impact of building elements, construction products and building service systems to be replaced over the 50-year calculation period.

5.2 B5 Refurbishment

- Report the climate impact of building elements, construction products and building service systems to be installed or replaced in connection with refurbishments over the 50-year calculation period.

Method

The modules "B1 Installed products in use", "B2 Maintenance" and "B3 Repair", are anticipated to have a marginal climate impact as compared to modules B4 and B5; as such, B1-B3 have been excluded from the criteria and reporting requirements.

5.1 B4 Replacement

- Calculate a *forecast* of the climate impact B4, referencing:
    - the anticipated service life of building elements, construction products and building service systems; reported quantities in the product stage A1-A3; transport impact A4; and climate data for waste/final disposal for A5.1/2
    - the assumption that replacement building elements, construction products and building service systems correspond with as-built conditions
- The forecast for climate impact B4 is based on the waste processing of the disposed construction product/building service system plus the climate impact of the manufacture, transport, and installation of the new construction product/building service system. Climate

data for manufacturing, transport and installation and waste processing are interpolated to zero in 2050, as Sweden and the EU will be climate neutral in 2050

5.2 B5 Refurbishment

- Calculate a *forecast* for climate impact B5, referencing:
  - anticipated refurbishment intervals and extent of refurbishment, reported quantities in the products stage A1-A3, transport impact A4 and climate data for waste processes in A5.1/2
  - the extent of the refurbishment is expressed as a percentage of the construction products/building service system to be replaced, for example 20% of interior partitions will be replaced every fifth year
  - the assumption that replacement building elements, construction products and building service systems correspond with as-built conditions
- The forecast for the climate impact of B5 is based on the waste processing of the disposed construction product/building service system plus the climate impact of the manufacture, transport, and installation of the new construction product/building service system. Climate data for manufacturing, transport and installation and waste processing are interpolated to zero in 2050, as Sweden and the EU will be climate neutral in 2050

6 Building energy use B6

Purpose

To design and construct buildings for low energy consumption and corresponding climate impacts.

Assessment scope

The building's energy performance and climate impact of energy use.

Criteria

6.1 Building energy use

- The building’s energy performance shall achieve Energy Class B or better (as defined by the Swedish National Board of Housing, Building and Planning (BBR))
- The building’s energy performance shall be maintained as verified annually

6.2 Energy production on the property

- Of the energy produced on the property, only that qualifying as renewable (see criterion 6.2) may be used to supply the NollCO_2 building

6.3 Measurement plan

- A measurement plan is developed for the building's energy consumption and production

6.4 Climate impact of the building's energy use

- The climate impact of the building's energy consumption is calculated and reported

Method

6.1 Building’s energy use

Calculation for preliminary certification

- The building’s energy performance according to BBR is calculated for energy delivered to the building for heating (E_{uppv}), comfort cooling (E_{kyl}), hot water (E_{tw}) and base building electricity (E_f) together with a geographical weighting factor and a factor for the energy provider. Energy Class B corresponds to a building energy performance (EP_{pet}) 50–75% lower than the code-mandated energy performance of new buildings.

- When designing for the building's energy performance, a margin of safety is recommended to ensure that the building's energy performance requirement will be met in the verification stage
- Calculations shall be performed based on the local climate, normal indoor temperature, normal use of domestic hot water and ventilation
- Tenant energy use (process energy) is *not included* in the building's energy use for the purposes of Indicator 6
- The energy use for shared garages shall be distributed according to the A_{temp} of the buildings sharing the garage. In mixed-use buildings with (residential and office), the energy requirements are weighted based on their respective A_{temp}.

Calculation/measurement during verification/reporting back

- the BBR version in effect at the time of building permit shall apply. The BBR requirement for a building's energy consumption during normal use and a normal year (BEN) shall be applied during the verification stage
- The building's energy consumption is verified by measuring the building's energy use over a continuous 12-month period, completed no later than 24 months after the building goes into operation
    - Measurement shall take place according to the measurement plan developed under criterion 6.3
    - To meet the energy performance requirement, it is recommended that first-year operation be used for optimisation and the subsequent year for verification
    - To analyse the building's energy performance and correct for normal usage it may be necessary to account for the number of occupants. New tenants and occupants (proportion of space leased) shall be noted monthly during the verification period. Correspondingly, operating hours and occupancy types should be noted monthly during the verification period
    - The measurement period should reflect intended activities and normal operation.
- The energy calculation shall be revised to correspond with the building's measured energy use
- During the reporting period, logged measured data compared with real-time measurements shall be used to identify operational deficiencies
    - If it is determined that the building's energy performance cannot be achieved for the reported year, the cause and planned measures must be documented and reported

6.2 Energy production on the property

- Renewable energy production includes:
    - Solar energy
    - Wind power
    - Biofuel
    - Geoenergy
    - Solar thermal energy
    - Free cooling

6.3 Measurement plan

- The measurement plan shall be structured in accordance with the Sveby programme's "Measurement instructions version 2.0" (10.06.2020)
- The measurement plan shall include information on meters for the following energy types, for calculation of the building's energy consumption climate impact:
    - delivered district heating (this includes delivered waste heat from neighbouring properties or other external suppliers)
    - delivered district cooling
    - delivered electricity for base-building energy use
    - delivered electricity for tenant (process) electricity use
    - energy production installed on the property per energy type
    - use of self-produced energy in the building per energy type

    - renewable electricity delivered to the electricity grid by production source (solar power, wind power, etc.)
- The measurement plan shall detail meters installed to cross-reference with billing meters; for example, to distinguish base-building energy from tenant/ household energy
- The measurement plan shall describe the ID, location, type (energy, temperature) and monitoring (manual or automatic) of all meters
- The measurement plan shall state the metering frequency (minimum monthly)
- The measurement plan shall contain a visualisation of how the measurement system is connected
- During commissioning, the measurement plan shall be verified, the function of the meters checked, the reporting of automatically meters to the system's database confirmed, and the manual entering of non-automated meter values in the system's database verified.
- Monthly reports shall show that measured values have been registered, and that data is being collected in the system's database. Monthly reports shall include:
    - Compilation of measured values
    - Energy performance deviations, planned corrective measures, and adjustments implemented to address deficiencies

6.4 Climate impact of the building's energy use B6

- Climate impact is calculated on an annual basis
- If the project **has not signed** an energy contract, or where an EPD is not available, generic climate data are used based on the life cycle climate impact of energy production.
    - for energy contracts:
        - electricity contract 22 $kgCO_2/MWh$
        - district heating contract 60 $kgCO_2e/MWh$
        - district cooling contract 60 $kgCO_2e/MWh$
    - for renewable energy production financed by the building developer or owner, and where production technology is not an integrated component:
        - solar power 41 $kgCO_2e/MWh$
        - wind power 12 $kgCO_2e/MWh$
        - bioenergy 40 $kgCO_2e/MWh$
    - For reporting the climate impact of construction products with integrated technology for energy production, system boundaries for reporting in A1-A3 vs B6 are described in the section *System boundaries > Building*
- If the project **has signed** an energy contract or has engaged a supplier of waste heat or technology for its own production of renewable energy, the following applies:
    - where the supplier offers an EPD, the project can use the climate data in that EPD provided that
        - The EPD has been produced in accordance with "Product Category Rules, PCR 2007:08 version 3.0 CPC 171 & 173: Electricity, Steam, and Hot and Cold Water Generation and Distribution", "General Programme Instructions for Environmental Product Declarations, Ver.2.5", ISO 14025 and ISO14044 or later versions thereof
    - where the supplier's electricity contract is certified Bra Miljöval by the Swedish Society for Nature Conservation:
        - Bra Miljöval Wind 14.8 $kgCO_2$ e/MWh
        - Bra Miljöval Water 8.6 $kgCO_2$ e/MWh
        - Bra Miljöval Solar 30.5 $kgCO_2$ e/MWh
    - waste heat used for building heating is calculated and reported in accordance with its original energy carrier
        - waste heat from an external supplier, such as a neighbouring property, is reported as externally delivered waste heat according to the amount of energy and climate data for the energy supplier generating the waste heat.

7 Water use B7

Purpose

To design, construction and manage buildings for reduced water consumption.

Assessment scope

The building's annual water consumption, reported in cubic metres, and associated climate impact

Criteria

7.1 Building' annual water use

- Water consumption shall include the following end uses, reported in cubic metres:
  - water for heating, cooling, ventilation, and steam processes

7.2 Measurement plan

- When the building is in operation, building's water consumption shall be measurable as per the end uses listed in criterion 7.1

Method

7.1 Building annual water use

- For estimating water use for preliminary certification, the project may base calculations on previous experience or the responsible engineer's estimation of water use per m^2 BTA
- For verification and reporting, measurement plans shall be used in accordance with criterion 7.2
- Climate data for the climate impact of water infrastructure outside the building's periphery, expressed in $kgCO_2e/m^3$ of water, is multiplied by the water use and divided by BTA for a climate impact in $kgCO_2e/m^2$ BTA
  - Climate data from an EPD shall be used when available
- The climate impact of tap water systems in the building shall be reported under Indicator 3 Building components A1-A3

7.2 Measurement plan

- The measurement plan shall describe the location of the meters and type of monitoring (manual or automatic, including time resolution)
- Any templates or calculation models used where measurement is not available shall be presented
- The measurement plan includes reporting for end uses listed under criterion 7.1

8 End of life stage C1-C4

Purpose

To increase awareness of the climate impact of buildings at the end of their service life.

Assessment scope

Climate impact from the deconstruction, waste transport, waste processing and disposal of the building when it reaches the end of its service life.

Criteria

8.1 Waste/final disposal of building C1-C4

- For buildings, projects report the total climate impact of:
  - dismantling/demolition of the building, C1

- transport to waste management facilities, C2
- waste management, C3
- final management C4

Method

8.1 End-of-life of building C1-C4

On or before the year 2045, Sweden has committed to 100 percent renewable electricity, fossil fuel free transports, and zero net emissions of greenhouse gases to the atmosphere. According to the organisation "Avfall Sverige" (~Waste in Sweden), waste processing will also be required to be carbon neutral. Since a NollCO_2 project has a 50-year calculation period, the project will be demolished no earlier than 2070, when end-of-life building processing must be completely fossil fuel free.

- Accordingly, the climate impact of C1-C4 is set to zero in NollCO_2
- The climate impact of waste associated with replacement and refurbishment is addressed under Indicator 5 "Building use B1-B5".

The climate impact C1-C4 for the building's end-of-life is interpolated from current C1-C4 values for the building elements/construction products/building service systems, to a zero value in 2045. Should the building reach its end of life before 2045, interpolated values are to be used.

CLIMATE ACTIONS

9 Net zero balance

Purpose

To achieve climate-neutral buildings that contribute to Sweden's goal of climate neutrality by 2045.

Assessment scope

To achieve a net zero balance between the climate impact of the building's life cycle and use, and the project's climate actions (offsets).

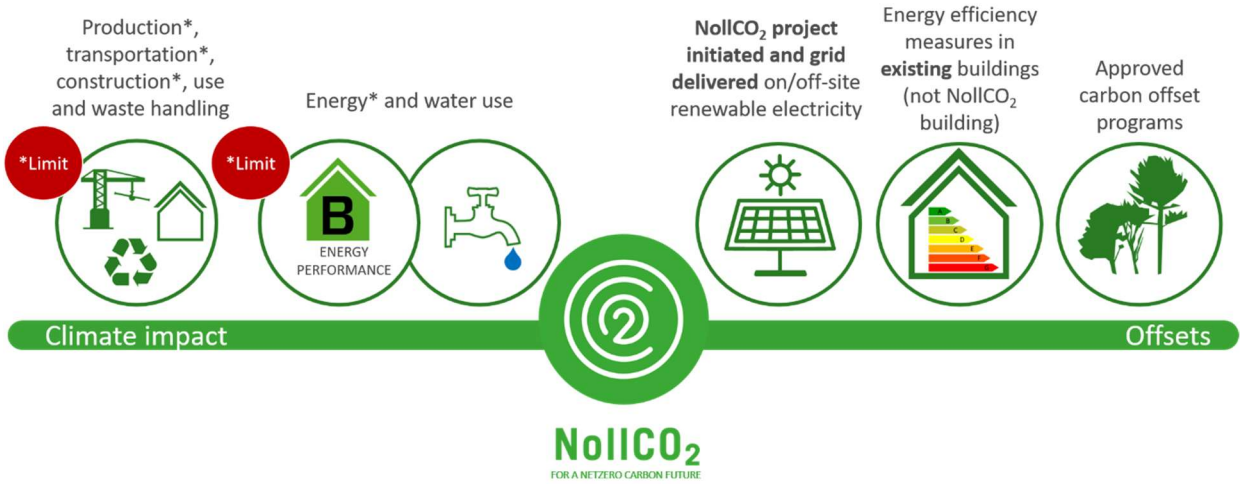

Figure 1 NollCO_2 net zero balance

Criteria

9.1 The climate impact of the building's use is balanced with climate actions to attain an annual net zero balance

- The climate impact of B4-B7 must be balanced with climate actions to an annual net zero balance during the 50-year calculation period, commencing with the building's occupancy

9.2 The climate impact of the building's production stage and end of life stage is balanced with climate actions to a net zero balance not later than 2045

- The climate impact of modules A1-A5 and C1-C4 must be balanced with climate actions to a net zero balance not later than 2045

Method

A detailed description of the method and criteria for balancing can be found at SGBC.se.

The project can use the following climate actions to balance B4-B7 to net zero on an annual basis and A1-A5, C1-C4 to net zero not later than 2045:

- grid-delivered renewable electricity production, on-site or off-site
    - the boundary for off-site electricity generation is Nord Pool's electricity market: the project can, as a climate action, install renewable electricity production in one of the countries physically connected to Sweden's electricity grid and within Nord Pool's electricity market
- energy efficiency measures in existing buildings
    - the existing building in which energy efficiency measures are implemented shall be in the same country as the NollCO_2 project
- climate compensation as approved by SGBC, according to criteria for environmental integrity (learn more at SGBC.se)

The project specifies information about its implemented climate actions:

- Calculate the annual net balance of use B4-B7:
    - B4-B7 are balanced with the project's climate actions
    - any annual surplus from balancing of B4-B7 flows to the balancing of A1-A5, C1-C4
    - any annual surplus from balancing of A1-A5 and C1-C4 flows to next year's balancing of B4-B7 and so forth.

Installation of renewable electricity

- The project may credit the share (%) of installed renewable electricity on- or off-site that corresponds to the share (%) that the building developer or the building owner has financed and where installation took place after the project's registration date in BGO
- The climate value of grid-delivered renewable electricity production is calculated as the reduction in emissions that occurs when fossil electricity is replaced by the renewable electricity in Nord Pool's electricity market (see Figure 2 below)

- only the renewable electricity delivered to the grid has a climate value based on the fossil fuel-based electricity generation it replaces.

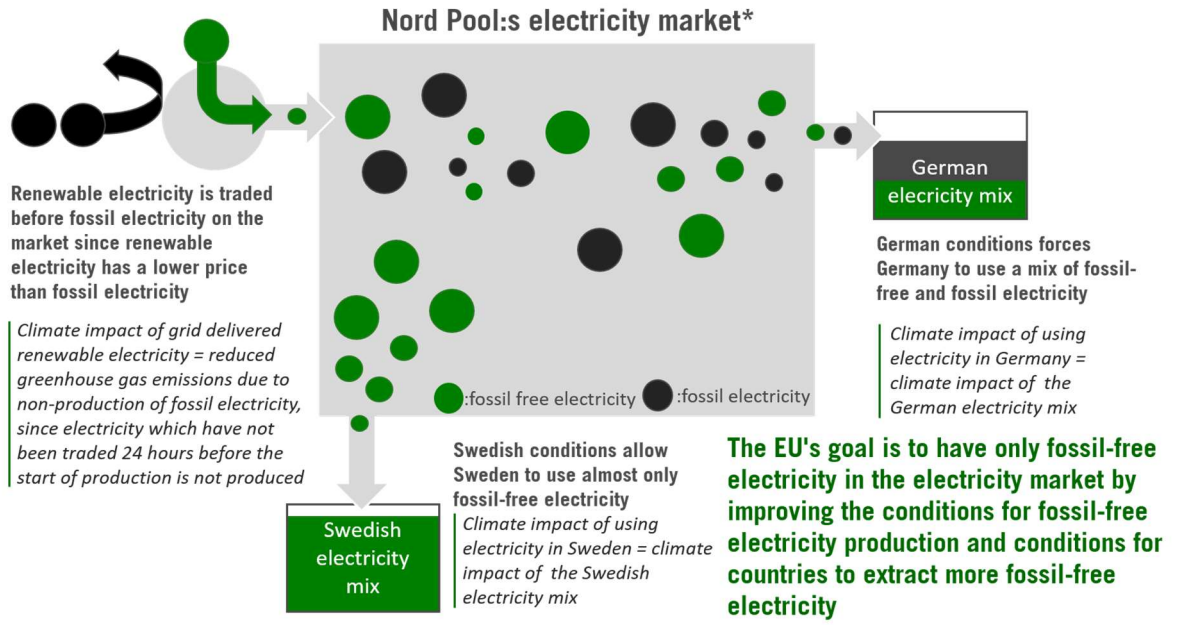

Figure 2 Nord Pool's electricity market

Energy efficiency in existing buildings

- The climate action for energy efficiency in existing buildings must take place in the same country as the NollCO_2 project. A building is deemed to be existing if it has been in use for at least 5 years.
- Energy efficiency measures must improve the building's energy performance to Energy Class B or better, no later than five years after the NollCO_2 project was verified
- The project may credit the share (%) of energy efficiency that corresponds to the share (%) that the NollCO_2 building developer or owner has financed
- The climate value of the reduction in operational electricity is calculated based on the emission reduction that occurs when the electricity market's most carbon-intensive electricity production (fossil fuel-based electricity) is replaced.
- The climate value of energy reductions other than electricity are factored based on the specific reductions multiplied by the climate data for each energy type
- The climate impact of the energy efficiency measures must not exceed 100gCO_2e per reduced kWh and per building (as per the EU taxonomy requirements)

Climate compensation

- Climate compensation can be performed through one of the following programmes:
  - VERRA, www.verra.org
  - Gold Standard, www.goldstandard.org
  - Plan Vivo, www.planvivo.org


NollCO2
A NET ZERO CARBON FUTURE


SWEDEN GREEN
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