

## METHODOLOGY DOCUMENTATION

# Sector and Sub-Sector Taxonomy

Classifying registry projects into a standardized sector taxonomy

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## Overview

Carbon credit registries categorize projects using their own sector and sub-sector labels, which vary widely in granularity and terminology from one registry to the next. To let clients search, filter, and analyze projects by sector consistently across all registries, AlliedOffsets maps every registry-specific (sector, sub-sector) combination onto a single standardized sector taxonomy — covering categories such as Forestry and Land Use, Renewable Energy, Household Devices, Agriculture, Waste Disposal, and others.

## Standardized Sector Categories — Overview

|                                                          |                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Agriculture</b>                                       | Projects that reduce emissions and enhance carbon sequestration through improved agricultural practices, soil carbon sequestration, and regenerative farming — including sustainable land management, methane reduction, and soil carbon enhancement.             |
| <b>Artificial Upwelling / Downwelling</b>                | Projects that transfer surface water and carbon to the deep ocean using pumps, surface cooling, or salinity changes (upwelling), or that pump nutrient-rich deep water to the surface to stimulate phytoplankton growth and enhance CO2 absorption (downwelling). |
| <b>BECCS (Bioenergy with Carbon Capture and Storage)</b> | Projects that generate energy by burning renewable biomass while capturing and storing the resulting CO2 emissions, drawn from sources ranging from biogenic waste burning to pulp and paper mill processes.                                                      |
| <b>Biochar</b>                                           | Projects that convert biomass at high heat into a stable charcoal form and add it to soils, improving water retention and nutrient availability for agricultural performance.                                                                                     |
| <b>Carbon Capture</b>                                    | Projects that capture or mineralize CO2 directly — including restoring and promoting new growth of peatlands, mangroves, tidal marshes, seagrasses, kelp, and other aquatic carbon sinks.                                                                         |
| <b>Chemical Processes / Industrial Manufacturing</b>     | Projects that avoid CO2e emissions by capturing and often repurposing emissions from industrial practices — including coal mine methane, fugitive emissions, oil flaring, N2O abatement, SF6 recovery, refrigerants, and low-carbon cement.                       |

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|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DAC (Direct Air Capture)</b>               | Projects that use chemical technologies to capture CO <sub>2</sub> directly from ambient air, whether through liquid sorbents, solid sorbents such as metal-organic frameworks, or electrochemical processes.                           |
| <b>Energy Efficiency &amp; Fuel Switching</b> | Projects that reduce emissions through energy efficiency improvements or by switching to lower-carbon energy sources — including industrial efficiency upgrades, residential energy efficiency, and fuel-switching in power generation. |
| <b>Enhanced Rock Weathering</b>               | Projects that capture CO <sub>2</sub> through enhanced weathering by grinding and spreading basalt, olivine, or other silicate minerals on land, sequestering carbon while improving soil health and agricultural productivity.         |
| <b>Forestry and Land Use</b>                  | Projects that sequester carbon through afforestation, reforestation, avoided deforestation, and improved land-use practices — including forest conservation, agroforestry, soil carbon sequestration, and wetland restoration.          |
| <b>Ocean Alkalinity Enhancement</b>           | Projects that increase seawater alkalinity to accelerate the ocean's natural carbon sink.                                                                                                                                               |
| <b>Renewable Energy</b>                       | Projects that displace fossil fuel-based energy with renewable alternatives, including solar, wind, hydro, and biomass energy generation.                                                                                               |
| <b>Waste Disposal</b>                         | Projects that prevent greenhouse gas emissions from waste disposal processes, including landfill gas capture, wastewater treatment, and composting.                                                                                     |

## Data Inputs

| Field / Parameter           | Description                                                                                                                                        | Source / Notes                                                          |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Raw sector</b>           | The top-level sector label as published by the originating registry for a project (e.g. 'Energy', 'Forestry', 'Waste').                            | Registry data feeds, captured during data extraction for each registry. |
| <b>Raw sub-sector</b>       | The more specific sub-category label published alongside the sector by the registry, where available.                                              | Registry data feeds, captured during data extraction for each registry. |
| <b>Project name</b>         | The project's title, used as a secondary signal to catch cases the sector/sub-sector labels alone would misclassify.                               | Registry project record.                                                |
| <b>Sector mapping table</b> | The internal reference table pairing every (raw sector, raw sub-sector) combination encountered so far with its corresponding standardized sector. | AlliedOffsets internal database.                                        |

## Logical Flow

- 1 Load the current mapping table**  
 Every existing (raw sector, raw sub-sector) pairing and its standardized sector is loaded from the internal mapping table into memory for lookup, keyed by the combination of the two raw values.
- 2 Normalize the raw values**  
 The raw sector and sub-sector text is lower-cased before lookup so that differences in capitalization between registries do not create duplicate, redundant entries.
- 3 Apply a project-name override for cookstove projects**  
 As a special case, if the word 'cookstove' appears anywhere in the project's name, the project is classified directly as 'Household Devices' regardless of its raw sector/sub-sector labels, since cookstove projects are frequently mis-tagged or inconsistently labelled by source registries.
- 4 Look up the standardized sector**  
 If no override applies, the normalized (sector, sub-sector) pair is looked up in the mapping table and the matching standardized sector is returned and attached to the project record.
- 5 Flag unmapped combinations**  
 If the (sector, sub-sector) pair has never been seen before, it is automatically added to the mapping table with no standardized sector assigned yet, so it can be reviewed and classified by the team.
- 6 Validate before publishing**  
 Before a batch of projects is finalized, every project's standardized sector is checked against the full set of recognized standardized sector values. Any project without a resolved standardized sector is flagged as a validation error.

## Assumptions

- The standardized sector taxonomy currently includes categories such as Agriculture, Renewable Energy, Forestry and Land Use, Waste Disposal, Chemical Processes/Industrial Manufacturing, Energy Efficiency & Fuel Switching, and a growing set of carbon-removal-specific sectors (e.g. BECCS, Biochar, DAC, Enhanced Rock Weathering, Ocean Alkalinity Enhancement, Carbon Capture, Artificial Upwelling/Downwelling) alongside a catch-all 'Other' category.
- A project missing sector data entirely (no sector value provided by the registry) is skipped rather than guessed at, and is not assigned a standardized sector through this process.
- The cookstove name-matching override takes priority over the registry's own sector/sub-sector labels, on the basis that registry labelling for this project type has proven unreliable in practice.
- Matching is done on the combination of sector AND sub-sector together, not on either field alone — the same raw sector label paired with two different sub-sectors is treated as two separate entries requiring independent classification.

## Limitations

- Newly encountered (sector, sub-sector) combinations are not automatically classified — they require manual review before resolving to a standardized sector, so there can be a delay after a registry introduces new labelling.

- The name-based override logic is currently limited to the single 'cookstove' keyword case; other known mislabeling patterns are not yet handled by an equivalent override.
- Projects with a sector value but no sub-sector value, or vice versa, rely on how the registry has represented the missing field (e.g. as blank text) and may not match an existing entry even if a similar mapping already exists for the same sector.
- This mapping governs a single standardized sector per project; it does not capture cases where a project legitimately spans multiple sectors beyond what the registry's own multi-sector fields provide.

## Output

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Each project record is enriched with a single standardized sector field (e.g. 'Renewable Energy', 'Forestry and Land Use', 'Biochar') that can be used consistently for filtering, comparison, and reporting across all registries on the AlliedOffsets platform.