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ALIGNED D1.2

A scientific framework for the Life Cycle Assessment of bio-based products

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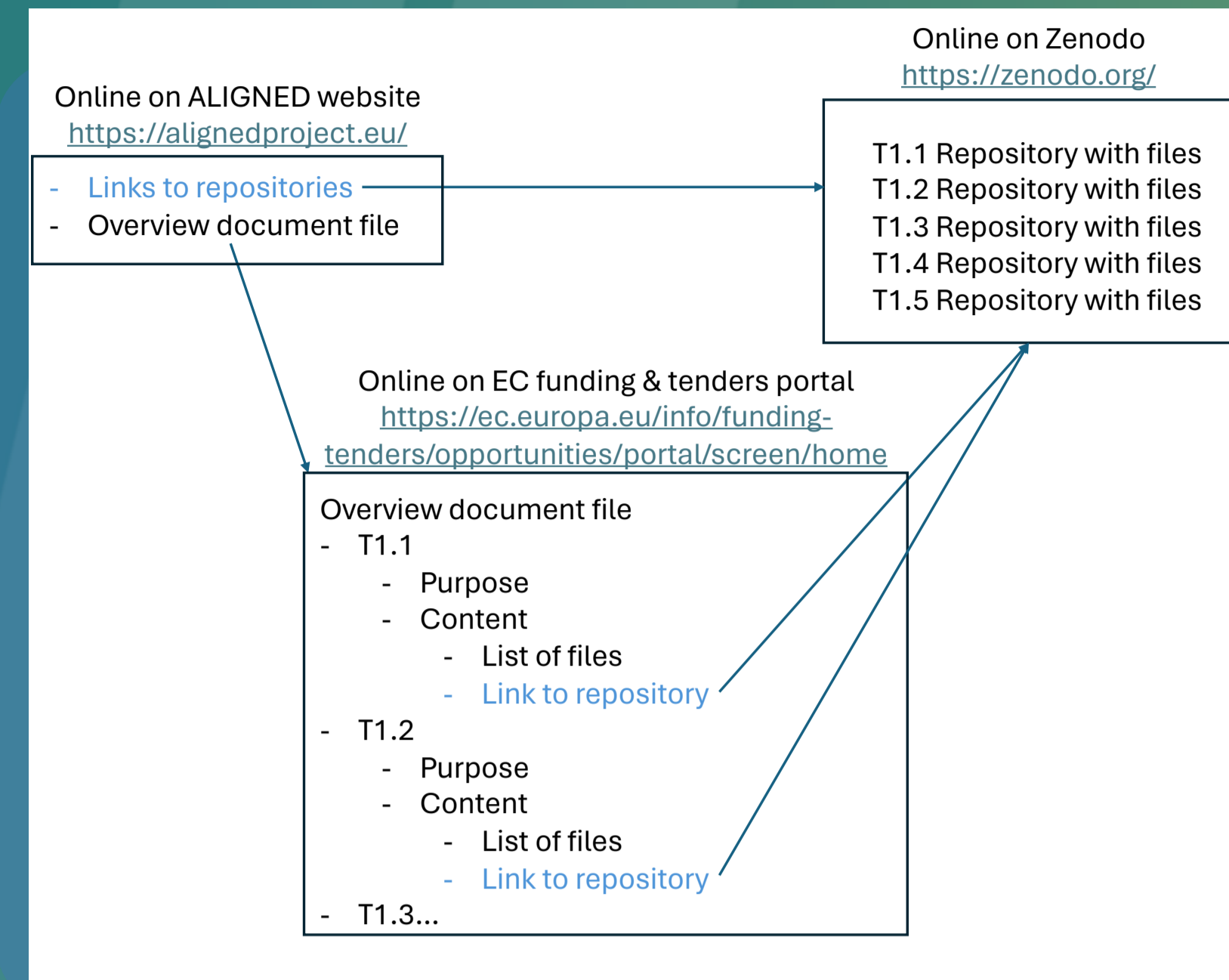
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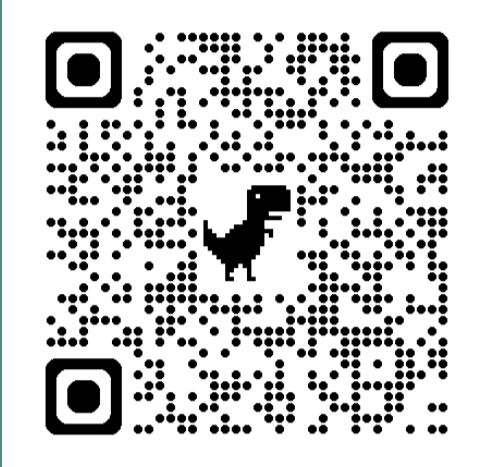
ALIGNED D1.2: A scientific framework for the Life Cycle Assessment of bio-based products

Massimo Pizzol (massimo@plan.aau.dk), Agneta Ghose, Søren Løkke, Kira Lancz, Marcos D. B. Watanabe, Narie R.D. Souza, Francesco Cherubini, Ugo Javourez, Damien Arbault, Lorie Hamelin, Maxim Tschulkow, Steven Van Passel.

STRUCTURE OF DELIVERABLE



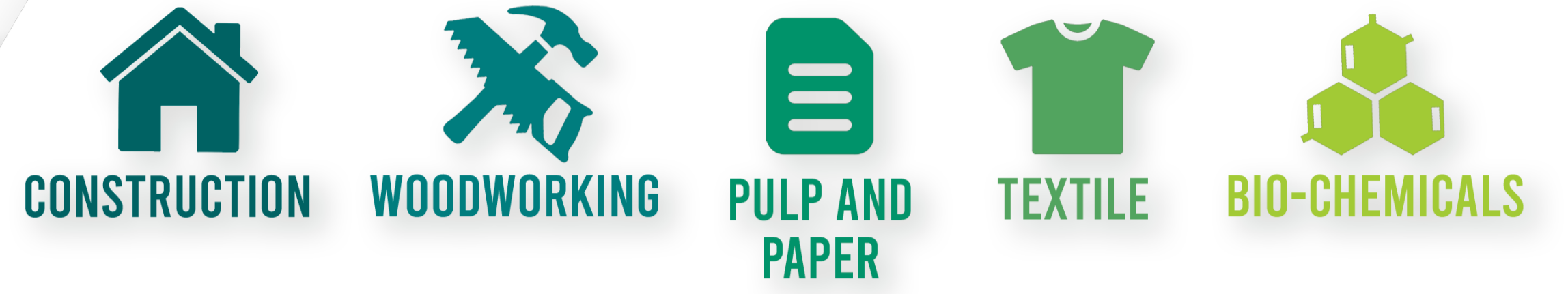
- Guidelines and tutorials
- Routines, Algorithms, Templates
- Datasets
- Models, Spreadsheets, Calculators
- Code and notebooks



ALIGNED

CONSTRUCTION - PULP AND PAPER - WOODWORKING - TEXTILE - BIO-CHEMICALS.

Aligning Life Cycle Assessment methods and bio-based sectors for improved environmental performance



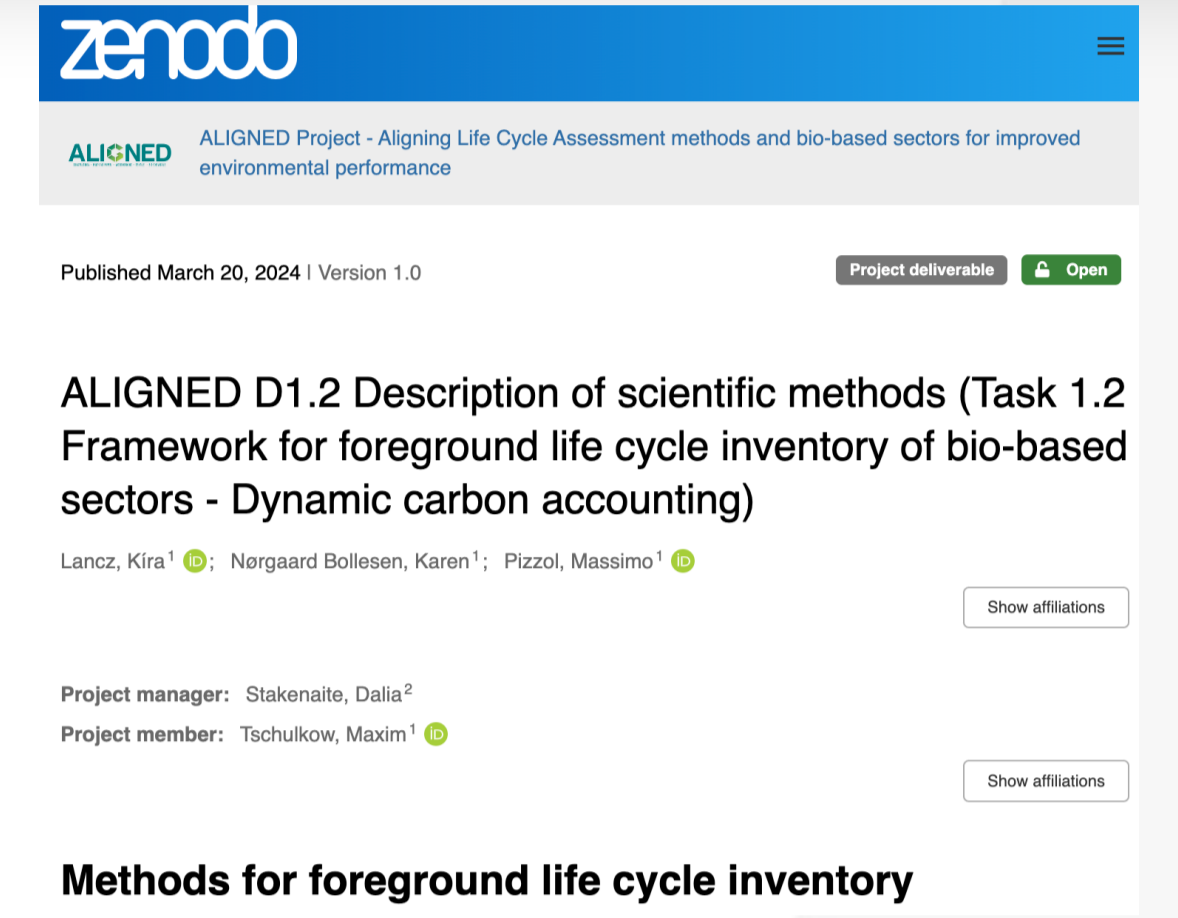
Dataset overview of biomass types

LCA Carbon Flux emissions **model** (.xlsx file)

Tutorial for dynamic carbon flux modelling of forest plantation

Carbon Flux model validation **data** (.xlsx file)

Carbon Flux model **validation** report



Guide on the Life Cycle Impact Assessment (LCIA) for bio-based products – Climate change and Biodiversity

Tool for deriving dynamic characterization factors for climate change (.xlsx file)

Tutorial on including time-dependencies in the estimation of climate change midpoint scores of bio-based productions

Dataset of biodiversity characterization factors

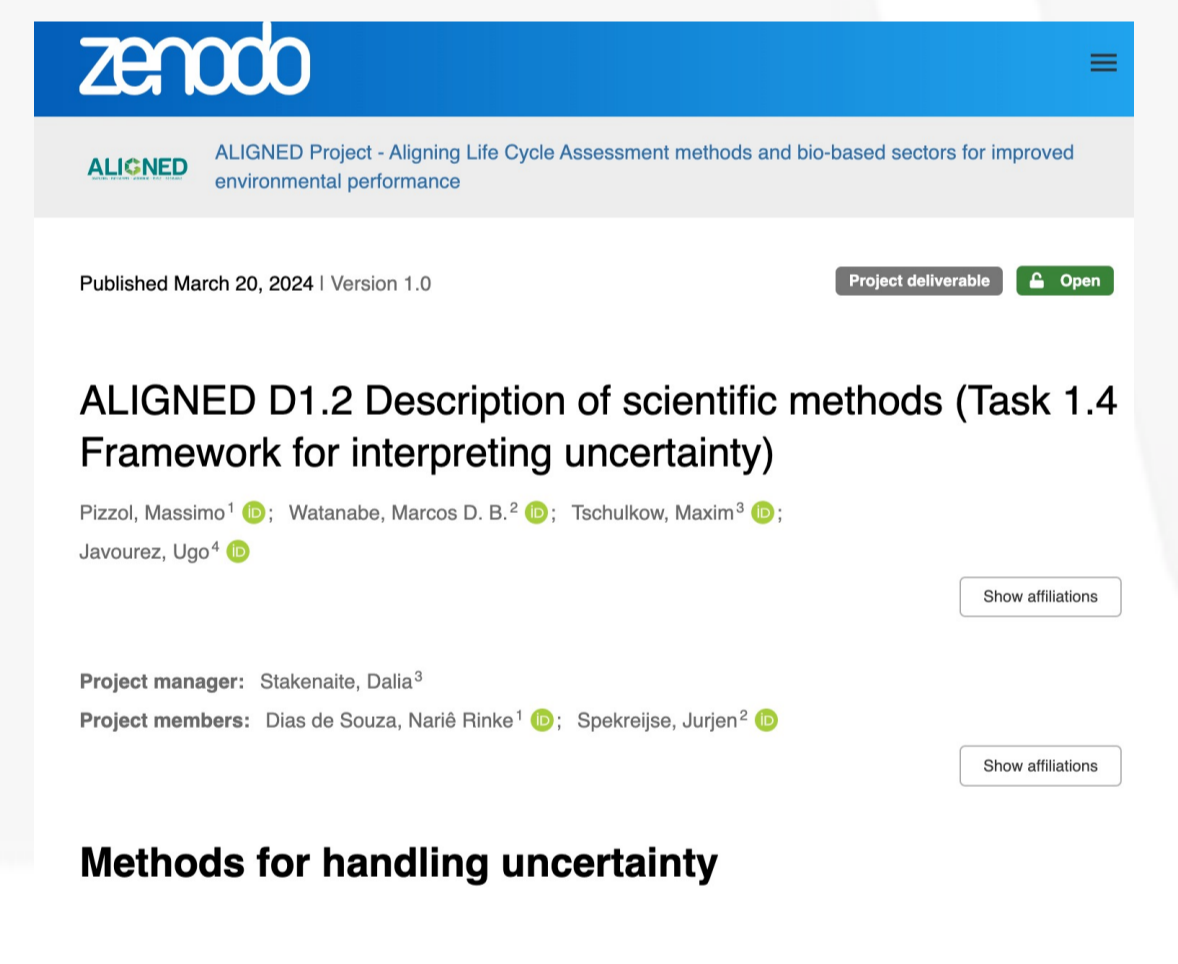
Tutorial to import biodiversity characterization factors (.ipynb and .html files)



Guide on the appraisal of uncertainty in the LCA of bio-based products

Calculators for uncertainty using pedigree matrix, uncertainty estimates from measurement data, sensitivity ration, analytical error propagation (.xlsx file)

Guide and **tutorials** for assessment of model uncertainty, comparative Monte Carlo simulation, One at Time (OAT) sensitivity analysis, Global Sensitivity Analysis (GSA) using correlation and FAST method (.ipynb and .html files).



Model description for techno-economic assessment for technologies within the bio-based sectors

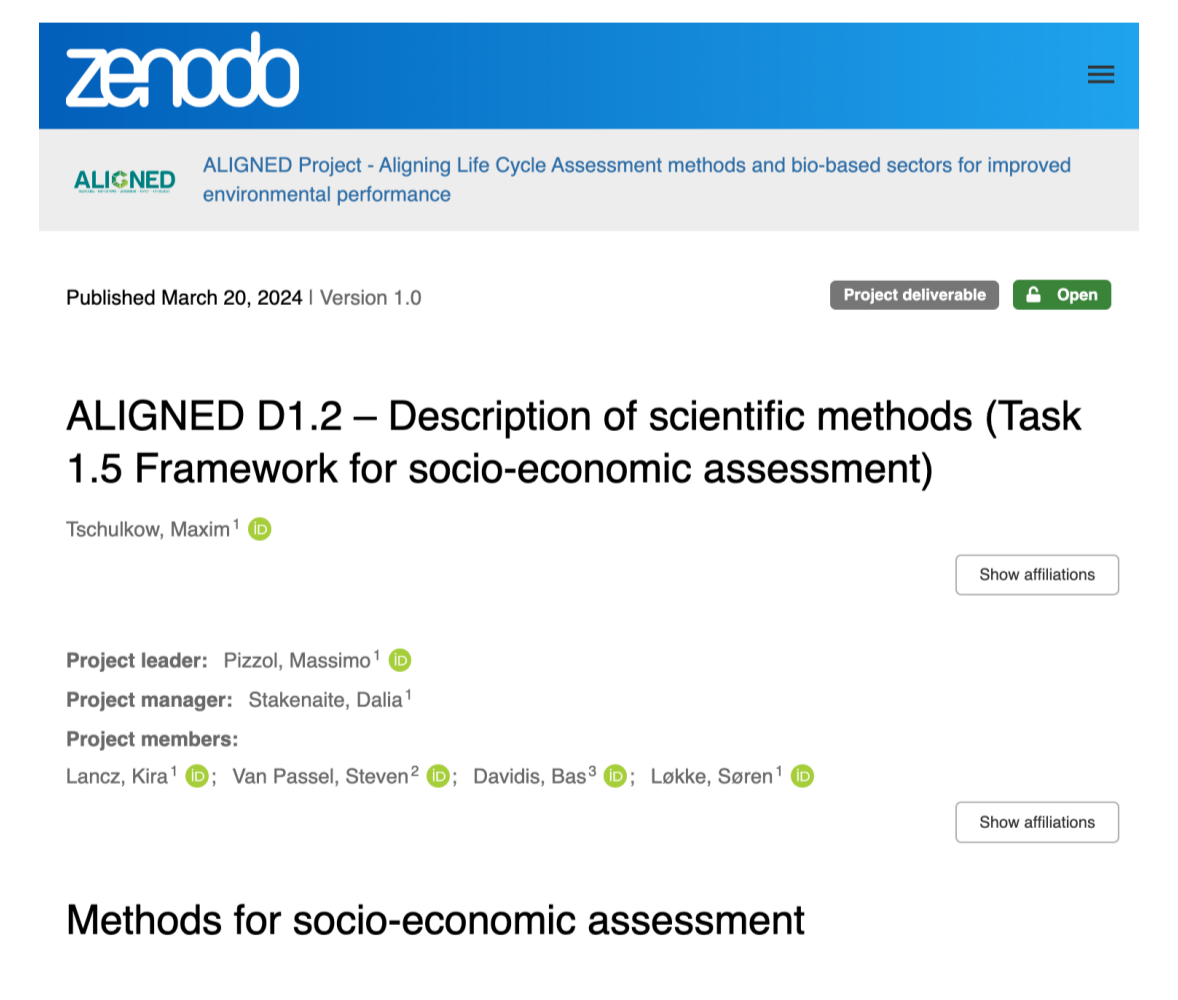
Tool for techno-economic assessment (.xlsx file)

Model description for the quantification of social indicators within the bio-based sectors

Tool for the quantification of social indicators (.xlsx file)

Model description for Stochastic multi-criteria decision analysis

Tool for stochastic multi-criteria decision analysis (.xlsx file)



OPEN REPOSITORIES AND METHODS

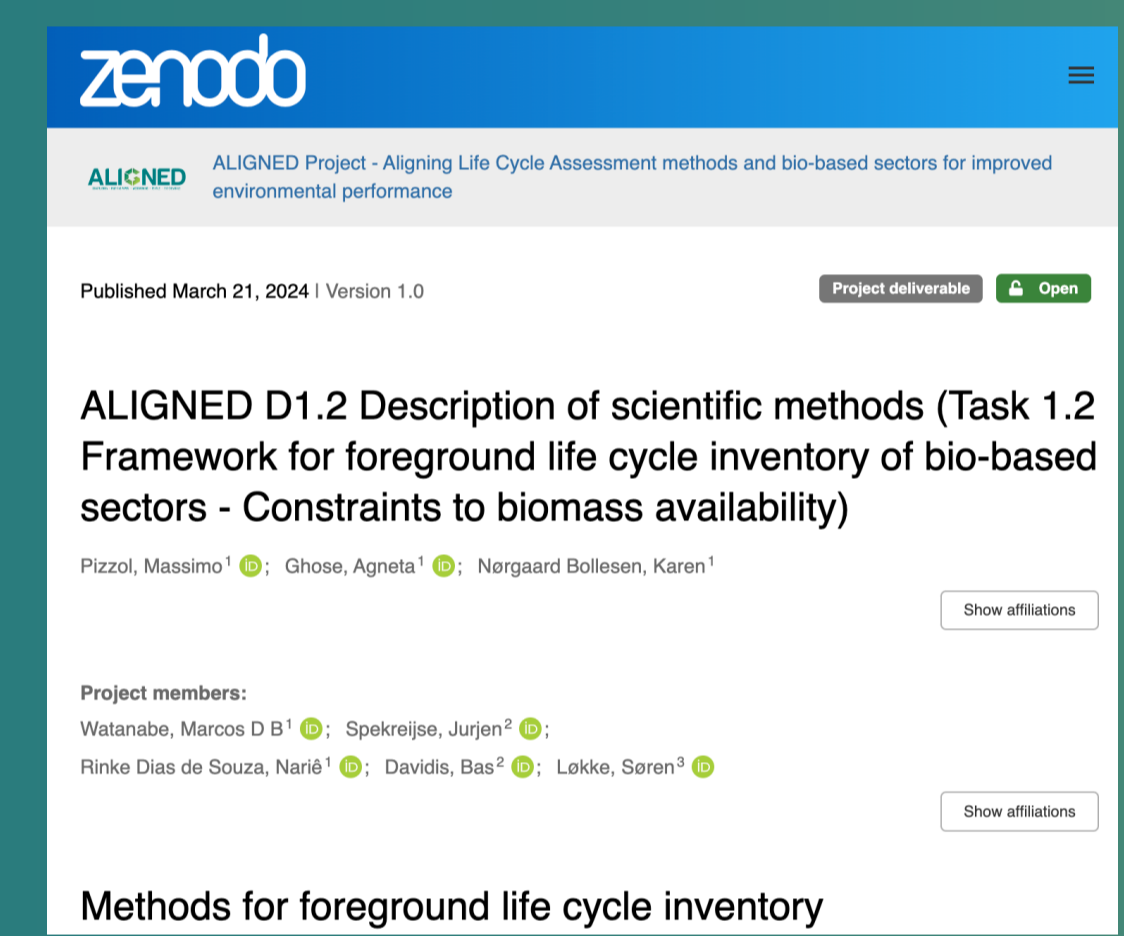


Model description for background life cycle inventory of bio-based sectors

Tutorial for generating background life cycle inventories, Tier 1 (attributinal and consequential)

Tutorial for generating background life cycle inventories, Tier 2 (attributinal and consequential)

Example of the foreground inventory format to be modified by the user (.xlsx file)



Method for modelling constraints to biomass availability

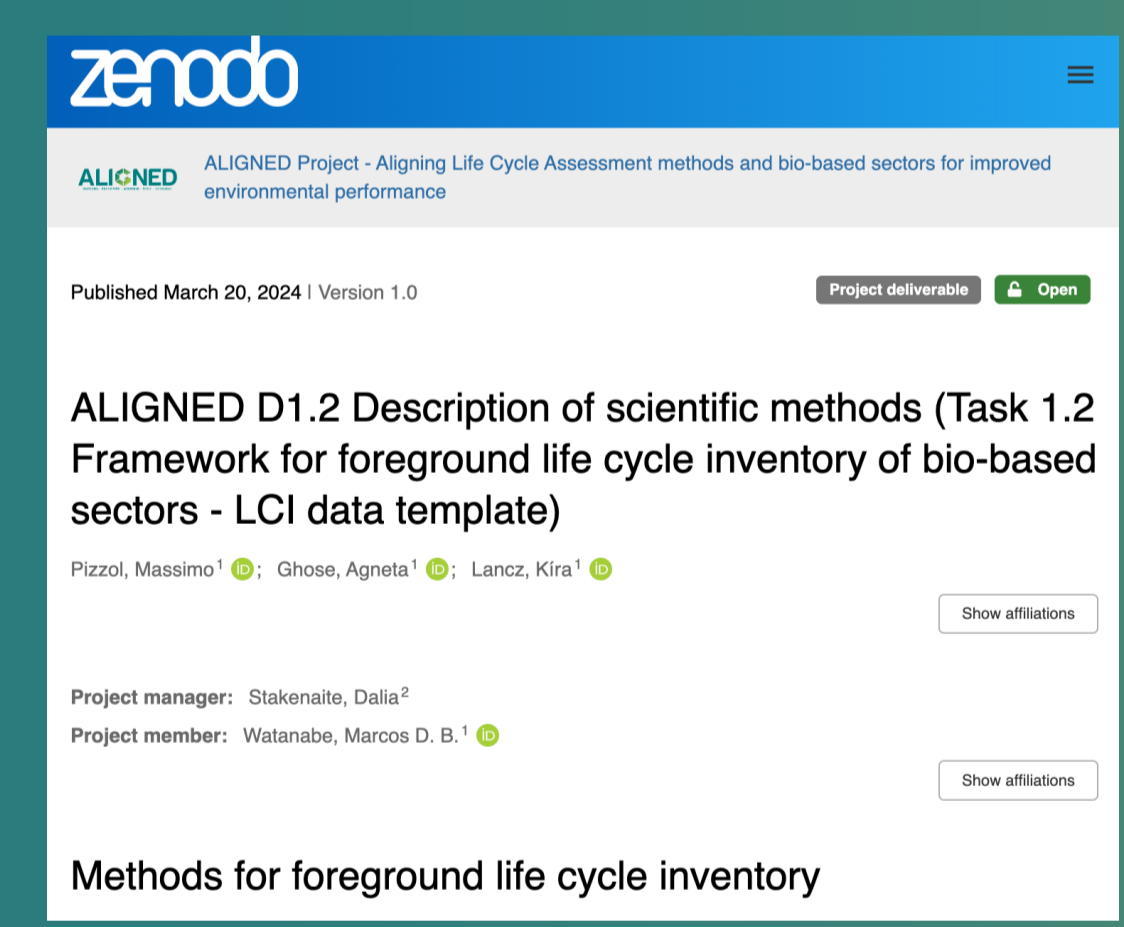
Screening and comparison of data sources to calculate market mix

Comparison of **data** sources (.xlsx file)

Modelling a market mix from FAOSTAT data

Tutorial for implementation of calculations for marginal mix (.xlsx, .py, .ipynb, .html and .R files)

Datasets used for market mix calculation (.csv files)



Guide for structuring and sharing LCI data

Explainer to understand the ALIGNED LCI data template

ALIGNED LCI **template** (.xlsx file)

ALIGNED LCI template **data** example (.xlsx and .csv files)

GLAD metadata **template** (.xlsx file)

Data import notebook (.ipynb and .html files)

Importer for life cycle inventory data (.py file)

HOW TO USE

Method for addressing competition for biomass **Find method...**

The repository contains:

- Method for modelling constraints to biomass availability

The document presents a method to model constraints to biomass availability under different situations. First it provides a theoretical introduction to how the problem is approached from a consequential perspective. Furthermore, specific recommendations are provided for modelling supply of biomass in line with this theory and indications for which types of data to use with respect to the methodological choices are provided.

Screening and comparison of data sources to calculate market mix **Read description...**

This document presents a screening of potentially useful literature to model a market mix for selected biomass products, starting from the Forestry Production and Trade data from FAOSTAT. By utilizing the tutorial, the user can generate overviews of annual production quantity of biomass for different countries.

Comparison data sources (xlsx file)

Spreadsheet with data and calculations on which the above-mentioned screening and comparison of data sources is based.

Modelling a market mix from FAOSTAT data

This tutorial serves as a tool for users seeking to model a market mix for selected biomass products, starting from the Forestry Production and Trade data from FAOSTAT. By utilizing the tutorial, the user can generate overviews of annual production quantity of biomass for different countries.

Coding for implementation of calculations for marginal mix (xlsx, .py, .ipynb, .html and .R files)

Models and codes to implement the calculations described in the guideline to calculate a marginal mix starting from FAOSTAT data. Coding is provided in both Excel, R, and Python for different users.

You can cite us!

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