

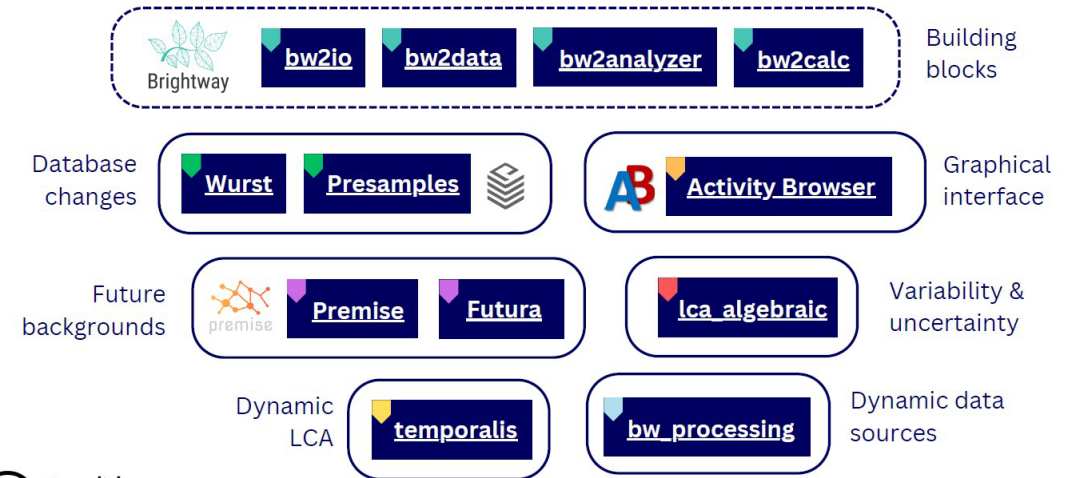
**PSI** Center for Energy and  
Environmental Sciences

# Welcome to Brightcon 2025 Beginners Course

## Introduction to Brightway, Activity Browser & Premise



### Overview of (some) BW-based LCA tools



Swedish Life Cycle Center webinar | 19th of March 2024 | Léa Braud | braud@kth.se

Léa Braud, Swedish [Life Cycle Center Webinar](#)



# BrightCon

12.-17.10.2025  
Grenoble (FR) / Online  
Sponsored by: **Cauldron.** ecoinvent

## Romain Sacchi

is a tenure-track researcher at the **Laboratory for Energy Systems Analysis** at the Paul Scherrer Institute in Switzerland. Romain primarily works on **developing methods and tools to assess the environmental and resource impacts of future energy scenarios**.

## Karin Treyer

is a senior scientist at same lab. She's an expert in LCA of energy technologies/systems dedicated to increasing transparency, robustness and interpretation of LCA studies and believing strongly in the power of open sharing of code & models. Her research spans from the underground (deep geothermal power) to space missions.

## Marin Vischer:

Software engineer at University Leiden. Spearheading the development of Activity Browser and thus making the life of many Brightway users easier.

# What to expect & learning goals



**Introduction** to LCA related software packages and how to use them

- What is BW, how it can be used, and how to install it
  - Role of BW in its packages ecosystem

9:15-9:45  
Karin Treyer  
Presentation

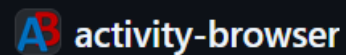


Brightway

in Jupyter Notebooks: Doing LCA

- Initiating a project
- Import of background and foreground data
  - Searching and changing data
  - Doing LCIA calculations

9:45-12:15  
Romain Sacchi  
Jupyter Lab



activity-browser

The BW Graphical User Interface

- Initiating a project
- Import of background and foreground data
  - Building new datasets
- Doing LCIA calculations & interpreting them
  - Advanced features

13:15-15:00  
Karin Treyer / Marin  
Vischer  
Activity Browser

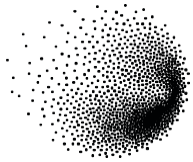


premise

A package for prospective LCA

- What is premise
- Using premise in jupyter notebook

15:15-17:15  
Romain Sacchi  
Presentation/Jupyter  
Lab



**PSI** Center for Energy and  
Environmental Sciences

# Introduction to open source software for innovative, flexible LCA



## Overview of (some) BW-based LCA tools



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Léa Braud, Swedish [Life Cycle Center Webinar](#)

karin.treyer@psi.ch  
Brightcon Beginners Course 2025  
14.10.2025

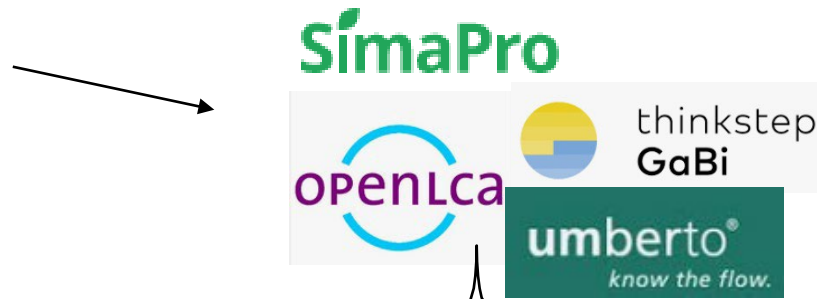
**BrightCon**

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Sponsored by: **Cauldron.** **ecoinvent**

# What is Brightway exactly?

This is what you  
are used to



Software code  
to do LCA

Graphical user  
interface

LCIA methods,  
LCI databases



ecoinvent

exiobase

sphera

- BW is an open-source software python package for LCA and environmental impact assessment (*=python made useful for LCA*)
- It allows for working with large datasets and performing fast LCA calculations.
- It offers possibilities to *break the limits of conventional LCA*.
- Many ways of how to use it, depending on your project and programming skills.

# Some attributes of Brightway (BW)

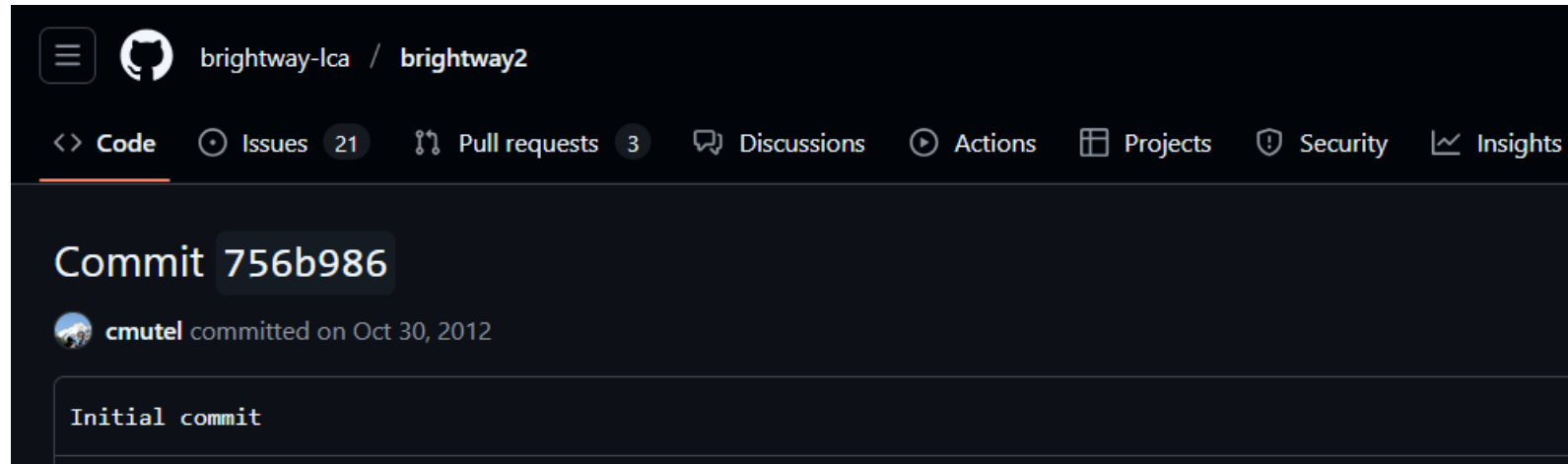
- **Open source, python-based LCA software** = community driven
  - ***Fast*** calculation time
  - ***Advanced***: e.g. regionalised/dynamic/prospective LCA)
  - ***Flexible***: Coupling with other models/measurements/etc.
  - ***Transparent***: Easy sharing of notebooks and data;  
reproducing results is possible at any time
  - ***Consistent***, e.g. systematic modifications of background data

# Some attributes of BW – should I then use it?



- **Open source, python-based LCA software** = community driven
  - ***Fast*** calculation time
  - ***Advanced***: e.g. regionalised/dynamic/prospective LCA)
  - ***Flexible***: Coupling with other models/measurements/etc.
  - ***Transparent***: Easy sharing of notebooks and data;  
reproducing results is possible at any time
  - ***Consistent***, e.g. systematic modifications of background data
- LCA studies from easy to complex are possible with BW
- BW does not intend to replace software like SimaPro or OpenLCA – it depends on what you want to do, how much time you want to invest etc. which software you choose.
- **Open source code = we can build on the models of others, collaborate, move faster, make LCA better!**

# Who developed / is developing Brightway?

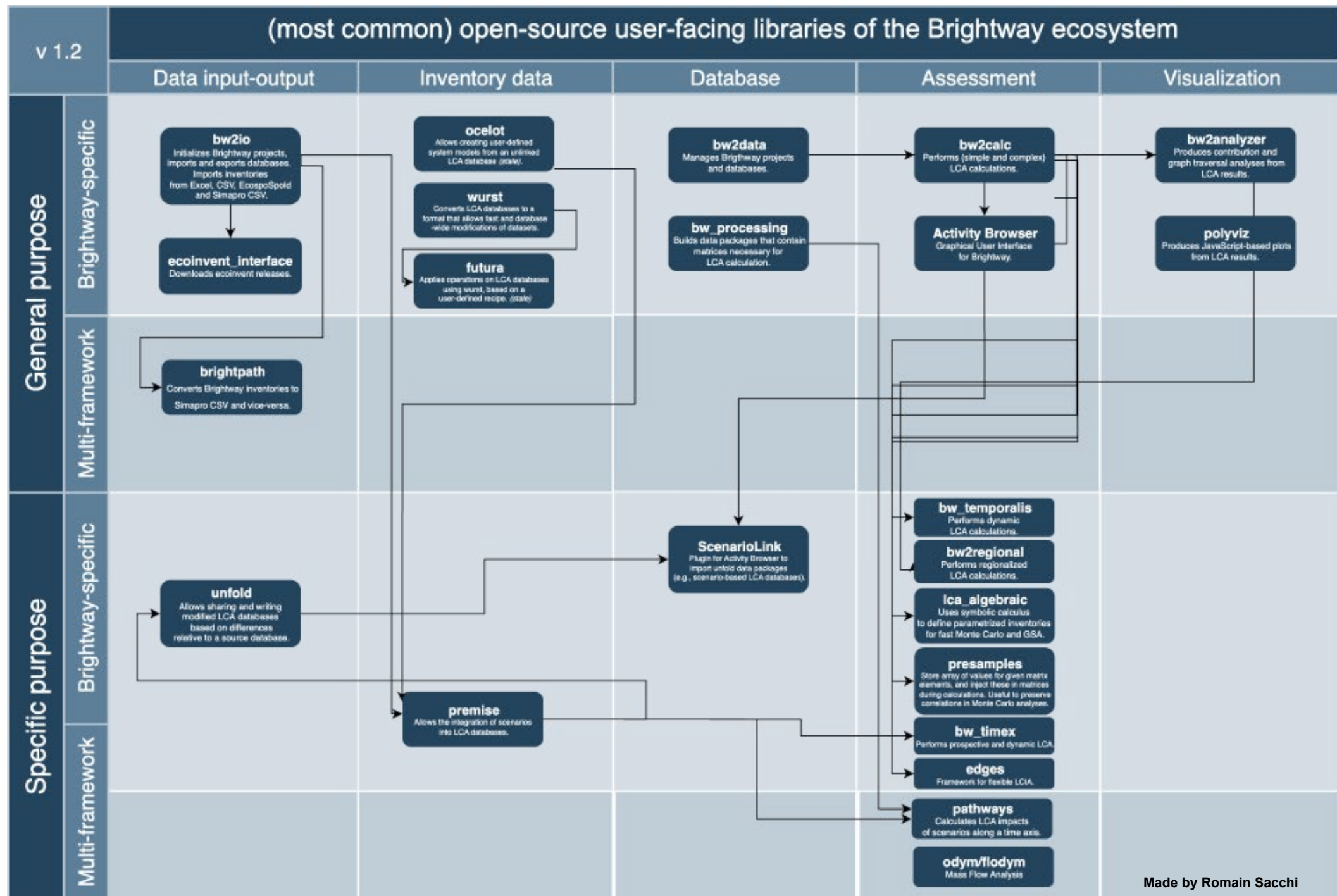


- Current Brightway ecosystem is more than 50 libraries, and around 10 core libraries.
- For the core libraries (bw2data, bw2calc, bw2io), there were 8 contributors in the past year. Of those, 4 were working for Cauldron.

Brightway is an open community software to which everybody can add.  
Main supporters are still Chris Mutel with Cauldron.

- The biggest changes over time are a ***community forming around Brightway***, and the community contributions, including temporal LCA, prospective, parametrized, regionalization, scenario analysis, and the AB.





# Premise: Prospective LCA

premise

A python package using BW and own code to combine IAM scenarios with LCI databases.

PSI

## What is premise?

- Python package for *generating prospective LCI databases*
  - Uses BW, wurst and own code to *combines scenarios from Integrated Assessment Models (IAMs) with e.g. ecoinvent*
  - *Main changes are in energy related sectors* (decarbonisation focus of IAMs): Transport, fuels, electricity, heat, steel, cement
- ⇒ Careful interpretation of LCIA results required



## How can I use it?

- a) Use it via Activity Browser v2 («ScenarioLink plugin»), or
- b) Via jupyter notebook (install BW, run premise, generate databases and export to AB/SimaPro or openLCA CSV/sparse matrices)

What it is, «installation», how to use: <https://premise.readthedocs.io>  
Code, excel files with inventories <https://github.com/polca/premise>

# Prerequisites and buzzwords you should know



- Beginners with various backgrounds want to use BW:
  - **LCA practitioners with no/little coding experience**
  - Data analysts/software engineers with no LCA background → Introduction to LCA
- *The use of BW requires a minimum understanding of...*

*Anaconda/Miniconda*

The engine to install/open the software (package/environment management system)

*Activity Browser*

Graphical User Interface of BW2

*Python*

The language in which BW is written.  
pandas, numpy, seaborn, matplotlib are very useful for LCA with BW.  
\*best search for python data analysis courses for getting started,

*Brightway*

The open python software code for doing LCA

*Module, package, library*

Libraries/packages contain modules. A module is a script with functions and classes.  
  
Lib/packages are not exactly the same, but the terms are often used interchangeably.

*Jupyter*

Used to create and share notebooks containing your LCA study code. You need an editor to open jupyter notebooks (e.g. spyder, VSC)

*Github*

Sharing, collaborating, managing projects, versioning, filing issues = reporting bugs/new ideas



# So how can I use Brighway?

## *Via AB only (and excel)*

- I want to do LCA as I am used to from e.g. SimaPro, and don't have to deal with the code behind
- I want a smooth intro to Brighway

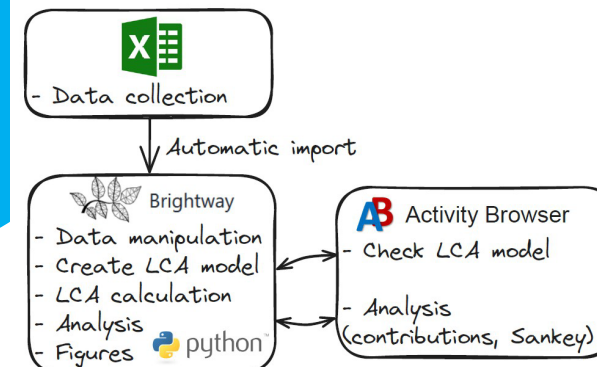
**Excel** spreadsheets are usually used to **build (at least the basis of) your own inventories**, linked to your source data for complete traceability&documentation. Further, I use it for **creating plots**. With advancing python skills, (much nicer and more flexible) visualisation can be done with e.g. seaborn, matplotlib.

## *Using jupyter notebooks, AB, (and excel)*

- I want to learn using notebooks to build on it later
- I want the human friendly AB for searches in databases and quick LCIA calculations / visualisations
- I need to troubleshoot (AB giving an error)

## *Using jupyter notebooks only (and excel if you want)*

- I want to do LCA by using the full fun of coding, which gives me a high degree of freedom



# Brightway and Activity Browser versions



## **Brightway version 2 «legacy» Activity Browser version 2**

- No real reason anymore to use BW v2
- AB v2 has the premise plugin

## **Brightway version 2.5 Activity Browser version 3**

- BW v2.5 released ca. 1 year ago
- AB v3 beta released mid 2025
- Some packages not yet updated to v2.5

- Existing notebooks on Github are often for v2, but with some adaptations possible to use in v2.5
- Some packages not yet updated to v2, but major ones are.

**Use BW v2.5 and AB v3 Beta from now on.**

# Using Brightway - Which version should I use?

- You can transfer a project from v2 to v2.5 in an irreversible way.

```
#open project with bw25 instead of bw2  
bw2data.projects.migrate_project_25
```

- See comparison

<https://docs.brightway.dev/en/legacy/content/faq/brightway.html>

- Basic code is not very different between v2 and v2.5, so notebooks can run in both versions
- If you take v2 written language, main changes to be done to transfer to v2.5:

Bw2io

Bw2data

bw2calc

# Activity Browser – The BW graphical user interface (GUI)



*Via AB only (and excel)*

## What does this GUI do?

- Fast LCA calculations and advanced analysis options
- Advanced scenario modeling for prospective LCA (superstructure approach – AB v2)

## How can I use it?

- Install anaconda/miniconda, open the command prompt, go on github, follow the instructions
- Next time you want to open it: see next slide

Install conda, e.g. <https://docs.anaconda.com/free/miniconda/>

Youtube channel with tutorials: <https://www.youtube.com/@activity-browser>

Information: <https://github.com/LCA-ActivityBrowser/activity-browser>

Installation: <https://lca-activitybrowser.github.io/activity-browser/beta.html>



# Installing, opening and maintaining AB



Via AB only (and excel)

1. Install conda, e.g. <https://docs.anaconda.com/free/miniconda/> or <https://docs.anaconda.com/free/anaconda/install/>

2. Open the command prompt

3. «Install» AB (do this only once):

```
conda create -n ab -c conda-forge activity-browser
```

4. Open AB:

```
conda activate ab #This activates the environment ab
activity-browser #This opens the relevant package
```

## Maintaining AB (keep up with new versions):

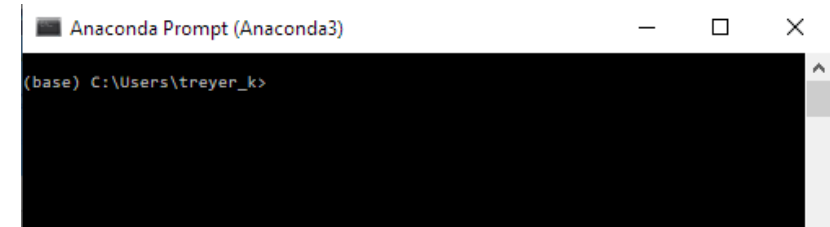
Open command prompt, activate ab environment

```
conda update --all #updates all packages to the latest version
```

Or

```
conda update activity-browser
```

Read the messages the command prompt gives you! Sometimes you need to e.g. first update your conda (do `conda update --all` in your base environment), or your python version



## Installation

### Step-by-step guide

See our [Installation Guide](#) wiki page for a step-by-step guide to installing Activity Browser.

### The quick way

Or you can install and start the activity-browser like this:

```
conda create -n ab -c conda-forge activity-browser
conda activate ab
activity-browser
```



# Using Brightway - Where can I find information & support?

*Using jupyter notebooks, AB,  
(and excel)*

- Description of the software, how to install it etc.: <https://docs.brightway.dev>
  - Example notebooks (work in progress): <https://learn.brightway.dev>
  - Interactive place to run notebooks (advanced): <https://live.brightway.dev>
  - Another interactive place: <https://try.brightway.dev>
- 
- «Forum»: <https://brightway.groups.io/g/development/subgroups>  
→ **Especially for beginners:** <https://brightway.groups.io/g/beginners>

# Getting started - *install conda*



https://docs.conda.io/projects/conda/en/stable/user-guide/getting-started.html

**CONDA** Conda-build Miniconda conda.org

Search Ctr1 + K

Navigation

- User guide
- Getting started with conda
- Installing conda
- Tasks
- Configuration
- Concepts
- Troubleshooting
- Cheat sheet
- Configuration
- Commands
- Release notes
- Glossary
- Developer guide

Getting started with conda

Conda is a powerful command line tool for package and environment management that runs on Windows, macOS, and Linux.

This guide to getting started with conda goes over the basics of starting up and using conda to create environments and install packages.

**Tip**

Anaconda Navigator is a graphical desktop application that enables you to use conda without having to run commands at the command line.

See [Getting started with Anaconda Navigator](#) to learn more.

On this page

- Before you start
- Starting conda
- Creating environments
- Listing environments
- Installing packages
- Specifying channels
- Updating conda
- More information

[Edit on GitHub](#)

[Show Source](#)

Before you start

You should have already installed conda before beginning this getting started guide. Conda can be found in many distributions, like [Anaconda Distribution](#), [Miniconda](#) or [Miniforge](#).

Starting conda

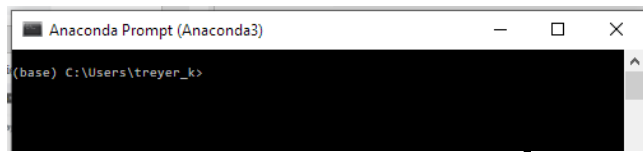
Conda is available on Windows, macOS, or Linux and can be used with any terminal application (or shell).

Windows macOS Linux

1. Open either the Command Prompt (cmd.exe) or PowerShell.

Creating environments

# Installation, opening, upgrading (prompt window) PSI



- ***Open your (ana-/mini-)conda prompt window*** – this is always the start of your work with bw!

- **«Installing»** = creating a conda environment and attaching the bw package to it:

```
conda create -n yourenvname brightway2 jupyterlab
```

- ***Starting = opening bw:*** we want to open a jupyter notebook in the environment you want to work in by doing this:

- open anaconda prompt

(conda env list for knowing which envs you have)

```
conda activate yourenv
```

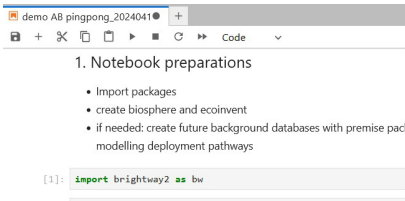
- jupyter lab **or** jupyter notebook)

- **Upgrading:**

```
activate yourenvname
```

```
conda update
```

```
conda conda update -c conda-forge brightway
```



# Working with BW (jupyter notebook)



- Open a **jupyter notebook** in an editor, and use the environment you want
- For beginners I recommend the use of jupyter notebooks, AB and excel.

Today we work in jupyter lab on a server

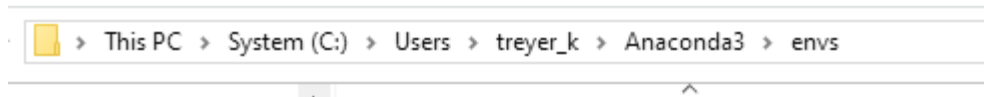
Advantages: No issues on your local computer => no troubleshooting necessary, efficient teaching

Disadvantages: At home you might encounter issues => Brightway beginners group (no official support – community)

# Environments: AB and BW «talk to each other»



- You can install activity browser ONCE on your computer in the environment «ab\_beta».
- For each new project, you create an own environment.
- AB is connected to these other environments, and any project you create is directly visible also in AB!
- Your environments are stored in your conda folder, i.e. they are usually to be found in one central folder on your machine



- Anaconda can eat up a lot of storage space because the individual envs are rather large.
- Make sure to delete unused envs also in the conda folder
  - Clear Cache from time to time
  - See <https://docs.anaconda.com/anaconda-notebooks/notebook-storage-memory/>

# Sounds cool, but how can I transfer my projects from another software into BW? Not without pain...



Source	Tool	TRL	Notes
EcoSpold 1	bw2io	8	Could require elementary flow harmonization
EcoSpold 2	bw2io	9	Most stable import format
OLCA Schema (JSON-LD)	bw2io	4	Broken with new JSON-LD version
OpenLCA (direct)	openlca2bw	5	Not all features supported
Excel (BW template)	bw2io	8	Most stable import format
Excel (Custom)	bw2io+	N/A	Must be developed by user
ILCD	bw2io fork	4	Unmaintained?
Simapro CSV	bw2io	7	Could requires elementary flow harmonization

# Previous courses/schools



<https://github.com/Laboratory-for-Energy-Systems-Analysis/winter-school-psi-2025>

<https://github.com/romainsacchi/autumn-school-dds-psi-2024>

# What to expect & learning goals



**Introduction** to LCA related software packages and how to use them

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  - Role of BW in its packages ecosystem

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Karin Treyer  
Presentation

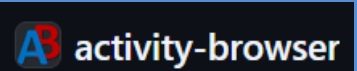


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Activity Browser



premise

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15:15-17:15  
Romain Sacchi  
Presentation/Jupyter  
Lab



# How to connect to the server



<https://fall.brightcon.link>

***User Name:*** The e-mail address you registered to this conference

***Password:*** brightcon2025