1.1 Q&A section

Hello CIRAIG Colleagues and many thanks for the webinar! I am surprised by the # of EFlows covered in Impact World +. How many substances are covered for toxicity? Many thanks

- Maxime AGEZ (IMPACT World+) I don't have a precise number to provide but ecotox and tox represent about 3000 substances. We are using the Usetox model for these impact categories which is used in many of the existing LCIA methods available.
- Cécile BULLE (IMPACT World+) All the substances considered in USEtox are considered in IW+.

You said aggregation is based on science; may we have a reference for this (scientific publication)? Thank you

- Maxime AGEZ (IMPACT World+) The aggregation of each impact category is done and documented in each of the respective publication of the impact indicators. In other words, the base articles that are used in IW+ mostly already provide characterization factors at the damage level (for instance in DALY) and we can then aggregate them since they are all in the same unit. So there is not one single publication where the aggregation of all impact categories is described.
- Maxime AGEZ (IMPACT World+) You can check the sources that we used here: <u>https://github.com/CIRAIG/IWP Reborn/tree/master/Methodology</u>. You will find there, for example, the article that describes how we go about determining the impact of human health of climate change.
- Cécile Bulle (IMPACT World+) The modelling up to the damage level is done by modelling the cause-effect chain up to the damage on human health or ecosystem quality, based on biological, physical and chemical mechanisms. Hence the units are the same (DALY for HH, PDF.m2.yr for EQ), which are hence added without any further weighting needed.

I am surprised you did not make a distinction between shorter and longer term for ionizing radiation.

• Cécile BULLE (IMPACT World+) - You are absolutely right that it would make sense. However, those impacts are always extremely low compared to other contributors to the damage on AoP, this is a parsimonious trade of not to multiply more the number of indicators.

What are the plans to implement this LCIA method into LCA software, such as Simapro? And in this case, do you foresee any limitation on interpretation and/or regionalization level when implemented?

- Maxime AGEZ (IMPACT World+) We currently develop and provide files allowing for the implementation of the IMPACT World+ method in SimaPro, openLCA and brightway2. They have to be downloaded from our website and imported in the software. The link is available in the presentation. The IW+ method is also included in those software's method packages with some limitations.
- Maxime AGEZ (IMPACT World+) Regarding the limitation of regionalization, we bend to what the software is supporting. So we follow the regionalization that is provided by SimaPro for example

and make IW+ work with it.

- Attendee (Procter & Gamble) Importing ourselves the method in the software can be an issue with linking to elementary flows. I would highly recommend CIRAIG/DTU to talk to software providers, so they make the adjustments needed to implement the LCIA into their softwares, directly
- Elliot MULLER (IMPACT World+) We are already in touch with the SimaPro, openLCA and ecoinvent teams (brightway directly uses the method library provided by ecoinvent). They currently provide implementations of IMPACT World+ that they developed with our input. But they are still more limited than the ones we provide ourselves (limits on regionalization, on new flows that do not exist in ecoinvent such as plastic leakage, etc.).

Hello! Thank you for doing this webinar today. I was wondering if the seabed use category is already included/functional in the method. If so, could you please provide a reference paper/document where we can consult the characterization models used?

• Maxime AGEZ (IMPACT World+) - Hello Bruna. The PhD student working on that topic does not have any published article yet.

Hello! I'm not sure I understood how the increased uncertainty for long term impacts was taken into account. Are these built into the CFs? Or does IW+ address this?

- Cécile BULLE (IMPACT World+) They are considered in a specific impact category "long term impact" which correspond to the remaining impact after 100 years
- Cécile BULLE (IMPACT World+) The increased uncertainty is not integrated as such in the CFs, but the "long term" impact categories can be considered as "interim" impact categories : they are here to highlight the fact that there is still an impact remaining, but we acknowledge the high uncertainty of those models beyond a 100 years time horizon.
- Attendee (CEEA-ACEG) Thank you, that makes sense.

We had issues with IW+ 2.0 and 2.1 in SimaPro with Ecoinvent 3.10 data, specifically in regards to water scarcity. Is this a known issue and is there a fix intended for this in EcoInvent 3.10 and has it been checked with Ecoinvent 3.11?

- Maxime AGEZ (IMPACT World+) What kind of issues did you have? The potential risk I can see is that IW+ files are produced on a specific ecoinvent version. For example IW+ v2.0 was made on ei3.8 which could create some issues with ei3.10. But I would not expect this to happen on water flows specifically. It is more likely to happen on categories like toxicity or ecotoxicity.
- Attendee (Trayak) We are seeing negative values for water scarcity,
- Attendee (ecoinvent) This is a known issue when applying CFs to net freshwater extraction (freshwater extraction minus release to freshwater), which can be due to imbalances or distortions from economic allocation. This is why at ecoinvent we apply CFs to water emissions to air (which often is equivalent to net extraction, but also not perfect). The implementation in software is the choice of the software provider.
- Attendee (ecoinvent) We are working towards fixing net extraction implementation issues...
- Maxime AGEZ (IMPACT World+) The water scarcity indicator AWARE that we use in IW+ is based

on input and output of water extraction/release. Both of which either have a negative or positive CF depending on if it's an extraction or release. Ultimately, it could result in negative results when applied with ecoinvent depending on the inventory quality.

Is there a way to access the CF's, regionalized, through excel or other type of file (but not via LCA software's)?

• Maxime AGEZ (IMPACT World+) - Yes you can consult the dev file of IW+ which regroups all the characterization factors of IW+ in an Excel framework, with the IW+ nomenclature. It is available on Zenodo with all the other versions.

Hi, are you going to re-calculate the global damage on human health and ecosystem quality, with the inventory of man-made emissions and extractions at the global scale for 2000 (just like in your previous version published in 2017), with these updated and new indicators ?

 Maxime AGEZ (IMPACT World+) - We are thinking about recalculating those but it is not in our priorities.

1.2 Chat

What are the main differences between GLAM and IMPACT World+? I ask since GLAM is also publishing a comprehensive method...

• Cécile BULLE (IMPACT World+) - IMPACT World+ combines some of the GLAM indicators (compliant and harmonized with the other IW+ metrics) with the most recent updates of research which have not yet reached consensus.

Is the temporal differentiation only adopted for airborne emissions? Or other compartments too?

- Maxime AGEZ (IMPACT World+) The temporal differentiation regarding the impact category does not depend on the compartment of emission in IW+. In other words, air, water and soil emission are present both in short term and long term impact categories. However, in ecoinvent there is only long term air emissions that are typically provided by the database. Here be careful I am talking about the short term/long term emissions and not short term/long term impact categories.
- Cécile BULLE (IMPACT World+) The criteria to integrate a long term impact category is the duration of the impact. If the impact lasts more than 100 years, a time differentiation is applied.
- Attendee (Karlsruhe Institute of Technology) This is an issue I've come across as well, sometimes different flows are considered for calculations by LCIA methods adopted by different LCA software and LCI databases. However it's an implementation (by the software) issue.
- Elliot MULLER (IMPACT World+) Yes, this is the reason why we recommend using our own versions of the method to be implemented in each software, because they insure a better harmonization of the implementation of the method among the different software and databases.

For toxicity, what is the version of USETOX? EC10/HC 20 or EC50/HC 50?

• Maxime AGEZ (IMPACT World+) - In the v2.1 of IW+ we are still using the Usetox v2 so it is still based on EC50/HC50. In the v2.2 we plan to update to the v3 of Usetox which should then be

using EC10/HC20.

Quick questions: it seems that native CF are not made available (or at least I did not find them). Is there a plan to release those as well? And is there any level between native and country? It seems that in one of the versions I used I could see US states CF (I think the developer version) but in the ecoinvent one I could not see those anymore.

 Maxime AGEZ (IMPACT World+) - Native CFs are available on a dropbox. You can find the link on the IW+ website. For some impact categories, there are regional CFs (as in sub-national CFs). For water indicators and PM (if I remember correctly) we have CFs per US state. The IW+ version that comes with ecoinvent directly is limited and does not include regionalized factors at all. But the versions that comes with SimaPro and openLCA do.

In the Expert version, are Climate change and Water scarcity impacts subtracted from the AoP?

- Maxime AGEZ (IMPACT World+) No they are not.
- Cécile BULLE (IMPACT World+) In the expert version, all the impact categories contributing to the AoP are considered. In the Footprint version, the impact categories contributing to the footprint are removed from the AoP. This is why in the Footprint version, the AoP is called "Residual Human health damages" and "residual Ecosystem quality damages"

1.3 Oral questions

I'm learning to use the methodology and I tried to use the developer version. I downloaded the Excel file. The names of the elementary flows would not match with the names in ecoinvent. Would it be possible to have a mapping file?

Maxime AGEZ (IMPACT World+) – There exists many mappings within IW+ to deal with the different nomenclatures involved. In the SQL source database, you will find a master mapping table (called SI – mapping with elementary flows) that links the nomenclature of the original LCIA model to the IW+ names. For instance, it will link "Ethylbenzene" from the photochemical ozone formation model to "Benzene, ethyl-" which is the name used by IW+. In the code of IW+ there are the mappings to go from the IW+ names to the names adopted by the different LCI software (https://github.com/CIRAIG/IWP_Reborn/tree/master/Data/mappings) where "Benzene, ethyl-" can be called "Ethylbenzene" in ecoinvent/brightway2/openLCA, and "Benzene, ethyl-" in SimaPro.

Why did not you provide also conversions into PDF reg and PDF glo for the endpoint indicators?

Cécile BULLE (IMPACT World+) – This is a very good question. It is very important to understand what PDF.m2.yr versus PDF.yr means. When you are using a PDF.m2.yr unit for damages on Ecosystem Quality, the PDF corresponds to the PDF on the surface that is considered. In other words, 1 PDF.m2.yr is equivalent to making all the species disappear on one m2 for one year. PDF glo and PDF local are regional, they correspond to species disappearing respectively in a global ecosystem (global scale) or in a local ecosystem. Therefore, these units do not mean the same thing. You can make a conversion: it has been done for some IW+ indicators that derive from GLAM (PDF.yr) by considering the scale (global, continental...). It could be done for other impact categories. It is very important to keep in mind that the meaning of these units is not the same.

You said that uncertainty for CFs is available in IMPACT World+. Where to find it and how can I use it?

• Elliot MULLER (IMPACT World+) - Only uncertainty for the aggregation linked to the regionalization of CFs is provided in the files. However, it would be manual work to include this uncertainty in the software. We plan to work on adding uncertainty data to the releases of new versions of IMPACT World+ in the future.

For the ionising radiation indicator, will you use the new indicator by Paulillo in the future?

• Cécile BULLE (IMPACT World+) – First, we have to check the compliance of the Paulillo model with what we have already done. But if it makes sense, why not.