START2SEE
LIFE CYCLE ASSESSMENTS

DEAKIN UNIVERSITY

Should capital goods be included in EPDs?

Rob Rouwette, start2see
Olubukola ‘Bukky’ Tokede, Deakin University

ALCAS conference, 19 July 2023

About start2see

START2SEE
LIFE CYCLE ASSESSMENTS

AFPA – Australian Flexible Pavement Association
BLUESCOPE
BORAL
GUNLAKE CONCRETE
Infrastructure Sustainability Council
REPURPOSE IT®
Humes
enviromesh
Fulton Hogan
ADBRI
Downer – Relationships creating success
Dulux
BGC
InfraBuild

25 years experience in LCA and EPD across the building and construction sector in Australia and Europe

(2014-current: EPD Australasia)

(1999-2006: MRPI)

- First **LCA Certified Professional** in Australia
- First **approved EPD verifier** in Australia and New Zealand

ALCAS – Life Cycle Assessment Certified Professional

EPD® AUSTRALASIA
ENVIRONMENTAL PRODUCT DECLARATION

Content

This is a tale of methodology and standards being out of touch with life cycle inventory data (or vice versa)

What if...

We want to compare the age of the audience?

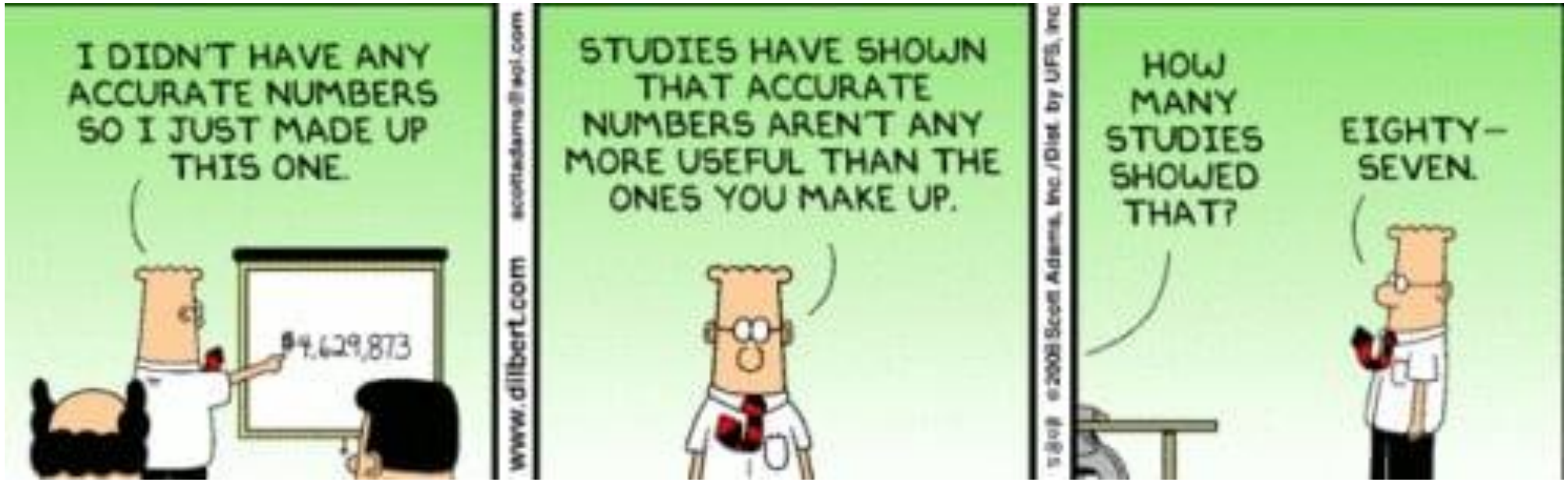
Now add 5 years for every woollen garment you are wearing,

Plus 3 years for every cotton garment

We don't have data on polyester clothing, so nothing to add

Shoes and belts are out of scope

Would this exercise result in a fair and accurate comparison?



Objectives of an EPD

EPDs are arguably the best chance for independently producing LCAs to a consistent and comparable format

Change in PCR requirements regarding capital goods

PCR 2019:14: *Infrastructure related inventory flows that are not directly consumed in the production process* [i.e. non-attributable!] *can be excluded if it is not known to have the potential to cause significant impact.*

(PCR = Product Category Rules)

Back to basics: How are capital goods included in an LCA?

If we are using background (ecoinvent) infrastructure data, then it is necessary that we understand these data.

Type of infrastructure processes:

- Buildings
- Energy infrastructure (plant, distribution network)
- Transport infrastructure (e.g. vehicles, roads)
- Equipment (machinery)

Capital goods in LCA

- We studied 38 building materials and products to better understand how capital goods are covered in ecoinvent

- What we found wasn't very pretty…

- In fairness, the data were never intended to be used for robust comparisons

  Some ecoinvent processes specifically state "**This module should not be used if its relative importance would be high in a certain environmental inventory**"

Capital goods in LCA

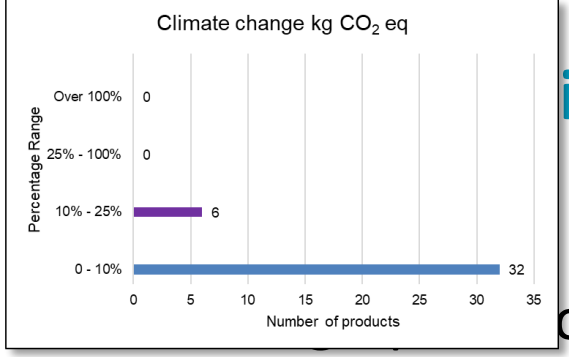
- What we found wasn't very pretty:
  - By definition, capital goods data are highly simplified data based on multiple levels of assumptions (quantification, production throughput, durability)
  - The data are not consistently developed across the various capital goods, creating a random influence at product level
  - Inconsistent implementation across products
  - A key building dataset contains a significant error that can dominate ADPE and has gone unnoticed for 15-20 years

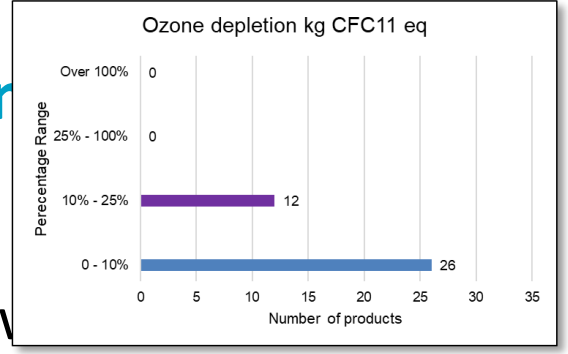
Capital goods in LCA

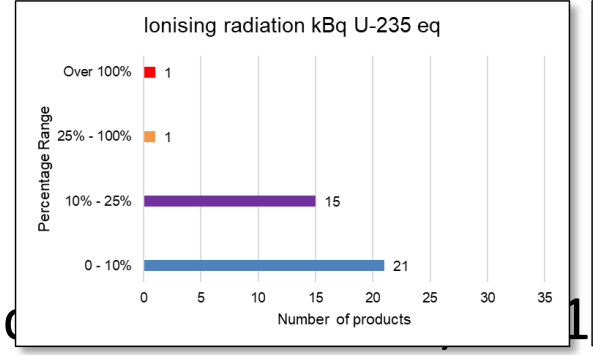
- The scope (which types of capital goods are included) varies between software / databases

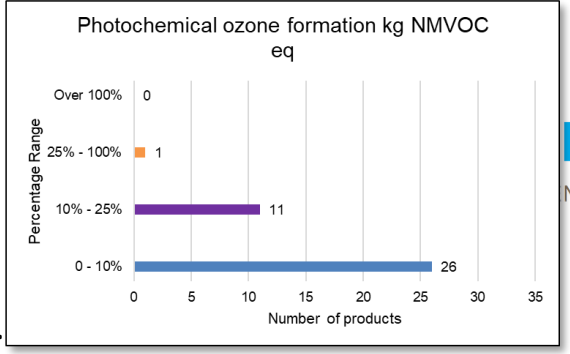
- Very few practitioners navigate this landscape; it is assumed the software / databases provide the solution

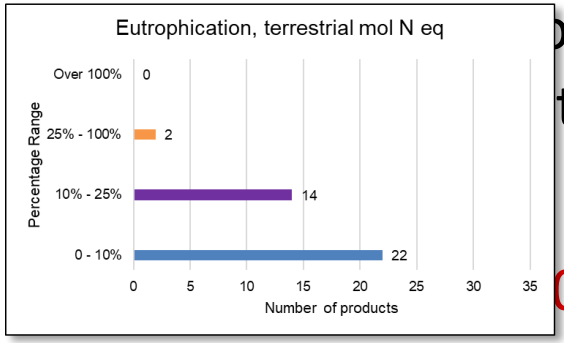
- There are no widely adopted guidelines for practitioners either

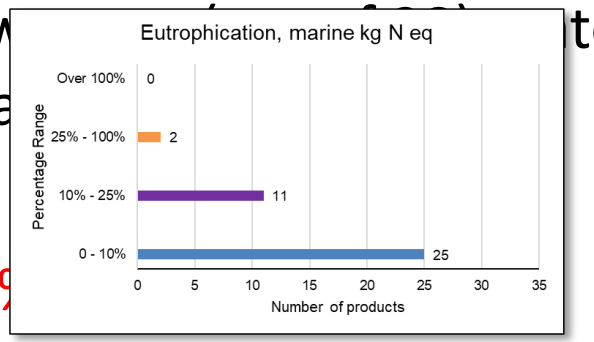

Climate change kg CO_2 eq
Over 100% 0
25% - 100% 0
10% - 25% 6
0 - 10% 32
Percentage Range
0 5 10 15 20 25 30 35
Number of products

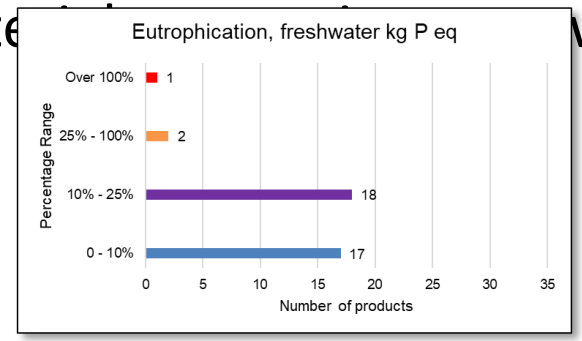

Ozone depletion kg CFC11 eq
Over 100% 0
25% - 100% 0
10% - 25% 12
0 - 10% 26
Perecentage Range
0 5 10 15 20 25 30 35
Number of products

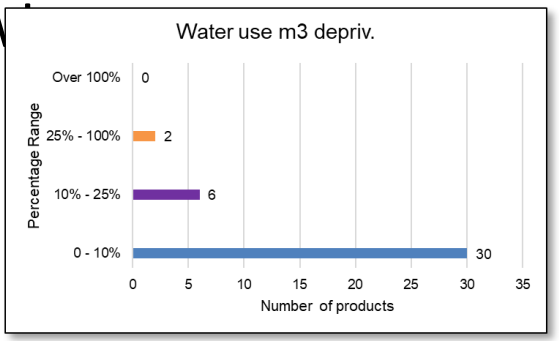

Ionising radiation kBq U-235 eq
Over 100% 1
25% - 100% 1
10% - 25% 15
0 - 10% 21
Percentage Range
0 5 10 15 20 25 30 35
Number of products

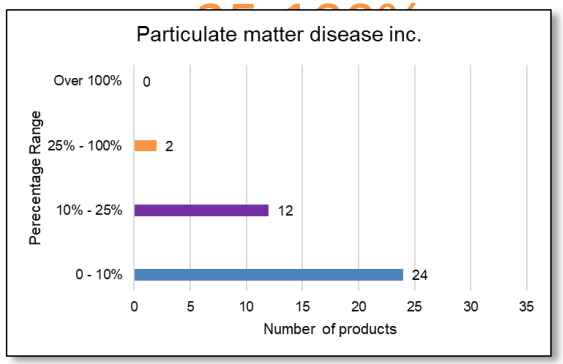

Photochemical ozone formation kg NMVOC eq
Over 100% 0
25% - 100% 1
10% - 25% 11
0 - 10% 26
Percentage Range
0 5 10 15 20 25 30 35
Number of products

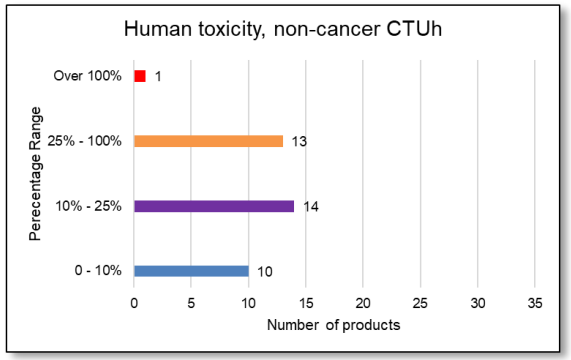

Eutrophication, terrestrial mol N eq
Over 100% 0
25% - 100% 2
10% - 25% 14
0 - 10% 22
Percentage Range
0 5 10 15 20 25 30 35
Number of products

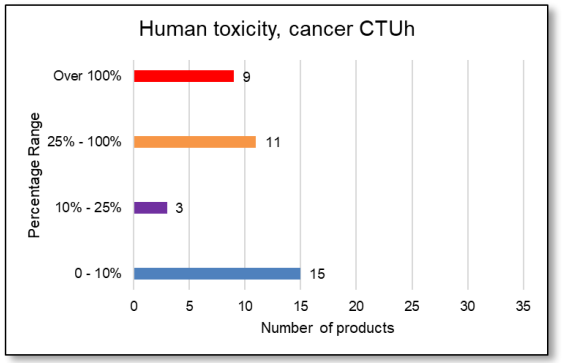

Eutrophication, marine kg N eq
Over 100% 0
25% - 100% 2
10% - 25% 11
0 - 10% 25
Percentage Range
0 5 10 15 20 25 30 35
Number of products

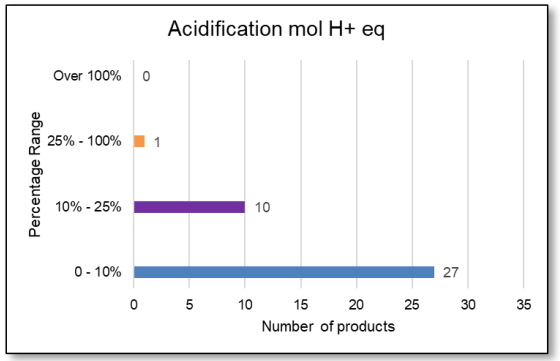

Eutrophication, freshwater kg P eq
Over 100% 1
25% - 100% 2
10% - 25% 18
0 - 10% 17
Percentage Range
0 5 10 15 20 25 30 35
Number of products

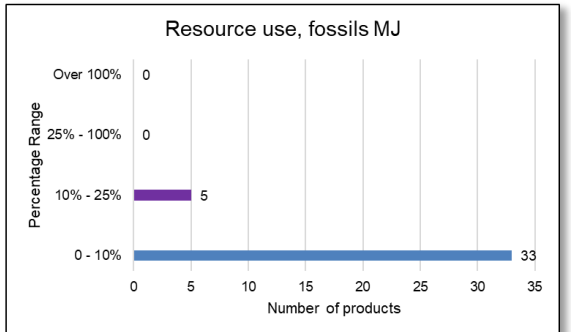

Water use m3 depriv.
Over 100% 0
25% - 100% 2
10% - 25% 6
0 - 10% 30
Percentage Range
0 5 10 15 20 25 30 35
Number of products

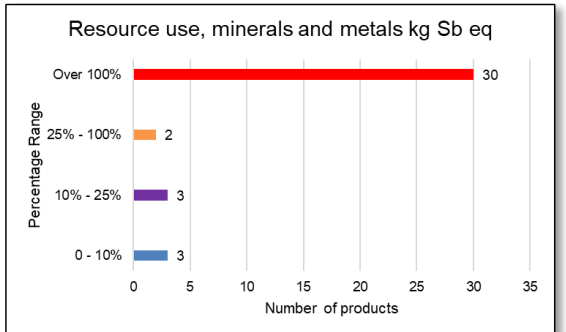

Particulate matter disease inc.
Over 100% 0
25% - 100% 2
10% - 25% 12
0 - 10% 24
Perecentage Range
0 5 10 15 20 25 30 35
Number of products

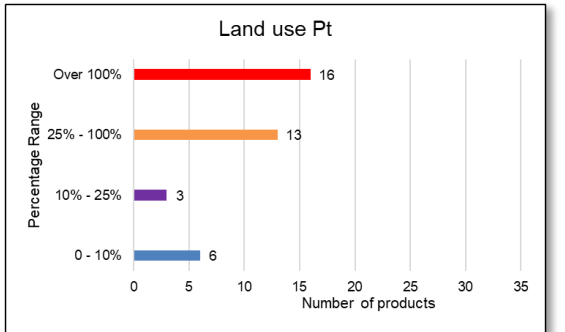

Human toxicity, non-cancer CTUh
Over 100% 1
25% - 100% 13
10% - 25% 14
0 - 10% 10
Perecentage Range
0 5 10 15 20 25 30 35
Number of products

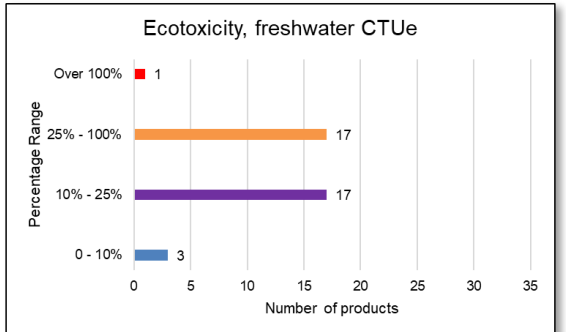

Human toxicity, cancer CTUh
Over 100% 9
25% - 100% 11
10% - 25% 3
0 - 10% 15
Percentage Range
0 5 10 15 20 25 30 35
Number of products


Acidification mol H+ eq
Over 100% 0
25% - 100% 1
10% - 25% 10
0 - 10% 27
Percentage Range
0 5 10 15 20 25 30 35
Number of products

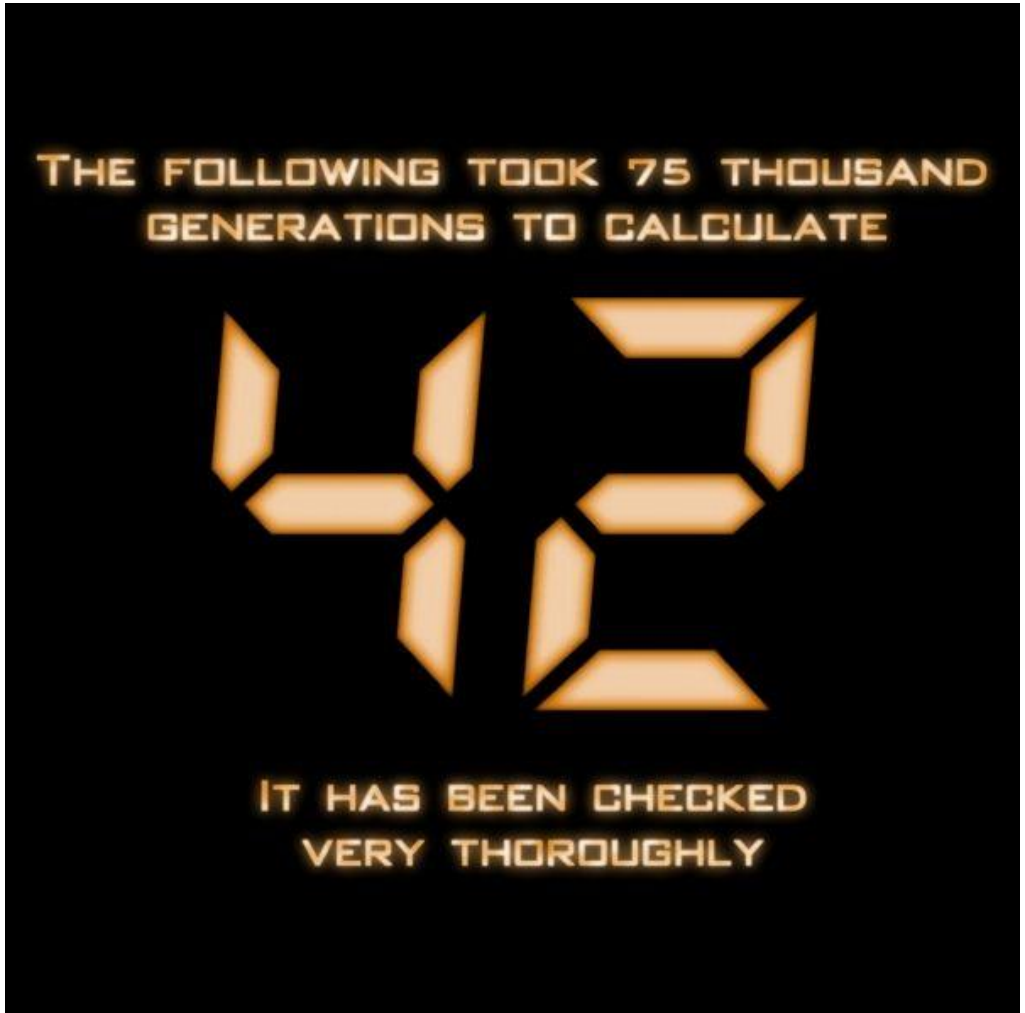

Resource use, fossils MJ
Over 100% 0
25% - 100% 0
10% - 25% 5
0 - 10% 33
Percentage Range
0 5 10 15 20 25 30 35
Number of products


Resource use, minerals and metals kg Sb eq
Over 100% 30
25% - 100% 2
10% - 25% 3
0 - 10% 3
Percentage Range
0 5 10 15 20 25 30 35
Number of products


Land use Pt
Over 100% 16
25% - 100% 13
10% - 25% 3
0 - 10% 6
Percentage Range
0 5 10 15 20 25 30 35
Number of products


Ecotoxicity, freshwater CTUe
Over 100% 1
25% - 100% 17
10% - 25% 17
0 - 10% 3
Percentage Range
0 5 10 15 20 25 30 35
Number of products

EPD results after including capital goods



Objectives of an EPD

DEAKIN UNIVERSITY

START2SEE LIFE CYCLE ASSESSMENTS

EPD®

EPD® MAKING SENSE

Environmental product declarations present relevant and verified environmental information about goods and services from a life cycle perspective.

EPD® ALLOWS YOU TO:

- Fairly compare environmental performance
- Reflect continuous environmental improvement
- Present relevant environmental information

USE IT TO REACH DIFFERENT DECISION MAKERS

The information in an EPD® is objective. Therefore it's the same regardless of whom you want to reach with your EPD® verified product, whether it's product designers, environmental managers or consumers.

COMMUNICATING ENVIRONMENTAL PRODUCT DECLARATIONS (EPD®)

Including capital goods violates ALL of these highlighted principles!

What does inclusion of capital goods mean for robustness/reliability of EPDs?

In summary:

unjustified
- We are adding random non-attributable elements to our inventories

uncertain
- We are not collecting reliable data on any infrastructure processes within the core processes, let alone that we are able to confirm the validity of background processes (other than proving they are not valid)

inconsistent
- We do not have any guidance on if or how LCA practitioners are expected to adjust (background) infrastructure data

high impact
- Adding infrastructure using standard (ecoinvent) data will always have a material impact (>25%) on at least one of the mandatory indicators

inappropriate
- Standard (ecoinvent) data “should not be used if its relative importance would be high in a certain environmental inventory”

irrelevant
- There is no causal relationship (relevancy) between the inventory data and actual supply chain

Conclusion

If we want that:

EPD® MAKING SENSE

Environmental product declarations present relevant and verified environmental information about goods and services from a life cycle perspective.

EPD® ALLOWS YOU TO:

- Fairly compare environmental performance
- Reflect continuous environmental improvement
- Present relevant environmental information

USE IT TO REACH DIFFERENT DECISION MAKERS

The information in an EPD® is objective. Therefore it's the same regardless of whom you want to reach with your EPD® verified product, whether it's product designers, environmental managers or consumers.

…there can be no other conclusion than capital goods need to be excluded until we better understand the issue, our databases contain appropriate data and we are confident that inclusion is credible and adds value to EPDs.

WWW.START2SEE.COM.AU