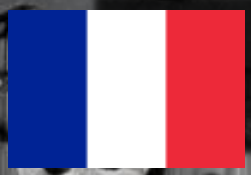
National LCA databases

Status and ways towards interoperability

White paper

Berlin, 9 May 2014



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Acronyms

EMAS - Eco-Management and Audit Scheme
EPD - Environmental Product Declaration
ErP - Energy-related Products
EuP - Energy-using Products
ILCD - International Reference Life Cycle Data System
ISO - International Organization for Standardization
LCA - Life Cycle Assessment
LCI - Life Cycle Inventory
LCIA - Life Cycle Impact Assessment
NGO - Non-Governmental Organization
PCR - Product Category Rules
PEF – Product Environmental Footprint
SCP - Sustainable Consumption and Production
SETAC - Society of Environmental Toxicology and Chemistry
SIP - Sustainable Industrial Policy
SME - Small and Medium Enterprises
UNEP - United Nations Environment Programme

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Executive summary

Policy and industry background

Life Cycle Assessment (LCA) is widely recognised as the most suitable tool for improving the environmental performance of any kind of product or technology. It has the potential to be used in a wide range of policy instruments from environmental labelling to Green Public Procurement (GPP), strategic technology decisions, and monitoring national resource-efficiency. The availability of more, higher quality, interoperable background Life Cycle Inventory (LCI) data is key to the implementation of any public and private life cycle based instruments. Over the past 15 years, an increasing number of countries worldwide have hence developed national LCA databases, complementing or integrating those developed by industry, consultants, and research groups.

Approach and scope of this white paper

A global online survey has been held, inviting all known or suspected national LCA databases projects globally, to characterise in detail their database project. This paper provides an overview of the results of those 15 National LCA database projects that have participated in the survey: the main policy and private drivers behind the database development, the data approach taken, financing mechanisms, management, and achievements as well as technical aspects such as used LCI methods, flow lists and others. The outcome of the survey is reflected against insights gained from many years involvement in national and private LCI database development. Key success factors are derived and recommendations given for developing successful National LCA databases and for the way towards global interoperability of LCI data.

Main findings

The following key factors for the success of National LCA databases are argued to be:

- meeting a dedicated demand, be it policy schemes and/or private initiatives, opposed to an unspecific “LCA database” development
- developing with the “rules-data-review+” triangle approach, i.e. partnering government, industry and independent reviewers
- ensuring full interoperability of the data sets with databases from key trade-partners
- avoiding dependency on one or few actors (experts, LCA database and LCA software developers)
- planning viability of all steps and timings from the beginning and until data continuity beyond first data release
- carefully localizing approaches from other countries, instead of simply adopting them
- building up expertise at government and industry in the country, to ensure the data can actually be used in the country
- working with competitive market mechanisms as incentives for continuously more and better data by all experts in the country
- setting up efficient online access mechanisms, such as online data networks with electronic data access, so users can find the data, integrate it into their software, and use it

Recommendations for interoperability of National LCA databases

The increasingly internationally intertwined supply-chains, necessitate to consider developments beyond the single country: agreed minimum requirements for data set interoperability in terms of common elementary flow lists, core data formats, LCI methods, review and documentation requirements - coordinated among national LCA database developments and major private databases worldwide - are argued to be a key for a longer lasting and wider success.

1 Background[1]

1.1 LCA[2] in policy making

Since about the year 2000, the principle of life cycle thinking has been integrated into an increasing number of policy instruments, globally. These policies either integrate life cycle elements and aspects, or they take the next step and build on a quantitative, LCA-based environmental performance of the products or other focus of the policy. This latter approach allows to quantitatively assessing the environmental performance of the entire life cycle of products, of technology options, and also of policy strategies. It allows to effectively compare alternatives, fully considering their functional or other equivalence.

Critically, LCA helps to avoid an unwanted "shifting of burdens" whereby a reduction of environmental pressures at one point in the life cycle leads to an unwanted increase elsewhere in different locations and in the form of different environmental pressures. LCA helps to identify and avoid situations in which, for example, waste issues are created while improving production technologies, land is degraded is generated while reducing greenhouse gas emissions, or toxic pressures are increased in one country while reducing them in another. It thereby helps to more effectively steer society towards resource-efficient production and consumption.

Recognising these benefits of the approach, life cycle based policies have been developed in a number of countries, some of which are shortly introduced here below:

In Brazil, the modern 2010 Policy for Solid Waste Management (Política Nacional de Resíduos Sólidos, PL 203/1991 (PNRS)) includes a life cycle approach as one of its guiding principles. Moreover, the Roadmap for Industrial Development highlights the need for life cycle management in Brazilian companies.

In China, the key national policies on Energy-using Products, the Waste Electrical and Electronic Equipment Directive and the Restriction of Hazardous Substances are based on life cycle thinking.

Key terms (continued on next page)

- **Life Cycle Assessment (LCA):** "*LCA is a scientific, structured and comprehensive method that is internationally standardised in ISO 14040 and 14044. It quantifies resources consumed and emissions as well as the environmental and health impacts and resource depletion issues that are associated with any specific good or service ("product"). It covers climate change, summer smog, ecotoxicity, human cancer effects, material and energy resource depletion, and so on. Crucially, it allows for direct comparisons of products, technologies and so on based on the quantitative functional performance of the analysed alternatives. LCA captures the full life cycle of the system being analysed: from the extraction of resources, through production, use and recycling, up to the disposal of remaining waste*." [Wolf et al. 2012]
- **LCA data:** "*Sets of quantitative data and descriptive meta data prepared for use in LCA*" (see, ISO 14044 2006, ILCD Handbook 2010 , UNEP 2011). Two main types: "Life Cycle Inventory (LCI) data set" (also called "process data set" and often used synonymous with "LCA data") with quantitative data on individual resources consumed and emissions for a process or product related to a well-defined reference and covering a single process step, parts of a life cycle, or the entire life cycle. "Life Cycle Impact Assessment (LCIA) data set" with quantitative characterization factors for individual resources and emissions. Other widely used supporting data set types are flows, flow properties (also called quantities), unit groups or units, sources, contacts, and accompanying files (e.g. pdf files of method reports, schematic graphics of the life cycle steps and photos of products).

The French Grenelle 2 legislation includes the development of environmental life cycle information for mass market products (ADEME/AFNOR BP X 30-323 methodology), which includes

[1] The first half of this background chapter is a modified and updated extract taken from [Wolf et al., 2012].
[2] Key terms are defined and explained in the two boxes in chapter 1.

several key environmental impacts beyond the carbon footprint (ADEME, 2011). This instrument has been successfully tested in 2011 and will now serve as an important step towards better informing consumers about the overall life cycle impacts of products.

On the EU-level and developed in follow-up of the 2003 Integrated Product Policy Communication COM(2003) 302, several policies use life cycle information, while to a different extent: The Ecodesign Directive 2009/125/EC on energy-related products uses LCA studies in a preparative step, with subsequent identification of product-group specific Implementing Measures that in most cases define mandatory minimum performance requirements that a product must meet to be permitted to be sold in the EU market. The voluntary EU Ecolabel Regulation (EC) 66/2010 on a revised Community ecolabel award and scheme develops criteria based on LCA studies and other information. It allows producers to identify their products as being among the environmentally best-performing ones. The ongoing EU-wide pilot testing of the Product Environmental Footprint (PEF) in a wide range of product groups aims at developing a reproducible instrument for life cycle based, comprehensive and robust environmental consumer information on products (European Commission, 2014).

In Japan, the legislation on Promoting Green Purchasing and the legislation for the Promotion of the Effective Utilization of Resources (the latter also known as "3 R – reduce, reuse and recycle") are key life cycle based policies. The successful Japanese carbon footprint labelling scheme (JEMAI, 2012) with a strong and wide buy-in of industry is another important life cycle based instrument.

In Switzerland, life cycle related legislation includes the application of reduced taxes since 2008 to renewable fuels that demonstrate that they meet minimum requirements in their overall environmental life cycle performance ("Mineralölsteuerverordnung" 641.611 of 20 November 1996, amended to version of 1 July 2008).

In Thailand, the Green Public Procurement (GPP) policy is a major driver for national LCA data development. This is complemented by Thailand's more recent carbon footprint programme (Lohsomboon, 2013).

Key terms (continued)

- **Interoperability (of LCA data):** *"Process data from different developers (e.g. different experts, different databases) can directly be combined in the life cycle of a product as if they were originally coming from the same, consistent LCA database, leading to valid and consistent results*." This interoperability has two main components that both should be met: methodological interoperability and IT interoperability. "Methodological" means that the same, reproducible LCI methods are used (i.e. without any result-relevant choices for the expert), including the same rules on elementary flows and applicable LCIA methods (e.g. regionalization). "IT" means that the data set is available in the same IT format and uses identical objects for shared elementary flows, flow properties, unit groups etc. Some other conventions usually need to be common as well (e.g. on data set naming, on data set cross-referencing, and various data set classification aspects such as product classes). Full interoperability means that data sets can be imported into the same LCA software (provided it has an import interface for the employed data set format) and allows without manual adjustments or flow mappings etc. to combine the data sets in a product life cycle,
- **LCA database:** "Set of methodologically and technically fully or mostly interoperable LCI data sets (and related data set types such as flows, LCIA methods, …) stored in an electronic database" .
- **National LCA database: "***LCA database with authoritative information*". Two subtypes: a) Governmentally (co-)led efforts, b) Efforts without a governmental (co-)lead, but open to all qualified actors in the country to participate at the same rights, under a governance scheme. (Not here belong database projects that receive e.g. governmental (co)funding but without a relevant governmental steering influence and without any governmental formal endorsement of the data sets.)
- **LCA Data Network:** *"Internet-based, electronic network that gives access to LCA data sets of the network via a common interface and/or other electronic access mechanism*." (Other uses of this term do not specify the electronic access to the data or refer simply to coordinated database development efforts by at least three actors.)

In the United States of America, several governmental programmes apply LCA. These include the US Environmental Protection Agency's Environmentally Preferable Purchasing Program, the Renewable Fuel Standard Program, and state-level legislation such as the implementation of the Californian Low Carbon Fuel Standard of 2007.

As already said, LCA is a very powerful instrument to capture many if not most of the potential environmental issues related to products, and hence the basis to effectively improve them. Still, expectations on LCA applications and on the development of LCA databases should not be unrealistic.

Also, in settings with more basic environmental problems, LCA should not divert governmental resources from basic environmental measures e.g. installation of wastewater treatment plants, sanitary landfills, and basic energy-saving measures. LCA can identify (and quantify) such "low hanging fruits" as well, but in some cases it is obvious what is to be done and LCA is surely not a priority in such settings.

1.2 LCA in industry

Long before being taken up by governments, LCA was used by industry, in fact since the late 1980s (Fava, 2006), with first projects starting as far back as the 1970s.

Initially, mostly large multinational corporations in major OECD economies have used LCA in isolated projects. Nowadays, many big companies in many countries worldwide (including e.g. in China, Thailand, …) have in-house experts or expert teams on LCA and the approach is often integrated with product development.

LCA is also being increasingly used at association level, especially in form of database development and sector / product-specific guidance. Efforts are underway to ease the use of LCA for medium and small companies, e.g. by development of product-specific software tools that do not require LCA expertise to produce still robust and valid analysis. The broad range of applications of LCA in industry includes the support to specific product decisions, assessing strategic alternatives with respect to, for example, raw materials (e.g. "bio-based society") and technologies (such as diesel vs. gasoline engines vs. fuel cells), and marketing to industry clients and consumers e.g. via published Environmental Product Declarations (EPD) or the growing set of life cycle based carbon, water and broader environmental footprint labels.

1.3 LCA at NGOs

A number of green and consumer NGOs increasingly make use of life cycle thinking and promote its use for policy decision support. Examples include stakeholder input prepared by the European Environmental Bureau (EEB) as an umbrella organisation of many European green NGOs and the European Consumer's Organisation (BEUC) as an umbrella organisation of many European consumer rights NGOs.

1.4 Need for more, higher quality, and interoperable LCA data

These modern life cycle based policies and instruments and industry applications require support in the form of dedicated methodological guidance and – importantly – of LCA background data for good reproducibility and reliable decision making: LCA is necessarily a data-intensive approach.

Data collection and modelling is hence the main challenge and also the largest cost factor for LCA studies and applications. Since emission and resource consumption data is not only required for a company's own operations but for all relevant activities along its entire supply-chain, the use of so-called background databases is a common approach. Limitations in readily available, interoperable background data of sufficient quality remains a main bottleneck for LCA to develop

its full potential for product groups that require highly specific materials and processes and in countries with limited LCA experience. A good data availability across industry sectors and of high quality exists only for few countries, but availability is increasing tremendously in recent years. A range of different databases are available to meet this demand, while their coverage of different materials, energy carriers, transport and waste services, of parts and complex products and of other services is very diverse, as is the data quality. Similarly, the availability of data that represents the country-specific production in different countries of the world is highly different among the available databases.

A not yet well-resolved issue is the data interoperability: in practice, users are strongly limited in combining data from different sources, given the different LCI methods, flow lists, data formats etc. in use. While increased availability of import/export interfaces to the most widely used data formats ILCD and EcoSpold have been made available in several of the major LCA software tools by now, different elementary flow lists, different LCI methods, and a few other but smaller differences – including on documentation extent and details as well as review requirements - pertain in current practice.

1.5 LCA databases

Considering the information above and judging from published studies and papers and from publicly available information from producing industry, in current practice, industry and governmental studies worldwide depend to a large extent on two major fee-based LCA databases: The GaBi databases developed by PE International since the early 1990s (PE International, 2014), with a predominant use in industry and many users in research, and the ecoinvent database developed by the ecoinvent partner institutes and available since 2003 (ecoinvent centre, 2014), with a wide use in research and a relevant number of users in industry. For an overview of these and of other relevant LCA databases from research, consulting, and industry please see the LCA Resources Directory (European Commission, 2014a), which has (mostly) updated information.

An increasing number of LCI data sets stems from industry associations that typically make available their data for free. Examples – partly with a history of publishing the data since the early 1990s - are the LCI databases developed by the following associations and published (or in preparation for publication) via the European Reference Life Cycle Database ELCD (European Commission, 2014b): Alliance for Beverage Cartons and the Environment (ACE), Association of Plastics Manufacturers (PlasticsEurope), Confederation of European Waste-to-Energy Plants (CEWEP), European Aluminium Association (EAA), European Cement Association (CEMBUREAU), European Confederation of Iron and Steel Industries (EUROFER), European Container Glass Federation (FEVE), European Copper Institute (ECI), European Federation of Corrugated Board Manufacturers (FEFCO), European Fertilizer Manufacturers Association (EFMA), Industrial Minerals Association Europe (IMA-Europe), International Zinc Association (IZA), Lead Development Association International (LDAI), Sustainable Landfill Foundation (SLF), and The Voice of the European Gypsum Industry (EUROGYPSUM) (Wolf et al., 2012). Similarly, in Japan many associations contribute their data to the national database (Ueno, 2011). Moreover, several global associations such as worldsteel and the International Copper Institute (ICI) give access to their data. Many of these data are now integrated in third-party databases and increasingly in National LCA databases, with the common purpose of increasing data interoperability and easing access.

Upcoming, new data sources are companies that make available the LCI data sets that are the basis of Environmental Product Declarations (type III Ecolabels) (ISO, 2006b) of individual products from these companies.

1.6 National LCA databases

The first national LCA databases are available since around the year 2000, with Germany, Switzerland and the U.S. database at NREL being recognised as the first ones. In between, the number of national LCA databases has considerably increased and the amount and diversity of products they cover has increased as well. Some of these databases have had an uninterrupted continuity and growth, some had pauses due to an intermittent lack of funding but are continued, and some have been discontinued.

The key question is what are the factors and lessons learned to make a national LCA database a success. The survey that supports this paper is intended to add recent and valuable information in this respect. While a number of factors are argued to be indispensable to provide the basis to be successful, there can be and effectively there have been very different reasons and constellations why different database projects were more or less successful, some of which are outside of the control of the database coordinators, while other, key factors can be managed to steer a database to lasting success. One needs however to define “success” of a national database: For the purpose of this paper, a successful national LCA database is defined as follows: it provides a relevant number of methodologically and technically/IT-wise consistent data sets, that are maintained and updated beyond the initial database establishment, that sufficiently represent the national production situation, that have a sufficient overall quality to be used for reliable LCA studies, that are actually used for one or more relevant LCA applications in industry or government, and that are recognized by the national government and industry to provide the best available data for the country it represents (compared to alternative data sources).

2 Aim and approach of this white paper

2.1 Aim of this paper

The aim of this paper is three-fold:

- to provide an overview of National LCA databases worldwide – which ones exist, why and how are they have been developed, which content they focus on, how do they deal with interoperability questions, etc. In differences to former database overview publications (particularly Curran et al. 2006), this paper focusses exclusively on National LCA databases and on technical details of relevance for a global database interoperability.
- to derive recommendations for the successful establishment of national LCA databases including their subsequent maintenance and updates, and
- to identify needs for better global interoperability of National LCA data and databases.

2.2 Online survey

In support of the following analysis and recommendations in this paper, an online survey has been held in February 2014 among all known or suspected National LCA database projects worldwide. The results of this survey have been complemented to a limited extent with information from LCA database developers' homepages.

Invitations to participate in the survey have been sent to key expert contacts – preferable directly at the respective database project – of the following countries/regions: Australia, Brazil, Canada, Chile, China, Columbia, Costa Rica, Cuba, Denmark, European Union, France, Germany, Hungary, India, Italy, Japan, Malaysia, Mexico, New Zealand, Peru, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, United States. Furthermore, UNEP was informed about the survey, given related interests at its DTIE unit.

The addressees were encouraged to internally forward the invitation and moreover to inform us about National LCA database projects run by other organizations, including in other countries that were not on our list, leading to three more countries than initially invited.

Relevant aspects for National LCI database developments have been addressed via this survey of 37 questions. The survey is composed of three sections: management including cost aspects, technical requirements as well as accessibility, and international compatibility.

The individual survey outcomes were checked for clarity and consistency as well as plausibility. Where necessary, specific feedback was sent to the participants, asking for clarification, conformation or amendment, as considered appropriate by the participant. Particularly, also the status of being a "National LCA database" in the sense of the definition in the box more above was clarified with the participants. In many cases these follow-up communications have helped to clarify different understanding of questions.

The further analysis and recommendations of this paper draws only to a very limited degree on publicly available information on other known National LCA databases, since it was not possible to obtain most of the detailed information asked for in the survey.

2.3 Selecting "National" databases

Not all contacted invitees participated ultimately in the survey. A few other survey returns had to be excluded from the analysis in this paper, to allow focusing on lessons learned at National LCA databases only, given the specific setting that the participation or endorsement by governmental

bodies implies, or that the necessarily open process requires for de-facto National databases without governmental participation or endorsement.

Not participating projects were the following ones:

- The following countries' projects did not reply to the invitation, including to two reminders sent in the course of the following 4 weeks: Columbia, Costa Rica, Cuba, Germany, Hungary, India, Peru, Portugal, and South Korea. Among these countries, known national LCA databases exist however in Germany, managed by the German EPA (UBA), and in South Korea with potentially more than one national LCA database.
- For the Swedish CPM database – likely developed that time as a private initiative without governmental endorsement or steering influence – the official contact-email was not deliverable and the website appears to be out of maintenance.

In a couple of other cases, contact could be made but follow-up emails and phone-calls did not lead to a participation in the survey, for different reasons. This situation applies to Denmark, Spain, and Switzerland:

- Particularly for Switzerland, with its ecoinvent database – developed initially as "ecoinvent 2000" project with governmental funding and since some years continued independent from the government - lack of time was stated as reason for ultimately not participating in the survey.
- In Denmark, the former EDIP database is apparently not further developed for many years now.
- In Spain, no national database could be identified.

As a next step, and since the focus of this paper are National LCA databases only (see the definition in the box more above), all those databases were excluded[3] from the survey results presentation and analysis in this paper that are currently neither officially governmentally (co-)led or endorsed nor are developed and maintained in a private-led but nation-wide, open process. While non-national LCA databases can often be of high relevance in LCA practice, these databases do not differ from other consultant or research group databases that were not invited / included in this more specific white paper. This exclusion applies to the databases of IKE in China and of the New Zealand LCM Management Centre in New Zealand. The results on these and other non-national database projects are foreseen to be presented in a separate paper.

2.4 Reflection of survey outcome

The results of the survey are reflected against own experiences made and insights gained by the author of this paper during his involvement in and discussions with various National LCA database developments during the past 15 years.

[3] The inclusion and exclusion of database projects as „National LCA database" was done based on best available knowledge and, where feasible, after clarification of the government-endorsement/involvement status with the database contact.

3 Outcome & Discussion

3.1 National LCA database projects participating in the survey

The final set of the 15 surveyed databases that are taken into account as "National LCA databases" and responded to the survey are those of Australia, Brazil, Chile (2 databases), European Union, France, Italy, Japan, Malaysia, Mexico, Quebec (province of Canada), Taiwan, Thailand, and in the United States (2 databases); see Figure 1.

Figure 1 The 15 National LCA databases participating in the survey.

Table 1 shows the websites and the organizations participating in the survey as well as three other, known national LCA databases that did choose to not participate in the survey.

Table 1 National LCA databases and organisations filling in the survey, plus known National LCA databases that did not participate in the survey.

Country / region	Web-address of national database project	Organisation name	Organisation type	Role in database project
Australia	http://auslci.com.au	Australian Life Cycle Assessment Society	NGO	Developer and manager
Brazil	www.acv.ibict.org	University of Brasilia	Research	Coordinator
Chile 1	-	CIMM and University of Concepción	Governmental / Private	Coordinator
Chile 2	www.consorcioporlasustentabilidad.cl	Fundación Chile	Non-profit, public-private	Technical coordinator
France	http://www.base-impacts.ademe.fr	ADEME	Governmental body	Coordinator
Europe	http://eplca.jrc.ec.europa.eu/ELCD3/	European Commission, JRC	Governmental body	Coordinator

Italy	http://lci-ilcd.bologna.enea.it:8080/Node/	ENEA	Governmental body (research centre)	Technical and methodolo-gical support.
Japan	http://lca-forum.org/	Life cycle assessment society of Japan	Not-for-profit organization	Coordinator
Malaysia	http://mylcid.sirim.my	SIRIM	Government-owned company reporting to Ministry of Science, Technology and Innovation	Initiator and host of database
Mexico	http://centroacv.no-ip.org:8088/MexicaniuhEE (under construction)	Center for LCA and Sustainable Design	Private research	Coordinator
Quebec (province of Canada)	http://www.ciraig.org/en/bd-icv_qc.php	CIRAIG	Academic (research center)	Developer
Taiwan	http://cfc.epa.gov.tw/CIT_Beta/CIT_UI/Fmodule/News.aspx	Industrial Technology Research Institute of Taiwan, R.O.C	Non-profit R&D organization	Assistant to Taiwan EPA
Thailand	www.lcidatabase.net	MTEC (National Metal and Materials Technology Center)	Governmental body	Coordinator
United States of America 1	http://www.nrel.gov/lci/	National Renewable Energy Laboratory	Government funded research	Coordinator, owner and manager of the database
United States of America 2	www.lcacommons.gov	United States Department of Agriculture-National Agricultural Library	Governmental body	Coordinator
Not participating in this survey:				
Germany	www.probas.umweltbundesamt.de/php/index.php	Federal Environment Agency - Germany	Governmental body	Coordinator
Korea	http://www.kncpc.re.kr/eng/topics/Lci.asp	Korea Institute of Industrial Technology and Ministry of Environment	Governmental body	Coordinator
Switzerland	www.ecoinvent.ch	ecoinvent Centre	Not-for-profit organisation	Coordinator

While not being an explicit question in the survey, the analysis has shown that all National LCA databases apply a process-based modelling approach[4].

3.2 Results of the survey and discussion

Question 1 (Q1): (Contact information) and Q2: (Declaration and agreement with use of replies): Skipped from results summary.

Q3: Three sub-questions on management, ownership, and number of full-time staff-equivalents

See Fig. 1.

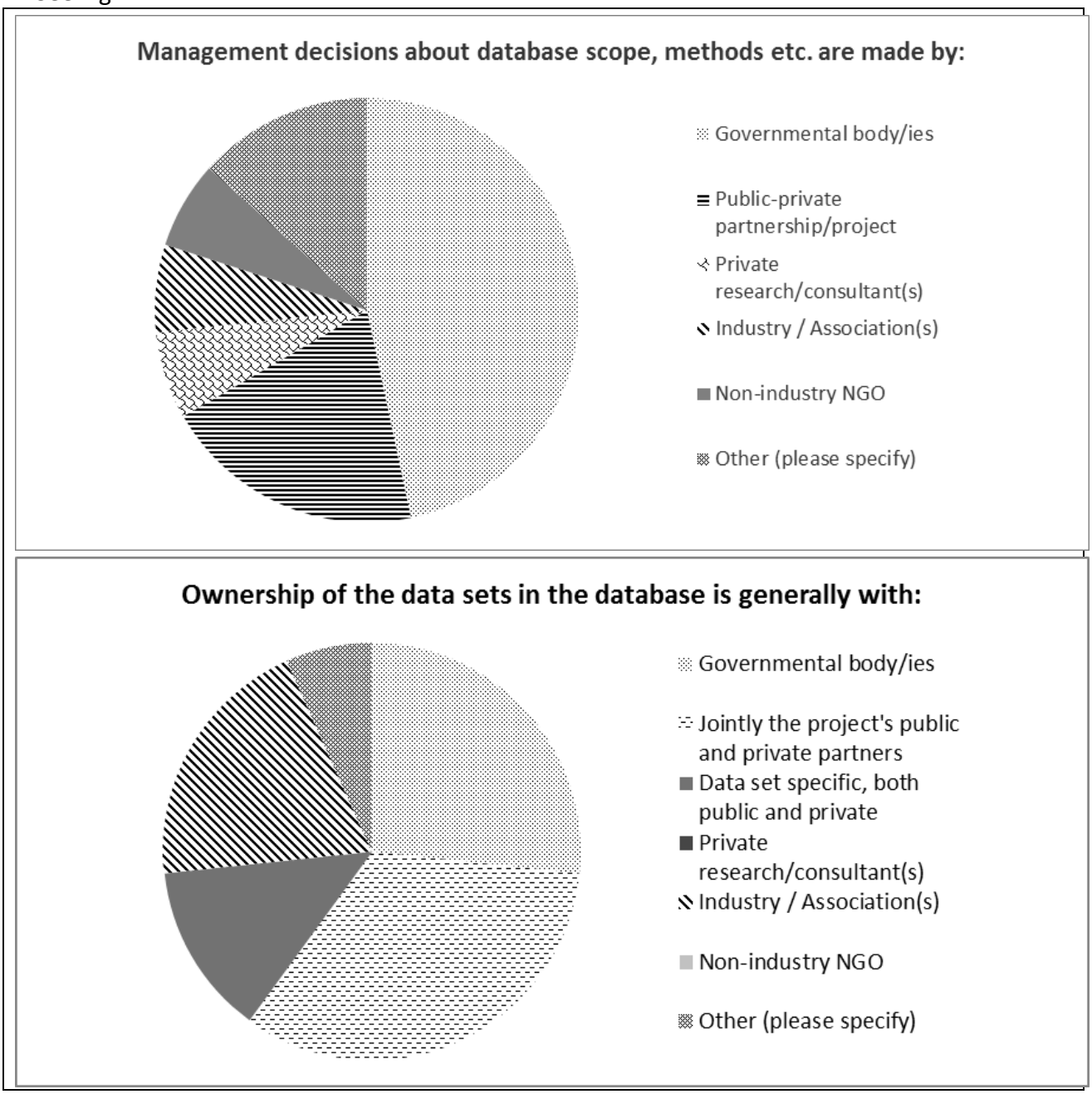

Figure 2 Q3: Sub-questions a and b on management of the database (top) and ownership of the data sets (bottom). Responses.

[4] It was not fully clear whether in single cases EEIO data is used to fill small data gaps in the background system.

While almost half of the 15 National databases are managed by governmental bodies, the slight majority is managed in different public/private or fully private constellations.

Ownership of the data sets in the database is even more heterogeneous, with government solemnly owning the data in about 1/4 of the cases. The reason for this difference is in several cases that data sets from partners, foremost national industry, are published, keeping ownership and hence responsibility and control with these non-governmental owners.

Q3, sub-question c: "Number of overall full-time equivalent staff working this year on the database including contractors and data contributors": most respondents replied "3 to 10" or "1 to 3", but 33% of the database require either very little staff ("1 or less") or many more ("20 to 40" and even "above 40"). There are several reasons that national database have a very different number of full time equivalent personnel working. These include foremost different levels of funding and hence data scope, number of data sets, and current activity levels, as well as different levels of understanding and experience in LCA.

Q4: "How is the coordination and management of the database composed and structured?"

Skipped here due to largely incomplete, text information.

Q5: "What was the development timeline of the database?"

The typical duration from start to first full release is several years. Less time (e.g. 2 years) was required in case of full funding and access to data e.g. at industry associations and/or consultants.

Q6 and Q7: Questions on direct applications (uses) and indirect applications (drivers) for the national LCA database

See Fig. 2.

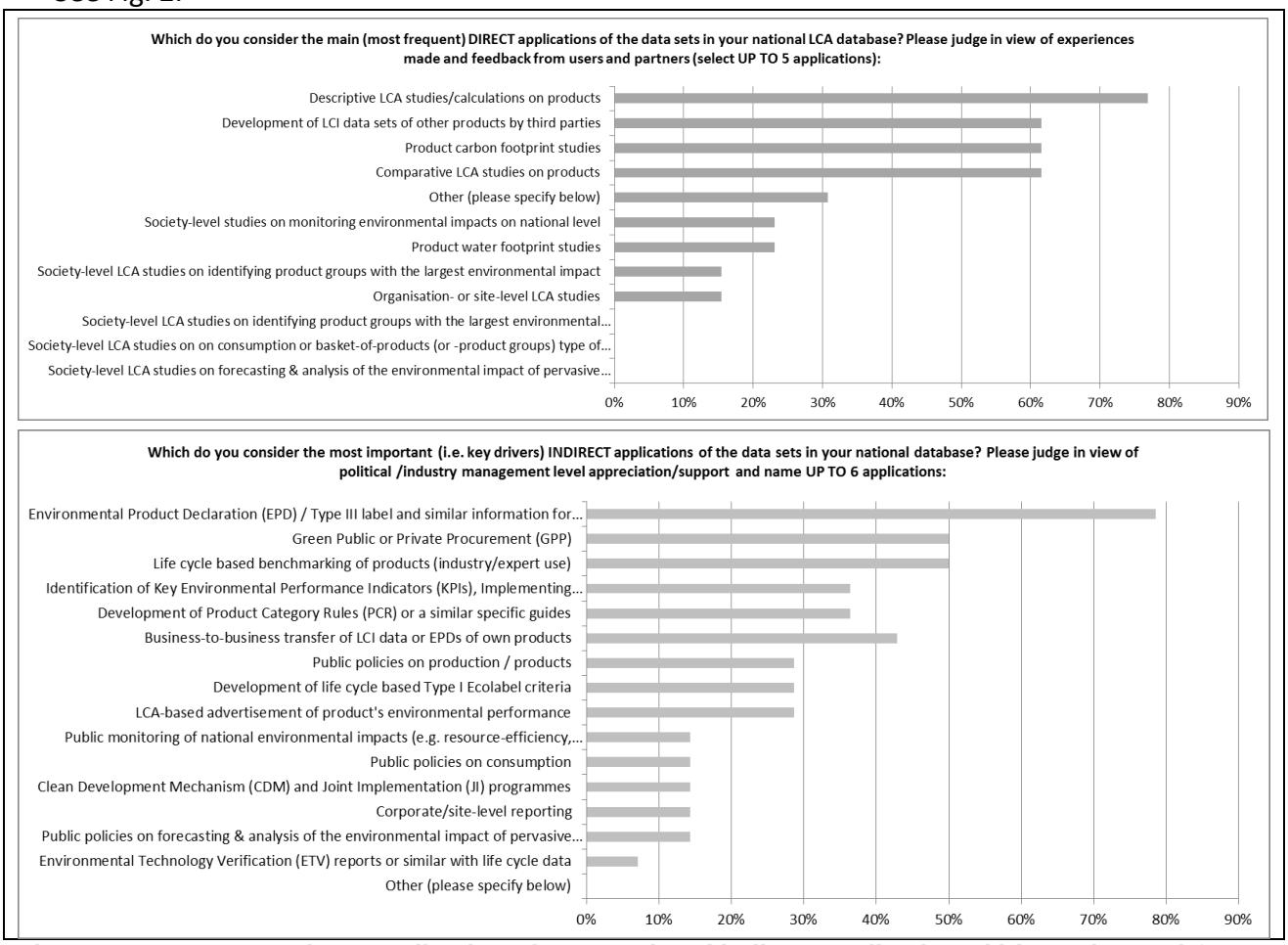

Figure 3 Q6, Q7: Direct applications (uses, top) and indirect applications (drivers, bottom) for the national LCA database. Responses.

Figure 2 shows that a wide range of LCA applications is targeted with National LCA databases, mostly the "classical" product applications of descriptive and comparative LCA studies, and carbon labelling, as well as providing a common background database for the development of data sets of more complex products by users.

A wide range of secondary applications ("drivers") has been identified that are understood to make use of these direct applications, mostly again product-related, with type III labels and similar uses, GPP, and product benchmarking being the three most frequently named ones. However, more recently developed and less widely known applications were also repeatedly named, e.g. monitoring national environmental impacts and consumption-based public policies.

Q8: "Which are the main types of actors that are meant to use the data sets?": Skipped because of limited value: limitation of possible answers to maximum of three actors meant that national users were named first.

Q9: Review requirements

See Fig. 3.

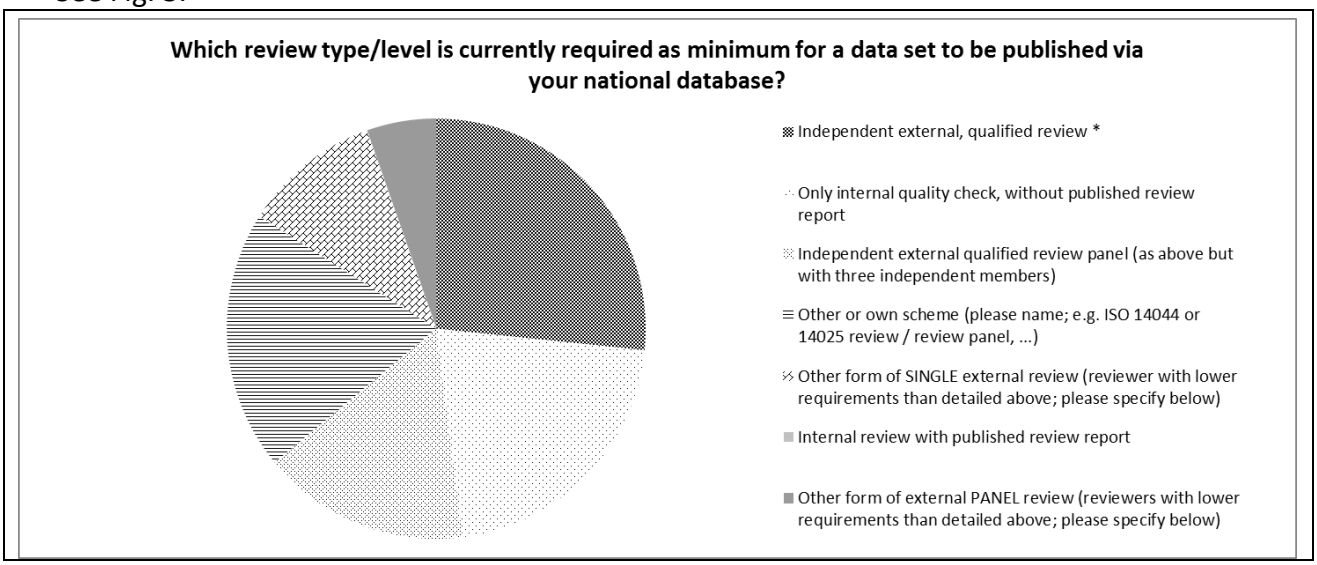

Figure 4 Q9 Minimum review type/level for data sets. Responses.

Minimum requirements for quality assurance differ widely among the survey National LCA databases, with independent external, qualified reviews (by a single reviewer or in some cases by a panel) being the most common form, jointly for half of the databases. Still, different minimum review requirements and sometimes only internal quality checks are applied in many cases.

Lower or less well specified review requirements can be expected to reduce acceptance of those data sets in the country and even more so abroad in many cases.

Q10: "What was/is the approximate share of costs to the initial database establishment?"

See Fig. 4.

Main cost drivers are staff costs at the database project partners (40%; averaged by number of responding database project, calculated independently of number of data sets). External fees for data development make up on average another 18%, while it is naturally higher for those databases that actually follow this approach. Other relevant components around 10% each are external software development costs (e.g. for database online publication), external method and general consulting costs, as well as other costs incl. marketing, travel etc.

Interestingly, cost factors that are much discussed in the LCA community are rather subordinate: LCA software license fees (6%) and life cycle/raw data fees (2 %). Cost savings lay

hence in a more efficient workflow, and in working with experienced staff (since efficiency in LCA is very much dependent on experience).

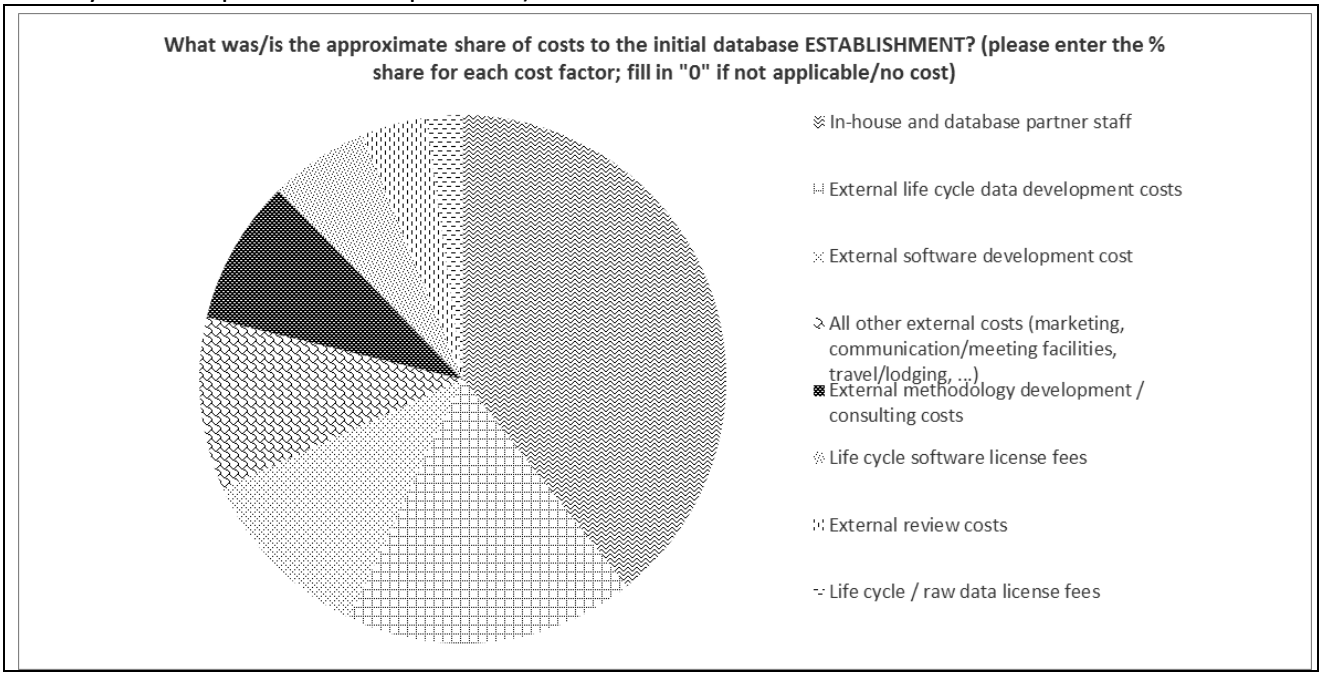

Figure 5 Q10: Cost components for initial database establishment. Responses.

Average cost for external review was also low (4%), while this partly influenced by those databases that do not run an external review.

Q11: "User cost/fee for the majority of LCI data sets in the national database?"

2/3 of the databases provide the majority of data sets "Free of charge for all users/uses". Several others however charge a fee to some or all user types, as mechanism to (co)finance the continuity of the database. Some databases give access to most of the data only to the data providing industry (associations), i.e. serve as inter-industry data managers.

Q12: "What is the financing mechanism for developing updated/additional data sets?"

Almost 50% replied "Predominantly by in-house governmental budget", but a wide combination of other financing solutions can be found, often by data providing industry but also by fees for data access (see previous question), third-party project funding, or private organisations' in-house budgets. Obviously, the available financing source often involves specific requirements that may or may not benefit other aspects of the resulting database including how well they reflect national production, options for database continuity, and other aspects.

Q13: "What is the financing mechanism for managing database maintenance/updates (excluding data set development; see previous question)?"

Similar answers were made as for question 12, with still 33% using "Predominantly by in-house governmental budget", but with a shift to more financing by private in-house budget and data use fees.

Q14: Data sources

See Fig. 5.

Averaging across the national databases (independent of the specific number of data sets in each), almost half of the data values in the data sets (in terms of the approximate contribution to the environmental impact result of the data on average) stems from the national industry, potentially ensuring the best possible data.

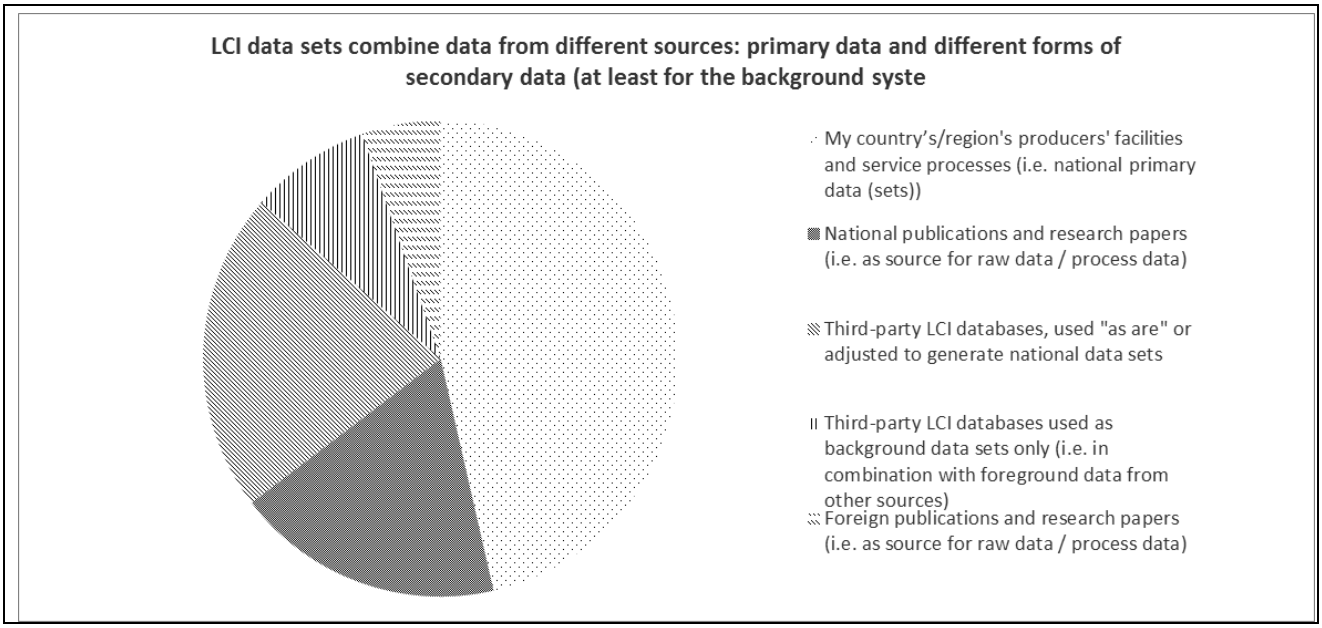

Figure 6 Q14: Data sources. Responses.

However, 20% of the data was estimated by the database projects to stem from third-party databases, used directly or after some adjustment to represent national data, and 5% from foreign publications and research papers. Databases that follow this approach can be expected to obtain less accurate data than using primary industry data (Makishi Colodel, 2010).

On average, 17% of the data is information from national publications and research papers, hence with the risk of database projects that focus on this approach to result in data that somewhat lag behind the current industrial processes and practice and often lack process-specific emissions, hence are less complete in the environmental profile.

Q15: "What is - roughly - the age of the national data sets in your database? Please give as the year which the LCI data sets actually represent (i.e. NOT year of calculation, or publication of literature sources in case of literature/research based data)"

The average age of the data content (averaged again arithmetically across the number of databases) is 5 to 6 years, while this includes some databases that currently have or recently had no funding. It can be expected that the data in a new release of a typical National LCA database has an average age of 2 years (provided all data has actually been updated and industry data was available). This means that for such industry-data based National databases that the large majority of industrial products the data sets well represent them, considering the generally less fast technological progress and changes in the background data.

Q16: "Which principle LCI methodology do you apply? (If you publish variants of all data sets with different modelling, please select all applicable variants)"

The principle LCI methodology is always attributional modelling[5], and hence meets most LCA applications' practical needs, considering moreover that attributional data is considered to form the suitable background data source also for most of the background system in consequential studies (European Commission, 2010a).

The more specific approaches employed for solving multifunctionality are more heterogeneous however: about 55% of the databases prefer allocation over substitution, 27% use a systematic combination of these two approaches, only 9% give – in line with ISO 14044 – preference to

[5] The ecoinvent database, that did not participate in the survey, provides as one its current data variants also consequentially modelled data sets.

substitution over allocation, and for another 9% the approach is decided case-by-case. The reasons for this heterogeneity already on this general LCI method level are understood to be historical or based on experts preferences, since the databases typically aim at serving the same kind of LCA studies. While documentation of the specifically applied approach in a data set's meta data (see also Q17 and Q18) can help users to identify methodologically interoperable data sets, the various practices in place lower the number of actually interoperable data sets considerable: this heterogeneous practice splits the available data into separate, methodologically incompatible groups of data sets that cannot be combined with each other in a life cycle model. Agreeing on a total of two or three LCI method approaches, tailored to the intended kind of application, should much improve the amount of compatible data (compare also European Commission, 2010a).

Q17 and Q 18: Questions on the inner database consistency and applied methods / standards / schemes

See Fig. 6.

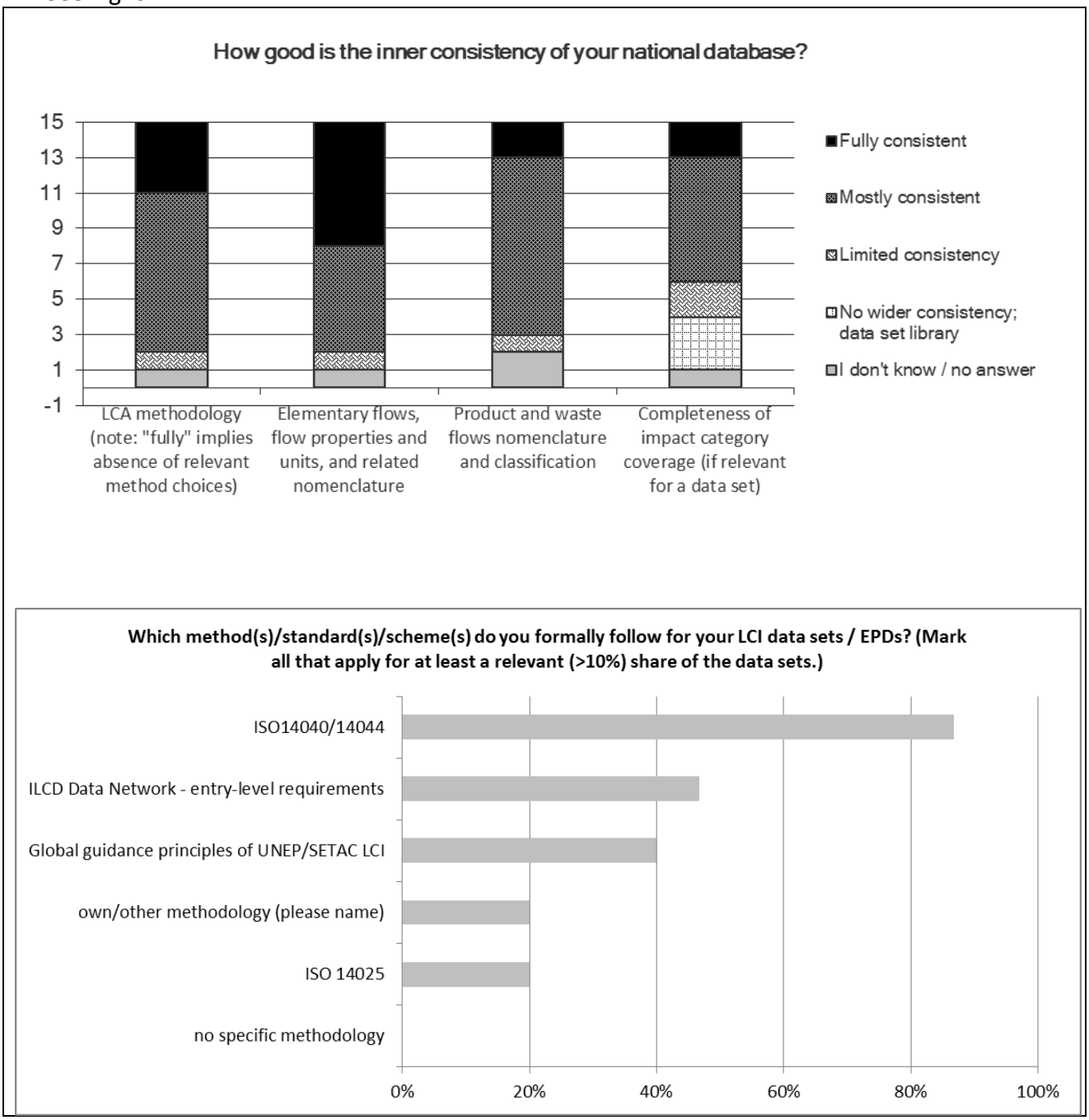

Figure 7 Q17, Q18: Inner database consistency and applied methods / standards / schemes. Responses.

The large majority of national LCA databases state that the data sets are mostly or even fully consistent (Q17). However, the methodological flexibility that the widely employed methods/standards allow (see Q18) make clear, that "full consistency" (i.e. the absence of result-relevant method choices, such as on allocation, among many others) is not actually achievable. More strict method standards or guides that would ensure an actual full methodological consistency were not named by the surveyed database projects. Hence, even within the same database, some or many data sets may be methodologically relevantly inconsistent, depending on the individual expert who has modelled them. This will limit also the future interoperability across national LCA databases.

Unit process databases face this problem to a lower degree, particularly if published as multiproduct data sets. Still, differences in data collection methods and some modelling choices on unit process level lead to limited interoperability also for unit process data sets, unless sufficiently strict method guides are put in place.

One option, actually employed in some databases, is to document the specific method approach or wider compliance systems in each data set in a way that groups of interoperable data sets can be automatically filtered; the ILCD format (European Commission, 2008) provides this function.

Efforts such as the ILCD Handbook (European Commission, 2010) and the PEF guide (European Commission, 2014) in the EU are examples of guides that were made in policy context to achieve full methodological consistency within and across future national LCA databases, with the often-named "ILCD Data Network – entry-level" compliance presenting an easier-to-achieve interim step that requires using common elementary flows, data format, documentation extent and review.

Q19 and Q20: "Roughly how many data sets for your country scope (production, consumption, or both) do you currently make available in the database?"[6]

The typical first, full version of a national database has data sets for a few hundred distinct raw materials, engineering materials, transport and waste services, energy carriers, (sometimes) complex products and other services and processes. Materials and raw materials typically make up around 2/3 of these data sets by number. Some National LCA databases however focus – at least initially - on certain sectors only. This is likely due to national sector-specific drivers (e.g. labels, business-to-business data demand), budget constraints, and limited raw data accessibility.

Depending on the specific function foreseen for a database in the country (e.g. be a seed and common data basis for basic goods and services and enable other data developers to develop complementary data, or provide the sole all-encompassing database), the increase in the number of data sets with time can be more or less extensive, entailing also considerable differences in future costs.

Q21: "Roughly how many data sets for YOUR country scope (production, consumption, or both) will you make available in the database at the next FULL release?"

One single case responded the confirmed number of 20000 data sets, rendering the average meaningless. Generally, a moderate increase in number of data sets was aimed at.

Q22: "Roughly how many data sets for other countries/regions and country-unspecific data sets do you currently make available in the database?"

About half of the national LCA databases also contain data sets that represent production abroad. That points to the demand for data from foreign suppliers of materials, energy and

[6] "In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once)."

products, while data from those other nations is either not available or is not interoperable. This clearly points to work towards interoperability, to avoid that foreign national databases compete with those of other nations, since providing data on the nation's industries' products should arguably be done by the nation in question and not by other nations.

Q23: "Number of data sets of different types in your database. Please give rough numbers; enter "0" if none"

About 40% of the national LCA databases provide exclusively or predominantly fully or partly aggregated data sets, another 20% exclusively or predominantly unit process data sets, the other databases have a combination of unit process and aggregated data sets, and one database provides exclusively LCIA results.

As main reasons for publishing aggregated data sets, confidentiality concerns of the data-providing industry can be assumed: industry fears exposure of technological know-how (and indirectly of their production cost structure) if unit process data sets would be published, while this is not always the case. Other reasons could be the easier usability of aggregated data but also interests to avoid that unit process data is modified by the users into many versions that do not anymore reflect production reality, with the resulting studies being communicated as "using LCI data from the National database X".

The other extreme – publishing exclusively LCIA results – is understood to allow reducing data license costs and improves the ease of use and full reproducibility of results. This very limited transparency will however likely cause opposition from scientists and some stakeholders. Such an approach might still serve the need, but requires an especially strong and reliable review of all underlying data, models, and aggregation as well as characterisation steps.

Q24: "Number of generic, specific, etc. data set types that you publish via your database"

About half of the databases predominantly provide generic data sets (but typically not exclusively), and each about 20% provide average data sets or a combination of generic and average data sets. One database provides predominantly producer-specific data sets.

The high share of generic data indicates that a deeper involvement of national industries is still to be achieved, to increase the share of typically better representative average data.

Q25: "Impact coverage – please select all impact categories that the inventory of the wide majority (i.e. > 80%) of your data sets covers well (if the respective impact is relevant for the individual data set)"

All databases cover Climate change impacts. 80 to 90% of the databases still cover in addition Acidification, Eutrophication as well as Energy and material resource depletion. At least 65% cover the whole range of these impacts: Climate change, Energy resource depletion, Material resource depletion, Acidification, Eutrophication, Photochemical ozone formation / summer smog, Ozone depletion, Land use, Particulate matter / respiratory inorganics, Human toxicity, Ecotoxicity, Water resource depletion. Only half of the database also state that they include emissions relevant for Ionising radiation impacts.

Depending on impact categories considered in different policy and private schemes in different nations, the limitations in coverage in a relevant number of databases are understood to limit the interoperability of the respective databases. A better coverage of impact categories would be therefore beneficial.

Q26: Elementary flow lists

47% of the National LCA databases use the elementary flow lists of ecoinvent, 40% ILCD. In several cases, databases use both ecoinvent and ILCD flow lists. Moreover, many databases use own or unconsolidated flow lists.

This means that the data sets are not interoperable on this basic level, since manual or script-based conversion or mapping is a prohibitive effort for potential data users. Also, available converter tools and mapping functions in LCA software are currently not able to correctly map at least between the named two main flow lists. Until a common elementary flow list is widely agreed upon, data sets are practically in-interoperable on this key, basic level, although the flow lists often contain principally compatible information.

Q27: Connection with impact assessment methods

See Fig. 7.

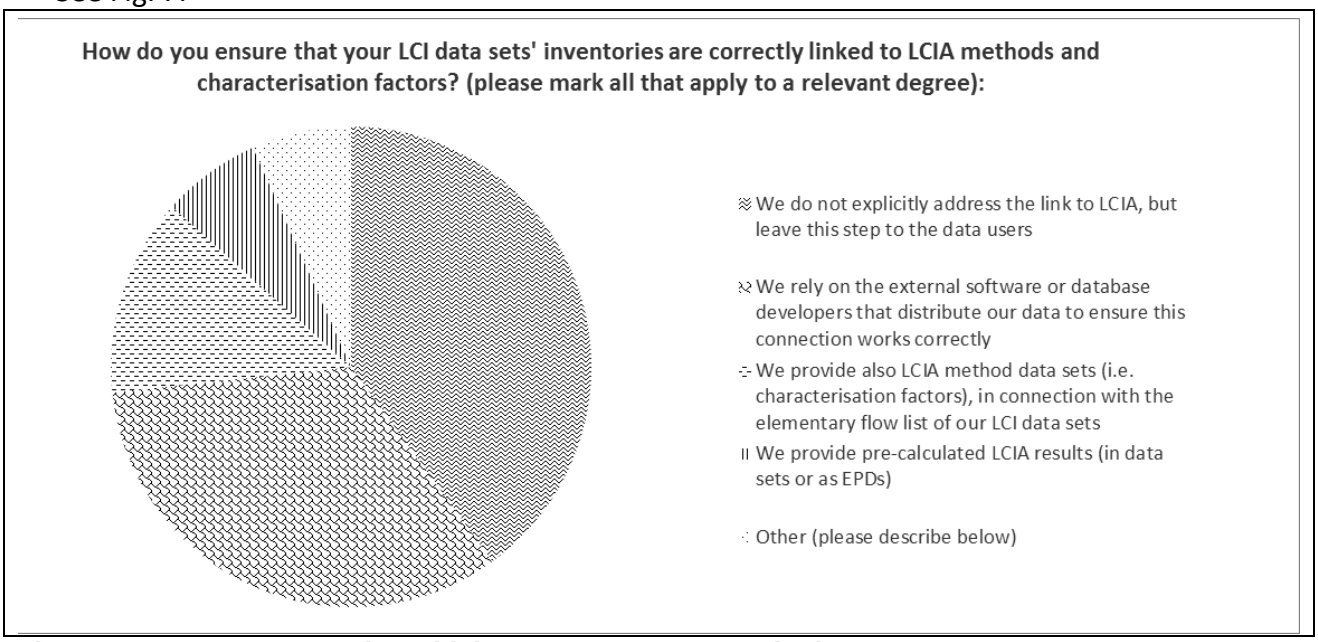

Figure 8 Q27: Connection with impact assessment methods. Responses.

The elementary flow list situation contributes apparently to another problem: the connection of the inventory to the impact assessment: 40% of the databases leave this step to the data users, what means a very high manual effort with risks of relevant errors (unless ILCD or ecoinvent flow lists are properly used and without additional elementary flows, as in some of the above cases).

One in three databases relies on third-party software and database providers that distribute their National LCA database to ensure that the connection of the inventory to the impact assessment works correctly. However, due to different elementary flow lists and mapping problems, the very same LCI data sets often result in somewhat different LCIA results depending on the specific LCA software used.

In sum, the problem boils down to the lack of using a common, comprehensive elementary flow list with the LCIA methods being connected to the flows.

Q28: "Which extent of data set specific documentation do you provide (i.e. next to method and other general reports)?"

2/3 of the databases provide "comprehensive documentation in the data set but no or short external report" and another 20% provide in addition a comprehensive external report. This is surely an encouraging result, given that general LCA databases 10 years ago had no or very little information provided inside the data set and often also no external report was available. Still, it can be judged from checking some of the data sets, that the scope of what is actually reported is still somewhat different and also differences in the provided detail of information will often lead to ineligibility of data sets from other databases with less (or different) documentation requirements.

Q29: "In which language(s) is/are the majority of the data sets accessible/available?"

With three exceptions, all databases offer an English "Database access/interface language(s)" and English "Core information (i.e. data set name, country/region, flow names, units) language(s)". That is believed to be an important step to global usability of the data sets. In several cases, the data is available also in the national language to ease the data use e.g. in national medium and smaller companies, often using the full multi-language capabilities of e.g. the ILCD data format.

Q30: Data set format

See Fig. 8.

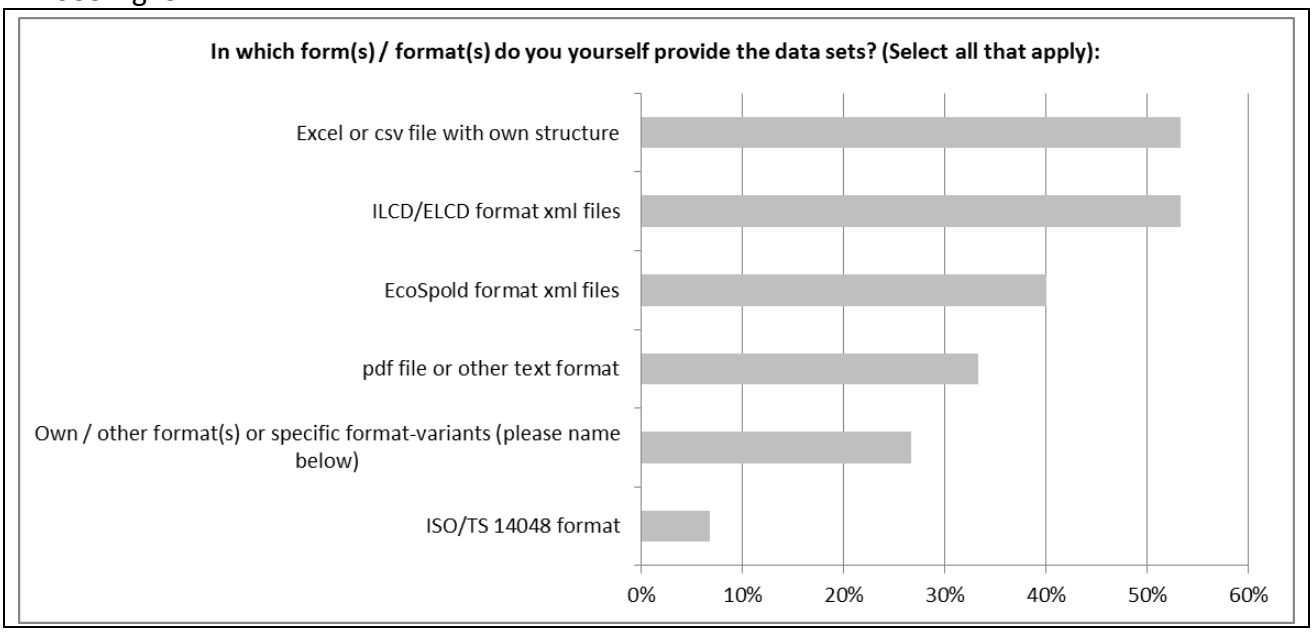

Figure 9 Q30: Data set format. Responses.

A similar problem as discussed on Q26 (elementary flow list) is caused by the different data formats in use: 53% use the ILCD format and 40% EcoSpold (v. 1 or 2). Format conversion between these two main formats using available converters leads to loss in at least some information. Only using a common core data set format will allow users to combine data from different sources (provided they are interoperable also in the LCI methods, elementary flows and other aspects). The ILCD format is the main candidate to form such a core format, as it was developed and designed to serve as exchange format.

Other databases use their own formats or Excel sheets and/or pdf files, what effectively means that interoperability of these data sets and their documentation is especially limited.

Q31: Data access

Data access is predominantly still given via a database access point on the National LCA project's homepage, i.e. requires manual download and import into LCA software (provided the interface exists).

However, so far a quarter of the National databases have already a modern online-database access, typically with an API (Application Progamming Interface) via which also LCA software can in principle directly access the data. In most of these cases, the soda4LCA software is used that is also used for the online ILCD Life Cycle Data Network. Coordinating database development via networking (be it via online networks or organisational networks) is a general tendency.

Q32, Q33: ILCD Life Cycle Data Network

60% of all survey participants know this new ILCD Life Cycle Data Network (also named LCDN) and 33% do publish or consider to publish their data via this newly launched data network (likely

in addition to other access forms on their homepages). Another 40% is not sure whether or not to use this option; 25% did not answer this question.

Q34, Q35: Data availability

The answers on the data availability on products and processes from the own country and from main trade partner countries that deliver goods to the country in question show a very heterogeneous picture: Most respondents judged the situation either still sufficient ("to start doing first and mostly valid LCA studies"), or even fair ("to do mostly valid LCA studies on at least a few product groups"). Only one respondent of the eleven that stated an opinion, judged the situation good, none as very good. Two respondents judged the situation however as poor or very poor.

The outcome on the quality of the available data was very similar, with a higher share of the extreme answers good / very good and poor. Judging from follow-up email exchanges with the participants, very different reasons lead to this heterogeneous outcome, ranging from actual differences in the situation to different expectations on data availability and quality.

Q36: Characteristics a data set must meet to be eligible for publication in the national database.

See Fig. 9.

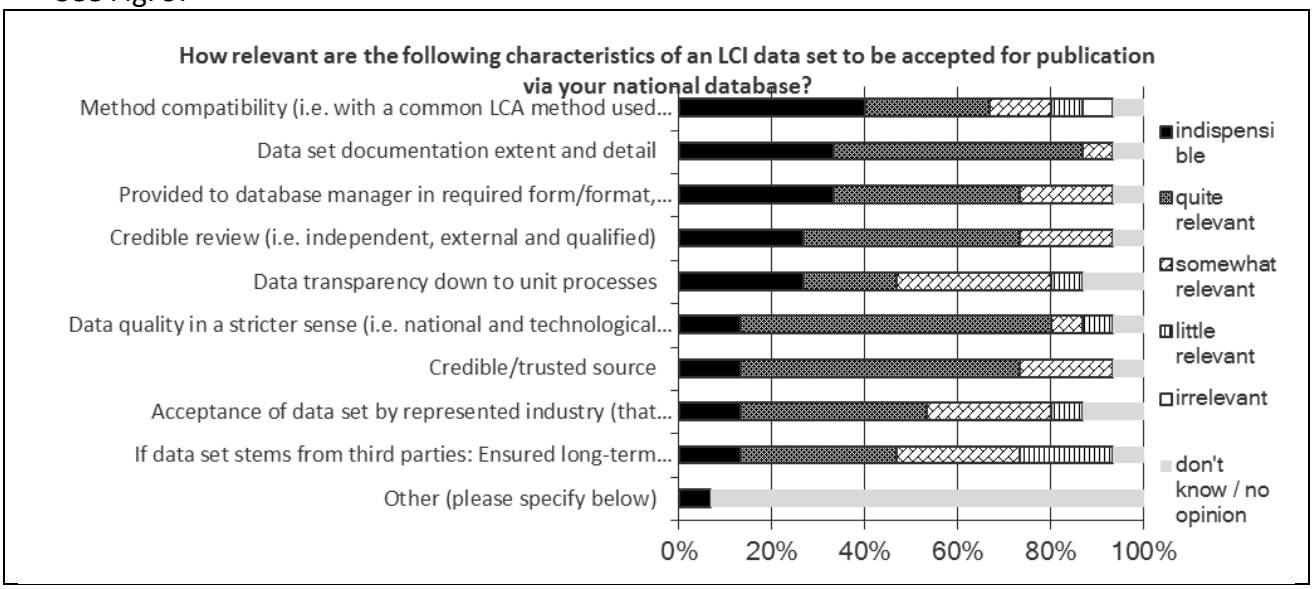

Figure 10 Q36: Characteristics a data set must meet to be eligible for publication in the national database. Responses.

While a very high share of respondents judged most of the listed aspects as indispensable or quite relevant, a still not negligible number of participants considers some of the characteristics as little relevant or irrelevant. Judging from follow-up email exchanges, a different understanding of the individual aspects, a different appreciation of their actual relevance (particularly at databases with lower internal consistency), and some specific aspects (e.g. different requirements for aggregated and for unit process data sets) are the main reasons for this heterogeneity.

Data transparency of data sets as unit processes to be published is required (i.e. indispensable or quite relevant) in only about half of the databases. For the other databases confidentiality concerns of industry prevent this, while this in turn often allows to get access to latest data from the national industry, increasing representativeness of the database.

Q37: Requirements for global compatibility / interoperability

See Fig. 10.

A similar result as for Q36 was obtained for Q37 on the characteristics data sets should commonly possess to achieve global interoperability of the National LCA databases: While roughly 60 to 80% of the respondents consider all requirements to be indispensable or quite relevant, 20 to 30% understand them to be of lower relevance (1 database project did not answer this question). At the same time, currently most of the National LCA databases worldwide show de-facto a complete lack of practical interoperability, with a better situation given only for those that cooperate in the ILCD Life Cycle Data Network or those that publish their data via the ecoinvent centre.

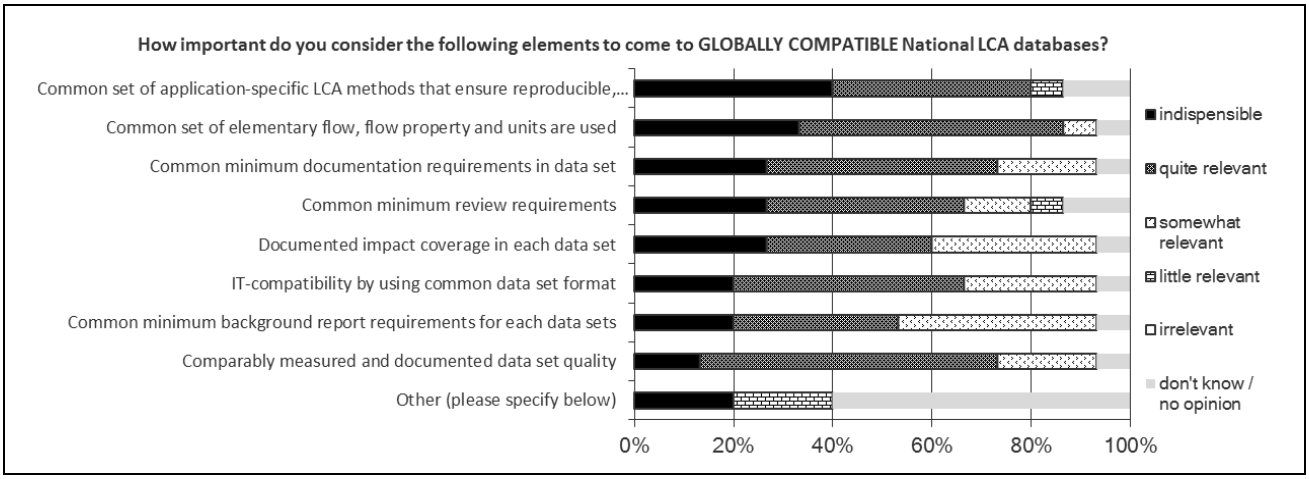

Figure 11 Q37: Requirements for global compatibility / interoperability. Responses.

Fact is moreover that any of the above-named items can render two databases un-interoperable (or mutually unacceptable). In consequence, one could argue that basically all of the items listed above are “indispensable” to achieve global compatibility and interoperability of National LCA Databases.

4 Conclusions and recommendations

4.1 Developing a successful National LCA database – overview

The survey among National LCA databases with its main outcome presented above, provides a valuable insight into common drivers and achievements among the database projects as well as common and individual needs, problems, and challenges.

One meta-level finding is the diversity of project settings, financing mechanisms, and technical approaches and details of the databases and their projects. Differences in the national setting include the available policy support, funding mechanisms, as well as access to national industry.

Reflecting on the lessons learned over the past 15 years of National LCA database developments - as evidenced among others in the survey outcome - some key success factors can be compiled. For newly starting National LCA database projects these are expected to help reducing costs, lowering risks, increasing output quantity and quality, speeding up the project, supporting uptake and impact as well as international recognition, and last-not-least ensuring continuity.

These "success factors" are listed here below. While most of the National LCA databases are active projects with available data, many of them have faced or face relevant problems with several or even most of these "success factors", particularly (but not only) National LCA database projects in countries with less experience in LCA. The factors are ordered roughly from the most critical success factors to the less often problematic ones. (More detailed recommendations on working with these success factors are provided in the next sub-chapter.):

- Letting a **specific policy or business demand for LCA data** lead a targeted, stepwise database development and extension; avoiding development of an "all-purposes" LCA database without a clear demand for it and in consequence very limited impact and lack of continuity financing.
- Working with the **"rules-data-review+ triangle"** approach, i.e. partnering government, industry and independent reviewers. This approach is key for getting the best and most representative data from the national industry, with the data sets being developed in an unbiased way using government-endorsed rules and with stakeholder involvement, and with the resulting data being independently checked for credibility. Research-based data sets or data sets obtained from adjusting foreign databases will usually result in less representative and less industry-accepted and hence less relevant databases.
- **Planning the database for full interoperability with data of other National LCA databases**, to ensure data of the country's products is recognised and used also abroad and vice versa to increase the availability of interoperable background LCI data from the country' trade partners and reliability of the LCA-based applications and decision support. The most flexible solution to this end offers the ILCD Life Cycle Data Network, with data staying physically at the national website, i.e. ensuring full independency.
- **Ensuring consistency and full interoperability of the data sets inside the database**, avoiding to end up with an inconsistent data library that cannot be used for robust decision support. Fixing requirements on several technical aspects and limiting subjective/expert choices are key to achieve this important aim.
- **Developing the data without creating dependency on one or few actors.** Such dependency can arise from dependency on single companies or research groups (in the country or abroad) for method and other decisions, future updates, or reviews, but also from publication via external databases, etc. and dependency due to exclusive data access via such external databases and tools. While working with external experts is initially often necessary and also beneficial, effective know-how transfer needs to be ensured.
- **Planning well beyond the initial database development project**, including future financing, coordination, data management, and setting up the project in a way to increase chances of continuity. This to avoid ending up with a discontinued effort and quickly outdated data.

- **Carefully localizing successful approaches and solutions of other nations**, fully taking into account the country's specific situation and needs, avoiding copy-and-paste approaches that either do not work or do not deliver what is needed in the specific national context. This includes problems when using foreign data sets as basis for "national" data sets that may not represent well the national situation and then add relatively little value.
- **Building up expertise in the country** before or at least during database development and both in the governmental bodies and industry, avoiding to end up with a database that nobody in the country understands and can use and that hence likely will see no applications neither in policy nor industry. Note that this is a separate aspect from the item more above on avoiding to create dependency in database development.
- **Working with competitive market mechanisms**, within the national database or beyond it with other database-developers in the country or abroad, towards a faster growing availability of constantly more and better data, and at lower costs for the user.
- **Ensuring an efficient access to the data sets for users**, typically via internet-based software interfaces with importability into the users' LCA software; avoiding to end up with unused/unusable pdf reports or lengthy procedures to get data access.
- **Ensuring full viability of the database project**, from the current situation all the way to the initial publication of the database and on to future maintenance, updates, and extensions.

Some of these factors are closely related.

Most of these factors require attention from the initial preparations and planning of the project.

The factor of international interoperability will require in addition an effort across national projects, or newly initiated projects to identify those foreign national LCA databases that are most relevant from political perspective and/or regarding foreign trade. However, ways to a global LCA data compatibility need to be found that do not disturb ongoing policy and business use of LCA data and the technical support by third-party LCA software and databases. Until an international agreement is found, developing a database with multiple compatibility might be a - somewhat more costly - option to follow for the time being.

4.2 Developing a successful National LCA database – details

4.2.1 Specific policy or business demand for LCA data

LCA data and major LCA policy applications as well as company-wide use of LCA in decision support face a "hen-egg problem": without a strong driver/demand, the development of a major LCA database cannot be justified and financed. Without LCA data however, major LCA-based policies and business decision support cannot be implemented. Particularly, LCA-based policy applications face one additional problem: next to the development of a major LCA database also the development of major policies takes several years, what means that the policy development cannot wait for the data to be available and vice versa. A parallel development of data and policy is equally not feasible, since data is required already as evidence basis for the assessment of the relevance, practicality etc. of the envisaged new policy.

This hen-egg problem has been a key issue for LCA-based policy developments for many years. Industry has been using LCA data since the late 1980s, while first LCA based policies are less than 10 years old [Wolf et al. 2012]. Industry was able to be much more advanced not only because of being more flexible on decisions to take up new instruments such as LCA. Companies are moreover in most cases focused on specific parts of the economy, can therefore start with less LCA data demanding products and questions. This insight already points to a way how to overcome the hen-egg problem in general (unless country-representative data would be already available from third-party databases): starting with policy applications that are less LCA data intensive and focused on specific sectors and products with simpler life cycles. This will help gaining experience, building up expertise and – importantly - stepwise increase the availability and – typically – the quality of the data, allowing policies and other applications with a higher data demand to be developed subsequently.

An example for this approach is the LCA-based European Ecodesign Directive of 2005 that initially focused on energy-using products only which have mayor environmental impacts linked to their energy-efficiency. A relatively limited number of data sets for the relevant energy carriers and the most relevant materials and parts yielded generally robust results during Preparatory Studies. This Directive is in between expanded to energy-related products (e.g. windows, hot water-saving shower heads, etc.), while this poses new problems. Also certain energy-using products such as computers cannot fully be captured with this approach, as production of the IT equipment contributes relevant parts to the overall impacts that cannot be ignored.

The new Product Environmental Footprint (PEF) tests the use of LCA on a very wide range of products and uses the results as final result, instead of as input to further developments such as in the Ecodesign Directive. Data availability and quality is hence of higher relevance. Given the better data availability from industry, major third-party databases and some National databases, the PEF nevertheless can be expected to demonstrate that it is data-wise viable for a wider range of products, though some issues remain to be solved (e.g. data from countries with limited data availability, and traceability of data / market surveillance).

Other drivers that can be developed in a way that they demand relatively little LCA data are the following ones: Public research project calls on technology, material and product development can be required to employ LCA to environmentally steer the research project and make publicly available those of the generated LCI data sets that are of wider interest, e.g. via a public database (by aggregating and anonymizing the data, confidentiality issues can be avoided). Such requirements have in fact been put on a number of research projects among others in the EU since the late 1990s, however without requiring to use common LCA methodology and without requiring to make the data available in an interoperable way. Still, this has helped to build up expertise and gain experience with LCA in the reach institutes, consultants and companies involved in the research projects.

Governmental direct research contracts and major Green public procurement (GPP) contracts e.g. on buildings can – where suitable – equally require to develop and deliver interoperable LCA data, same as companies can do this to feed data into their in-house LCA databases. Also in industry, business-to-business demand for Environmental Product Declarations and LCI data has emerged in some sectors since the 1990s, which has also helped to make progress in LCA data availability and expertise. This holds true particularly for the building sector.

Modern Environmental Technology Verification (ETV) schemes are potential new drivers with a somewhat higher data demand.

National resource-efficiency and decoupling indicators (supplementing GDP with overall national environmental impact), as well as economy-wide voluntary and particularly mandatory consumer labels are the most data demanding applications that can be implemented only if other applications have helped building up sufficient background data.

An important argument for industry to make available LCI data and – more important even – use LCA, is the frontrunner effect, identifying an industry or company as advanced, contributing to its positive image. Where industry is exporting its products to countries with established LCA-based market-based or policy-schemes, LCA know-how and development of data can bring competitive advantages abroad. Generally, LCA-based policies are often understood to defend a country's industries' interests against cheap imports from less environmentally friendly competition from abroad.

In sum: Governmental and business demand side for LCI data and LCI data endorsement are key. A governmental financing of an LCA database development is useful only if demand-driven. Without demand, a dead-end, one-time-effort is likely and the money is mostly lost. Even more, with good governmental and business drivers, costs for data can be much reduced, as it will be attractive for industry to make its data available ("our data for our products") and for consultants/research groups to invest and develop data sets and license them, both increasing data availability.

4.2.2 "Rules-data-review+" triangle

An important success-factor for any National LCA databases should be to use the "Rules-data-review+" triangle approach (see figure 11):

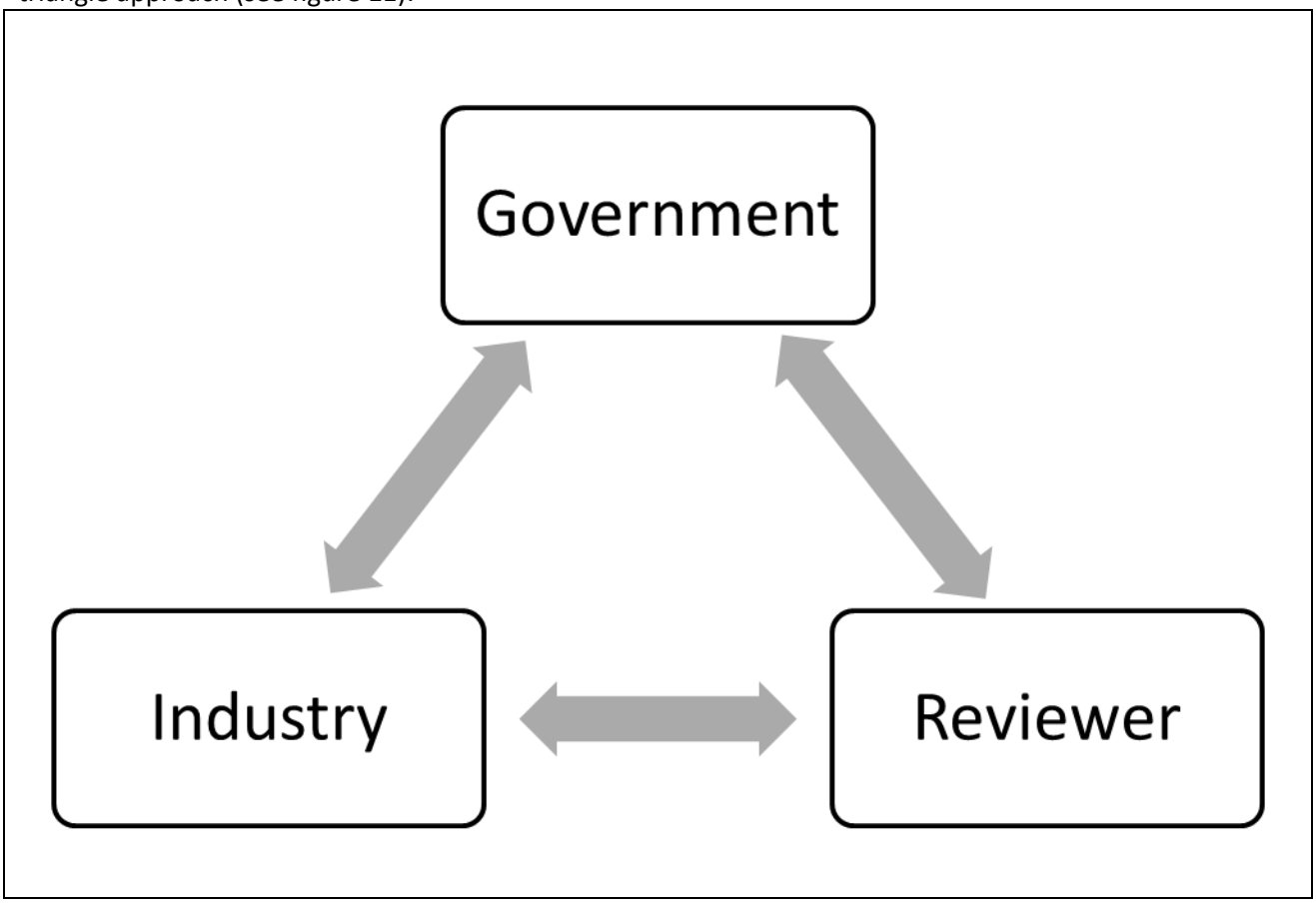

Figure 12 The "Rules-data-review+" triangle, with government, industry, reviewers; schematic.

In this "Rules-data-review+" triangle approach:

- Government is defining the rules for LCA modelling. This is motivated by the public/national interest in unbiased rules, to effectively protect the natural environment, human health, and resources for society including future generations. Importantly, this rules development should be done in an open stakeholder process to ensure buy-in of industry and other key stakeholders.
- Industry is the preferred source for data, since it is industry who is developing and producing the products, strongly influences the products use-phase performance, offers services, including for end-of-life treatment. At the same time and for the same reasons, industry is the key user of the LCI data, to further improve its products. It is hence key to develop data that truly represents the national situation and is accepted by industry. Using or adjusting data from foreign databases may be initially a faster way to get data, but this way will not easily lead to truly national data, is likely to divert focus from building up real data collection know-how in the country, will even often create dependency on the foreign source and advice. It will hence also take away finance from actually collecting data in the country, and has the relevant risk of reducing active participation of the national industry and industry's subsequent feeling of ownership as well as the ultimately most important use/recognition/support of the resulting data sets. A National LCA database should have industry as an active, key partner, via industry associations but possibly also single companies. (Note that the review of the national data typically includes cross-checks with third-party data, but such data should not be automatically considered a suitable reference as it will often represent different technologies, be incomplete, reflect different industry-practice or supply-chains, and other national conditions.
- Independent and qualified reviewers, finally, give a guarantee that the data (and the subsequent LCA applications) are valid and ensure acceptance across industry, government, as well as for green

and consumer rights NGOs. Next to the self-explaining need to have reviewers that are independent from the data development process and the industry that is producing the modeled products, the qualification is important, while often misunderstood: qualification should include expertise and experience in LCA methodology, but also in the specific industry / processes. Until now, critical reviews of LCA studies are often weak in this second aspect. As third component, the experience in performing reviews, is important (while this experience may be gained in related fields). For more on LCI reviews, see [European Commission, 2010a and 2010b]. Last not least, the standard (or other reference) against which the review has to be performed, needs to be specified. This should always include ISO 14040/14044 and preferably go on step further to require review against the ILCD Handbook or the specific requirements defined for the National database, preferably aiming at international compatibility (what will be addressed in a separate chapter more below).

These three types of actors – government-industry-reviewers - are typically supported by consultants and research groups (hence the "+" after "Rules-data-review") that often can support in method development, as trainers, advising the data developers, as reviewers (if independent from the data development and industry) and by providing professional LCA software. Market mechanisms should be employed to incentivize the important support from these actors.

4.2.3 Planning the database for international interoperability

Coordination and efforts to interoperability is important: It can ensure international compatibility and recognition of the national data in other countries that purchase products from the country. The other way round it will ensure that data sets from trade partners that export their products to the country are suitable for LCA studies on products that use these products as input. It is hence highly recommended from the start to coordinate the National LCA database development rules with related efforts abroad, particularly main trade partners.

See also chapter 5 for more details on international LCA data interoperability.

4.2.4 Ensuring consistency and full interoperability of the data sets in the database

On a more technical level, a couple of important elements are to be considered for the data in the National database: The aim should be to ultimately have a database with data sets of full consistency and technical interoperability, so they can actually be combined in life cycle models of products. It should be avoided at any cost ending up with a data library, i.e. a collection of not fully interoperable data sets that in practice cannot be used in the same life cycle model, hence have little value.

The following is highly recommended:

- Like all National databases, process-based LCI data sets should be developed, to ensure sufficient accuracy for the represented products and international compatibility. The use of well-defined, fully reproducible LCI method rules for data collection and data set modelling. These rules should minimize the LCA expert's influence, ensuring comparability of data sets developed by different experts and organisations. It is advisable in this context, to employ a three-level approach: Starting from the LCA frame of ISO 14040/14044, and possibly the more comprehensive and further detailed provisions of the ILCD Handbook [European Commission 2010], define more narrow rules to make the data sets suitable for the main LCA applications they should support (initially typically micro-level product LCA). Derive, together with the relevant stakeholders, product/process group specific rules that ease practical application and strongly reduce the required LCA expertise compared to the more generic, general guidance. This includes, importantly, to check for available specific guides elsewhere, including to ensure international data interoperability, as addressed in more detail more below. The Product Environmental Footprint (PEG) guide of the European Commission is one good option, while selection will have to consider which countries are major trade partners.

- The use of the same electronic data set format, ideally one that allows direct import into the actual database via which the data is accessible to users. The ILCD format is the most advanced, database-developer independent format for this purpose.
- The use of a common elementary flow list (and use common flow properties and units). Again, the ILCD flow list is the most comprehensive available.
- The use of the same product and waste flow classes, as structure for the database.
- Meeting minimum review requirements including to define the independency and qualification of the reviewer (expertise in LCA methodology and the modelled product/technology, review experience); see chapter on the "Rues-data-review+" triangle.
- Set minimum documentation requirements, including on detailed identification of the modelled process or product and their typical uses, geographical validity of the data set, its time representativeness, the applied LCI methodology incl. details, the main review outcome, the achieved data quality, and others. Proper documentation changes "data" to "information", is hence adding substantial value to the data and indispensable for correct use of a data set. A suitable minimum documentation extent has been suggested as part of the ILCD Handbook documents.
- While aiming at high fata quality is important, it is almost equally important to document the achieved quality, so also less precise data can be included, while users are properly informed about their shortcomings. Data quality needs to be well defined and consider all relevant aspects Data quality is best judged by an independent expert (e.g. the critical reviewer), as automatic calculation of data quality cannot capture a number of often relevant aspects, such as data gaps, model assumptions, cross-correlation of data uncertainty, etc. Monte-Carlo-Simulation calculations of data quality can only support the data quality assessment, typically strongly underestimate the true uncertainty and lack of representativeness.

A good starting point to set all of the above-mentioned rules is the document defining the ILCD Data Network - entry-level requirements (except for the first bullet, on the LCI methods to use for modelling, which are left to the user in these entry-level requirements; hence the recommendation to adopt/adapt other guides for the LCI method rules.)

As to the process of managing an LCI database and that the selected rules are met by the data sets etc., the UNEP/SETAC document "Global guidance principles for LCA databases" adds valuable information in chapter 4. Moreover, chapters 2 and 3 are helpful for data collection, modeling and aggregation [Sonnemann & Vigon, 2011].

4.2.5 Developing the data without creating dependency on one or few actors

Dependency on LCA experts and from external software and database developers can have many forms. While cooperation with experienced experts in the country and abroad is often useful, even necessary, dependency should very carefully be avoided. The various elements and forms of dependency were already named: dependency on method and other decisions, on future data updates, or reviews, on publication via external databases or due to exclusive data access via such external databases and tools.

When selecting LCA software to compile the data, model the product systems and manage them, many aspects matter. In view of the aim of database consistency and international operability, support to data management including on the level of flows, flow properties and units, support to proper data set documentation as well as full import and export support to the main LCA data formats, and – important – potentially the mapping to the final elementary flow list for publication are some of the most relevant aspects. The support to upload the final data sets to the – preferably online – database access system, is a second aspect that is relevant within the scope of this paper. In view of the high cost share that the staff of typical database projects has compared to the share of LCA software license fees, an efficient support to the work of the database project staff should be another important consideration for LCA software selection.

4.2.6 Planning well beyond the initial database development project

A National LCA database has its benefits only if it will be available for a longer time-period, well beyond the initial development: Public policies and strategic decisions to establish LCA as decision support instrument in a company's product development have time-horizons longer than the 3 to 4 years or so that data sets are typically still valid after initial LCA database establishment. Using LCA data in industry or in policies, requires that data is maintained and updated for a longer time-perspective to reflect technological progress and other changes (e.g. changing trade-partners country mixes) that change the data sets environmental profile over the years. It is hence crucial to plan the financing mechanism of the database beyond the initial database development. Data maintenance and updating (incl. updated data reviews) requires human and often financial resources, although less than building up the database. Data expansion and data quality improvement to meet increased and changed demand in industry and government has to be anticipated.

Financial planning will have to consider all relevant cost components; make sure not to overlook any and balance the funding properly. Sometimes basic items such as need for software development or licensing are forgotten, or for reviewers.

Very different financing mechanisms are used by existing national databases, ranging from refinancing by data access fees, through building on partly or fully free-of-charge industry-developed data sets, to fully financing all efforts by governmental budget.

Public financing for government-led LCA database developments can come e.g. from national (and sometimes international) research funds, from the Trade/Economy or Industry ministry or the Environmental ministry. All financing sources have advantages and disadvantages and it depends on the specific situation of the country, which is the most suitable one in view of establishing a long-term successful National LCA database.

It is argued that one particularly attractive approach is the "data from industry for industry" approach: The willingness of industry to initially carry this cost would be out of the industry's interests in governmental official recognition of their data and of having the most recent (= less environmentally polluting, more energy-efficient) data available and in preferred use. An example for national LCA databases where this approach has been partly or fully employed are the Japanese [LCA Society of Japan, 2014] and the European ELCD database [European Commission, 2014]. In the leanest situation, the main remaining effort on National database level would be to coordinate the process. Data development, review, publication (e.g. via a common national database or an interoperable data network, such as the ILCD Life Cycle Data Network [European Commission, 2014]) would be done by the industry. Obviously, this requires clear incentives or other benefits for industry to carry the costs. The much better cost/output ratio and industry-co-ownership of the project also means that this approach – if feasible in the specific country – has a higher chance of being continued to be financed by the government beyond the initial development.

It has to be understood that development of quality LCI data sets costs expert time and resources. "Free-of-charge" data that is often asked for is therefore an illusion - unless somebody else pays for its development, documentation, the qualified and independent review, the data maintenance and regular updates/continuity. Cheap or free data from research groups and consultants may of course entail costs at a later moment in time, may create dependency (and hence costs), or means that the data will not be maintained and updated. In any case are all costs ultimately covered by the consumers, either via taxes or via marginally higher prices on the goods and services they consume.

4.2.7 Carefully localizing successful approaches of other nations

When adopting technical rules and database development and financing approaches from other countries, the national situation should be carefully considered in terms of:

- available national expertise in governmental bodies, companies, associations, consultants, and research groups,
- available raw data situation at industry (e.g. related to legal obligations and general degree of measurements/planning in national industry),
- existing or upcoming legislation in the country that may influence the database rules,

- existing or upcoming industry schemes that involve life cycle data, and consumer interests e.g. in environmental labelling, and
- political culture of public-industry cooperation, stability of government decisions.

It should also be avoided – while such can often be found – to re-invent existing solutions. Comprehensive, practice-tested method guides, powerful and flexible data formats, fully equipped online database applications, suitable elementary flow lists etc. exist that often can be used for free and even be extended to meet additional needs. Redevelopments will not only waste scarce financial and human expert resources, but also very often result in internationally incompatible solutions. At the same time, own developments can contribute to develop own expertise. However, such developments should from the start be designed to complement what is available, instead of merely reinventing it. International cooperation on such developments can be a particularly efficient means to build up expertise.

4.2.8 Building up expertise in the country

The purpose of any LCA database is its use in decision support. This requires LCA expertise to use the LCA data in the targeted applications, be it in industry or in government. It is hence crucial to build up LCA expertise in the country, foremost in industry but best also in government. If foreign experts are contracted to technically lead the development the national database and know-how transfer is not effective, the resulting database will also be of little use (apart from its potential use by other countries that import the respective products). An active and co-steering involvement of government and national industry is crucial for any successful National LCA project and emphasis should be put from the beginning in identifying and training the future LCA experts in industry as users and LCA trainers in universities and consultants as multipliers in the country. In countries with very little own LCA expertise, special focus should be put on selecting high-potential staff to become the key experts in the country. Staff should have strong engineering and preferably as well a natural sciences background and be able to learn fast and then act as core and multiplier for establishing expertise in the country.

Data collection at industry and industry's checks on the LCI models and results is already a key mechanism to build up expertise. However, since efficient LCI data development requires experience on which processes mater and what to consider, partnering with experienced experts, also from abroad, may not only be helpful but even necessary.

It is also key to ensure the suitable kind of national organisation be mandated with (co-)coordinating the national database effort. A good understanding of the industry situation and its needs is important, to avoid ending up with a database that would serve only e.g. research needs or be rejected by industry for other reasons.

4.2.9 Work with competitive market mechanisms

Market mechanisms can be used beneficially to speed up data availability and continuously increase data quality: when setting rules e.g. for governmental recognition of data sets or for making data sets eligible for policy applications, it is advisable to follow the principle to make it attractive for data developers to constantly make more and better data available. That implies that instead of setting one set of minimum requirements for data quality, rather incentivize stepwise higher quality data, e.g. by giving it preference or by putting slight penalties on data of lower quality (e.g. increase the inventory flows all by 10% or 20%, depending on achieved quality levels).

Official recognition of third-party data sets that do not stem directly from the national industry – provided the data sets meet the same requirements on interoperability and their good national representativeness can stand a qualified and independent review including of national industry-domain experts – can be a powerful means to quickly increase the available data for a country.

Such data sets may also be included in the national database and still be available for a fee, effectively allowing market forces to refinance the data set development. In the end, somebody has to finance the data collection and documentation effort. Ultimately the consumers of the country will have to carry the costs, be it via general taxes to the government or via marginally increased prices of the products paid to the industry.

It is argued to be important however to avoid data monopolies by third-parties, as such will negatively impact on future data quality and costs.

4.2.10 Ensuring an efficient access to the data sets for users

Collecting and handling LCI data is the most resource-consuming task in LCA work. The access to the data sets should therefore be eased, to avoid unnecessary barriers and transaction costs for data set users. Electronic access to actual data sets, in a format that can be imported by the main professional LCA software systems, is key.

Printed reports or pdf files that require manual transfer and mapping of the hundreds or thousands of input and output flows of aggregated LCI data sets must be avoided as in practice such data sources will rarely be used.

The most suitable way to give access to LCA data sets is via online databases, particularly as independent database node of the ILCD Life Cycle Data Network, and potentially other data networks. In case of the ILCD network, a free software (soda4LCA, [KIT, 2013]) is available to store, manage and publish the National data sets online, for manual search and download, but also via API interface, that allows LCA software to directly download the data sets, check for updates etc. This eases data set access and use and hence helps to ensure that the National data sets are effectively used. Importantly, the data stays physically on the server of the National LCA project and hence in full, direct control.

4.2.11 Ensuring full viability of the database project

Building up an LCI database is only partly a technical exercise. It is very much also a management and cooperation exercise, a process. To ensure acceptance and uptake in industry and government as well as recognition of the data by key trade-partner countries, all related requirements and necessary process steps of the development from e.g. establishing committees and defining their exact roles and responsibilities, through organizing an early stakeholder engagement, to reporting should be carefully planned from the beginning.

All this is essentially the same for any complex project that aims at longer term maintenance and updates, experience in successfully establishing and running such complex multi-stakeholder processes is important for the success of the project and hence the resulting database.

4.3 Differences among National LCA databases

Some aspects will likely show stronger differences between different national LCA databases:

- Regarding the specific organizational structure for the national LCA database project, a number of different approaches can be successful, depending also strongly on the national situation. It should be aimed at having an effective governmental decisive influence and responsibility (e.g. via ownership of the database project, while not necessarily of the data sets). The relevance of involving other stakeholders and particularly industry was already addressed more above. Alternatively, National LCA databases may also be established without governmental active involvement. This has obviously the risk that private interests effectively exclude some actors in the country. Only projects that effectively are open to all qualified actors and on equal rules should be considered authoritative, national LCA projects that merit a governmental recognition.
- Depending on the national setting, the financing mechanism for database development and its continuation will differ.
- The dominant drivers for the database development and National policy applications will moreover often differ (e.g. Type I or type III labels, GPP, etc.).
- For a few impact categories, local/regional LCIA method variants may be developed that reflect – where relevant – key differences in climate, population density, predominant soil types. However, given the heterogeneity and generic character of most LCIA models and the uncertainty in the characterisation factors, differences between countries and regions of the world are smaller than it might be expected. Main topics where major differences should be considered in geographically

differentiated LCIA models and methods are water scarcity and in some cases acidification. For some other topics such a differentiation is discussed. Geographical representativeness of LCI data is argued to be generally much more relevant, for several reasons, including buy-in of industry.

- Valuation e.g. weighing/relevance of different environmental topics in the intended applications/policy instruments may differ, e.g. based on national policy priorities. However, to ensure that industry gets clear decision support from LCA studies performed in the country and at main trade partner countries, these valuation elements, if used, should be coordinated with the ones at the main trade partners (i.e. clients of the national industry). In consequence, also the use of the same LCIA methods is recommended (with national/regional differentiation were beneficial, as explained just above).

5 Towards international interoperability of LCA data

Many of the above considerations and recommendations for National LCA databases apply analogously to the international interoperability of the data sets.

Key is the interoperability of the resulting LCI data sets on methodological, technical, and IT level as well as agreeing and adhering to other common requirements e.g. on review and documentation.

Some technical issues of limited interoperability can be overcome by using data set converters that convert one data set format into another and by elementary flow, flow property, and unit mappings that are intended to yield formally compatible data sets inventories. So far, attempts towards a working converter&mapper have failed[7]. Moreover, even if format conversion and flow mapping is optimized, some information will be lost during conversion and some elementary flows cannot be mapped (e.g. if one list allows poorly specified elementary flows such as “heavy metals”, which are not eligible in the target flow list). In fact, relying on converters prevents efforts to take the necessary steps to actually achieve data interoperability..

An agreement on common data set core format and a common elementary flow list, which are the main technical components to be converted would have other benefits: the expert resources currently bound for maintaining, updating and extending the various flow lists at the various software and tool developers would be freed, software-integration of LCA software with industry-databases and design software would be eased, reviewers’ efforts to review data sets would be eased etc., all to the effect of saving cost.

Finally, data set converters can in any case not solve the important issue of method differences between data sets, the different extent of data set documentation, different review requirements, and some other aspects. In conclusion: Key is the agreement on these issues, avoiding the need for data set conversion.

A mutual international recognition of the data sets should be based on common requirements on the data sets to ensure both full interoperability and acceptance of the data across different nations. Unless a widely used solution establishes itself over time, a coordinated effort will be needed among the main National LCA databases and in coordination with private data providers from consulting, research and last not least industry associations. In case of a coordinated effort and depending on the specific approach, some tasks may be taken over by an internationally agreed body, such as maintaining and further developing the common core data set format, elementary flow list and other common set of rules.

Such a secretariat would need to be newly established. The process towards interoperability should:

- employ mechanisms that an agreement can be achieved with a clear time-horizon,
- be technically driven opposed to politically driven (which may easily lead to technically not well suitable results),
- avoid that agreements can be blocked by one or few actors (as was the effort under the UNEP/SETAC Life Cycle Initiative for data format harmonization 2002-2005), and
- ensure that the ongoing work at major National and private LCA databases worldwide is not impacted during the development or by an outcome that would be disruptive to existing databases.

Until this happens, it will be up to each National database project to orient to the most relevant international activities and systems, to ensure the widest possible interoperability.

[7] The only available format converter and flow mapper, the openLCA converter [Ciroth et al., 2013], available and formally finalized since 2010. While format mapping is mostly complete and correct, the tool is not yet fully and correctly mapping the elementary flows, leaving a huge manual work to the user (status version 3.0 of 2013). Another attempt to solve these issues is currently ongoing.

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About maki Consulting

maki Consulting is a small company, offering life cycle based services at the interface between industry and policy, among others in the context of the European Commission's Environmental Footprint (PEF/OEF) and it's International Reference Life Cycle Data System (ILCD) Handbook and Data Network, which we have helped to shape from 2005 to 2012 while working at the Commission's JRC.

We offer solution-oriented services with the promise of quality, reliability, and customer-orientation, based on over 15 years working experience in Life Cycle Assessment (LCA) and related topics in consulting, government, and research.

Areas of expertise:

Life Cycle Assessment (LCA), Environmental Footprinting (PEF/OEF), Carbon Footprinting (CF), Resource-efficiency studies and indicators, Water Footprinting, Sustainability Assessment

Services offered:

- Decision support and strategic studies,
- Data set and database development,
- Methodology development and harmonisation,
- Moderation of stakeholder processes,
- Capacity building and expert courses,
- Reviews of data and studies

About the author

Marc-Andree Wolf, owner of maki Consulting, has over 15 years professional experience full-time in Life Cycle Assessment (LCA) and Sustainability Assessment methods, data, and policy support.

In his current position at maki Consulting, he is supporting his clients as advisor and senior expert, reviewer, data developer, and expert trainer. Since forming maki Consulting in 2012, he has worked for different national and international industry associations, governmental bodies and consultants in France, Thailand, Germany, Italy and Belgium. Among others he has advised the European Commission's DG CONNECT as contractor in LCA standards' harmonisation for the ICT industry and related database development, and has co-developed LCA data sets for the Thai National LCA database, coordinated at MTEC.

Starting in April 2014, Marc has moreover an independent 50% employment at PE International, working on internal projects on software and database development innovation.

Previously, Marc worked at the European Commission's in-house Joint Research Centre (JRC-IES) from 2005 to 2012, where his main assignment was to implement the "European Platform on LCA" in close coordination with the European Commission's DG Environment. He was technical coordinator for the development of the ILCD Handbook, the ELCD LCA database and the ILCD Data Network at the JRC. This included drafting and editing the ILCD Nomenclature and elementary flow list as well as specifying the ILCD Data Format. These technical developments are mandatorily to be used in the European Commission's ongoing Product and Organisational Environmental Footprint (PEF/OEF) pilots. Marc's knowledge of the technical requirements on the LCA data sets under the PEF/OEF pilots is hence likely the best available.
He has previously worked at the University of Stuttgart's IKP and at PE Europe. His main assignments were on LCA software specification and testing, database and data set development, on developing, coordinating and implementing consulting studies for industry (renewable raw materials and products, fertiliser, specialty chemicals, agrimachinery, refinery) and in research, on developing social LCA methodology, and teaching at Stuttgart University to engineering students and at the renowned international MBA school SIMT. He was also manager of the 10-experts GaBi department from 2003-2005.

Annex (detailed survey results)

	* Main country/region of the database content	Australia	Brazil	Chile 1	Chile 2	Europe
Contact information (you need to fill in at least the sub-questions marked with *):	* Web-address of national database project	http://auslci.com.au	www.acv.ibict.org	www.consorcioporlasustentabilidad.cl	---	http://www.base-impacts.ademe.fr
	* How is the government endorsing/recognising your database?	Small amount of funding support to develop some inventory	The database development is coordinated by Ministry of Science and Technology and Innovation and Ministry of Industrial Development and Trade	Funding it	It has participate and support its developmement and maintenance	Full endorsment: the Base Impacts (R) is the official national database for the French PEF program.
	* Your organisation's name	Australian Life Cycle Assessment Society	University of Brasilia	Fundación Chile	CIMM and University of Concepción	ADEME
	Organisation type (e.g. Governmental body, Private research / consulting, Industry / Association, NGO, ...)	NGO	Academy	Non profit, public private	Governamental/Private	Governmental body
	Role of your organisation within the national database (e.g. coordinator, partner, ...)	Developer and manager	coordinator	Technical coordinator	Coordinator	coordinator
Database management and ownership, resources	Please select - Management decisions about database scope, methods etc. are made by:	Non-industry NGO	Other (please specify)	Public-private partnership/project	Public-private partnership/project	Governmental body/ies
	Please select - Ownership of the data sets in the database is generally with:	Data set specific, both public and private	Governmental body/ies	Jointly the project's public and private partners	Jointly the project's public and private partners	Data set specific, both public and private
	Please select - Number of overall full-time equivalent staff working this year on the database including contractors and data contributors:	1 or less	3 to 10	3 to 10	1 to 3	3 to 10
How is the coordination and management of the database composed and structured?	Please briefly describe the structure and name organisations (e.g. paste text, up to 1 page)	AusLCI database committee is a sub committee under the ALCAS board. The database is managed by a database manager who has had a small amount of funding to support adding and verifying data inputs.	Brazilian Programme of LCA: >Established by Conmetro (Brazilian Interministerial Metrology Commission) on December2010; >Coordinated by Inmetro/MDIC and Ibict/MCTI; >Managerial Committee + 5 Technical Committees (Funding; Inventory; Impact Assessment; Diffusion; Capacity Building);> Member of ILCD network;> Methodological and data base/terminological approach: ILCD Handbook and Format	Our LCA Database projects, Ecobase, are focused on two sectors: food and building products. Food Ecobase structure: Executors: Fundación Chile and Universidad de la Frontera Partners: ProChile, Ministry of Agriculture, Ministry of Environment; Trade associations: Asoex (fresh fruits), Fedefruta (fresh fruits), Chilealimentos (processed fruits), SalmonChile (salmon), Vinos de Chile (wines), AmiChile (mussels), Exporlac (dairy), Movi (boutique vineyards), Cenem (packaging) Subcontracts: FDF (Fundación para el Desarrollo Frutícola), AVS Chile, IERS (Sangwon Suh), Edge Environment, Chilean LCA network and Quantis (to be confirmed) Ecobase Building products structure: Executors: Idiem (from University of Chile), CDT (Technology Development Corporation from Chilean CHamber of Construction) and Fundación Chile Partners: Ministry of Housing, Ministry of Environment, Chilean Chamber of Construction and Construction Institute. Subcontracts: IERS (Sangwon Suh), Edge Environment, Chilean LCA network.	CIMM and University of Concepción are the entities taht coordinate the development of this project. The maintenance and management of the database is at present the University of Concepción. The database has a board of directors composes by the mining industry, and by governamental (ministries of Mining and Economy) and academic bodies	To establish management decisions and sectorial modelling rules, ADEME take decisions based on a Governance Committe (mix of private sector, academics, gov. bodies...) and on Technical Committees (consultants, indutries, academics).
	Please insert a web-link to an organisation chart or similar, if available	http://alcas.asn.au/AusLCI/Documents/Flowchart_Feb_2012.pdf			not yet	
What was the development timeline of the database? (Please enter year, or expected future year, if step has not yet been achieved; leave empty if step is not applicable.)	Informal preparations or unfunded early work started in year:	2007	2004	2011	2years. The database now is being preapering to be use as well for EPD purposes	2009
	Funded national database project started in year:	2013	2006	2013	2010	2009
	First data set officially published via national database in year:	2011	2010	2015	2012	2013
	Publication of set of initially foreseen data sets (with possible omissions) completed in year:	2013		2015	2012	
	Latest data set update/extension step completed/published:	2014	2010		2013	
	Update frequency of the data sets (as number of years):	none			2 years	
	Until which calendar year is maintenance/update/extension of the national database currently ensured/financed?:	none	2015	2015	Not jet defined, we are applying to funds	
Which do you consider the main (most frequent) DIRECT applications of the data sets in your national LCA database? Please judge in view of experiences made and feedback from users and partners (select UP TO 5 applications):	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products		Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products	
	Comparative LCA studies on products	Comparative LCA studies on products		Comparative LCA studies on products	Comparative LCA studies on products	
	Development of LCI data sets of other products by third parties	Development of LCI data sets of other products by third parties		Development of LCI data sets of other products by third parties		
	Organisation- or site-level LCA studies			Organisation- or site-level LCA studies		
	Product carbon footprint studies	Product carbon footprint studies		Product carbon footprint studies	Product carbon footprint studies	
	Product water footprint studies	Product water footprint studies			Product water footprint studies	
	Society-level LCA studies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.					
	Society-level LCA studies on on consumption or basket-of-products (or -product groups) type of studies					
	Society-level LCA studies on identifying product groups with the largest environmental impact					
	Society-level LCA studies on identifying product groups with the largest environmental improvement potential					
	Society-level studies on monitoring environmental impacts on national level				Society-level studies on monitoring environmental impacts on national level	
	Other (please specify below)					Other (please specify below)
	Other (please specify)		There aren't no use of the datasets acknowledged up to the moment.	Fulfillment of reporting requirements from international markets (for exporting companies), Material credits for LEED certification (building products), national EPD program (DAPCO program for the building products)		Product Environmental Footprint (multi-criteria) and Eco-design awareness through the Bilan Produit (R) tool (no LCA application as the database contains LCIA only)
*** Which do you consider the most important (i.e. key drivers) INDIRECT applications of the data sets in your national database? Please judge in view of political /industry management level appreciation/support and name UP TO 6 applications:**	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers
	LCA-based advertisement of product's environmental performance			LCA-based advertisement of product's environmental performance		
	Business-to-business transfer of LCI data or EPDs of own products	Business-to-business transfer of LCI data or EPDs of own products		Business-to-business transfer of LCI data or EPDs of own products	Business-to-business transfer of LCI data or EPDs of own products	
	Corporate/site-level reporting					
	Development of life cycle based Type I Ecolabel criteria			Development of life cycle based Type I Ecolabel criteria		
	Development of Product Category Rules (PCR) or a similar specific guides			Development of Product Category Rules (PCR) or a similar specific guides	Development of Product Category Rules (PCR) or a similar specific guides	
	Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA	Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA				
	Life cycle based benchmarking of products (industry/expert use)	Life cycle based benchmarking of products (industry/expert use)		Life cycle based benchmarking of products (industry/expert use)		Life cycle based benchmarking of products (industry/expert use)
	Green Public or Private Procurement (GPP)		Green Public or Private Procurement (GPP)		Green Public or Private Procurement (GPP)	Green Public or Private Procurement (GPP)
	Environmental Technology Verification (ETV) reports or similar with life cycle data					

	* Main country/region of the database content	Europe	Italy	Japan	Malaysia	Mexico
Contact information (you need to fill in at least the sub-questions marked with *):	* Web-address of national database project	http://eplca.jrc.ec.europa.eu/ELCD3/	http://lci-ilcd.bologna.enea.it:8080/Node/	http://lca-forum.org/	http://mylcid.sirim.my	www.centroacv.mx/mexicaniuh
	* How is the government endorsing/recognising your database?	This is an European Commission coordinated development. The ELCD is referenced e.g. in the annex of the EU Ecolabel Regulation, requ. to use the ELCD wherever applicable. The Covenant of Majors, with DG ENER being the EC partner, is using selected ELCD data sets' CO2-factors for those cities that apply a life cycle approach.	The Italian National Database is an initiative of the Italian Ministry of Environment.	The government supported to produce the database	Not widely used and not endorsed as there was no scheme or programme to use LCA	with funding and participation
	* Your organisation's name	European Commission, JRC	ENEA	Life cycle assessment society of Japan	SIRIM	Center for LCA and Sustainable Design
	Organisation type (e.g. Governmental body, Private research / consulting, Industry / Association, NGO, ...)	Governamental body	Governmental body (research centre)	NPO	Government -owned company reporting to Ministry of Science, Technology and Innovation	pirvate reseaarch
	Role of your organisation within the national database (e.g. coordinator, partner, ...)	Coordinator	Technical and methodological support.	Coordinator	Initiator and Host of Database	coordinator
Database management and ownership, resources	Please select - Management decisions about database scope, methods etc. are made by:	Governmental body/ies	Governmental body/ies	Industry / Association(s)	Other (please specify)	Private research/consultant(s)
	Please select - Ownership of the data sets in the database is generally with:	Industry / Association(s)	Industry / Association(s)	Industry / Association(s)	Other (please specify)	Jointly the project's public and private partners
	Please select - Number of overall full-time equivalent staff working this year on the database including contractors and data contributors:	20 to 40	3 to 10	1 to 3	1 to 3	1 to 3
How is the coordination and management of the database composed and structured?	Please briefly describe the structure and name organisations (e.g. paste text, up to 1 page)	The JRC is the European Commission's in-house science service. It provides the science for policy decisions, with a view to ensuring that the EU achieves its Europe 2020 goals for a productive economy as well as a safe, secure and sustainable future. "The mission of the IES is to provide scientific-technical support to the European Union's policies for the protection and sustainable development of the European and global environment"	The Italian National Database is a node of the Life Cycle Data Network. As an initiative of the Italian Ministry of Environment, that drives the initiative, the database presently is only at a demonstration stage, covering a few datasets on the food sector. ENEA provides the methodologicla and technical support for buolding up the datasets and for managing the node, and the companies provide data.	The Life Cycle Assessment Society of Japan (JLCA) was established in October 1995 as a network to distribute information on LCA to interested parties in industry, academia and government. The JLCA has promoted discussions on the future progress of LCA in Japan, and released a JLCA report and LCA Position Statement in June 1997 proposing the construction of an LCA background database as well as the development of impact assessment methods that are most suitable for the circumstances in Japan. Subsequently, in 1998 the Ministry of Economy, Trade and Industry began a 5 year LCA Project, which was completed at the end of March 2002 with the construction of an LCA database. In consideration of the circumstances of the project and the provision of data for inclusion in the database from more than 50 industry organizations, the Ministry of Economy, Trade and Industry decided that it would be desirable for this database to be managed and operated by the JLCA , since the group brings together industry, academia and government.	Cover page of MYLCID	by CADIS
	Please insert a web-link to an organisation chart or similar, if available			http://lca-forum.org/about/organization/	http://lcamalaysia.sirim	www.centroacv.mx
What was the development timeline of the database? (Please enter year, or expected future year, if step has not yet been achieved; leave empty if step is not applicable.)	Informal preparations or unfunded early work started in year:		2012		2004	
	Funded national database project started in year:	2004		1998	2006	2010
	First data set officially published via national database in year:	2006	2014	2002	2010	to be published
	Publication of set of initially foreseen data sets (with possible omissions) completed in year:	2006	2014	2002	2010	
	Latest data set update/extension step completed/published:	2013	2014	2013	2014	
	Update frequency of the data sets (as number of years):				Not updated	
	Until which calendar year is maintenance/update/extension of the national database currently ensured/financed?:				2010	
Which do you consider the main (most frequent) DIRECT applications of the data sets in your national LCA database? Please judge in view of experiences made and feedback from users and partners (select UP TO 5 applications):	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products
	Comparative LCA studies on products	Comparative LCA studies on products	Comparative LCA studies on products			
	Development of LCI data sets of other products by third parties		Development of LCI data sets of other products by third parties	Development of LCI data sets of other products by third parties	Development of LCI data sets of other products by third parties	
	Organisation- or site-level LCA studies		Organisation- or site-level LCA studies			
	Product carbon footprint studies			Product carbon footprint studies	Product carbon footprint studies	Product carbon footprint studies
	Product water footprint studies					Product water footprint studies
	Society-level LCA studies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.					
	Society-level LCA studies on on consumption or basket-of-products (or -product groups) type of studies					
	Society-level LCA studies on identifying product groups with the largest environmental impact			Society-level LCA studies on identifying product groups with the largest environmental impact		Society-level LCA studies on identifying product groups with the largest environmental impact
	Society-level LCA studies on identifying product groups with the largest environmental improvement potential					
	Society-level studies on monitoring environmental impacts on national level	Society-level studies on monitoring environmental impacts on national level				Society-level studies on monitoring environmental impacts on national level
	Other (please specify below)	Other (please specify below)	Other (please specify below)			
	Other (please specify)	Policy support	Development of Environmental Product Declarations		Studies to identify hotspots for preparing Product Criteria Document for Type i ecolabelling scheme	
*** Which do you consider the most important (i.e. key drivers) INDIRECT applications of the data sets in your national database? Please judge in view of political /industry management level appreciation/support and name UP TO 6 applications:**	Environmental Product Declaration (EPD) / Type III label and similar information for consumers		Environmental Product Declaration (EPD) / Type III label and similar information for consumers			
	LCA-based advertisement of product's environmental performance	LCA-based advertisement of product's environmental performance				
	Business-to-business transfer of LCI data or EPDs of own products					
	Corporate/site-level reporting					Corporate/site-level reporting
	Development of life cycle based Type I Ecolabel criteria				Development of life cycle based Type I Ecolabel criteria	
	Development of Product Category Rules (PCR) or a similar specific guides				Development of Product Category Rules (PCR) or a similar specific guides	
	Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA		Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA		Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA	Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA
	Life cycle based benchmarking of products (industry/expert use)		Life cycle based benchmarking of products (industry/expert use)			Life cycle based benchmarking of products (industry/expert use)
	Green Public or Private Procurement (GPP)	Green Public or Private Procurement (GPP)	Green Public or Private Procurement (GPP)			Green Public or Private Procurement (GPP)
	Environmental Technology Verification (ETV) reports or similar with life cycle data					

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	* Main country/region of the database content	Quebec (Canada)	Taiwan	Thailand	United States 1	United States 2
Contact information (you need to fill in at least the sub-questions marked with *):	* Web-address of national database project	http://www.ciraig.org/en/bd-icv_qc.php	http://cfc.epa.gov.tw/CIT_Beta/CIT_UI/Fmodule/News.aspx	www.lcidatabase.net	www.lcacommons.gov	http://www.nrel.gov/lci/
	* How is the government endorsing/recognising your database?	Financial support	This effort has been entrusted by Taiwan EPA to build up the database of Taiwan carbon footprint emission factors. All of these sets of data should be examined by the the experts and Council of Carbon Footprint Labeling Technical Team of Taiwan EPA,respectively.	National LCI is used for Emission factor for Carbon footprint programme of TH, for SEEA, and will be used for Green GDP (by Ministry of industry and NSTDA).	This is a U.S. government databse	initially they provided funds. no official status of being officially required or recommened.
	* Your organisation's name	CIRAIG	Industrial Technology Research Institute of Taiwan, R.O.C	MTEC (National Metal and Materials Technology Center)	United States Department of Agriculture-National Agricultural Library	National Renewable Energy Laboratory
	Organisation type (e.g. Governmental body, Private research / consulting, Industry / Association, NGO, ...)	Academic (research center)	Nonprofit R&D organization		Government body	Government funded research
	Role of your organisation within the national database (e.g. coordinator, partner, ...)	Developper	We assist Taiwan EPA to set up this database and establish the product carbon footprint calculation platform		coordinator	coordinator, owner and manager of the database
Database management and ownership, resources	Please select - Management decisions about database scope, methods etc. are made by:	Governmental body/ies	Governmental body/ies	Governmental body/ies	Governmental body/ies	Public-private partnership/project
	Please select - Ownership of the data sets in the database is generally with:	Jointly the project's public and private partners	Governmental body/ies	Governmental body/ies	Governmental body/ies	Jointly the project's public and private partners
	Please select - Number of overall full-time equivalent staff working this year on the database including contractors and data contributors:	3 to 10	20 to 40	above 40	3 to 10	1 or less
How is the coordination and management of the database composed and structured?	Please briefly describe the structure and name organisations (e.g. paste text, up to 1 page)	The Quebec government (Ministry of the Environment and Sustainable Development, and Finance and Economy) for a Steering committee that has ultimate last say in substantial decisions. All work delegated to CIRAIG.	All of these data sets are provided by by the government and local manufacturers and examined by the experts and the Council of Carbon Footprint Labeling Technical Team of Taiwan EPA.	contractors gather data and the data is approved by MTEC and critical review process.	This database is managed by USDA-NAL in collaboration with multiple federal (Department of Energy and Environmental Protection Agency) and academic (Univerity of Washington, University of Arkansas, and Oregon State University) partners.	The USLCI Database is managed by NREL. We are working in coordination with the USDA NAL Data Commons and utilizing their database platform. A advisory committee composed of public and private partners has provided guidance to NREL for managing the database.
	Please insert a web-link to an organisation chart or similar, if available		https://drive.google.com/file/d/0BzBCrWJMVcwIcnVDdlJ1LVNtd00/edit?usp=sharing			
What was the development timeline of the database? (Please enter year, or expected future year, if step has not yet been achieved; leave empty if step is not applicable.)	Informal preparations or unfunded early work started in year:	2008	2010	2003		2003
	Funded national database project started in year:	2011	2012	2006	2009	2003
	First data set officially published via national database in year:	2013	2013	2010	2012	2003
	Publication of set of initially foreseen data sets (with possible omissions) completed in year:	2014	2017		2013	2003
	Latest data set update/extension step completed/published:	Unknown	2013		2013	2014
	Update frequency of the data sets (as number of years):	Unknown	3 years		Unknown	varying
	Until which calendar year is maintenance/update/extension of the national database currently ensured/financed?:	2014	2017	2016	Indefinitely for now	it is not currently financed
Which do you consider the main (most frequent) DIRECT applications of the data sets in your national LCA database? Please judge in view of experiences made and feedback from users and partners (select UP TO 5 applications):	Descriptive LCA studies/calculations on products	Descriptive LCA studies/calculations on products			Descriptive LCA studies/calculations on products	
	Comparative LCA studies on products	Comparative LCA studies on products		Comparative LCA studies on products	Comparative LCA studies on products	
	Development of LCI data sets of other products by third parties			Development of LCI data sets of other products by third parties	Development of LCI data sets of other products by third parties	Development of LCI data sets of other products by third parties
	Organisation- or site-level LCA studies					
	Product carbon footprint studies	Product carbon footprint studies		Product carbon footprint studies		
	Product water footprint studies					
	Society-level LCA studies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.					
	Society-level LCA studies on on consumption or basket-of-products (or -product groups) type of studies					
	Society-level LCA studies on identifying product groups with the largest environmental impact					
	Society-level LCA studies on identifying product groups with the largest environmental improvement potential					
	Society-level studies on monitoring environmental impacts on national level					
	Other (please specify below)					Other (please specify below)
	Other (please specify)					internally developed LCI datasets
*** Which do you consider the most important (i.e. key drivers) INDIRECT applications of the data sets in your national database? Please judge in view of political /industry management level appreciation/support and name UP TO 6 applications:**	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers	Environmental Product Declaration (EPD) / Type III label and similar information for consumers
	LCA-based advertisement of product's environmental performance		LCA-based advertisement of product's environmental performance		LCA-based advertisement of product's environmental performance	
	Business-to-business transfer of LCI data or EPDs of own products	Business-to-business transfer of LCI data or EPDs of own products	Business-to-business transfer of LCI data or EPDs of own products			Business-to-business transfer of LCI data or EPDs of own products
	Corporate/site-level reporting			Corporate/site-level reporting		
	Development of life cycle based Type I Ecolabel criteria				Development of life cycle based Type I Ecolabel criteria	Development of life cycle based Type I Ecolabel criteria
	Development of Product Category Rules (PCR) or a similar specific guides				Development of Product Category Rules (PCR) or a similar specific guides	Development of Product Category Rules (PCR) or a similar specific guides
	Identification of Key Environmental Performance Indicators (KPIs), Implementing Measures (IMs) and similar of a product group for Ecodesign / simplified LCA					
	Life cycle based benchmarking of products (industry/expert use)			Life cycle based benchmarking of products (industry/expert use)	Life cycle based benchmarking of products (industry/expert use)	
	Green Public or Private Procurement (GPP)			Green Public or Private Procurement (GPP)		
	Environmental Technology Verification (ETV) reports or similar with life cycle data					Environmental Technology Verification (ETV) reports or similar with life cycle data

	* Main country/region of the database content	Australia	Brazil	Chile 1	Chile 2	Europe
	Clean Development Mechanism (CDM) and Joint Implementation (JI) programmes					
	Public policies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.					
	Public policies on consumption				Public policies on consumption	
	Public policies on production / products					
	Public monitoring of national environmental impacts (e.g. resource-efficiency, decoupling, Beyond GDP indicators)					
	Other (please specify below)					
	Other (please specify)		These will be the foreseen applications of the data sets during the next years.			B2B exchange of LCIA results for use in French national PEF. See also free text entry on Q 6.
Which are the main types of actors that are meant to use the data sets? (Please select up to 3 actors)	Producing industry in my country/region	Producing industry in my country/region		Producing industry in my country/region	Producing industry in my country/region	
	Governmental bodies in my country/region			Governmental bodies in my country/region	Governmental bodies in my country/region	
	Researchers and students in my country/region	Researchers and students in my country/region	Researchers and students in my country/region		Researchers and students in my country/region	
	Consultants in my country/region	Consultants in my country/region	Consultants in my country/region	Consultants in my country/region		
	NGOs in my country/region					
	Users in other countries/regions					
	Other (please specify below)					Other (please specify below)
	Other (please specify)					Producing industry in any region selling mass market products to France
Which review type/level is currently required as minimum for a data set to be published via your national database?	Response	Other form of SINGLE external review (reviewer with lower requirements than detailed above; please specify below)	Only internal quality check, without published review report	Other form of external PANEL review (reviewers with lower requirements than detailed above; please specify below)	Independent external qualified review panel (as above but with three independent members)	Only internal quality check, without published review report
	Other or own scheme (please name; e.g. ISO 14044 or 14025 review / review panel, ...)		The internal review is based on ISO14044, but not published.	For the building products "Independent external qualified review panel (as above but with three independent members)". For the food project is internal review and potential review by Ecoinvent		ILCD Entry Level
What was/is the approximate share of costs to the initial database ESTABLISHMENT? (please enter the % share for each cost factor; fill in "0" if not applicable/no cost)	In-house and database partner staff	50	70	35	40	0
	External methodology development / consulting costs	0	0	10	0	15
	External life cycle data development costs	0	0	20	0	45
	External review costs	0	0	5	30	0
	External software development cost	0	0	20	10	20
	Life cycle software license fees	0	10	0	15	0
	Life cycle / raw data license fees	0	0	0	0	20
	All other external costs (marketing, communication/meeting facilities, travel/lodging, ...)	50	20	10	5	0
User cost/fee for the mayority of LCI data sets in the national database:	Response	Free of charge for all users/uses	Free of charge for all users/uses	Free of charge for all users/uses	Fee for all users/uses	Free of charge for all users/uses
	Specific restrictions / Other (please specify)			Free of charge, except when a trade associations wants to have more customized and confidential models for their members.	fees considered only for the database management	The consultation shall remain free. Some features (PCR tools, downloading) might be charged in the future.
What is the financing mechanism for developing updated/additional data sets? (Compare also next question.)	Response	Financed mostly by data/membership fees and partly from other, predominantly governmental sources (direct or indirect finance e.g. as by-product from research projects, in kind contribution, free data input, etc.)	Predominantly by in-house governmental budget	Other (please specify below)	Predominantly by in-house governmental budget	Predominantly by in-house governmental budget
	Other (please specify)			Still to be defined		Most of the datasets are "bought" by ADEME from existing DBs (mainly Gabi), after a potential methodological adaptation. On some sectors, they are produced thuogh projects co-funded by ADEME and public and private partners.
What is the financing mechanism for managing database maintenance/updates (excluding data set development; see previous question)?	Response	Financed predominantly by in-house private institutional budget	Other (please specify below)	Other (please specify below)	Financed mostly by data/membership fees and partly from other, predominantly governmental sources (direct or indirect finance, in kind contribution, free data input, etc.)	Financed predominantly by in-house governmental budget
	Other (please specify)		Public - private partnership	Still to be defined		
LCI data sets combine data from different sources: primary data and different forms of secondary data (at least for the background system). Across all your country's national data sets and related to the Climate change impact results: Which share of the impacts come ROUGHLY in % from the following data sources? (Expert judgement is sufficient. Please enter 0 if a source is not applicable.)	My country's/region's producers' facilities and service processes (i.e. national primary data (sets))	0	0	50	20	5
	National publications and research papers (i.e. as source for raw data / process data)	50	0	20	50	0
	Foreign publications and research papers (i.e. as source for raw data / process data)	0	0	10	10	0
	Third-party LCI databases, used "as are" or adjusted to generate national data sets	50	100	10	10	90
	Third-party LCI databases used as background data sets only (i.e. in combination with foreground data from other sources)	0	0	10	10	5
	Other	0	0	0	0	0
What is - roughly - the age of the national data sets in your database? Please give as the year which the LCI data sets actually represent (i.e. NOT year of calculation, or publication of literature sources in case of literature/research based data):	Average represented year across all data sets:	2011	2008	2013	2009	2011
	Represented year of the most recent data set:	2012	2010	2013	2011	
	Represented year of the oldest data set:	2010	2008	2011	2008	
Which principle LCI methodology do you apply? (If you publish variants of all data sets with different modelling, please select all applicable variants):	Response	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible
	Other (please specify)					

	* Main country/region of the database content	Europe	Italy	Japan	Malaysia	Mexico
	Clean Development Mechanism (CDM) and Joint Implementation (JI) programmes				Clean Development Mechanism (CDM) and Joint Implementation (JI) programmes	
	Public policies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.	Public policies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.				
	Public policies on consumption		Public policies on consumption			
	Public policies on production / products	Public policies on production / products	Public policies on production / products			Public policies on production / products
	Public monitoring of national environmental impacts (e.g. resource-efficiency, decoupling, Beyond GDP indicators)	Public monitoring of national environmental impacts (e.g. resource-efficiency, decoupling, Beyond GDP indicators)				
	Other (please specify below)					
	Other (please specify)				Data sets not in demand at all by both public and private sectors. Web access via http://mylcid.sirim.my so access not a problem. It is true many of the university studie use commercial software e.g. Simapro. Todate we have not received any requests from abroad.	
Which are the main types of actors that are meant to use the data sets? (Please select up to 3 actors)	Producing industry in my country/region		Producing industry in my country/region	Producing industry in my country/region	Producing industry in my country/region	Producing industry in my country/region
	Governmental bodies in my country/region	Governmental bodies in my country/region	Governmental bodies in my country/region			
	Researchers and students in my country/region	Researchers and students in my country/region		Researchers and students in my country/region	Researchers and students in my country/region	Researchers and students in my country/region
	Consultants in my country/region			Consultants in my country/region		Consultants in my country/region
	NGOs in my country/region					
	Users in other countries/regions		Users in other countries/regions		Users in other countries/regions	
	Other (please specify below)					
	Other (please specify)					
Which review type/level is currently required as minimum for a data set to be published via your national database?	Response	Independent external, qualified review (i.e. reviewer not involved in data development or commissioning or currently linked to industry of product AND more than 3 years experience in LCA/footprint studies and reviewes AND more than 3 years experience in the data set related wider industry sector or research)	Independent external, qualified review (i.e. reviewer not involved in data development or commissioning or currently linked to industry of product AND more than 3 years experience in LCA/footprint studies and reviewes AND more than 3 years experience in the data set related wider industry sector or research)	Independent external qualified review panel (as above but with three independent members)	Only internal quality check, without published review report	Independent external, qualified review (i.e. reviewer not involved in data development or commissioning or currently linked to industry of product AND more than 3 years experience in LCA/footprint studies and reviewes AND more than 3 years experience in the data set related wider industry sector or research)
	Other or own scheme (please name; e.g. ISO 14044 or 14025 review / review panel, ...)	Entry-Level Requirements				
What was/is the approximate share of costs to the initial database ESTABLISHMENT? (please enter the % share for each cost factor; fill in "0" if not applicable/no cost)	In-house and database partner staff				20	45
	External methodology development / consulting costs				30	5
	External life cycle data development costs				0	10
	External review costs				0	
	External software development cost				20	30
	Life cycle software license fees				30	
	Life cycle / raw data license fees				0	
	All other external costs (marketing, communication/meeting facilities, travel/lodging, ...)				0	10
User cost/fee for the mayority of LCI data sets in the national database:	Response	Free of charge for all users/uses	Free of charge for all users/uses	Fee for all users/uses	Free of charge for some user/use types (please specify below), otherwise fee	Other (please specify below)
	Specific restrictions / Other (please specify)				Collaborators of projects get free access as part of project activity	not specified yet. Free for data providers. MAKI: next to some public data sets, more data sets are non-public, industry associations have access to their own datasets.
What is the financing mechanism for developing updated/additional data sets? (Compare also next question.)	Response	Predominantly by in-house governmental budget	Other (please specify below)	Predominantly by data providing industry	Predominantly by third-party public project funding (e.g. research project)	Predominantly by in-house private institutional budget
	Other (please specify)		The demonstration phase has been supported by the Italian Ministry of Environment, ENEA and the companies that provided the data.			
What is the financing mechanism for managing database maintenance/updates (excluding data set development; see previous question)?	Response	Financed predominantly by in-house governmental budget	Other (please specify below)	Financed fully from data set fees (or membership fees which give access to data)	Financed predominantly by in-house private institutional budget	Financed predominantly by in-house private institutional budget
	Other (please specify)		Still not defined.			
LCI data sets combine data from different sources: primary data and different forms of secondary data (at least for the background system). Across all your country's national data sets and related to the Climate change impact results: Which share of the impacts come ROUGHLY in % from the following data sources? (Expert judgement is sufficient. Please enter 0 if a source is not applicable.)	My country's/region's producers' facilities and service processes (i.e. national primary data (sets))	0	55	50	30	80
	National publications and research papers (i.e. as source for raw data / process data)	0	5	40	0	10
	Foreign publications and research papers (i.e. as source for raw data / process data)	0	10	10	10	5
	Third-party LCI databases, used "as are" or adjusted to generate national data sets	0	0	0	30	5
	Third-party LCI databases used as background data sets only (i.e. in combination with foreground data from other sources)	0	30	0	30	0
	Other	0	0	0	0	0
What is - roughly - the age of the national data sets in your database? Please give as the year which the LCI data sets actually represent (i.e. NOT year of calculation, or publication of literature sources in case of literature/research based data):	Average represented year across all data sets:	2006	2010	2005	2005	2008
	Represented year of the most recent data set:	2011	2012	2012	2011	2013
	Represented year of the oldest data set:	1996	2010	1995	2005	2005
Which principle LCI methodology do you apply? (If you publish variants of all data sets with different modelling, please select all applicable variants):	Response	Other (please specify below)	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with systematic or case-wise decision on either substitution or allocation of co-products	Attributional modelling (i.e. modelling the existing supply-chain) with systematic or case-wise decision on either substitution or allocation of co-products	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible
	Other (please specify)					

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	* Main country/region of the database content	Quebec (Canada)	Taiwan	Thailand	United States 1	United States 2
	Clean Development Mechanism (CDM) and Joint Implementation (JI) programmes		Clean Development Mechanism (CDM) and Joint Implementation (JI) programmes			
	Public policies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.	Public policies on forecasting & analysis of the environmental impact of pervasive technologies, raw material strategies, etc.				
	Public policies on consumption					
	Public policies on production / products	Public policies on production / products				
	Public monitoring of national environmental impacts (e.g. resource-efficiency, decoupling, Beyond GDP indicators)					Public monitoring of national environmental impacts (e.g. resource-efficiency, decoupling, Beyond GDP indicators)
	Other (please specify below)					
	Other (please specify)					
Which are the main types of actors that are meant to use the data sets? (Please select up to 3 actors)	Producing industry in my country/region				Producing industry in my country/region	Producing industry in my country/region
	Governmental bodies in my country/region	Governmental bodies in my country/region				Governmental bodies in my country/region
	Researchers and students in my country/region	Researchers and students in my country/region			Researchers and students in my country/region	Researchers and students in my country/region
	Consultants in my country/region	Consultants in my country/region			Consultants in my country/region	Consultants in my country/region
	NGOs in my country/region					NGOs in my country/region
	Users in other countries/regions					Users in other countries/regions
	Other (please specify below)					
	Other (please specify)					
Which review type/level is currently required as minimum for a data set to be published via your national database?	Response	Other form of SINGLE external review (reviewer with lower requirements than detailed above; please specify below)	Independent external, qualified review (i.e. reviewer not involved in data development or commissioning or currently linked to industry of product AND more than 3 years experience in LCA/footprint studies and reviewes AND more than 3 years experience in the data set related wider industry sector or research)	Independent external qualified review panel (as above but with three independent members)	Independent external, qualified review (i.e. reviewer not involved in data development or commissioning or currently linked to industry of product AND more than 3 years experience in LCA/footprint studies and reviewes AND more than 3 years experience in the data set related wider industry sector or research)	Only internal quality check, without published review report
	Other or own scheme (please name; e.g. ISO 14044 or 14025 review / review panel, ...)		ISO 14048			
What was/is the approximate share of costs to the initial database ESTABLISHMENT? (please enter the % share for each cost factor; fill in "0" if not applicable/no cost)	In-house and database partner staff				30	64
	External methodology development / consulting costs				20	0
	External life cycle data development costs				49	36
	External review costs				1	0
	External software development cost				0	0
	Life cycle software license fees				0	0
	Life cycle / raw data license fees				0	0
	All other external costs (marketing, communication/meeting facilities, travel/lodging, ...)				0	0
User cost/fee for the mayority of LCI data sets in the national database:	Response	Other (please specify below)	Free of charge for all users/uses	Free of charge for all users/uses	Free of charge for all users/uses	Free of charge for all users/uses
	Specific restrictions / Other (please specify)	Gate-to-gate data: free Cradle-to-gate: sometimes free, sometimes not, depends on the relative contribution to impacts of datasets not developed as part of the database project.				only restriction is to properly reference source.
What is the financing mechanism for developing updated/additional data sets? (Compare also next question.)	Response	Predominantly by data providing industry	Predominantly by in-house governmental budget	Predominantly by in-house governmental budget	Predominantly by in-house governmental budget	Other (please specify below)
	Other (please specify)					a funding mechanism has not been established. we are looking for additional government support, but there is not current funding for this year.
What is the financing mechanism for managing database maintenance/updates (excluding data set development; see previous question)?	Response	Financed fully from data set fees (or membership fees which give access to data)	Financed predominantly by in-house governmental budget	Financed predominantly by in-house governmental budget	Financed predominantly by in-house governmental budget	Other (please specify below)
	Other (please specify)					no funding
LCI data sets combine data from different sources: primary data and different forms of secondary data (at least for the background system). Across all your country's national data sets and related to the Climate change impact results: Which share of the impacts come ROUGHLY in % from the following data sources? (Expert judgement is sufficient. Please enter 0 if a source is not applicable.)	My country's/region's producers' facilities and service processes (i.e. national primary data (sets))	50	90	60	90	70
	National publications and research papers (i.e. as source for raw data / process data)	20	10	10	10	30
	Foreign publications and research papers (i.e. as source for raw data / process data)	20	0	0	0	0
	Third-party LCI databases, used "as are" or adjusted to generate national data sets	10	0	0	0	0
	Third-party LCI databases used as background data sets only (i.e. in combination with foreground data from other sources)	0	0	30	0	0
	Other	0	0	0	0	0
What is - roughly - the age of the national data sets in your database? Please give as the year which the LCI data sets actually represent (i.e. NOT year of calculation, or publication of literature sources in case of literature/research based data):	Average represented year across all data sets:	2008	2012	2010	2003	2005
	Represented year of the most recent data set:	2012	2012	2009	2009	2011
	Represented year of the oldest data set:	2005	2010	2006	1996	1989
Which principle LCI methodology do you apply? (If you publish variants of all data sets with different modelling, please select all applicable variants):	Response	Other (please specify below)	Attributional modelling (i.e. modelling the existing supply-chain) with systematic or case-wise decision on either substitution or allocation of co-products		Attributional modelling (i.e. modelling the existing supply-chain) with preference of SUBSTITUTION / SYSTEM EXPANSION of co-products, where sub-division is not possible	Attributional modelling (i.e. modelling the existing supply-chain) with preference of ALLOCATION of co-products (i.e. not substitution), where sub-division is not possible
	Other (please specify)	Datasets are system modelling agnostic. They can (and are) used to generate both attributional (with allocation) and consequential system models. See ecoinvent documentation.				

	* Main country/region of the database content	Australia	Brazil	Chile 1	Chile 2	Europe
How good is the inner consistency of your national database?	**LCA methodology (note: "fully" implies absence of relevant method choices)**	Mostly consistent	Mostly consistent	I don't know / no answer	Mostly consistent	Mostly consistent
	Elementary flows, flow properties and units, and related nomenclature	Mostly consistent	Fully consistent	I don't know / no answer	Limited consistency	Fully consistent
	Product and waste flows nomenclature and classification	Mostly consistent	I don't know / no answer	I don't know / no answer	Limited consistency	Fully consistent
	Completeness of impact category coverage (if relevant for a data set)	Mostly consistent	No wider consistency; data set library	Mostly consistent	No wider consistency; data set library	Fully consistent
Which method(s)/standard(s)/scheme(s) do you formally follow for your LCI data sets / EPDs? (Mark all that apply for at least a relevant (>10%) share of the data sets.)	**ISO14040/14044**		ISO14040/14044	ISO14040/14044	ISO14040/14044	ISO14040/14044
	ISO 14025			ISO 14025	ISO 14025	
	ILCD Data Network - entry-level requirements		ILCD Data Network - entry-level requirements			ILCD Data Network - entry-level requirements
	Global guidance principles of UNEP/SETAC LCI	Global guidance principles of UNEP/SETAC LCI		Global guidance principles of UNEP/SETAC LCI	Global guidance principles of UNEP/SETAC LCI	
	no specific methodology					
	own/other methodology (please name)	own/other methodology (please name)				
	Please name other or own methodology/standard/scheme and add web-link to document (if possible)	AusLCI requirements and ecoivent requirements				
Does your database have a specific focus, i.e. generally aims at specific sectors / product groups only (opposed to officially aiming at covering all relevant sectors)?	**Response**	Aim is broad coverage of all relevant sectors in the country/region	Aim is broad coverage of all relevant sectors in the country/region	Current aim is one or more dedicated sector(s) / product group(s) (please name below)	Current aim is one or more dedicated sector(s) / product group(s) (please name below)	Aim is broad coverage of all relevant sectors in the country/region
	Please specify the specific database focus, if any			Food and building products	mining and energy	All sectors + all regions (aiming to cover French consumption, not production)
Roughly how many data sets for YOUR country scope (production, consumption, or both) do you CURRENTLY make available in the database? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	**Energy carriers and technologies**	35	10	0	3	5
	Materials / raw materials	1	0	0	5	0
	Systems / complex goods		0	0	2	0
	End-of-life treatment		0	0	3	20
	Transport services	18	0	0	3	10
	Use phase at consumer		0	0	1	0
	Other services / processes	75	0			0
Roughly how many data sets for YOUR country scope (production, consumption, or both) will you make available in the database at the next FULL release? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	**Energy carriers and technologies**		50		3	5
	Materials / raw materials	150	50		6	70
	Systems / complex goods		50	40	2	0
	End-of-life treatment		50		3	20
	Transport services		50		3	10
	Use phase at consumer		50		3	0
	Other services / processes		50			0
Roughly how many data sets for OTHER countries/regions and country-unspecific data sets do you CURRENTLY make available in the database? In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	**Energy carriers and technologies**		0	0	1	350
	Materials / raw materials		0	0	6	200
	Systems / complex goods		0	0	2	70
	End-of-life treatment		0	0	3	20
	Transport services		0	0	3	90
	Use phase at consumer		0	0	3	0
	Other services / processes		0	0		0
Number of data sets of different types in your database. Please give rough numbers; enter "0" if none:	**LCI results (i.e. aggregated, only products/co-products and elementary flows in input/output list but no unconnected product/waste flows)**	0	10	40	7	0
	Partly terminated systems (i.e. aggregated, but with unconnected product/waste flows in input/output list)	0	0	5	0	0
	Unit processes on plant or site level, covering multiple process steps	0	0	5	15	0
	Unit processes covering a single process step	130	0	5	5	0
	LCIA results of processes/products (also count those contained in LCI data sets)	0	0	21	3	750
	LCIA method data sets with characterisation factors	0	0	0	5	28
	Normalisation data sets	0	0	0	3	0
	Weighting data sets	0	0	0	3	0
	Other content data (social data, cost data, ... but NOT counting flows, units etc.)	0	0	0		0
Number of generic, specific, etc. data set types that you PUBLISH via your database. Please give rough numbers; enter "0" if none:	**Generic data sets (i.e. modelled/generalised from "typical" process data)**	65	0	40	3	750
	Average data sets (i.e. mix of specific data sets from different producers/sites)	65	0	21	10	0
	Specific data sets (i.e. specific producer brand/model, incl. EPDs)	0	0	0	10	0
	Generic/average/specific combination (i.e. average or specific data completed with generic data in foreground and/or background system)	0	10	0	0	0
Impact coverage – please select all impact categories that the inventory of the wide majority (i.e. > 80%) of your data sets covers WELL (if the respective impact is relevant for the individual data set):	**Climate change**	Climate change		Climate change	Climate change	Climate change
	Acidification	Acidification		Acidification	Acidification	Acidification
	Eutrophication	Eutrophication		Eutrophication	Eutrophication	Eutrophication
	Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics		Particulate matter / respiratory inorganics		Particulate matter / respiratory inorganics
	Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog		Photochemical ozone formation / summer smog		Photochemical ozone formation / summer smog
	Ozone depletion			Ozone depletion		Ozone depletion
	Human toxicity	Human toxicity		Human toxicity	Human toxicity	Human toxicity
	Ionising radiation					Ionising radiation
	Ecotoxicity	Ecotoxicity		Ecotoxicity	Ecotoxicity	Ecotoxicity
	Land use	Land use		Land use	Land use	Land use
	Material resource depletion	Material resource depletion		Material resource depletion	Material resource depletion	Material resource depletion
	Energy resource depletion	Energy resource depletion		Energy resource depletion	Energy resource depletion	Energy resource depletion
	Water resource depletion	Water resource depletion		Water resource depletion	Water resource depletion	Water resource depletion
	Other (please specify below)		Other (please specify below)			

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	* Main country/region of the database content	Europe	Italy	Japan	Malaysia	Mexico
How good is the inner consistency of your national database?	LCA methodology (note: "fully" implies absence of relevant method choices)	Mostly consistent	Fully consistent	Fully consistent	Mostly consistent	Fully consistent
	Elementary flows, flow properties and units, and related nomenclature	Mostly consistent	Fully consistent	Fully consistent	Mostly consistent	Mostly consistent
	Product and waste flows nomenclature and classification	Mostly consistent	Mostly consistent	Mostly consistent	Mostly consistent	Mostly consistent
	Completeness of impact category coverage (if relevant for a data set)	Mostly consistent	Mostly consistent	I don't know / no answer	Mostly consistent	Mostly consistent
Which method(s)/standard(s)/scheme(s) do you formally follow for your LCI data sets / EPDs? (Mark all that apply for at least a relevant (>10%) share of the data sets.)	ISO14040/14044	ISO14040/14044	ISO14040/14044	ISO14040/14044	ISO14040/14044	ISO14040/14044
	ISO 14025				ISO 14025	
	ILCD Data Network - entry-level requirements	ILCD Data Network - entry-level requirements	ILCD Data Network - entry-level requirements			ILCD Data Network - entry-level requirements
	Global guidance principles of UNEP/SETAC LCI	Global guidance principles of UNEP/SETAC LCI				Global guidance principles of UNEP/SETAC LCI
	no specific methodology					
	own/other methodology (please name)			own/other methodology (please name)		
	Please name other or own methodology/standard/scheme and add web-link to document (if possible)			http://lca-forum.org/database/inventory/manual.pdf		ecospold
Does your database have a specific focus, i.e. generally aims at specific sectors / product groups only (opposed to officially aiming at covering all relevant sectors)?	Response	Aim is broad coverage of all relevant sectors in the country/region	Current aim is one or more dedicated sector(s) / product group(s) (please name below)	Aim is broad coverage of all relevant sectors in the country/region	Aim is broad coverage of all relevant sectors in the country/region	Aim is broad coverage of all relevant sectors in the country/region
	Please specify the specific database focus, if any		Food and drink sector			
Roughly how many data sets for YOUR country scope (production, consumption, or both) do you CURRENTLY make available in the database? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies	167		25	20	5
	Materials / raw materials	81	2	400	60	
	Systems / complex goods	6		255	60	
	End-of-life treatment	28		84	0	
	Transport services	28		34	10	
	Use phase at consumer	0		24	0	
	Other services / processes			0	0	
Roughly how many data sets for YOUR country scope (production, consumption, or both) will you make available in the database at the next FULL release? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies					20
	Materials / raw materials		15			600
	Systems / complex goods					
	End-of-life treatment					10
	Transport services					10
	Use phase at consumer					50
	Other services / processes					
Roughly how many data sets for OTHER countries/regions and country-unspecific data sets do you CURRENTLY make available in the database? In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies			25		
	Materials / raw materials			30		
	Systems / complex goods					
	End-of-life treatment					
	Transport services					
	Use phase at consumer					
	Other services / processes					
Number of data sets of different types in your database. Please give rough numbers; enter "0" if none:	LCI results (i.e. aggregated, only products/co-products and elementary flows in input/output list but no unconnected product/waste flows)	260	2	30	150	650
	Partly terminated systems (i.e. aggregated, but with unconnected product/waste flows in input/output list)	50	0	250	0	0
	Unit processes on plant or site level, covering multiple process steps	0	0	500	0	0
	Unit processes covering a single process step	30	0	100	0	0
	LCIA results of processes/products (also count those contained in LCI data sets)	0	0	0	0	0
	LCIA method data sets with characterisation factors	30	0	0	0	0
	Normalisation data sets	0	0	0	0	0
	Weighting data sets	0	0	0	0	0
	Other content data (social data, cost data, ... but NOT counting flows, units etc.)	0	0	0	0	0
Number of generic, specific, etc. data set types that you PUBLISH via your database. Please give rough numbers; enter "0" if none:	Generic data sets (i.e. modelled/generalised from "typical" process data)	0	0	300	150	0
	Average data sets (i.e. mix of specific data sets from different producers/sites)	0	0	300	0	0
	Specific data sets (i.e. specific producer brand/model, incl. EPDs)	0	2	100	0	0
	Generic/average/specific combination (i.e. average or specific data completed with generic data in foreground and/or background system)	0	0	150	0	0
Impact coverage – please select all impact categories that the inventory of the wide majority (i.e. > 80%) of your data sets covers WELL (if the respective impact is relevant for the individual data set):	Climate change	Climate change	Climate change	Climate change	Climate change	Climate change
	Acidification	Acidification	Acidification	Acidification	Acidification	Acidification
	Eutrophication	Eutrophication	Eutrophication	Eutrophication	Eutrophication	Eutrophication
	Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics		Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics
	Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog		Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog
	Ozone depletion	Ozone depletion	Ozone depletion	Ozone depletion	Ozone depletion	Ozone depletion
	Human toxicity	Human toxicity	Human toxicity		Human toxicity	Human toxicity
	Ionising radiation	Ionising radiation	Ionising radiation		Ionising radiation	
	Ecotoxicity	Ecotoxicity	Ecotoxicity		Ecotoxicity	Ecotoxicity
	Land use	Land use	Land use			Land use
	Material resource depletion	Material resource depletion	Material resource depletion	Material resource depletion	Material resource depletion	Material resource depletion
	Energy resource depletion	Energy resource depletion	Energy resource depletion	Energy resource depletion	Energy resource depletion	Energy resource depletion
	Water resource depletion	Water resource depletion	Water resource depletion		Water resource depletion	Water resource depletion
	Other (please specify below)					

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	* Main country/region of the database content	Quebec (Canada)	Taiwan	Thailand	United States 1	United States 2
How good is the inner consistency of your national database?	LCA methodology (note: "fully" implies absence of relevant method choices)	Mostly consistent	Limited consistency	Mostly consistent	Fully consistent	Mostly consistent
	Elementary flows, flow properties and units, and related nomenclature	Fully consistent	Fully consistent	Mostly consistent	Fully consistent	Mostly consistent
	Product and waste flows nomenclature and classification	Mostly consistent	Mostly consistent	Mostly consistent	Fully consistent	Mostly consistent
	Completeness of impact category coverage (if relevant for a data set)	Fully consistent	Limited consistency	Limited consistency	No wider consistency; data set library	Mostly consistent
Which method(s)/standard(s)/scheme(s) do you formally follow for your LCI data sets / EPDs? (Mark all that apply for at least a relevant (>10%) share of the data sets.)	ISO14040/14044		ISO14040/14044	ISO14040/14044	ISO14040/14044	ISO14040/14044
	ISO 14025					
	ILCD Data Network - entry-level requirements		ILCD Data Network - entry-level requirements		ILCD Data Network - entry-level requirements	
	Global guidance principles of UNEP/SETAC LCI				Global guidance principles of UNEP/SETAC LCI	
	no specific methodology					
	own/other methodology (please name)	own/other methodology (please name)				
	Please name other or own methodology/standard/scheme and add web-link to document (if possible)	ecoinvent v3 Data Quality Guidelines	PAS 2050			
Does your database have a specific focus, i.e. generally aims at specific sectors / product groups only (opposed to officially aiming at covering all relevant sectors)?	Response	Aim is broad coverage of all relevant sectors in the country/region			Current aim is one or more dedicated sector(s) / product group(s) (please name below)	Aim is broad coverage of all relevant sectors in the country/region
	Please specify the specific database focus, if any				United States Agriculture	primarily commodity flows
Roughly how many data sets for YOUR country scope (production, consumption, or both) do you CURRENTLY make available in the database? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies	64	2	12	0	130
	Materials / raw materials	346	61	250	536	650
	Systems / complex goods	5	0		0	5
	End-of-life treatment	83	0	37	0	22
	Transport services	10	0	188	0	156
	Use phase at consumer	0	0	30	0	
	Other services / processes	3	0		0	
Roughly how many data sets for YOUR country scope (production, consumption, or both) will you make available in the database at the next FULL release? (In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies				0	130
	Materials / raw materials				20000	700
	Systems / complex goods				0	
	End-of-life treatment				0	22
	Transport services				0	156
	Use phase at consumer				0	
	Other services / processes				0	
Roughly how many data sets for OTHER countries/regions and country-unspecific data sets do you CURRENTLY make available in the database? In case of both aggregated data sets and unit processes on the same activities/products, please count only one of the two; see also next questions. Please also count data sets "doubles", i.e. with different allocation settings, in different formats or languages, etc. only once):	Energy carriers and technologies	0			0	
	Materials / raw materials	0			0	20
	Systems / complex goods	0			0	
	End-of-life treatment	0			0	
	Transport services	0			0	
	Use phase at consumer	0			0	
	Other services / processes	0			0	
Number of data sets of different types in your database. Please give rough numbers; enter "0" if none:	LCI results (i.e. aggregated, only products/co-products and elementary flows in input/output list but no unconnected product/waste flows)	500	0	443	0	40
	Partly terminated systems (i.e. aggregated, but with unconnected product/waste flows in input/output list)	0	0	45	0	40
	Unit processes on plant or site level, covering multiple process steps	400	20	0	536	450
	Unit processes covering a single process step	100	43	0	0	450
	LCIA results of processes/products (also count those contained in LCI data sets)	500	0	0	0	0
	LCIA method data sets with characterisation factors	0	0	0	0	0
	Normalisation data sets	0	0	0	0	0
	Weighting data sets	0	0	0	0	0
	Other content data (social data, cost data, ... but NOT counting flows, units etc.)	0	0	0	0	0
Number of generic, specific, etc. data set types that you PUBLISH via your database. Please give rough numbers; enter "0" if none:	Generic data sets (i.e. modelled/generalised from "typical" process data)	225	0	100	466	250
	Average data sets (i.e. mix of specific data sets from different producers/sites)	225	4	388	70	450
	Specific data sets (i.e. specific producer brand/model, incl. EPDs)	50	59	0	0	1
	Generic/average/specific combination (i.e. average or specific data completed with generic data in foreground and/or background system)	0	0	0	0	250
Impact coverage – please select all impact categories that the inventory of the wide majority (i.e. > 80%) of your data sets covers WELL (if the respective impact is relevant for the individual data set):	Climate change	Climate change	Climate change	Climate change	Climate change	Climate change
	Acidification	Acidification		Acidification	Acidification	Acidification
	Eutrophication	Eutrophication			Eutrophication	Eutrophication
	Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics		Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics	Particulate matter / respiratory inorganics
	Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog			Photochemical ozone formation / summer smog	Photochemical ozone formation / summer smog
	Ozone depletion	Ozone depletion			Ozone depletion	Ozone depletion
	Human toxicity	Human toxicity			Human toxicity	Human toxicity
	Ionising radiation	Ionising radiation			Ionising radiation	Ionising radiation
	Ecotoxicity	Ecotoxicity			Ecotoxicity	Ecotoxicity
	Land use	Land use			Land use	Land use
	Material resource depletion	Material resource depletion		Material resource depletion	Material resource depletion	Material resource depletion
	Energy resource depletion	Energy resource depletion		Energy resource depletion	Energy resource depletion	Energy resource depletion
	Water resource depletion	Water resource depletion			Water resource depletion	Water resource depletion
	Other (please specify below)					

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	* Main country/region of the database content	Australia	Brazil	Chile 1	Chile 2	Europe
	Other (please specify)		It is not possible to know at this moment.			
With which elementary flow list(s) and following which nomenclature do you officially provide your LCI data sets?	we provide exclusively LCIA results					we provide exclusively LCIA results
	ILCD / ELCD flow list		ILCD / ELCD flow list			
	ecoinvent flow list	ecoinvent flow list		ecoinvent flow list	ecoinvent flow list	
	Multiple lists / no consolidated list					
	Other or own list or specific variant of one of the above lists (please name below)					
	Other or own (please name)					... from ILCD flow lists
How do you ensure that your LCI data sets' inventories are correctly linked to LCIA methods and characterisation factors? (please mark all that apply to a relevant degree):	Response	We do not explicitly address the link to LCIA, but leave this step to the data users	We do not explicitly address the link to LCIA, but leave this step to the data users	We rely on the external software or database developers that distribute our data to ensure this connection works correctly	We rely on the external software or database developers that distribute our data to ensure this connection works correctly	We provide also LCIA method data sets (i.e. characterisation factors), in connection with the elementary flow list of our LCI data sets
	Other (please describe)					
Which extent of data set specific documentation do you provide (i.e. next to method and other general reports)?	Response	comprehensive in data set but no or short external report	comprehensive in data set but no or short external report	no/little in data set and short external report	no data set but exclusively report (e.g. EPD)	comprehensive in data set but no or short external report
In which language(s) is/are the majority of the data sets accessible/available?	Database access/interface language(s):	English	English	spanish	Spanish	French and English
	Core information (i.e. data set name, country/region, flow names, units) language(s):	English	English	english/spanish	Spanish and English	English
	Complete data set documentation language(s):	English	English	spanish	Spanish and English	English
	Separate report (if available) language(s):	English	English	spanish	Spanish and English	French
In which form(s) / format(s) do you yourself provide the data sets? (Select all that apply):	pdf file or other text format				pdf file or other text format	
	ILCD/ELCD format xml files	ILCD/ELCD format xml files	ILCD/ELCD format xml files			ILCD/ELCD format xml files
	ISO/TS 14048 format					
	EcoSpold format xml files	EcoSpold format xml files		EcoSpold format xml files		
	Excel or csv file with own structure	Excel or csv file with own structure		Excel or csv file with own structure	Excel or csv file with own structure	Excel or csv file with own structure
	Own / other format(s) or specific format-variants (please name below)				Own / other format(s) or specific format-variants (please name below)	
	Own / other(s) (please list)					The metadata are in ILCD format. The elementary flows are not provided (only LCIA).
How and where do you give access to your data sets? (Select all that apply):	Database on own homepage for search and download	Database on own homepage for search and download		Database on own homepage for search and download	Database on own homepage for search and download	Database on own homepage for search and download
	Database on own homepage for direct access with LCA software (e.g. via an API)			Database on own homepage for direct access with LCA software (e.g. via an API)	Database on own homepage for direct access with LCA software (e.g. via an API)	
	Our database is accessible as part of an online database network		Our database is accessible as part of an online database network	Our database is accessible as part of an online database network		
	File system / download links on own homepage			File system / download links on own homepage		
	Via third-party LCA software developers (official distribution partner)	Via third-party LCA software developers (official distribution partner)				
	Other (please name below)					
	Others (please specify)					
Do you know / have heard about the European Commission's ILCD Life Cycle Data Network that is now being publicly launched on 6 February?	Response	No	Yes	Not sure	Yes	Yes
If you know it: Do you consider giving access to your data additionally / alternatively via the ILCD Life Cycle Data Network?	Response			Not sure	Not sure	Yes
How good do you consider the current life cycle data AVAILABILITY (i.e. availability of data of SUFFICIENT quality for a wide range of materials, parts, complex products, energy carriers, and for transport, waste management and other service processes)?	The overall coverage of products produced in my country is ...	poor; does not allow to do robust/valid studies	poor; does not allow to do robust/valid studies	fair, to do mostly valid studies on at least a few product groups	still sufficient, to start doing first and mostly valid studies	still sufficient, to start doing first and mostly valid studies
	The overall coverage of products from my country's MAIN IMPORT TRADE partner countries is ...	very poor; no/almost no data	still sufficient, to start doing first and mostly valid studies	poor; does not allow to do robust/valid studies	still sufficient, to start doing first and mostly valid studies	poor; does not allow to do robust/valid studies
How good do you consider the QUALITY of the currently available LCI data sets (i.e. technological, geographical and time representativeness; precision; completeness of inventory / impact coverage)?	The overall quality is of data sets for my country is ...	still sufficient	poor	Don't know / no answer	still sufficient	good
	The country-representativeness of data sets for my country is ...	poor	poor	Don't know / no answer	poor	good
	The overall quality of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	very poor	very good	Don't know / no answer	poor	good
	The compatibility (i.e. LCI method, elementary flows, data format, review requirements, ...) of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	poor	very good	Don't know / no answer	poor	good
So, we are almost there: How relevant are the following characteristics of an LCI data set to be accepted for publication via your national database?	Method compatibility (i.e. with a common LCA method used in the database)	indispensible	indispensible	quite relevant	little relevant	indispensible
	Data quality in a stricter sense (i.e. national and technological representativeness, age, completeness, precision)	quite relevant	quite relevant	somewhat relevant	quite relevant	indispensible
	Provided to database manager in required form/format, elementary flows, etc. for direct import into database	somewhat relevant	indispensible	somewhat relevant	somewhat relevant	indispensible
	Data set documentation extent and detail	quite relevant	indispensible	quite relevant	somewhat relevant	indispensible
	Credible review (i.e. independent, external and qualified)	quite relevant	quite relevant	somewhat relevant	quite relevant	indispensible
	Credible/trusted source	quite relevant	quite relevant	quite relevant	indispensible	quite relevant
	Acceptance of data set by represented industry (that produces the product / operates the process)	somewhat relevant	somewhat relevant	indispensible	don't know / no opinion	quite relevant
	Data transparency down to unit processes	indispensible	little relevant	indispensible	don't know / no opinion	somewhat relevant
	If data set stems from third parties: Ensured long-term maintenance/updates of data set	quite relevant	quite relevant	indispensible	indispensible	somewhat relevant
	Other (please specify below)					
	Comment / Other characteristics of relevance					Regarding "Data transparency down to unit processes": very relevant but mainly not applied to this database (only for datasets produced in the frame of the project)
And finally: How important do you consider the following elements to come to GLOBALLY COMPATIBLE National LCA databases?	Common set of application-specific LCA methods that ensure reproducible, method-compatible data sets	quite relevant	indispensible	indispensible	don't know / no opinion	indispensible
	Common minimum review requirements	somewhat relevant	indispensible	indispensible	don't know / no opinion	quite relevant
	Comparably measured and documented data set quality	quite relevant	indispensible	quite relevant	quite relevant	quite relevant
	Common set of elementary flow, flow property and units are used	quite relevant	indispensible	quite relevant	quite relevant	indispensible
	IT-compatibility by using common data set format	quite relevant	quite relevant	indispensible	somewhat relevant	quite relevant
	Documented impact coverage in each data set	indispensible	somewhat relevant	somewhat relevant	somewhat relevant	quite relevant
	Common minimum documentation requirements in data set	somewhat relevant	quite relevant	quite relevant	somewhat relevant	quite relevant
	Common minimum background report requirements for each data sets	somewhat relevant	quite relevant	somewhat relevant	quite relevant	quite relevant
	Other (please specify below)					

	* Main country/region of the database content	Europe	Italy	Japan	Malaysia	Mexico
	Other (please specify)		The ILCD recommended impact categories are supported.			
With which elementary flow list(s) and following which nomenclature do you officially provide your LCI data sets?	we provide exclusively LCIA results					
	ILCD / ELCD flow list	ILCD / ELCD flow list	ILCD / ELCD flow list		ILCD / ELCD flow list	ILCD / ELCD flow list
	ecoinvent flow list					ecoinvent flow list
	Multiple lists / no consolidated list				Multiple lists / no consolidated list	Multiple lists / no consolidated list
	Other or own list or specific variant of one of the above lists (please name below)			Other or own list or specific variant of one of the above lists (please name below)		
	Other or own (please name)			14 output flows (CO2, CH4, HFC, PFC, N2O, SF6, NOx, SOx, dust, BOD, COD, T-N, T-P, SS)		
How do you ensure that your LCI data sets' inventories are correctly linked to LCIA methods and characterisation factors? (please mark all that apply to a relevant degree):	Response	We provide also LCIA method data sets (i.e. characterisation factors), in connection with the elementary flow list of our LCI data sets	Other (please describe below)	We do not explicitly address the link to LCIA, but leave this step to the data users	We do not explicitly address the link to LCIA, but leave this step to the data users	We rely on the external software or database developers that distribute our data to ensure this connection works correctly
	Other (please describe)		The LCI are not linked to LCIA methodds and thus, we rely on external software developers. However, the documentation is clear in stating that only the ILCD recommended impact categories are supported, and thus the practitioners have all the elements to make a consistent connection between LCI and LCIA:			
Which extent of data set specific documentation do you provide (i.e. next to method and other general reports)?	Response	comprehensive in data set and comprehensive external report	comprehensive in data set but no or short external report	comprehensive in data set and comprehensive external report	comprehensive in data set but no or short external report	comprehensive in data set but no or short external report
In which language(s) is/are the majority of the data sets accessible/available?	Database access/interface language(s):	English and several others	English	Japanese	English	spanish/english
	Core information (i.e. data set name, country/region, flow names, units) language(s):	English	English	Japanese	English	spanish/english
	Complete data set documentation language(s):	English	English	Japanese	English	spanish/english
	Separate report (if available) language(s):	English	English/Italian	Japanese	English	
In which form(s) / format(s) do you yourself provide the data sets? (Select all that apply):	pdf file or other text format				pdf file or other text format	pdf file or other text format
	ILCD/ELCD format xml files	ILCD/ELCD format xml files	ILCD/ELCD format xml files		ILCD/ELCD format xml files	ILCD/ELCD format xml files
	ISO/TS 14048 format				ISO/TS 14048 format	
	EcoSpold format xml files					EcoSpold format xml files
	Excel or csv file with own structure					Excel or csv file with own structure
	Own / other format(s) or specific format-variants (please name below)			Own / other format(s) or specific format-variants (please name below)		Own / other format(s) or specific format-variants (please name below)
	Own / other(s) (please list)			JLCA format		
How and where do you give access to your data sets? (Select all that apply):	Database on own homepage for search and download			Database on own homepage for search and download	Database on own homepage for search and download	Database on own homepage for search and download
	Database on own homepage for direct access with LCA software (e.g. via an API)	Database on own homepage for direct access with LCA software (e.g. via an API)				Database on own homepage for direct access with LCA software (e.g. via an API)
	Our database is accessible as part of an online database network	Our database is accessible as part of an online database network	Our database is accessible as part of an online database network			
	File system / download links on own homepage	File system / download links on own homepage				File system / download links on own homepage
	Via third-party LCA software developers (official distribution partner)	Via third-party LCA software developers (official distribution partner)				
	Other (please name below)					
	Others (please specify)					
Do you know / have heard about the European Commission's ILCD Life Cycle Data Network that is now being publicly launched on 6 February?	Response	Yes	Yes	Not sure	Yes	Yes
If you know it: Do you consider giving access to your data additionally / alternatively via the ILCD Life Cycle Data Network?	Response	Yes	Yes	Not sure	Not sure	Not sure
How good do you consider the current life cycle data AVAILABILITY (i.e. availability of data of SUFFICIENT quality for a wide range of materials, parts, complex products, energy carriers, and for transport, waste management and other service processes)?	The overall coverage of products produced in my country is ...	don't know / no answer	still sufficient, to start doing first and mostly valid studies	good, to do valid studies on many product groups and corporate/site-level studies	still sufficient, to start doing first and mostly valid studies	still sufficient, to start doing first and mostly valid studies
	The overall coverage of products from my country's MAIN IMPORT TRADE partner countries is ...	don't know / no answer	don't know / no answer	fair, to do mostly valid studies on at least a few product groups	still sufficient, to start doing first and mostly valid studies	fair, to do mostly valid studies on at least a few product groups
How good do you consider the QUALITY of the currently available LCI data sets (i.e. technological, geographical and time representativeness; precision; completeness of inventory / impact coverage)?	The overall quality is of data sets for my country is ...	Don't know / no answer	still sufficient	good	fair	poor
	The country-representativeness of data sets for my country is ...	Don't know / no answer	poor	good	fair	poor
	The overall quality of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	Don't know / no answer	Don't know / no answer	fair	fair	poor
	The compatibility (i.e. LCI method, elementary flows, data format, review requirements, ...) of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	Don't know / no answer	Don't know / no answer	fair	fair	poor
So, we are almost there: How relevant are the following characteristics of an LCI data set to be accepted for publication via your national database?	Method compatibility (i.e. with a common LCA method used in the database)	don't know / no opinion	indispensible	indispensible	quite relevant	somewhat relevant
	Data quality in a stricter sense (i.e. national and technological representativeness, age, completeness, precision)	don't know / no opinion	indispensible	quite relevant	quite relevant	quite relevant
	Provided to database manager in required form/format, elementary flows, etc. for direct import into database	don't know / no opinion	indispensible	quite relevant	quite relevant	quite relevant
	Data set documentation extent and detail	don't know / no opinion	indispensible	indispensible	quite relevant	quite relevant
	Credible review (i.e. independent, external and qualified)	don't know / no opinion	indispensible	quite relevant	somewhat relevant	somewhat relevant
	Credible/trusted source	don't know / no opinion	indispensible	quite relevant	quite relevant	somewhat relevant
	Acceptance of data set by represented industry (that produces the product / operates the process)	don't know / no opinion	quite relevant	quite relevant	quite relevant	indispensible
	Data transparency down to unit processes	don't know / no opinion	quite relevant	somewhat relevant	somewhat relevant	indispensible
	If data set stems from third parties: Ensured long-term maintenance/updates of data set	don't know / no opinion	quite relevant	somewhat relevant	quite relevant	little relevant
	Other (please specify below)	don't know / no opinion		don't know / no opinion	indispensible	
	Comment / Other characteristics of relevance				Cost that will be incurred, as well as ownership to be reported in the documentation etc have to be worked out before data sets that are not developed by SIRIM as host of the database system are included.	
And finally: How important do you consider the following elements to come to GLOBALLY COMPATIBLE National LCA databases?	Common set of application-specific LCA methods that ensure reproducible, method-compatible data sets	don't know / no opinion	indispensible	quite relevant	quite relevant	quite relevant
	Common minimum review requirements	don't know / no opinion	indispensible	quite relevant	quite relevant	quite relevant
	Comparably measured and documented data set quality	don't know / no opinion	indispensible	somewhat relevant	quite relevant	quite relevant
	Common set of elementary flow, flow property and units are used	don't know / no opinion	indispensible	quite relevant	quite relevant	indispensible
	IT-compatibility by using common data set format	don't know / no opinion	indispensible	quite relevant	somewhat relevant	somewhat relevant
	Documented impact coverage in each data set	don't know / no opinion	indispensible	quite relevant	quite relevant	quite relevant
	Common minimum documentation requirements in data set	don't know / no opinion	indispensible	indispensible	quite relevant	quite relevant
	Common minimum background report requirements for each data sets	don't know / no opinion	indispensible	indispensible	somewhat relevant	somewhat relevant
	Other (please specify below)	don't know / no opinion		don't know / no opinion	little relevant	

	* Main country/region of the database content	Quebec (Canada)	Taiwan	Thailand	United States 1	United States 2
	Other (please specify)					
With which elementary flow list(s) and following which nomenclature do you officially provide your LCI data sets?	we provide exclusively LCIA results		we provide exclusively LCIA results			
	ILCD / ELCD flow list			ILCD / ELCD flow list		
	ecoinvent flow list	ecoinvent flow list		ecoinvent flow list		ecoinvent flow list
	Multiple lists / no consolidated list					
	Other or own list or specific variant of one of the above lists (please name below)				Other or own list or specific variant of one of the above lists (please name below)	
	Other or own (please name)				We are currently refining our flows to match the ecoinvent flow list	
How do you ensure that your LCI data sets' inventories are correctly linked to LCIA methods and characterisation factors? (please mark all that apply to a relevant degree):	Response	We rely on the external software or database developers that distribute our data to ensure this connection works correctly	We provide pre-calculated LCIA results (in data sets or as EPDs)	We rely on the external software or database developers that distribute our data to ensure this connection works correctly	We do not explicitly address the link to LCIA, but leave this step to the data users	We do not explicitly address the link to LCIA, but leave this step to the data users
	Other (please describe)					
Which extent of data set specific documentation do you provide (i.e. next to method and other general reports)?	Response	comprehensive in data set but no or short external report	comprehensive in data set but no or short external report	comprehensive in data set but no or short external report	comprehensive in data set and comprehensive external report	comprehensive in data set but no or short external report
In which language(s) is/are the majority of the data sets accessible/available?	Database access/interface language(s):	English	Chinese (We will develop English interface this year)	English	english	English
	Core information (i.e. data set name, country/region, flow names, units) language(s):	English	Chinese (We will develop English interface this year)	English	english	English
	Complete data set documentation language(s):	English	Chinese	Thai	english	English
	Separate report (if available) language(s):	English		Thai	english	English
In which form(s) / format(s) do you yourself provide the data sets? (Select all that apply):	pdf file or other text format		pdf file or other text format	pdf file or other text format		
	ILCD/ELCD format xml files				ILCD/ELCD format xml files	
	ISO/TS 14048 format					
	EcoSpold format xml files			EcoSpold format xml files	EcoSpold format xml files	EcoSpold format xml files
	Excel or csv file with own structure		Excel or csv file with own structure	Excel or csv file with own structure		Excel or csv file with own structure
	Own / other format(s) or specific format-variants (please name below)	Own / other format(s) or specific format-variants (please name below)				
	Own / other(s) (please list)	ecoSpold v2 format				
How and where do you give access to your data sets? (Select all that apply):	Database on own homepage for search and download	Database on own homepage for search and download	Database on own homepage for search and download		Database on own homepage for search and download	Database on own homepage for search and download
	Database on own homepage for direct access with LCA software (e.g. via an API)					
	Our database is accessible as part of an online database network	Our database is accessible as part of an online database network	Our database is accessible as part of an online database network			
	File system / download links on own homepage					
	Via third-party LCA software developers (official distribution partner)					
	Other (please name below)			Other (please name below)		Other (please name below)
	Others (please specify)			request by email or internet		data is available at the LCA Data Commons
Do you know / have heard about the European Commission's ILCD Life Cycle Data Network that is now being publicly launched on 6 February?	Response				Yes	Yes
If you know it: Do you consider giving access to your data additionally / alternatively via the ILCD Life Cycle Data Network?	Response	Not sure			Yes	Yes
How good do you consider the current life cycle data AVAILABILITY (i.e. availability of data of SUFFICIENT quality for a wide range of materials, parts, complex products, energy carriers, and for transport, waste management and other service processes)?	The overall coverage of products produced in my country is ...	fair, to do mostly valid studies on at least a few product groups	still sufficient, to start doing first and mostly valid studies	fair, to do mostly valid studies on at least a few product groups	poor; does not allow to do robust/valid studies	still sufficient, to start doing first and mostly valid studies
	The overall coverage of products from my country's MAIN IMPORT TRADE partner countries is ...	poor; does not allow to do robust/valid studies	fair, to do mostly valid studies on at least a few product groups	fair, to do mostly valid studies on at least a few product groups	don't know / no answer	good, to do valid studies on many product groups and corporate/site-level studies
How good do you consider the QUALITY of the currently available LCI data sets (i.e. technological, geographical and time representativeness; precision; completeness of inventory / impact coverage)?	The overall quality is of data sets for my country is ...	good	fair	good	poor	still sufficient
	The country-representativeness of data sets for my country is ...	fair	fair	very good	poor	still sufficient
	The overall quality of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	poor	fair	Don't know / no answer	Don't know / no answer	good
	The compatibility (i.e. LCI method, elementary flows, data format, review requirements, ...) of data sets for the MAIN IMPORT TRADE partner countries of my country is ...	poor	fair	Don't know / no answer	Don't know / no answer	good
So, we are almost there: How relevant are the following characteristics of an LCI data set to be accepted for publication via your national database?	Method compatibility (i.e. with a common LCA method used in the database)	indispensible	quite relevant	quite relevant	irrelevant	somewhat relevant
	Data quality in a stricter sense (i.e. national and technological representativeness, age, completeness, precision)	quite relevant	quite relevant	quite relevant	little relevant	quite relevant
	Provided to database manager in required form/format, elementary flows, etc. for direct import into database	indispensible	quite relevant	indispensible	quite relevant	quite relevant
	Data set documentation extent and detail	quite relevant	quite relevant	quite relevant	indispensible	quite relevant
	Credible review (i.e. independent, external and qualified)	indispensible	quite relevant	indispensible	quite relevant	quite relevant
	Credible/trusted source	quite relevant	somewhat relevant	quite relevant	somewhat relevant	quite relevant
	Acceptance of data set by represented industry (that produces the product / operates the process)	little relevant	somewhat relevant	quite relevant	somewhat relevant	quite relevant
	Data transparency down to unit processes	indispensible	somewhat relevant	somewhat relevant	quite relevant	quite relevant
	If data set stems from third parties: Ensured long-term maintenance/updates of data set	little relevant	somewhat relevant	somewhat relevant	little relevant	quite relevant
	Other (please specify below)					don't know / no opinion
	Comment / Other characteristics of relevance				We are heavily focused on complete metadata. Our philosophy is that it is not for us to judge the quality of the data, but we will have the metadata peer reviewed. The metadata must be robust enough for users to discriminate among data sets.	
And finally: How important do you consider the following elements to come to GLOBALLY COMPATIBLE National LCA databases?	Common set of application-specific LCA methods that ensure reproducible, method-compatible data sets	indispensible	quite relevant	indispensible	little relevant	quite relevant
	Common minimum review requirements	somewhat relevant	quite relevant	indispensible	little relevant	quite relevant
	Comparably measured and documented data set quality	somewhat relevant	quite relevant	quite relevant	somewhat relevant	quite relevant
	Common set of elementary flow, flow property and units are used	indispensible	quite relevant	quite relevant	quite relevant	somewhat relevant
	IT-compatibility by using common data set format	indispensible	quite relevant	quite relevant	quite relevant	somewhat relevant
	Documented impact coverage in each data set	indispensible	somewhat relevant	somewhat relevant	indispensible	quite relevant
	Common minimum documentation requirements in data set	quite relevant	somewhat relevant	indispensible	indispensible	quite relevant
	Common minimum background report requirements for each data sets	somewhat relevant	somewhat relevant	indispensible	quite relevant	quite relevant
	Other (please specify below)	indispensible				don't know / no opinion

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	* Main country/region of the database content	Australia	Brazil	Chile 1	Chile 2	Europe
	Other (please specify)					"IT-compatibility by using common data set format" or by using robust and stable converters.
Any other comment/feedback about national LCA databases?	Open-Ended Response					
If you still have time and energy: the survey had a ...	Relevance		high	high	high	very high
	Focus		high	still sufficient	still sufficient	high
	Clarity		still sufficient	very high	low	high
	Neutrality		high	very high	still sufficient	high
	Completeness		still sufficient	high	still sufficient	high
	Overall quality		still sufficient	high	still sufficient	high
	Other comment/feedback on survey form and content					Unit Processes datasets produced in the frame of some specific data development projects (Agribalyse, ACYVIA) might be used for eco-design purpose. These datasets are made available publicly but not through ADEME's Base Impacts website, on request. For all other products exclusively the LCIA results are available.

	* Main country/region of the database content	Europe	Italy	Japan	Malaysia	Mexico
	Other (please specify)					
Any other comment/feedback about national LCA databases?	Open-Ended Response		The database is presently ata demonstration stage. It has been launched together with the Life Cycle Data Network, with 2 datasets as a demonstration. Activities to extend the number of datasets until 15 are in place, and are foreseen to be completed in the coming months. A working Group has been established by the Ministry of Environment, involving industry representatives, associations and research centres, in order to establish a long lasting plan for the development of the database.		Questions not a key concern currently, issue is lack of demand for LCA in the country.	
If you still have time and energy: the survey had a ...	Relevance		high		low	still sufficient
	Focus		high		still sufficient	still sufficient
	Clarity		high		still sufficient	low
	Neutrality		high		still sufficient	still sufficient
	Completeness		high		still sufficient	still sufficient
	Overall quality		high		high	still sufficient
	Other comment/feedback on survey form and content					

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	* Main country/region of the database content	Quebec (Canada)	Taiwan	Thailand	United States 1	United States 2
	Other (please specify)	Data transparency down to unit processes OR, at minimum, partially unterminated datasets for major inputs.				
Any other comment/feedback about national LCA databases?	Open-Ended Response			We have full reports on data sets kept at MTEC and we'll provide to public upon specific request only.	Our data representing US commodity crop production are unallocated. It is our preference that submitted data be unallocated, However, the allocation approach must be fully documented and clear. Ultimately, we will include pesticides and fertilizers and seed crops. We will not be providing data on deisel and other upstream process that occur outside of the agricultural sector.	
If you still have time and energy: the survey had a ...	Relevance	high				
	Focus	high				
	Clarity	still sufficient				
	Neutrality	high				
	Completeness	high				
	Overall quality	high				
	Other comment/feedback on survey form and content	Thank you for allowing more time to answer the survey, hope to see the results!				

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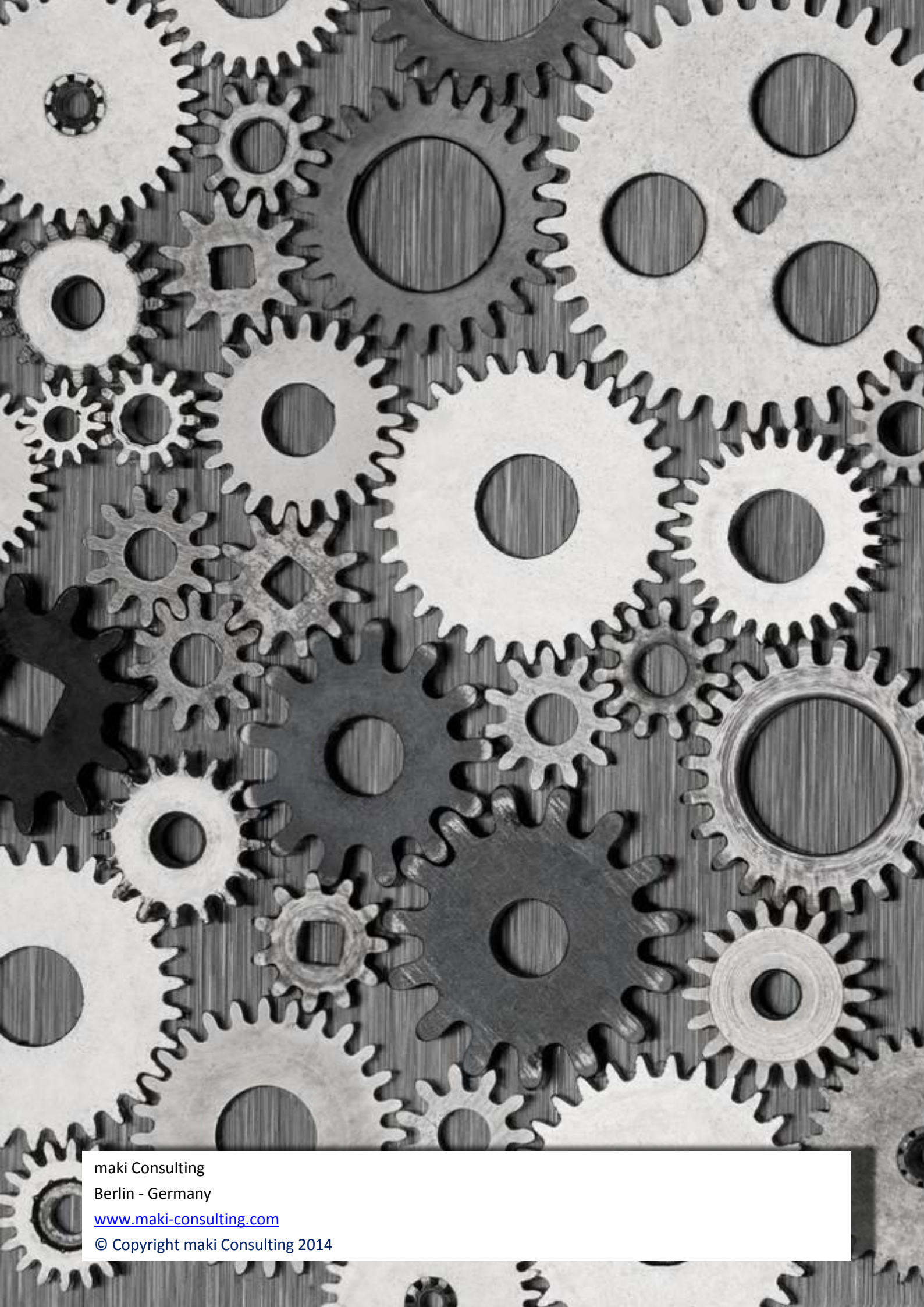

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