

Life Cycle Analysis and Carbon Footprint, uses and limitations in Public Procurement

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Abstract

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Over the last two decades public procurement has won recognition as an important tool to support implementation of environmental policies. Thus public procurement has been introduced as an accompanying tool in environmental product policies (such as the Integrated Product Policy), energy policies and, more recently, also in innovation policies as public procurement can foster market penetration of green products and services and the development of new environmentally friendlier solutions.

In order to define what a greener product or service is, public procurers can use different instruments set in environmental policies, that includes regulatory instruments as well as voluntary communication instruments. Most countries and also at EU level define their green criteria based on existing regulations and on ecolabels, applying a life-cycle thinking perspective and consulting with the market. However there is a growing pressure and interest in using full Life-Cycle Assessments (LCA) and Carbon Footprints (CF). The first one as a tool to demonstrate the overall impact of a product or activity. The second one as climate protection is still a major priority in many public authorities.

Nevertheless, its use in public procurement is still reduced due to intrinsic limitations and potential conflicts with public procurement regulations. Therefore this paper highlight and present from the public procurement perspective why LCA and CF are not yet widely used in Green Public Procurement (GPP), what are the main factors hindering its use in comparison to other voluntary systems and information sources (such as ecolabels) based on the degree of complexity, harmonisation, comparability of offers and legal framework of public procurement. It will also try to propose ways to progress on its use in a way that doesn't conflict with public procurement regulations at EU level.

Keywords: Green public purchasing, Green public procurement, Ecolabel, Life cycle assessment, Environmental declaration, Carbon footprint

1. Introduction

The recognition of public procurement as an important policy tool for environmental relief, economic development and competitiveness has been consolidated in recent years in parallel to the evolutionary process of environmental policies. Such policies are deployed by a wide variety of instruments each one of them originated and created by different stakeholders and with different objectives.

Life-cycle assessment (LCA) has been since the origins an important tool for strategic planning and decision-making in new products development and corporate strategy (Jensen 1997). In the same way carbon footprint assessment, a simplified LCA focussing only on global warming impacts, allows organisations to identify where they produce more greenhouse emissions and plan measures to reduce them. Whereas ecolabels were established specifically to provide information to consumers about the relative environmental quality of products and have become a useful tool for governments to encourage greener consumption and for businesses in identifying and establishing markets for their environmentally friendlier products (Global Ecolabelling Network [GEN] 2004).

LCA and carbon footprint are essential tools to promote and widespread life-cycle thinking to all decision making levels, however the growing interest in using them directly in public procurement arises some concerns due to the conflict between the intrinsic characteristics of such tools and public procurement regulations.

Thus the purpose of this paper is to contribute to the understanding of the interaction between LCA and Carbon Footprint (CF) with public procurement in order to avoid set backs in the implementation of green public procurement.

2. Understanding Public Procurement in the European Union

Public procurement differs from any other type of procurement (from the private sector or the general public) in that it is strongly regulated. In the European Union (EU) public procurement is regulated by the EU public procurement Directives (over certain thresholds), by National procurement regulations (under those thresholds) and as part of the World Trade Organisation (WTO), certain public procurements have to also respect WTO government procurement agreements.

However in order to understand the basics of public procurement in the EU, it is necessary to look not only at the Directives but also at the context within which they were adopted (Support for Improvement in Governance and Management [SIGMA] 2011) and which determines its content, the European Union. One of the main objectives of the creation of the EU has been to establish a single internal market that eliminates barriers to trade between EU Member States. In that respect, EU public procurement legislation is found in those premises and with the purpose to, among others, eliminate existing barriers and new possible ones to internal trade from the public sector perspective in order to support the Treaty on the functioning of the European Union (TFEU)¹ (Arrowsmith 2010, SIGMA 2011).

In order to achieve that, public procurement in the European Union has to respect some key principles to guarantee competition and non-discrimination, namely freedom of movement of goods and to provide services, equal treatment, transparency, proportionality and mutual recognition (Arrowsmith 2010, SIGMA 2011, European Commission [EC] 2011). And in fact these principles apply independently of the Directives and national regulations, as Under EU law a directly applicable provision of the TFEU will override any inconsistent national legislation (Arrowsmith 2010). Therefore they have to be strongly considered when defining any kind of procurement procedure and criteria.

¹ Formerly known as the EC Treaty, the Treaty of Rome or the Treaty establishing the European Community. The TFEU was given its name and amended by the Lisbon Treaty. The TFEU sets out organisational and functional details of the European Union (European Union 2007).

3. Green Public Procurement as a policy instrument

The use of public purchasing to enforce and implement national policies can be traced back to the 19th century when procurement was used as a mean to tackle social justice issues, from fair labour conditions to fare wages, unemployment or integration of disabled people (McCrudden 2004).

Its use for environmental purposes however is much more recent and it is not until the end of the 20th century that a strong relation between environmental protection and public procurement is made at international level, with the inclusion in the Rio Declaration on Environment and Development, also known as the Agenda 21, of an action calling governments to review their purchasing policies and improve their environmental content in order to encourage more sustainable consumption patterns (United Nations 1992, Chapter 4, paragraph 4.23). Ten years later, in 2002, the international commitment is strengthened in the Plan of Implementation of the World Summit on Sustainable Development held in Johannesburg, which calls for the promotion of “public procurement policies that encourage development and diffusion of environmentally sound goods and services” (United Nations 2002, Chapter 3, paragraph 19.c).

At European level the role of environmentally responsible public procurement in relation to strategic and thematic policies has radically evolved during that decade from being closely linked to the promotion of green technologies and eco-efficient products (environmental policies) to becoming a key instrument for the economic development and competitiveness of Europe (innovation and economic policies).

Thus GPP has been introduced as an accompanying instrument in eco-product policies (such as the Integrated Product Policy or the Environmental Technology Action Plan), in energy related directives (such as the Directive on energy end-use efficiency and energy services or the Directive on clean and energy-efficient road transport vehicles) or in innovation strategies (like the Lead Markets Initiative or the Union for Innovation Initiative).

That means that public procurement serves as a support instrument for the market penetration of greener, more innovative products and solutions and only in innovation initiatives it promotes the development of more environmentally sustainable alternatives. In that regard, GPP is always an accompanying tool; it can serve as driving force but cannot be implemented by itself.

The first GPP initiatives in the 80s-90s in Europe took place in Central and Nordic countries in parallel to the definition of ecolabelling schemes (such as the Blue Angel in Germany or the Nordic Swan in the Scandinavian countries) and many environmental criteria depend on the existence of regulations, standardised test methods and product declarations to be possible. Thus, without a well-developed environmental policy and the existence of other instruments the use of GPP is limited and less efficient.

For example, the political commitment to promote environmental quality in energy using products with the EuP Directive² fostered the European Vending Association to establish a standard to evaluate the energy efficiency of vending machines and develop an energy label for the sector in line with the ones developed in other ones (the EVA-EMP energy labelling standard). Before that it was very difficult if not impossible to evaluate the energy efficiency and consumption of vending machines when selecting such services in public procurement. However once the sector defined the standard, it was possible to consider energy efficiency easily in public procurement and to promote companies calculate it and advertise it for the benefit of other contracting organisations. Besides the impact of standards promoted through environmental policies have a greater impact than trying to establish calculation methods by a public administration individually.

² Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.

Public procurement is not an environmental tool to define what a green product is but it uses existing instruments that do so in order to select between options and alternatives and promote market penetration of greener products, services and companies. As mentioned above, public procurement is not a stand-alone tool that can be applied all by itself, but an accompanying tool to complementary policies and instruments (not only environmental but also social, economical, for innovation).

4. The definition of environmental criteria for Green Public Procurement

For public procurement to act as a market driver for the wider introduction of environmentally friendlier products and services (also referred as only products) we need to define which are the characteristics that make a product “green”. To do so, life cycle thinking, that is the consideration of all environmental impacts throughout the life cycle of a product or service, is key in order to avoid shifting environmental burdens to different vectors, actors, regions and/or to the future.

Instruments that can be used in GPP to define the environmental criteria, products need to comply with or are preferable and make them “green”, are regulations and voluntary communication tools (such as environmental labelling or environmental management systems). As those instruments are defined: 1) within a different framework than public procurement, 2) by environmental experts, institutions and the industry with different agendas and motivations and 3) for divers purposes (i.e. to define general policies, to help improve production processes and goods or to inform individual consumers), its use in public procurement is not straight forward due to the legal limitations of public procurement.

As already presented in section two, public procurement differs from any other type of procurement (from the private sector or the general public) in that it is strongly regulated in order to guarantee non-discrimination and competition. Due to those strict rules for Public Procurement, procurers are constrained in relation to what environmental criteria they can demand and how they can specify them in the tenders. Thus, whatever criteria procurers want to include, they have to guarantee that they are: link to the subject matter, transparent (clear and verifiable), comparable, proportional and non-discriminatory.

In order to define environmental criteria, procurers, as already mentioned before, can use regulatory instruments (mainly Directives, laws and regulations) and communication instruments such as environmental labelling (according to ISO standards), which includes: typical type I ecolabels (ISO 14024), type II environmental self-declarations (ISO 14021) and type III quantified environmental product declarations (ISO/TR 14025) based on life-cycle assessments (ISO 14044).

Most countries and also at EU level define their green criteria based on existing regulations and on ecolabels, applying a life-cycle thinking perspective and consulting with the market. However there is a growing pressure and interest in using full Life-Cycle Assessments and Carbon Footprints. LCA as a tool to demonstrate the overall impact of a product or activity because it is a process to evaluate the environmental burdens and impacts associated with a product, process, or activity throughout its life cycle from the extraction of materials, its processing, manufacturing, transportation, use and disposal (from cradle to grave). CF as climate protection is still a major priority in many public authorities. Despite that, its use in public procurement is still reduced due to several limitations linked to the tools themselves and to the legal constraints of public procurement. In the following sections we analyse the reasons for the greater use of regulations and type I ecolabels in opposition to full LCA and CF.

4.1. The use of regulations and Type I ecolabels

When public authorities contract a work or service or the supply of goods, they select the offer that, on the basis of an equitable comparison between the different offers received offers best value for money (according to the criteria set in the tender or call for offers).

The easiest way to define environmental specifications that comply with the key principles mentioned in section two (of transparency, comparability, non-discrimination, etc.) and, that at the same time are easy to verify, is by refereeing to regulations.

For example, in the case of vehicle procurement, public authorities in the European Union can demand cars' CO₂ emissions to be under a certain threshold and award additional points to those suppliers that offer less emitting vehicles. As the declaration of cars' CO₂ emissions is legally regulated (both in terms of calculation method and information declaration) and compulsory for all manufactures and vehicles, this criterion is easy to use by public authorities as it is transparent and comparable (Adell 2012).

When not a single criteria is considered or when procurers don't know what exact criteria make a product or service greener, the main source of information used by practitioners are Type I ecolabels such as the European Ecolabel, the German *Blauer Engel* or the Nordic *Swanen*. These types of labels are used because they guarantee that products that comply with the requirements set in the ecolabel are environmentally better than a conventional product: "ecolabels reflect a determination and recognition of a products' environmental performance leadership characteristics [...]. In this respect, the ecolabels "flag" leadership products in the marketplace" (GEN 2004).

During the development process of Type I ecolabel requirements, stakeholders from the government, private sector as well as other interested parties, consider the impacts of products or services throughout their life cycle, focus on a few key attributes and assess industry performance in those areas in order to define the final set of requirements that products have to comply with in order to be awarded the ecolabel (GEN 2004).

Ecolabel requirements are widely used in public procurement because:

- They refer specifically to the product or service and its production process.
- They guarantee a better environmental performance. Products or services complying with ecolabel criteria are environmentally better than a conventional product.
- They are adopted on the basis of scientific information and are the result of a broad consultation process with all interested parties.
- They are normally clear and precise relating to tests, exclusion of certain substances, etc.
- Many of them are define as pass/failure specifications, which facilitates comparison.
- What is very important, they are easy to verify as they normally refer to standardised analysis and calculation methods (defined by law) and they indicate how to verify compliance (type of test or documents to be submitted).
- And also they can easily be selected in order to promote the achievement of national environmental priorities, one of GPP's objectives.

The relation of Type I labels and GPP is so close that at European level, the European Commission has set up a combined procedure to develop GPP criteria during the development of European Ecolabel requirements (EC 2011).

4.2. The use of full life-cycle assessment and Type III environmental declarations

The limited application of full LCA in the definition of Type I ecolabels requirements has raised concerns in relation to the relevance of selected requirements and the real environmental relief of prioritised production methods (GEN 2004). That is one of the reasons why Type III Environmental declarations³ are winning popularity in the business sector and, by extension, there is a growing pressure in using them in public procurement.

³ A Type III environmental declaration provides quantified environmental data of a product based on life cycle assessments conducted following some pre-set parameters and system boundaries.

However LCA and their expression in Type III environmental declarations have several limitations as tools for public procurement due to “self-limitations” as well as restrictions related to public procurement legal framework.

In relation to “self-limitations” on the one hand, even though LCA quantifies the environmental impact of products in their whole life cycle (from cradle to grave), not all impacts can be included and quantified in LCA. For example illegal logging, wood stemming from sustainably managed forestry, biodiversity loss or risks from using genetically modified organisms are environmental aspects that are not quantified or considered in LCA. LCAs are portrayed as more comprehensive, accurate and objective than Type I ecolabels, but as any tool and for the purpose of public procurement, they are also incomplete and by using them in procurement we omit or might forget to take into consideration those relevant impacts.

On the other hand, LCA and Type III declarations by their very nature, provide only environmental data of the performance of a product in certain impact categories (global warming, ozone depletion, eutrophication, etc.) but by themselves don't demonstrate that a product is environmentally better. For that only a comparison between declarations can be conducted, benchmarking different products among each other and thus obtaining a relative ranking of them that still don't guarantee a real better environmental performance in comparison to conventional ones. For a company, the calculation of the LCA of their products provides by itself important information to improve their product design, production process and products performance but for procurement comparison is required.

When applied to public procurement, additional limitations arise. LCA is a long complicated process that requires taking decisions in many different steps in order to produce the environmental assessment throughout the life cycle. ISO regulation 14044 on life cycle assessment provides a general framework in order to conduct LCAs however it leaves the individual practitioner with a wide range of choices, which can affect the legitimacy of the results of an LCA study (EC Joint Resource Centre- Institute for Environment and Sustainability [IES] 2010) or the possibility to compare studies as results may vary considerably depending on the assumptions made during the study. Type III environmental declarations set parameters and system boundaries for LCA by product groups but as there is no harmonisation between different Type III schemes, comparison between declarations are not straight forward and it is difficult to evaluate from non-experts such as procurement practitioners. Therefore LCAs and Type III declarations when conducted under different schemes or with different assumptions don't comply with one basic principle in public procurement, which is comparability.

Even if LCAs were totally harmonised, in some cases specific LCA data for the specific product throughout the supply chain do not exist. Therefore companies are allowed to use a proportion of generic data that is data that is not from the specific factories involved in the process but from aggregated sources for the sector. Doing so studies are more complete but from the public procurement perspective it might arise concerns, as then LCA results do not refer totally to the product or service being contracted but to generic sector data and it could lead to distorted or even false results and decisions. A company with information in all steps of its supply chain might obtain worst results than another one that uses generic data for some of the steps, affecting the objectivity and fairness of the comparison of offers, crucial in public procurement. Having to use data specifically linked to the actual production of that product and not generic data brings the issue of traceability through the supply chain and also the changes that occur on it constantly. LCA values and CO₂ for the product would be changing constantly, requiring a too large effort for the result.

LCAs using generic data could be useful in order to select the sectors on which prioritise GPP actions, as a planning tool, but not in actual procurement activities. The only exception when the use of generic data would be acceptable is in the procurement of the design of a solution or idea. LCA results of a design would always be based on generic data and therefore comparability could be guaranteed. In fact that is the application most used of LCA in public procurement (Jonkers, Tóth and van Oijen 2010). In that case however, all other parameters should be set in order to assure comparability (scope, data sources, assumptions, evaluation unit, impact categories, etc.).

Furthermore not all impacts calculated through LCA are equally important for each organisation. Each one has environmental priorities (either local, national or international) that might want to promote through public procurement. LCA gives results for several impact categories and procurers don't have the expertise to decide by themselves, which one is more relevant for the environmental goals of their organisations. ISO 14044 foresees the possibility of weighting in order to combine all impact categories into one final result. However it also states in section 4.1., that: "It should be recognized that there is no scientific basis for reducing LCA results to a single overall score or number." (ISO 2006). Furthermore section 4.4.5. mentions that: "weighting [...] shall not be used in LCA studies intended to be used in comparative assertions intended to be disclosed to the public" (ISO 2006). Therefore LCAs and Type III declarations are difficult to use by procurers when specific environmental priorities want to be tackled through procurement.

Another drawback of using LCA and Type III declarations in public procurement, which is more acute than using ecolabel-based criteria, is the discriminatory potential towards small and medium enterprises (SMEs). The promotion of SMEs access to public procurement is another EU priority. LCA requires a lot of information that SMEs might not have or be able to gather from their suppliers. Furthermore, costs of undertaking a full life cycle analysis are considerable and maybe even prohibitive for SMEs (Allison and Carter 2000). When defining green public procurement criteria selected from regulations or ecolabels both large and small and medium size companies have the same possibilities. However when asking for LCA or Type III environmental declarations and awarding tenders based on their results, we might discriminate a portion of the market that cannot afford calculating LCAs for their products.

To all the limitations of using LCA and Type III declarations for public procurement presented above we need to add the ones linked specifically to the calculation of global warming impacts, which are presented in the next session as well as the fact that there are still few products with Type III declarations (and Carbon footprint information).

4.3. The use of full Carbon Footprint or climate declarations

The growing concern about climate change has resulted in the development of calculation tools, standards, labels and declarations that focus exclusively on their emissions of green-house gases, expressed as CO₂-equivalents, that is on their carbon footprint. A Carbon Footprint (CF) is described as the parameter to describe the amount of greenhouse gases (GHG) emissions caused by a company, event and activity or by a product/service during its life cycle in order to determine its contribution to climate change (ISO 2012).

Due to a lack of common and harmonized rules, the scope of CF calculation varies considerably ranging from only direct CO₂ emissions to full life-cycle GHG emissions, including indirect emissions embodied in upstream production processes (Del Borghi). If we focus on the most comprehensive carbon footprinting option, based on life-cycle assessment and consider its application in public procurement, the following concerns arise some linked to the tool itself and others when confronted with procurement rules and regulations.

On the one hand, by its very nature CF are partial as it focuses only on CO₂-eq emissions linked mainly to energy consumption. Even though climate change is very important it is not the only environmental challenge nowadays therefore concentrating only on climate change is very reductionist and might shift environmental burdens resulting in the promotion of products that do not necessarily have a better overall environmental performance (IES 2005-2010). Favoring extraction processes, production methods and technologies with low intensity energy use although positive doesn't allow us to evaluate or realized the actual exploitation level of the resources, the intensity in the use of other resources (such as water) or the environmental problems caused by them in other impact categories (quantifiable or not in full LCAs). Thus for example might promote the search for better energy performance at the expenses of recuperation or recycling processes. Besides, focusing on CO₂ dilutes the importance and visibility of energy consumption and efficiency with the potential consequence of producing a similar pattern in strategies development as with waste, where the 3Rs start with reduction

but most efforts focus not in prevention (reduction and reuse) but in “the cure” through recycling. In that regard, CF are not better tools than Type I ecolabels so the same criticism can be applied, if not more, in relation to the relevance as a tool to demonstrate real environmental relief of prioritised production methods.

On the other hand, when used in public procurement CF face the same limitations already mentioned for full LCAs (lack of a unified methodology, risk of data not totally linked to the production process of the product in each stage but use of generic data, possible discrimination to SMEs) and the ones related to the calculation of CO₂ itself that apply also to full LCAs.

The first element of potential conflict is due to the inclusion of transport emissions in LCA and CF calculations. From an environmental perspective and in order to know the full impact of a product, transport emissions are very important especially in a globalised economy, however from a public procurement perspective, a conflict of interests arises with the principle of free movement of products and services.

Based on CF, for example, if two products from different companies had the same emissions considering all manufacturing steps, the one produced at locally/regionally would most of the times have lower emissions than a product produced abroad. As already mentioned in section two, public procurement legislation at EU level is found mainly in the free movement provisions of the TFEU and was elaborated with the aim of avoiding discrimination within the EU in order to create a free market in the EU (Arrowsmith 2010). Therefore considering transport emissions in LCA/CF could be an element of “hidden” internal discrimination, which would enter into conflict not only with procurement directives and regulations but also with one important principle of the TFEU. At present and in legal terms there is a priority order and freedom of movement has a higher ranking, which translates into the possibility of promoting environmental protection through public procurement as long as freedom of movement is guaranteed. That also enters in contradiction with possible policies to promote regional economic development when tried to apply through public procurement. Furthermore, lower impacts due to less polluting transport systems are not entirely a result of a company decision but depend greatly on the national context and reality (in one country for example freight transport by rail could be very accessible whereas in another one, due to lack or less developed rail infrastructure, that possibility could not be possible). Imputing to the product the impacts of something the company have limited decision reach would be unfair.

Even deciding to exclude emissions from materials and products transport to avoid that problem, another one arises along the same lines. CO₂ production emissions from energy use depend, on the one hand, on consumption levels and on the other on the energy source. A company has control and decision capacity about the efficiency of their equipment and, to a certain extent, about the energy sources to use. However, when that one is electricity from the national mix it is not clear that one could discriminate a product with high CO₂ levels because it is produced in a country with a high-carbon electricity mix. This “discrimination” may be from an environmental point of view desirable, but not in the frame of public procurement. In a similar theoretical example as before, if two products consumed the same amount of energy to be produced and from the same energy sources, one could have lower CF just because the national electricity mix is based on hydroelectric (or nuclear) energy in comparison with the other one where the national mix has a strong contribution of coal and combined cycle plants. In both cases we would again discriminate on the basis of something the company might have no control upon as it depends on the country’s context (and not in all countries can company decide to buy green electricity). In that regard, energy efficiency expressed in energy consumption per unit would be a better indicator of the company’s environmental performance than CO₂ emissions.

Lastly, besides the use of CF at product level and for product selection, there are some initiatives to use CF at company level (scope 1 and 2 according to GHG Protocol) as part of the selection criteria of the bidding companies in public procurement. The main objective is to raise awareness on the subject and force companies to calculate their CF. However selection criteria in public procurement have a clear and regulated function, which is to make sure that bidders have the technical and professional capacity to execute the contract in the way it is prescribed in the tenders, therefore any selection

criteria has to be linked to the contract's subject matter and contract execution and not to the general environmental performance of companies.

5. Conclusions and recommendations

In order to promote the achievement of environmental objectives and to drive market penetration of greener products and services through public procurement, practitioners need to know what makes a product greener and how it can be promoted within the legal provisions and constraints of public procurement.

In terms of environmental relief all solutions are incomplete and have their advantages and limitations. Type I ecolabels might not be based in full LCAs but they apply a life-cycle thinking approach and allow considering a wide variety of criteria. LCA and Type III environmental declarations quantify impacts in different environmental categories avoiding burden shifting however they omit other important non-quantifiable impacts. And CF is a partial instrument with all its limitations.

Regulations and criteria from Type I ecolabels are the most used resources because they:

- Can be easily selected in order to promote the achievement of national environmental priorities (one of GPP's objectives),
- Refer specifically to the product or service and its production process,
- Are adopted on the basis of scientific information and are the results of a broad consultation process with all interested parties,
- Are normally clear and precise relating to tests, exclusion of certain substances, etc.,
- Are easy to verify, in case of regulations because they define the standardised analysis/calculation method and declaration documents; in case of ecolabels because they refer to the regulations and also indicate how to verify compliance (type of test or documents to be submitted),
- Ecolabel criteria guarantee a better environmental performance. Products or services complying with ecolabel criteria are environmentally better than a conventional product, although some are concerned for the lack of use of full LCA in their definition and the risk of burden transfer, and
- Many of them are define as pass/failure specifications, which facilitates comparison.

On the other hand, there is a growing interest on using LCA, Type III declarations and CF. However its use in tenders is so far limited and presents several limitations in comparison to regulations and Type I ecolabels:

- They are more complex than Type I criteria and require greater expertise from procurers,
- Comparability is not guaranteed, as LCAs require making several assumptions that can affect results. Even with Type III declarations comparability might be compromised as there are a variety of systems worldwide with different pre-set parameters and even using the same one the use of generic data when no specific information is available (specially through the supply chain) compromises fair comparison. LCA and CF are very "data" intensive to be precise, to the level to be linked directly "to the object of the contract".
- Exclusion and limitation of competition is higher when using LCA and CF as companies have to conduct such calculations in order to comply with the tender specifications or be awarded points. With ecolabel-based criteria products from different companies might be able to comply with a larger/smaller number of specifications. However with LCA and CF there is no partial compliance, either you have calculated them or not. That can be discriminatory especially towards SMEs and limit competition.
- Targeting of environmental priorities is more complicated (except for some of them, like climate change) as they might be reflected in several impact categories or even not reflected, as not all impacts are quantifiable.

- And by its very nature such tools can be discriminatory in terms of freedom of movement in relation to CO2 emissions and global warming impacts.

For more than 10 years the lack of progress in GPP implementation was due to the legal uncertainty about how to introduce green criteria in public contracts. The use of life cycle assessments and carbon footprinting in public procurement arises some issues and concerns about the legality of its use in public procurement therefore its promoters need to be aware of those constraints in order to foster its use only in legally secured tendering processes to avoid legal insecurities, conflicts and the risk of going backwards in GPP implementation (which is not so broadly implemented anyways as several EU and national studies show).

Nevertheless LCA (and to a lesser extend CF) can be a very useful tool in public procurement related issues. This includes its use:

- To plan and prioritise those product groups and environmental areas where to focus efforts, in a similar way like the EIPRO e IMPRO studies (decision making phase), and
- In complex product groups or in innovation where planning and design is the object of the contract and the overall environmental performance is evaluated (like for infrastructure and buildings or design of solutions such as event stands or innovations. In those cases, it can be used: i) previously to decide the appropriate solution (planning phase) or ii) in the tendering phase as part of the proposal; and in any case it will be necessary to define the tool to be used, information sources and scope of LCA calculations in order to guarantee comparability.

Further development of LCA/CF, improved LCA data through the supply chain and defining LCA methodologies adapted to GPP are also ways forward to improve this tool for future potential legally-sound use in public procurement.

REFERENCES

- Adell, A. (2012). Ecodesign in the Mediterranean region, a needed tool to reduce impacts and obtain market advantage and penetration. *2n Congrés Internacional de Disseny i Innovació de Catalunya 25-27 abril*, approved to be published.
- Allison C., Carter A. (2000). Study on different types of Environmental Labelling (ISO Type II and III Labels): Proposal for an Environmental Labelling Strategy. Oxford: Environmental Resources Management.
- Arrowsmith, S. et.al. (2010). EU public procurement law: an introduction. EU Asia Inter-University Network for Teaching and Research in Public Procurement Regulation. <http://www.cbs.dk/Forskning/Institutter-centre/Projekter/EU-Asia-Inter-University-Network-for-Teaching-and-Research-in-Public-Procurement-Regulation/Menu/Publications/Menu/Textbooks> (accessed 16 April 2012).
- Del Borghi, A. et.al. Carbon footprint vs climate declaration: Two tools in comparison. Retrieved from: <http://www.environdec.com/en/Articles/Climate-Declarations/Carbon-Footprint-vs-Climate-Declaration-two-tools-in-comparison/> (accessed 16 April 2012).
- European Commission [EC] (2011). COMMISSION STAFF WORKING PAPER Evaluation Report Impact and Effectiveness of EU Public Procurement Legislation SEC (2011) 853 final Part 1. European Commission. Retrieved from: http://ec.europa.eu/internal_market/publicprocurement/docs/modernising_rules/er853_1_en.pdf
- EC Joint Resource Centre- Institute for Environment and Sustainability [IES] (2010). ILCD handbook International Reference Life Cycle Data System. European Union.
- EC Joint Resource Centre- Institute for Environment and Sustainability [IES] (1995-2010). Life Cycle Thinking and Assessment, Carbon Footprint. European Union. Retrieved from: <http://lct.jrc.ec.europa.eu/assessment/projects#g> (accessed 18 April 2012).
- European Union (2007). Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007. European Union. Retrieved from: <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:C:2007:306:SOM:EN:HTML> (accessed 12 April 2012).
- Jensen, A. et.al. (1997). Life Cycle Assessment (LCA) A guide to approaches, experiences and information sources. *Environmental Issues Serie*, 6, August. European Environment Agency. Retrieved from: http://www.eea.europa.eu/publications/GH-07-97-595-EN-C/Issue-report-No-6.pdf/at_download/file
- Global Ecolabelling Network [GEN] (2004). Global Ecolabelling Network (GEN) Information Paper: Introduction to Ecolabelling. GEN. Retrieved from: http://www.globalecolabelling.net/docs/documents/intro_to_ecolabelling.pdf
- Jonkers N., Tóth E, van Oijen C. (2010). LCA related sources and instruments in Sustainable Procurement Criteria. Amsterdam: Agentschap NL.
- International Organization for Standardization [ISO] (2006). ISO 14044. Environmental management - Life cycle assessment - Requirements and guidelines. Geneva: ISO.
- International Organization for Standardization [ISO] (2012). ISO/DIS 14067, Carbon footprint of products -- Requirements and guidelines for quantification and communication. Geneva: ISO.
- McCrudden, C. (2004). Using public procurement to achieve social outcomes. *Natural Resources Forum*, 28, Issue 4, pg. 257–267.
- Support for Improvement in Governance and Management [SIGMA] (2011). Public Procurement in the EU: Legislative Framework, Basic Principles and Institutions. *Public Procurement Brief*, 1, January. EC/OECD. Retrieved from: <http://www.sigmaweb.org/dataoecd/33/4/47449308.pdf>
- United Nations (1992). Agenda 21: Earth Summit - The United Nations Programme of Action from Rio. New York: United Nations Department of Public Information. Retrieved from: <http://www.un.org/esa/dsd/agenda21/> (accessed 1 April 2012).
- United Nations (2002). Plan of Implementation of the World Summit on Sustainable Development. Retrieved from: http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm (accessed 1 April 2012).