

# AN EXPERT REVIEW OF THE ENVIRONMENTAL PROFIT & LOSS ACCOUNT

What the Experts say: the Way Forward

PPR

AN EXPERT REVIEW  
OF THE ENVIRONMENTAL  
PROFIT & LOSS ACCOUNT

INTRODUCTION	3
PARTICIPANTS	5
OVERVIEW	6
OUTCOMES OF THE E P&L EXPERT REVIEW	13
WHAT THE EXPERTS SAID	15
RECOMMENDATIONS FOR FURTHER DEVELOPMENT OF THE E P&L ACCOUNTING FRAMEWORK	20

# INTRODUCTION

*14 December 2012*

At PPR we view sustainability as value-creating and enhancing shareholder and societal value while simultaneously taking into account the impact on the environment a business can have in the long run. As such, identifying and valuing the environmental impact that comes from producing and selling our products throughout the entire supply chain is an essential part of our long-term sustainability program and overall business strategy.

In November 2011 PPR published the first-ever Environmental Profit & Loss (E P&L) with its brand PUMA. It calculated the environmental impact for the key areas of greenhouse gas emissions (GHG), water use, land use, air pollution and waste, generated through the operations and supply chain of PUMA which was valued at € 145 million in 2010. The E P&L was seen as a pioneering approach to valuing natural capital and met with significant interest among national governments, sustainability experts, the integrated reporting community, and academics as well as a multitude of other companies. Since then we have taken it upon ourselves to champion the E P&L as a best practices tool that has the potential to change the way the business world measures, values and reports their impact on the environment. We view the E P&L as a key first step in the development of a natural capital accounting framework.

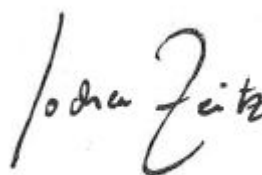
For the E P&L to be most effective and standardised – both for the implementation across PPR by 2015 and to help drive cross-industry adoption – part of the process was to open the E P&L up to scrutiny. We determined that expert opinion was necessary for the next phase of its development and PPR convened a group of independent experts with expertise in the different techniques and disciplines used in the E P&L.

This report presents their views and:

- *Provides the background and the benefits of an E P&L analysis*
- *Reviews the original E P&L methodology*
- *Presents the findings of the experts*
- *Recommends areas where the E P&L could be improved*
- *The way forward*

In sharing the experts' findings we want to engage the broader stakeholder community and encourage and highlight the importance of innovations such as the E P&L that can be of benefit to businesses and to the future of our planet. As well, we want to provide further input for the ongoing work on the E P&L methodologies to help make it available and scale it to other sectors and regions. We also hope to continue to add to the natural capital accounting discussion that has seen greater prominence in the international agenda since Rio +20 in June.

Best,



**Marie-Claire Daveu**

Chief Sustainability Officer and Head of international institutional affairs

**Jochen Zeitz**

Director and Chairman of the board's sustainable development committee

## PARTICIPANTS IN THE E P&L EXPERT REVIEW

Name	Affiliation	Role
John Barrett	University of Leeds	Professor of Sustainability Research
Josh Bishop	WWF Australia	National Manager - Markets, Sustainability and Business Partnerships at WWF Australia
Robert Costanza	Australian National University	Professor of Sustainability
Ioannis Kountouris	Imperial College London	Environmental Economics & Policy Co-convenor
Pushpam Kumar	UNEP; University of Liverpool	Chief Economist at UNEP Ecosystem Services division
Guillaume Majeau-Bettez	NTNU (Norwegian University of Science)	PhD Student
Jan Weinzettel	NTNU (Norwegian University of Science) and Charles University in Prague, Environment Center	Post-doctorate researcher
Peter Bakker	World Business Council for Sustainable Dev	President
Paul Druckman	International Integrated Reporting Council	CEO
John Elkington	Volans	Founding Partner & Executive Chairman
Pavan Sukhadev	TEEB, Gist Advisory	TEEB Study Leader & Chair of the TEEB Advisory Board
Michael Beutler	PPR Group	Director, Sustainability Operations
Holly Dublin	PPR Group	Director and Special Adviser, Sustainability (until January 1, 2013)
Reiner Hengstmann	PUMA	Global Director PUMA.Safe
Jochen Zeitz (opening introduction of day)	PPR Group	Director of PPR and Chairman of the board's sustainable development committee
Tom Beagent	PwC	Assistant Director, Sustainability & Climate Change
Quiller Brooke	PwC	Senior Associate, Sustainability & Climate Change
William Evison	PwC	Assistant Director, Sustainability & Climate Change
Alan McGill	PwC	Partner, Sustainability & Climate Change
Richard Mattison	Trucost	CEO
Alastair MacGregor	Trucost	COO
Ross Pow	Idenk	Facilitator

## OVERVIEW

In November 2011 PPR and its brand PUMA published the full results of the first-ever Environmental Profit & Loss Account (E P&L) which calculated PUMA's 2010 impact from its own operations and supply chain and valued it at € 145 million.

PPR determined that expert opinion was necessary for the next phase of its development and convened a group of independent experts with expertise in the different techniques and disciplines used in the E P&L.

Overall, the experts unanimously agreed that the concept of the E P&L was an excellent step in the right direction to promote the sustainable use of natural capital.

- The initiative was seen as an innovative and pioneering corporate approach to transparency to its environmental impact as well as a logical way to frame environmental issues for business
- The experts were impressed with the quality of the E P&L approach and noted that it clearly applied credible valuation approaches
- The current E P&L methodology was viewed as appropriate to support strategic decision making, provide insight into natural capital risks faced by business, highlight potential opportunities and act as a basis to communicate a company's impact on the environment to key stakeholders, including customers and investors

A challenge recognized going forward for the business community will be to understand how best to standardize the principles and the approach to producing an EP&L as well as facilitating the implementation of the accounting framework by more businesses.

The experts noted some areas where the methodology could be improved and the certainty in the results further enhanced.

- Increasing the amount of primary data on which the E P&L is based will help to reduce the uncertainty in the results. The results rely significantly on estimation techniques such as environmentally extended input-output (EIO) modelling and sourcing location information limited to the country level. For a business this can be a real challenge, especially where the impact is occurring deep in their supply chains.
- When using EIO modelling to estimate biophysical units, the results can be improved by hybridising the results with data collected directly from suppliers or from specific secondary sources such as Life Cycle Assessment (LCA) databases. Care should be taken when choosing the appropriate models or methods to ensure that the approach best reflects the characteristics of the specific supply chain.
- The uncertainty in the valuations could be further reduced by increasing the number of variables used to transfer values from existing studies to the locations relevant to the business and its suppliers.
- The E P&L would be improved with the addition of the impact of water pollution to the current impact areas of GHG emissions, other air emissions, land use, waste and water use.

PPR and PUMA appreciate the views and recommendations shared by the experts and are looking at ways to incorporate these in the E P&L methodology going forward, recognizing that any new accounting standard goes through an early period of rapid evolution. This report was reviewed by the experts and confirmed as being an accurate representation of the process as well as their technical insights, discussions and recommendations. The views shared here will help focus and accelerate this evolution.

## Background to the E P&L

Businesses depend on services provided by nature such as fresh water, clean air, healthy biodiversity and productive land, but the immense value of these services is not currently accounted for by business. Without measuring this value a business cannot effectively manage this impact and therefore cannot develop a sustainable business model.

After searching for a tool to help PUMA understand and measure the true cost of such services and finding nothing, PUMA embarked on the development of the Environmental Profit and Loss Account (E P&L). An E P&L is simply a means of placing a monetary value on the environmental impact along a company's value chain.

The concept of an E P&L was conceived by then PUMA CEO and Chairman, Jochen Zeitz, and the project to develop the E P&L commenced in November 2010 with the support of PPR, PUMA.Safe, Trucost and PwC. The initial results of the E P&L (covering greenhouse gas (GHG) emissions and water use) were published by PPR and PUMA in May 2011, and the full results published in November 2011 (with the addition of land use, air pollution and waste disposal). In publishing these results PUMA was the first company to attempt to measure the immense value of these services to a business, and the true costs of a business's impact on natural capital.

The short timeframe for the development of the first-ever E P&L meant that the methodologies developed were limited by what was achievable in the time available. It was seen as important to test the concept of the E P&L in this short timeframe, share the development publicly to invite feedback and spark further innovation before furthering the development of the methodologies.

Since the completion of the first phase of the corporate PUMA E P&L, PPR recognized the potential in the E P&L as a business tool and as key to the Group's overall sustainability strategy, and committed to implementing a Group E P&L by 2015 covering all the Group's Luxury and Sport & Lifestyle brands.



With the support of PPR, PUMA has also taken the analysis further with the development of the Product E P&L to extend the corporate level analysis, with initial results announced on the 8th of October 2012. The product level analysis helps compare the impact of similar products, and communicate to consumers the implications of their purchasing decisions.

## Business benefits

The E P&L is transforming how PPR and PUMA approach environmental management and extends the responsibility of a business beyond its own operations and direct control to include the entire supply chain. Due to this extension, PPR and PUMA are going beyond compliance and the traditional scope of reporting to acknowledge the real impact of the cost of doing business on nature.

The information provided by the E P&L delivers the following benefits to businesses:

- **Strategic tool:** The findings of the E P&L make transparent where businesses need to direct their sustainability initiatives in order to make real improvements in reducing their impact. As a result businesses can look into solutions to identify more sustainable materials, investigate the development of broadly-accepted definitions of sustainable cotton and rubber and pursue opportunities to reduce greenhouse gas emissions, as just a few examples.
- **Risk management tool:** The E P&L gives businesses an understanding of the value and nature of their environmental impact in the supply chain thus providing an early view of emerging risks, enabling businesses to respond strategically to protect and enhance shareholder value. This is particularly relevant in an industry already facing increasing input costs as a result of a changing climate and availability of water.
- **Transparency tool:** By reporting the results of an E P&L businesses can be transparent about the extent of their environmental impact thus providing a basis for more meaningful, evidence-based engagement with stakeholders

and to further enable the clear demonstration of the impact of a businesses activities to reduce their impact.

- **Supply chain understanding and opportunities:** The processes of evaluating environmental impact through the supply chain, mapping suppliers, engaging suppliers to collect data, and scrutinizing those data provides a new level of understanding of the activities and actors down the supply chain. This can inform and drive changes and opportunities beyond an improved understanding of environmental risk in the supply chain.

## **The development of a natural capital accounting framework**

The E P&L provides business with a new accounting framework that offers a clearer understanding of the relationship between the business and natural capital. It not only provides an understanding of how and where a business is dependent on natural capital, it also converts these dependencies into a common basis of measurement and a language business is familiar with – money. Ultimately, the E P&L better enables more informed business decision-making that takes account of environmental impact alongside more traditional financial and operational considerations.

The development of any new accounting framework starts with a period of rapid evolution. PUMA's 2010 E P&L was the first step in the development of a methodological approach to account for a business's relationship with natural capital which can be adopted by all businesses. Since the release of the first E P&L, the original development team have been looking for ways to further develop the E P&L accounting framework, which draws on well-established disciplines such as environmental economics, environmentally extended input-output modelling and Life Cycle Assessment. In order to take the next major development leap forward, all involved thought it was essential to bring in the views and experience of a wider group of external experts.

## **Taking the next step in the development – an expert review of the E P&L**

To further the development of the E P&L, PPR convened independent experts from across academia with expertise in the different techniques and disciplines used in the corporate and product E P&Ls such as: environmentally extended input-output modelling; Life Cycle Assessment; environmental valuation; and corporate sustainability. This review process balanced an analysis of what was achieved, with a forward-looking assessment of what could be done to improve the methodology. The objectives of the expert review process were as follows:

- Determine if the PUMA E P&L approach and methodologies applied, in the initial work, met the needs originally set out by PUMA, in particular to assess whether the results were 'fit for purpose' to assess risks in the supply chain, establish priorities for decision-making and management, identify business opportunities and further the development of transparency and integration in reporting.
- Propose ways in which the approach and methodologies presented could be further improved / enhanced to serve a variety of needs going forward.
- Highlight alternative approaches and methodologies that could enhance the approach going forward both within PPR's brands and for other corporates.

### **The process**

The review process itself was conducted in two stages. Firstly, selected experts provided structured comments on the detailed methodology documents that underpin the PUMA 2010 E P&L. The areas on which comments were requested are outlined in the appendix. These responses were collated into three groups:

- Observations on what has been done – comments focussing on the approach taken for PUMA's 2010 E P&L

- Ideas for improvement – forward looking comments focusing on how the E P&L methodology could be realistically improved upon
- Ideas for improvement – a step too far? – ideas where time and cost constraints that exist within business were thought to limit the ability for the E P&L to respond to the ideas at this point in time

A summary of the comments was provided to the experts prior to a face-to-face meeting in London, with PPR, PUMA, PwC and Trucost, to explore in more depth these comments and agree on the best way forward for the E P&L. These discussions were independently facilitated.

This summary of the written comments and workshop output is structured around each of the methodological areas. For each individual approach (estimation of biophysical units and the five valuation methodologies) the observations on what was done and ideas for improvement are presented. This report was reviewed by the experts and confirmed as being an accurate representation of the process, their technical insights, discussions and recommendations.

# OUTCOMES OF THE E P&L EXPERT REVIEW

## **Furthering business adoption**

The publication of the PUMA E P&L had created a significant interest among other companies and in the wider sustainability community. During the expert review some challenges were identified that the E P&L approach would need to overcome if it is to become widely adopted by businesses.

## **Complexity**

It was acknowledged that there is a lot of complexity in the E P&L methodology. Without the drive of business leadership the E P&L as an approach is unlikely to be used by more companies unless a more accessible methodology is developed for companies that do not have strong support from the senior executives. Standardisation of the E P&L approach should help broader adoption of the E P&L concept.

## **Decision-making**

The E P&L was seen to have great potential as a decision making tool but it was noted that no one had yet seen the forward 'game plan' for how this will be harnessed. The reasons behind this are the need for standardisation of the principles of the approach, and in particular how uncertainty is dealt with. This should be set out in a manual or 'cookbook' to guide businesses through the process and help with comparability between companies. This cookbook should also talk to other standards such as GRI.

Presenting the E P&L at different levels (ie corporate, product, site, etc) is useful and allows flexibility for different business models or end users. The value chain approach of the E P&L may provide additional motivation for supply chain integration.

It was particularly of interest how the E P&L could be used as an indicator of risk with the results used to inform the content of risk registers, and how it could influence investment or project appraisal decisions. The information in the E P&L was seen to be of value internally for CEO and CFOs, as well as externally for investors and insurers. It was recommended that a paper be published on how the E P&L has been used in this way by PPR/PUMA (in particular by the finance function), and how it could be used in the future.

## **Integration with other initiatives**

The E P&L is one amongst a number of corporate sustainability initiatives. It is therefore important that it align with other efforts and works together as part of a bigger strategy. In particular the Business for Better initiative, the International Integrated Reporting Council, the World Business Council on Sustainable Development's Reporting Initiative, the TEEB (The Economics of Ecosystems and Biodiversity) for Business Coalition and the Global Reporting Initiative were discussed. In addition, the E P&L approach should link up with national level initiatives such as Wealth Accounting and the Valuation of Ecosystem Services (WAVES) and individual government national capital initiatives and could also link to national accounting standards such as The Financial Accounting Standards Board (FASB).

## **Driving public policy**

By providing greater transparency on the impact of business on society the E P&L can provide companies with leverage in public policy discussions which can ultimately help shape better-enabled and more sustainable business operating environments in future.

## WHAT THE EXPERTS SAID

Overall, the concept of the E P&L received unanimous and enthusiastic support. It was seen as an excellent first step in the right direction to promote the sustainable use of natural capital. The initiative was seen as an innovative, refreshing and honest corporate initiative.

### **Philosophy of an E P&L – were the principles of the E P&L appropriate?**

The principles of an E P&L were confirmed as a logical way to frame environmental issues for business, and in particular to identify and quantify environmental footprints.

Experts agreed that it is important for a business to share responsibility for activities in their supply chain, and thought it was therefore important that the boundary of the E P&L included the supply chain. Additional insight could be provided by extending the analysis to a cradle-to-grave, or even to a cradle-to-cradle level.

### **Defining the E P&L approach – were the approaches to estimation and valuation appropriate?**

Given the level of data available on PUMA's supply chain, particularly basic information further removed from PUMA's own activities, it was agreed that the approaches were appropriate to support strategic decision making, provide insights into natural capital risks faced by the business, highlight potential opportunities and act as a basis to communicate PUMA's impact on the environment to stakeholders, including customers and investors.

The quality and ambition of the study was viewed as impressive, particularly as the approach puts into practice frameworks from a range of academic disciplines, culminating in credible valuation frameworks for practical application by a business.

## *Estimation of bio-physical units*

To measure the drivers of each of the chosen impact, a global environmentally extended input output model (EIO), based on modified US input-output tables was used. This was supplemented with data sourced from PUMA's operations and suppliers.

The experts recognised a number of advantages and disadvantages of EIO modelling (table 1), however unanimously agreed that EIO was an appropriate basis and method for an E P&L and provides the best starting point to calculate impact along an entire supply chain. They noted that it is becoming more recognised as the only available approach to provide such an overview.

Some concern was raised on the variability of results from different types of EIO models. Therefore disclosure of details on the model used is critical to understand the results and the development of the accounting framework should seek to limit the variability.

*Table 1: Advantages and disadvantages of EIO modelling*

<b>Advantages</b>	<b>Disadvantages</b>
Completeness, avoids truncation error <sup>1</sup>	Often limited environmental extensions available
Good starting point	Generic nature of sectors
Fast, practical and relatively inexpensive	Inventories are not always current
Helps identify 'hotspots'	Difficult to model capital investments
Used by governments for similar purposes	Static models don't take account of changing cost and pricing structures of sectors and impact of technological change

---

<sup>1</sup> Truncation error refers to the impacts excluded from LCA results as a result of the system boundaries set for the LCA



## *Valuation of environmental impacts*

The environmental valuation approaches used in the E P&L quantify in monetary terms the changes in human welfare which result from PUMA's environmental impact. The E P&L therefore presents an estimated cost to society of PUMA's environmental impact.

All agreed that valuation of the environment is not about intrinsic value, but rather anthropocentric value of services provided by ecosystems to human populations. When applying a range of approaches for different impact areas care needs to be taken to avoid double counting of impact, for example, across land use and water use.

## **Are the E P&L methodologies suitable for application to products, sites or activities?**

In 2012 PUMA introduced a new lens to the E P&L – the product level analysis. All agreed the product-level analysis is compelling from a communication perspective and a useful way to engage consumers. To maximise the potential of the approach, products should be seen as parts which sum to the whole corporate. However, the approaches for the corporate and product E P&Ls employed to date appeared not to be fully integrated.

Experts agreed that analysis at a site level is arguably the most appropriate level for the E P&L as valuations can take into account the specific local context but they also accepted that data at the site level may not always be available. Site level E P&Ls were also thought to be very relevant to businesses whose operations are focussed at the site level such as mining companies and where data is more likely to be available.

## **Application of the approach to PUMA – were the approaches applied appropriately and consistently to the PUMA context?**

Overall feedback was very positive, however, the E P&L results are not without uncertainties, and there is room for improvement.

The following sections outline these areas for improvement:

### *Estimation of bio-physical units*

The need for greater transparency in the description of how the model was set up and applied was highlighted. Without such disclosure it is difficult to comment on the appropriateness of the application the EIO model.

The experts noted that the choice of EIO model is dependent on characteristics of the business model. For a business like PUMA whose supply chain touches on many economies around the world, the experts indicated that a model based solely on a single region to represent PUMA's supply chain was not necessarily the most appropriate choice. One of the advantages of, for instance, the US model is that it has a larger number of sectors available compared to many models and can therefore better reflect product categories. However, they pointed out that this should not be the only consideration. In particular, they noted that the US economy structure is generally a poor match for Asian economies, and that single region models fail to take account of international trade and as such results in increased uncertainty in the results. Guidance from the experts on how to choose an appropriate EIO model is set out below.

### *Valuation of environmental impacts*

#### *Country-level analysis*

Valuations experts recognised that to value impact across a global supply chain represented a new kind of challenge. Environmental valuation is designed for well-defined and discrete changes in environmental quality; applying these types of techniques to modelled outputs with limited contextual information is a key challenge. Experts agreed that country level valuations have greater uncertainty associated, particularly as they don't allow in-country heterogeneity

to be accounted for, however, they are still meaningful for an assessment such as the E P&L.

The experts thought the results probably provide an indication of lower bound of impact because not every aspect of human interactions with the environment has been valued yet. The relative lack of primary studies for global ecosystem services was a significant limitation and potentially a source of bias in the results.

### Uncertainty

While all experts recognised there is uncertainty around environmental valuations, they noted that financial reporting also includes uncertainties and estimations, however, financial reporting standards have evolved to agree on accepted levels of uncertainty. They agreed that there are accepted methods in the literature for minimising uncertainty, which are not dissimilar to those used for financial reporting. Where there are several options on a particular assumption it was appropriate to be conservative as per the approach to date. The experts stated that all assumptions should be clearly stated alongside the results.

## **Product level analysis – were concepts of the E P&L adapted and applied appropriately in the Product E P&L?**

Experts agreed that the best starting point for an E P&L was at the corporate level, which allows 'hot-spotting' of impact. This gives a focus for more specific analysis on parts of the supply chain (either certain sites or products) with relatively high levels of impact. Bottom up information then gleaned from product or site level analysis through, for example, LCA enriched with real supplier information, should then be re-integrated into the corporate level model, allowing it to be refined and re-run.

With regards to the modelling approach, the experts noted that EIO is too general for product level analysis. The Product E P&Ls used other techniques, such as LCA, for material impact. Some experts expressed concern that the initial approach did not include enough primary data and relied too heavily on LCA databases, which tend to be very generic.

# RECOMMENDATIONS FOR FURTHER DEVELOPMENT OF THE E P&L ACCOUNTING FRAMEWORK

## General Recommendations

The principle issues arise from the limited availability of actual data on a company's supply chain. Given the complex nature of international supply chains and the fluid nature of commodity markets it is unrealistic to ever have an exhaustive dataset. This means that using data derived from modelling of industry sources is required. All agreed that incremental improvements in supply chain visibility and data from those actually involved in PUMA's supply chain would be beneficial.

The E P&L results would also continue to benefit from a continued reduction of uncertainty and enhanced resolution, possibly with a range of values presented. There was some discussion as to whether the details of this should be presented in the 'headline' figures or in an appendix as the level of interest in uncertainty depends on the audience.

Though all agreed the E P&L is a great way of presenting impact which is easily grasped, they cautioned that it is important to be aware that an E P&L is currently more a backward looking indicator of the current perception of welfare impact, and not necessarily of sustainability over the long term.

## Estimation of biophysical units

### *Setting a standard*

There is a need to define a set of rules or principles for how estimations can be made. The experts highlighted that this should not prescribe a single approach but rather state the requirements for different approaches and state the level of transparency for each approach (akin to accounting policies in financial reporting), including key assumptions made. To achieve comparability of results the boundaries of the reported data need to be consistent.

## *Getting the most out of EIO modelling*

EIO can be used as a tool to identify key sectors of impact in what is commonly referred to as 'hot-spotting'. The identification of hot spots will provide focus for more detailed research into actual impact. Increased primary data (eg from PUMA's supply chain beyond Tier 1) alongside other forms of secondary data can be integrated into the model to create a hybrid EIO model. Continued iterative analysis will continually improve the quality of data by adding more specific information to sectors of greatest impact.

## *How to choose the most appropriate EIO model?*

The appropriateness of a specific type of model (ie. single region or multi-region) will vary from business to business and the most appropriate model will depend on the specific business operating model.

The experts highlighted three key factors to consider:

1. *Complexity of product/product categories* – which EIO model has sectors that best match the product categories?
2. *Countries from which a business source* – single region models are most applicable if a company sources mainly from a single country (due to domestic production assumption); if possible the single region model should represent the country or region of interest. Multi-region models may be more suitable when sourcing from many countries.
3. *Rate of change of technology / production efficiencies* – if this is changing rapidly then there is a need to ensure the EIO model technology assumptions match the actual technology as best as possible by using most up to date tables

For PUMA, some experts indicated that a move to multi-regional EIO models (MRIO) would represent an improvement and would map much better PUMA's global footprint and give the best representation of its complex international supply chain. The above three areas should be taken into consideration when

selecting a MRIO. They observed that the rationale set out in the detailed EIO methodology document for not considering MRIO models was not properly justified.

### *Dealing with inflation*

All experts agreed that it is important to adjust for inflation when using models. The experts suggested that the best way to deal with inflation is to use the most up to date tables available and deflate demand to the year of IO tables (rather than changing the IO table itself or adjusting environmental extensions). This will ensure the uncertainty around the relevance of the technology deployed in a specific region at the date of the IO tables (technology assumption) is minimised. They suggested that inflation should be adjusted at the sector level, using basic or producer pricing in preference to purchase pricing.

If dated IO tables are being used it is necessary to ensure that the inflation is adjusted for appropriately and the basis by which this was done should be disclosed in the stated assumptions.

### *When to use LCA?*

LCA databases can be used as a source of information to hybridise EIO analysis. This can be particularly useful when LCA databases contain details on relevant products and processes. Used together in such a way can help to overcome some of the weaknesses of each approach (eg LCA can help to reduce sector homogeneity found in EIO analysis and MRIO can help to better reveal structural differences between regions that LCA might not).

Comparative LCA's are also very useful when you want to compare one particular process/technology with an alternative. This leverages the advantages of an LCA without having to worry about truncation error.

### *Ideas for improvement: a step too far?*

EIO models provide a static view of the world. This is considered appropriate given the limited influence of PUMA on the world economy and ecosystem functioning. However, it was noted that a dynamic systems approach

to integrated environmental and economic modelling would provide a deeper level of insight. It was recognised that given the current level of modelling technology this would require very significant financial investment to research and develop and is therefore a step too far for the E P&L as a methodology/standard serving business.

## **Valuations – recommendations on the general approaches adopted**

As with the estimation of biophysical units, the experts have provided comments on how to take forward and improve the overall methodology around valuations. Their key recommendations are listed below.

### *Risk of double counting*

By being as specific as possible about the good that is being valued, focusing on ecosystem service benefits will help avoid this risk.

### *The importance of bio-physical units*

Given the unavoidable uncertainty in the 'real' social costs and therefore the results of the E P&L, it is important to continue to present and analyse the physical units alongside the results in value terms.

### *Valuation approaches*

Non-market valuation has a suite of different techniques that can be applied. One key source of discussion amongst economists is the use of production function approaches versus welfare approaches to estimate the value. Each approach has its own strengths and weaknesses. It was acknowledged that welfare approaches are a more inclusive and complete measure, but can suffer from a number of sources of uncertainty and bias if not implemented properly (eg limited information, anchoring bias, lexicographic preferences, sensitivity of scope and scale, non-marginal scenarios). As a result some governments, such as Bolivia, are not confident of welfare approaches, particularly on bequest and existence values. There is disagreement over best approaches amongst economists, but for estimation of social costs, welfare economics are considered

by many to be most suitable. In addition, production function approaches are not possible for many environmental goods, particularly where no market operates. This advice is consistent with the approach taken in the E P&L to date.

The main area for improvement identified was in how the benefit transfer<sup>2</sup> (which was confirmed as the best approach for the E P&L) of primary studies was conducted. The experts recommended a move away from value transfer (or average value transfer) to function transfer<sup>3</sup>. This would include using a consistent set of standards for selecting studies (eg peer reviewed), carrying out the transfer and conducting sensitivity analysis as appropriate (impact specific comments detailed below).

Experts agreed that when carrying out benefit transfer it is appropriate and economically correct to adjust for differences in purchasing power parity (PPP). This is to take account of differing incomes and as well as proxy for how consumer preferences may vary with wealth. However, a set of results excluding the income adjustment should also be used in decision-making.

### *Baseline*

Discussions touched on the need for a company to consider a baseline scenario when valuing the impact. The experts agreed that PUMA's chosen baseline – that if PUMA did not exist all activities attributed to PUMA and its supply chain would cease – is the most transparent, conservative and easily understood baseline and was therefore appropriate in this instance; however this may not always be the most appropriate scenario.

### *Ideas for improvement: a step too far?*

While the most accurate valuation approach would be to conduct primary studies at all sites where PUMA has an impact, this is unrealistic and benefit transfer was agreed to be the most feasible and appropriate approach.

---

<sup>2</sup> A practice used to estimate economic values for ecosystem services by transferring information available from studies already completed in one location or context to another. This can be done as a unit value transfer or a function transfer. (Source OECD)

<sup>3</sup> Function transfers involve transferring an estimated benefit function from a study site to another using location specific variables. It is considered more sophisticated than unit value transfer mainly because it transfers more information.



It was noted that the E P&L only captures damage costs and does not attempt to define optimal levels of production and therefore net impact for society at large. It was also suggested that the E P&L could present abatement costs or market prices in some situations.

## **Valuations – specific recommendations for each impact area**

### *Greenhouse gas emissions*

There was broad agreement that the approach undertaken was the best available method to estimate the social cost of carbon. The only area for improvement offered was to consider including studies which were either omitted by Tol (2007) or those conducted after 2007.

### *Air pollution*

The experts broadly agreed with the approach taken but highlighted some areas that could be improved. The experts' main concern was that the figures don't provide insights into the local environmental pressures due to the level of geographic aggregation. It was also highlighted that the methodology paper itself presents only a brief high level discussion of how the calculation was carried out.

## **The methodology could be improved in the following areas:**

### *Reflecting location specific conditions*

Air pollution impact is mostly local and heavily affected by the contextual conditions, which should be taken into account as far as possible. Simple benefit transfer is an acceptable approximation, but there may be other options which allow more location specific information about the conditions to be reflected in the analysis (albeit at a country level or state level).

While a dose response function was used, some experts recommended using dispersion modelling and epidemiological data to estimate dose response functions based on concentration rather than emissions as this would better reflect the current state of knowledge in estimating health impact from air pollution.

Reducing the level of aggregation at a country level was identified as the key area for improvement. For example, even reflecting urban versus rural splits would allow some in-country heterogeneity to be taken into account because the impact of air pollutants has been shown to be an order of magnitude greater in urban areas in location specific analysis by governments and academics. The lower resolution associated with aggregated country-level analysis therefore leads to increased uncertainty over the results.

### *Calculating the value of statistical life (VSL)*

The experts agreed that it is economically correct to adjust for income when calculating the VSL and to therefore include different values for different countries. Transferring values in this way from developed to developing countries is consistent with the best available techniques used by academia and governments. However, when the values are used in decision-making income levels should not drive decisions. The sensitivity analysis should therefore include results which excludes income adjustments and gives an equal VSL to all countries.

### *Non-health impacts*

The non-health impact of air pollution (visibility, agriculture productivity losses, and property damage) have had significantly less focus in the literature because they only represent about 5% of the total impact, with health representing about 95%. The best approach to approximate non-health impact would be to do a meta-analysis from those existing studies which do consider them, and conduct a function transfer to other countries based on a set of reasonable and defensible variables.

## *Water use*

Some experts thought that the approach used for valuing water was appropriate whilst others raised concerns over the basis for estimating the scarcity function, which was derived from 18 studies in the United States, and its transfer to the rest of the world.

## **The following ideas were offered as areas for improvement:**

### *Function transfer*

To address the short comings of the current approach some experts suggest the use of function transfer. This should include a fuller set of variables in addition to scarcity. It was suggested that the response variable could be split between different types of water use; ground and surface water (ground water is not considered in the original analysis). This should allow unsustainable ground water consumption to be estimated. The explanatory and independent variables could include controls for the type of primary study and method of estimation used, alongside the specific ecosystem service value at risk, demographic and socio-economic parameters.

The sample size should also be increased to include more studies and studies from across a broader geographical range.

### *Focus on specific ecosystem services*

Identifying the specific ecosystem service at risk in different contexts would allow greater specificity in the analysis. Splitting out health impact from other environmental and economic impact would also better reflect the impact pathway of reduced water availability. One option for estimating health impact would be to consider how scarcity affects malnutrition.

### *Land use*

It was agreed that the current approach gives a fair estimation of the impact of lost ecosystem services. They agreed that the temporal adjustment

used in land use is reasonable, given the assumption of 'fungibility' of land within a country or state. Some experts noted that the valuation could be improved with more specific location information.

Indeed, the main cause of uncertainty in the results is due to the limited geographical specificity, given PUMA's current level of knowledge regarding where its raw materials are originally produced (eg the farm where cattle were raised to provide leather).

## **The following areas for improvement were raised:**

### *Extent of ecosystem service loss*

Experts agreed that the assumption that all ecosystem services are lost following conversion of natural areas was in most cases an over-estimation of the losses. If the level of sustainable land management could be estimated and included in the analysis it would provide more accurate results. This would require estimating the extent of loss, for each specific ecosystem service, following conversion of different ecosystem types for various new land uses. Similarly to water pollution, it is hard to estimate quantitative loss of ecosystem services following conversion. While data may be available for carbon and water availability in the biological literature, it is difficult to generalise across geographies.

The implications of including cultural ecosystem service values was discussed, in particular the difficulties in measurement, and the implication of changing cultural values through time. For example, the UK has lost most of its natural woodland, but derives high cultural and recreational values from agricultural landscapes. Experts suggested exploring this further and considering the inclusion of these positive values in the net change in the ecosystem services calculations.

### *Ecosystem service framework*

The framework set out by TEEB, which the approach draws on, has received some criticism for double counting final and intermediary services. It is

nevertheless a useful framework and appropriate for use in the E P&L, but an alternative could be considered. The experts agreed that one of the best expositions to date was in the UK National Ecosystem Assessment.

### *Ideas for improvement: a step too far?*

Together with the need for more primary studies, some experts noted that the approach does not take into account broader aspects of ecosystem services and functioning, and the implications of fragmentation, genetic simplification and the spread of invasive species, for example.

If it was known where all raw materials were originally sourced, it would allow the valuations to offer more accurate results. However, it is unrealistic for most companies to identify all their raw material suppliers given the fluidity of global commodity markets and the amount of time and resources required to conduct this exercise.

### *Waste*

Given the time and cost constraints it was noted that the approach was handled well. The main issue identified was the limited ability of the approach to differentiate between the impact of high and low quality treatment practices. This likely has resulted in an underestimate, which would be particularly acute for developing countries where open dump sites are prevalent.

In addition, it was highlighted that the limited number of primary studies used and the chosen method of extrapolation leads to high uncertainty in the results. It was acknowledged that there are limited primary studies available, but the experts questioned whether the basis for extrapolation was appropriate, suggesting a function transfer as an alternative.

### *Waste treatment quality*

Some experts agreed that the methodology should reflect the different severity of impact associated with the range of quality in waste treatment practices, and the range in toxicity of the waste itself (hazardous and non-

hazardous waste are treated the same). They also noted that the broader impact of dump sites, including health, fires and biodiversity could have been valued.

### *Function transfer*

Some experts suggested that the approach should use hedonic pricing function transfer<sup>4</sup> rather than value transfer, including more arguments to take greater account of the contextual differences between sites, particularly population density, as well as environmental factors.

### *Water pollution*

It was agreed that water pollution should be included for a company such as PUMA. There is a body of scientific work on this, but not always reporting on the same basis used by the E P&L (eg per cubic meter); research is often focused on specific polluting events (eg spills, loss of transport or recreation etc). How best to use the available literature requires additional thought.

The experts agreed it is probably too ambitious to try and value the impact of each type of water pollutant separately (eg Chromium), but the approach could group different pollutants by endpoint impact and potentially value these through the reduction in ecosystem services. Estimating the extent of ecosystem service loss may need to be based on 'judgement' (eg high, medium, low ecosystem service loss).

***We kindly thank the participants in the E P&L Expert Review for the time they gave and for their insightful feedback. Their input has provided an invaluable contribution in preparing for the next phase and continued evolution of the E P&L.***

---

<sup>4</sup> The hedonic pricing method is used to estimate economic values for ecosystem or environmental services that directly affect market prices. It is most commonly applied to variations in housing prices that reflect the value of local environmental attributes. (Source: Ecosystemvaluation.org)

## ***Appendix: Documents reviewed by the experts***

### **Documents in the public domain**

1. The complete results and the story behind PUMA's E P&L  
[http://about.puma.com/wp-content/themes/aboutPUMA\\_theme/financial-report/pdf/EPL080212final.pdf](http://about.puma.com/wp-content/themes/aboutPUMA_theme/financial-report/pdf/EPL080212final.pdf)

### **Further detailed documentation shared with the experts**

1. Summary of the EIO methodology applied
2. Paper comparing the results of different approaches to EIO modelling
3. Detailed methodology papers for the valuation of the following impact:
  - a. Greenhouse gas emissions
  - b. Water use
  - c. Land use
  - d. Air pollution
  - e. Waste
4. Product E P&L methodology
5. Draft Product E P&L results

### **Areas covered by the expert review**

1. Philosophy of an E P&L – are the principles of the E P&L appropriate?
2. Defining the E P&L approach – are the approaches to modelling and valuation appropriate?
3. Application of the approach to PUMA – were the approaches applied appropriately and consistently to the PUMA context?
4. Application of the E P&L approach at different scales – are the E P&L methodologies suitable for application to products, sites or activities?
5. Application of the E P&L approach in the Product E P&L – were concepts of the E P&L adapted and applied appropriately in the Product E P&L?
6. Development and improvement of the methodologies
7. Any other comments

PPR