

# Balancing Act

## A TRIPLE BOTTOM LINE ANALYSIS OF 135 SECTORS OF THE AUSTRALIAN ECONOMY



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### A numerate 'Triple Bottom Line' account

This report *Balancing Act*, uses the well developed analytical approach of 'generalised input-output analysis' to develop a numerate triple bottom line account of the Australian economy for three financial, three social and four environmental indicators. For each of 135 economic sectors, every indicator is developed as an intensity, that is, per one dollar of final demand or per one dollar spent for consumption in everyday life. The indicators are generated with a supply chain approach where all activities are included or 'embodied' in the final indicator number. Taken together, these ten indicators provide a macro-landscape against which many management issues can be benchmarked.

The analysis seeks to underpin broader societal calls for industry, government and institutions to make decisions on a broader basis than just the financial bottom line. At an international level, these concerns drive initiatives such as the *Global Reporting Initiative* (or GRI) for corporate reporting, and the *Equator Principles* for development project financing. At a national level many firms now report on a triple bottom line basis, while socially or ethically responsible investment guidelines are now used by the financial investment industry.

While the methodology used in this analysis is already well established, the scale and depth of this analysis represents a first nationally, if not internationally. Subsequent work could extend the range of reporting indicators and produce a time series for the last thirty years. Because the indicators are referenced against one dollar of final demand, there is a potential for numerate triple bottom line accounting to become routine in traditional accounting practices. The report has three sections as follows: three chapters of background and methodology; detailed reports on 135 economic sectors; and appendices of summarised data.

### Interpreting the results

*Balancing Act* provides a snapshot of the triple bottom line performance of the Australian economy in the mid 1990s. While this may appear 'old', the data was the most recent available when the study commenced, as input-output tables are published many years after the relevant accounting period. Nevertheless, other studies indicate the structure of the economy changes relatively slowly, so we would not expect to observe significant differences in the indicator values in the short term. In addition, where relevant the sectoral reports highlight recent major structural changes which may affect the results.

Care needs to be taken in drawing conclusions from the results. A 'below average' indicator (eg high water use, low employment, low surplus) does not necessarily indicate a problem or inefficiency. Different sectors perform different functions in the economy and all sectors have a mix of above and below average results. The report provides a static description of these results for a point in time. Dynamic modelling would need to be used to

quantify changes in TBL factors that would occur if conditions changed (eg shifts in demand or supply, or in corporate or government policies). Thus the results cannot by themselves identify problems or appropriate policy and management responses, nor tell us whether Australia's environmental, economic and social performance is sustainable or not. Information on the state of Australia's environment, society and economy must also be considered in determining the efficiency and acceptability of a sector's performance.

*Balancing Act* should not be viewed in isolation: it informs and is informed by the broader context of TBL accounting and reporting (and indeed sustainable development). In addition to presenting the sectoral results, the report draws on a range of external information sources to identify technological opportunities and future trends affecting each sector. It is hoped this will provide a starting point and stimulus for further investigation and development of policies and programs to improve Australia's TBL performance.

# Environmental indicators

Four environmental indicators are used: greenhouse gas emissions, primary energy use, managed water use and land disturbance. From an environmental perspective, we interpret that a sector performing 'above average' in triple bottom line accounting terms will have lower than average intensity values for each of these indicators. The indicators or intensities are referenced against one dollar of final demand. Average values for the economy as a whole are 1 kg of CO<sub>2</sub> equivalent greenhouse gas emissions per dollar, 7.7 Megajoules (MJ, one million J) of primary energy use per dollar, 41 litres of managed water use per dollar, and 3.2 square metres of land disturbance per dollar.

Clearly, the primary sectors in agriculture and mining will, by their nature, have higher environmental intensities than service sectors such as banking, education and health. Nevertheless one of the insights emerging from this analysis is that the prices consumers pay for primary production items do not reflect the full value of the natural resources embodied in their production chains. This physical reality is reflected in the current debate on national water resources reform with calls for consumption-based pricing, full cost recovery pricing for water services, and the implementation of pricing that, where feasible, includes externalities (CoAG 2004) which, if acted upon, would inevitably work its way through to the basic prices of agricultural commodities.

# Social Indicators

Three social indicators are used: employment generation, income and government revenue. From a social perspective we interpret that a sector performing 'above average' will have higher employment generation, higher income and higher government revenue, although it is difficult to conceive of a magical sector that could perform above average for all three social indicators. The indicators or intensities are referenced against one dollar of final demand in a sector. Average values across the economy are 1.75 minutes of employment generation, 34 cents of income and 21 cents of government revenue per dollar.

The diversity of sectoral structure and function throughout the economy means no sector should be 'expected' to equal the economy wide average. Sectors such as petroleum, alcohol, tobacco and gambling give government revenue intensities that are substantially above average, and to some extent these 'sin taxes' subsidize the function of governance.

Conversely service sectors such as banking, insurance and finance have lower than average employment generation while retail trade and restaurants have above average employment generation. Also the capital intensity and scale of the mining and metals industries results in lower than average social returns. These industries compete in an intense globalised marketplace and domestic social returns have to be balanced against the export income required to balance our international trading accounts.

# Financial indicators

Three financial indicators are used: the gross operating surplus (or profits), the export propensity and the import penetration. In general we assume that a sector performing 'above average' has a higher than average surplus and export propensity and a lower than average import penetration. Each of these indicators or intensities is referenced against one dollar of final demand and is expressed in terms of dollars per dollar. In national average terms, the operating surplus is 38 cents per dollar, the export propensity is 16 cents per dollar, and the import penetration is 19 cents per dollar. The imbalance between exports and imports is a long

running one in the Australia economy and leads to deficits in our international trading accounts (the balance of payments) and increases in our indebtedness to international financiers. Commodity exports from the farm and the mine, together with manufactured goods and contributions from some service sectors, provide most of Australia's exports. This report views tourism activities more as a physical sector than a service sector, due to the embodiment of energy and food in the totality of its outputs.

# Scope of TBL accounting

With only ten indicators, this triple bottom line account provides depth but lacks the breadth of some corporate triple bottom line accounts which extend to fifty or sixty indicators covering a broad range of issues. The macro-viewpoint provided for each of the 135 sectors that make up the economy allows a distillation of the key issues at a glance. While using more indicators would tell a fuller story and capture some aspects otherwise overlooked, it could create confusion so we can't see the 'forest for the trees'. Segmenting each indicator or intensity into its direct and indirect effects helps indicate whether efforts to improve performance should focus on the sector's own affairs within house, or whether the sector should start managing its supply chain in a more concerted way.

In addition, the dissection of each indicator into its main contributors helps focus on whether key innovations in several key industrial processes are needed, or whether the supply chain requires a revolutionary redesign. The sector specific analysis provides guidelines for individual products and firms and gives a benchmark against which individual firms and institutions may measure their own performance.

# How can this report be used?

The first year after the release of this report will reveal where its primary usefulness lies. Preliminary discussions have suggested uses in six areas.

- It helps make the intent and practice of 'triple bottom line' approaches more numerate and defensible and gives a bottom line that is broader than the traditional focus on financials alone.
- It will give policy analysts a wider view of their subject areas and will help identify where a more thorough analysis is required.
- Preliminary views from the investment industry suggest that the report will help highlight sector issues for firms, which if they are responding to them, will confer higher ratings particularly from social or ethical investment funds.
- Technical and science direction which is often constrained in its oversight, because it has to be narrowly focused and reductionist in order to generate fundamental innovations. The broad TBL view of a sector might show that a proposed research activity brings few social or environmental rewards and the research may need to be reassessed.
- Non-government organisations and community groups who frequently lack the analytical budget and organisation of the institutions with whom they have differences. Having the capacity to view the economy at a glance will help NGOs to decide whether their activity should focus on the product, the factory or somewhere in the production chain.
- The general public, the media and educational organisations could develop many information products from this report.

# A life cycle analysis of the Australian economy

An alternative way to view this triple bottom line report is as a boundary-free lifecycle analysis of the Australian economy. The analysis bridges the concept of the multiplier effects of project development, and traditional life cycle analysis which usually focuses on a discrete factory or a product. The structural path analyses shown at the end of the data analysis section for each sector, allow an analyst to make a stepwise trace of the main effects that make up any of the nine TBL indicators. In many cases it shows that significant effects occur in the production chains that supply the factory or the office. Since the analysis includes the whole chain - theoretically up to many thousands of suppliers - it often shows that within factory efficiency improvements, while well meaning, can be relatively insignificant. This brings opportunities for a beyond the horizon view of procurement policies and the chance to locate, choose or develop procurement chains that have for example, lower environmental impacts and higher social returns. This will challenge some contemporary management decisions that are based principally on price. It will also lay down the gauntlet to worthy statements on 'the triple bottom line' that are without much analytical substance in the context of the full production chain.

## Future issues

While this analysis is static and performed for one point in time, its context has used both historical and futures studies to highlight important trends for each sector. The CSIRO *Australian Stocks and Flows Framework*, a future orientated model of Australia's physical economy, has been used to gauge important trends driven by issues such as population growth, technological innovation, industry development and export trends. In addition, many future orientated studies on both global and national issues have been examined, and key issues have been included in each sector report. Four future issues stand out. The first is the demographic shift to a more mature and stabilising population structure. For many sectors, the implications of this shift are poorly understood and the greater than 65 year old population cohort, that will eventually represent one quarter of the consumer and political power, is largely ignored. The second issue is the declining availability of cheap oil and after 2040, natural gas. While energy is still a relatively minor cost in most sectors, high quality fuels are more than just a cost. Without fluent and constant supplies of oil and gas, the finely balanced economies of today may face ongoing shocks for which they are ill prepared, as there are few viable substitutes on line. The third emerging issue is that of industrial ecology, a view that industrial processes will one day be all interconnected to virtually eliminate wastes. This will require the co-location of many firms and processes to maximise the recycling of materials, energy and heat. Organisational and planning aspects of this trend are especially challenging for Australia. The fourth issue relates human health and happiness to the increasing complexity of life in general, and specifically to the increasing numbers of industrial substances that underpin our everyday lives, and become embodied in the human food chain. Restructuring this complexity may require an organised simplification of entire production chains and the transition to a simpler material composition of our everyday lifestyle. This will not be easy given humankind's belief in robust and ongoing technological 'progress'.

## Technological opportunities

The analysis for each sector includes the distillation of key opportunities for technological improvement. These have been distilled for each sector report. In an overall sense, five

technological issues stand out. For basic primary production (agriculture, forestry and fishing), substantial reductions in

the embodiment of water, greenhouse emissions and land disturbance will most likely come from redesigning production processes. In mining and metals, increasing the capacity for successive recycling or reuse stages can progressively lower the lifecycle material and greenhouse content, and transfer this advantage to the consumer product or service. In manufacturing, Australia cannot compete across the board with the scale and low cost of countries such as China. It must therefore focus on a high embodiment of skills and design in its production, and develop niche positions in complex materials, the carbohydrate economy, green chemistry and renewable energies. The services sectors in general have low export earnings and are perhaps less open to simple technological solutions to rectify this. A possible solution could emerge if private services acquired a deep and ongoing technical understanding of the primary and secondary sectors, and then led investment decisions strategically, rather than on a case by case and short term returns basis. The mix of investments may then shift to those with higher environmental and social returns.

## Interactions between indicators and trade-offs

The analysis reveals the many trade offs already made in triple bottom line performance during the evolution of the current Australian economy. Some suggestions are given for possible changes that could improve social indicators while reducing environmental loadings. In some chemical sectors for example, high levels of import penetration mean that the energy and greenhouse intensities are lower than expected because the manufacturing process occurs overseas. However the employment and income indicators are also low for the same reason. Thus policies to make Australia more self sufficient in basic chemicals would add to the national energy use and greenhouse emissions, but may also improve the social indicators of employment generation and income while reducing the import penetration indicator. Deciding whether such a policy is advantageous is thus more complex than that assumed by more limited methods such as cost-benefit analysis. Indeed a single integrative metric, or new decision making tools, may help in this. However, armed with new understanding, the well tested traditional policy process, which is both discursive and iterative, may still be the most appropriate way forward.

## The issue of ideology

Both the presentation and interpretation of the results carry a number of value judgements that could be considered as ideological positions. The authors have taken the aspirations of triple bottom line analysis as given. For the financial indicators, high operating surplus, high export propensity and low import penetration are viewed positively. For the social indicators, high employment generation, income and government revenue are all viewed positively. For the environmental indicators, low energy use, greenhouse emissions, water use and land disturbance are viewed positively. Nevertheless the authors acknowledge these interpretations could create tensions in the established world of single bottom line (ie financial) performance. For example high operating surplus might result from replacing labour with capital, resulting in lower employment generation and higher energy use. Judgements on the 'correct' interpretation of TBL imbalances can be prone to bias depending on the analyst's world view and knowledge of key issues that contribute to the indicators. The data and supporting material provided enable readers to produce their own perspectives on these issues.

## Agriculture, fishing, forestry and food

For each dollar of final demand, primary production and its value added food and fibre products, have greenhouse, water and land disturbance intensities that are many times the average. These sectors are by definition physically intensive, but the prices we pay for the products reflect the marginal cost of production, rather than the full resource and environmental costs of production.

There are many opportunities for innovation and better management to reduce the land, water and greenhouse intensities, but few will significantly moderate the unbalanced triple bottom line outcomes shown by this analytical method. Moves to internalise the full costs of production in the final price of the market product may mean substantial price increases. This would give rise to a number of social equity issues and does not seem feasible in today's society where the market price of food continues to decline.

## Mining and metals

The mining sector reveals excellent financial and environmental outcomes, but below average employment and income indicators for each dollar of final demand. The substantial resource royalties that flow to state and federal governments from mining are not included in the national input-output tables due to international accounting conventions. The government revenue indicator may therefore be understated.

The capital intensity of mining operations required for them to remain price and quality competitive in an international marketplace, drives these lower social returns. However many regional areas assert that resource booms provide them with few long term opportunities for human capital development, and the underpinnings for resilient regional economies. Instead urban areas and overseas owned companies benefit from the resource flows from these regions. This analysis provides few answers at the regional level, but the accounting approach highlights the issue.

## Manufacturing

Notwithstanding the traditional smokestack image of the manufacturing sectors, its overall TBL performance is reasonably balanced. Energy use and greenhouse emissions are above average while employment generation and income are below average.

Many of the manufacturing sectors currently face strong competition from countries with lower wages and larger scale, and effective solutions are difficult to define. Nevertheless three issues emerge from this analysis. Industry strategies which aim to increase value adding in Australia bring with them the social returns of increased employment and possibly increased use of resources such as energy and water. If these products can be developed with environmentally advanced production chains, then this may give an advantage in affluent countries where markets are concerned with sustainability issues. Finally, meeting the environmental challenges may require industrial processes and material fabrication skills that are currently under-developed in Australian industry.

Overall, there does not seem much advantage in Australia relying solely on being a cost efficient producer of average quality materials and products.

## The service sectors

Both private services (eg banking and insurance) and public services (eg health, education and community services) are characterised by environmental indicators that are well below the national averages. Commentators often use this profile to suggest the likely sustainability end point for the Australian economy, dominated by private service sectors which are essentially 'light, dry and cool' compared to the 'heavy, wet and hot' structure we have today.

There are several important caveats highlighted by our analysis. While private services generate more than one quarter of GDP in this analysis, their intensities of employment generation, income and export propensity are well below average. Balancing our trade account and maintaining full employment in a future economy where possibly three quarters of our GDP comes from private services may therefore be difficult. The second issue is that while private services are themselves 'light, dry and cool', they finance and underwrite most of the resource intensive activities in the Australian economy. Increasingly, their financing decisions may come under scrutiny with the expectation that social and environmental returns match the expected financial returns.

## Future developments

Future activity for this form of numerate triple bottom line accounting will be guided by the response from the markets for corporate reporting and for policy and philosophical ideas. At this stage, it seems logical that these boundary-less reporting approaches should implement as far as possible, the protocols set out in the *Global Reporting Initiative* (for corporate and government reporting) and also some of the issues highlighted by *The Equator Principles* (for the social and environmental implications of major project financing).

The analytical approach must also extend beyond the boundary of the Australian economy to include the impacts in other countries, of many of our imported goods and services. This requires a similarly structured analysis for our most important trading partners. It is also possible to extend the indicator set so that each financial, social and environmental account could have more appropriate indicators, accompanied by a deeper more focused interpretation.

From an analytical perspective, development of this indicator set for all the national input-output tables back to 1969 would provide a time series of triple bottom line performance for the 135 sectors in this report. This could be particularly important for water, energy and greenhouse policy development in the near future.

## Further information

Foran, B. Lenzen, M. Dey, C. (2005) *Balancing Act: A triple bottom line analysis of the 135 sectors of the Australian economy*. CSIRO Technical report.

The full report can be downloaded from:

[www.cse.csiro.au/research/balancingact](http://www.cse.csiro.au/research/balancingact)

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