

CARBON POLLUTION REDUCTION SCHEME

DISCUSSION PAPER: ASSESSING EMISSIONS INTENSITY USING A VALUE ADDED METRIC

The paper does not necessarily represent the views of the Australian Government or any Government Minister. It is a working paper prepared by the Emissions Trading Division of the Department of Climate Change. The views contained in this paper are preliminary only and are subject to change. The aim of this paper is to promote discussion ahead of final decisions on the design of the emissions intensive trade exposed assistance policy.

1. Introduction

Since the release of the Carbon Pollution Reduction Scheme Green Paper in July, there has been widespread discussion and debate about several aspects of the proposed transitional assistance policy for emissions-intensive trade-exposed (EITE) industries.

A particular focus of this debate has been on the identification of activities that would be eligible for assistance, and on whether a value-added based emissions intensity metric would be more appropriate than a revenue based emissions intensity metric for comparing the relative emissions intensities of different activities across the economy.

The purpose of this paper is to consider the implications of a change from a revenue to a value-added based metric for assessing EITE eligibility, while maintaining all other features of the EITE assistance policy. This is intended to support an informed discussion of the independent contribution of changing the metric from revenue to value added.

2. Background

In the Carbon Pollution Reduction Scheme Green Paper, the Government proposed that EITE assistance should be targeted towards those activities producing traded goods that have the most significant exposure to a carbon price. It was assessed that entities operating these activities would be constrained in their capacity to pass through carbon costs and these activities would tend to be most at risk of significant carbon leakage as a result of the introduction of a carbon price.

Comparing the emissions intensity of activities across the economy, however, is not straightforward. In particular, it requires the emissions of different activities to be measured relative to a common unit of size or value, in order that the emissions associated with the production of one good can be compared with those associated with the production of another. Three alternative 'common units' discussed in the Green Paper which could be used to scale the emissions from different activities were employment, value added and the value of production or revenue.

In assessing the advantages and disadvantages of the alternative “common units”, the Government was mindful of two issues:

- (i) does it enable a comparable assessment of the carbon cost impact across different types of activities; and
- (ii) can it be calculated in a transparent and robust way across different types of activities?

On balance, the preferred measure of emissions intensity outlined in the Green Paper to assess the relative carbon cost exposures of different activities was emissions per unit of revenue. The Government acknowledged, however, that there were advantages and disadvantages of all of the alternative options including the preferred approach.

Irrespective of the metric adopted to assess eligibility for EITE assistance, note that the Green Paper proposes to allocate assistance on the basis of the emissions per unit of product for each activity. A schematic representation of the allocative process for EITE assistance as proposed in the Green Paper is provided at Attachment A.

This paper further elaborates the issues surrounding the use of a measure of emissions per unit of ‘value added’ (tonnes of CO₂-e/\$VA) for assessing emissions intensity. In section three, we define value added and in section four we discuss how value added could be calculated for an activity. In section five we discuss the advantages and disadvantages of calculating emissions intensity using a value added metric and in section six, we discuss the possible relative impact across industries of moving towards a value-added metric, using the available industry level data.

3. The definition of value added

Value added is a concept that is used widely for national accounting and statistical purposes. The value added of an industry measures the net contribution of that industry to output in the economy, or in other words the wealth created by that industry. The wealth created by an industry, in turn, reflects the returns to labour and capital used by that industry. Adding up the value added of all industries across the economy provides a measure of the total production or output of the economy.

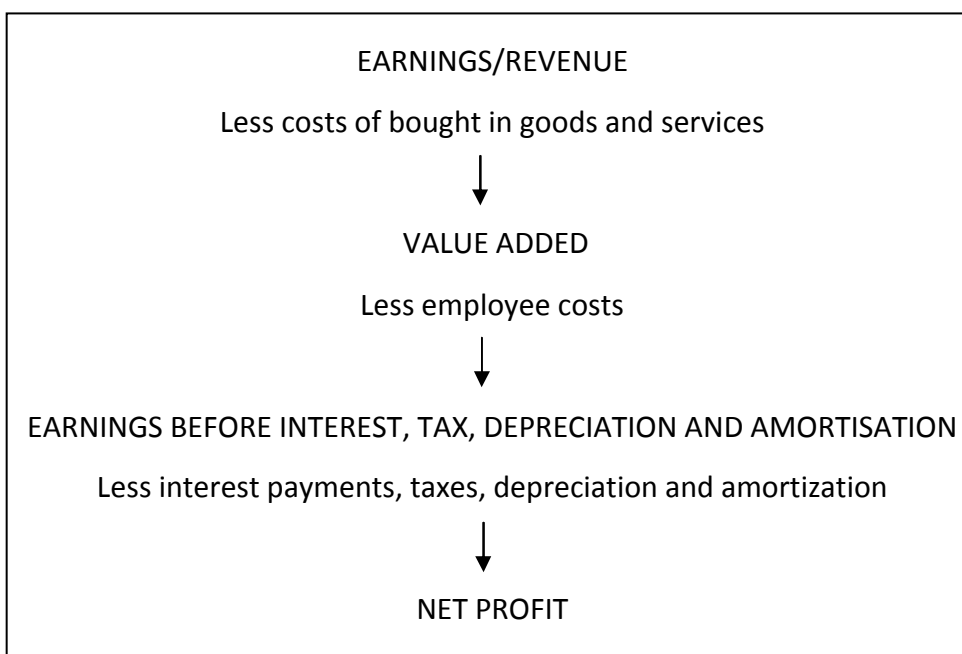
At a firm or company level, the wealth created by a company is defined as its value added and is calculated as follows:

$$\text{Value added} = \text{Earnings less Costs of bought-in goods and services}$$

An estimate of a firm’s value added can therefore be derived from the components of a firm or company’s income or profit and loss statement.

Figure one illustrates, at a very high level, the concepts being discussed in this paper which can be related to the key components of a firm’s income statement.

Figure 1



This figure illustrates that at a firm or company level, value added can be calculated in two ways:

- (i) By taking revenue (or earnings) and subtracting the costs of bought in goods and services; or
- (ii) By taking EBITDA and adding on employee costs.

4. The calculation of value added for an activity

The Green Paper proposed that EITE assistance should be provided on an activity basis to ensure that assistance is most effectively targeted to the most emissions intensive parts of the economy and to minimise distortions between firms on the basis of their corporate or facility structure.

Assessing the emissions intensity of different activities in the economy using a value added metric requires estimates of value added at an *activity* level.

Estimates of value added for different *industries* are provided by the ABS in a number of different publications. Estimates of gross value added are provided in the Input-Output tables and the Australian National Accounts National Income, Expenditure and Product tables. For the manufacturing and mining sectors, estimates of industry value added are also published for some sub-sectors of these industries.¹

¹ 8415.0 - Mining Operations, Australia, 2006-07
8221.0 - Manufacturing Industry, Australia, 2006-07

In only a couple of circumstances, however, the ABS estimates of industry value added correspond with the activities considered to be potentially eligible for EITE assistance. To calculate value added for an activity using the methodology applied by the ABS would be extremely onerous and complex task that would be difficult to make transparent.²

While estimates of value added can be calculated at a firm or company level, as outlined in section three, using 'whole of company' estimates of value added for an *activity* level assessment would not be appropriate.

Estimates of the value added of most potential EITE activities are thus not readily available and if value added is to be used to assess emissions intensity at the activity level, a proxy for value added would need to be estimated.

The concepts outlined in Figure 1, suggests two possible proxies for calculating of value added for an activity:

- (i) Revenue (or earnings) less the cost of the most significant non-labour non-capital inputs used in the production of the output *of the activity*; and
- (ii) EBITDA *for the activity* plus direct labour costs *for the activity*.

Further details on the calculation of these proxies are provided below.

4.1. Revenue less significant input costs

Definition:

Value Added = Revenue - Cost of the most significant non-labour non-capital inputs used in the production of the output of the activity

Where:

- 'Revenue' is the inflow from sales of goods and services produced by the activity.
- 'Cost of the most significant non-labour non-capital inputs used in the production of the output of the activity' would include the cost of major consumable inputs into the activity's production such as the cost of feedstock, energy costs and other raw material costs.

²ABS Mining Statistics Theme page. Using the ABS methodology, industry value added of an activity would be given by: Revenue (sales of minerals and goods + income from services) + Rent, leasing and hiring income + Government funding for operational costs (e.g. wages and salaries, rent) + Capitalised wages and salaries + Net increases in inventories - Purchases of materials, components, containers, packaging materials, electricity, gas, coal, diesel oil and fuel, other petroleum products, other fuels, water, minerals and other goods for resale - Rent, leasing and hiring expenses - Freight and cartage expenses - Motor vehicle running expenses - Repair and maintenance expenses - Contract, sub-contract and commission expenses - Bank charges other than interest - Payment to employment agencies for staff - Other operating expenses.

The key challenges with the 'revenue less costs' option are that for each activity the Government would need to determine:

- which are the significant input costs that would be removed from the activity's revenue to generate that activity's proxy measure of value added, ensuring that this assessment is consistent across different activities;³ and
- how the revenue and costs for the activity would be transparently assessed.
 - Revenue could be calculated as the output of the activity multiplied by the market price of the product, or could be calculated as the businesses' actual earnings from the sales of the products or products produced by the activity. In many cases this would be reasonably straightforward.
 - The costs of significant inputs could be calculated in a similar manner, however, it will often be more complex as these inputs may not be traded products. In this case, within-firm transfer prices or shadow prices may be required and it will be important to establish these costs transparently.

4.2. EBITDA plus direct labour costs

Definition:

$$\text{Value Added} = \text{EBITDA} + \text{direct labour costs}$$

Where:

- EBITDA is earnings before interest, tax, depreciation and amortization *for the activity*.
- Direct labour costs are the cost of 'direct labour' *used in the activity* (including employees and contractors).

The key challenges with this option are that:

- EBITDA is generally calculated at a company level and calculating this at an activity level may be challenging for some firms. While some businesses may treat individual activities within their businesses as profit centres (and thus may calculate EBITDA for the activity), others may not (and would not have estimates of EBITDA for these activities); and
- Firms would need to assess which labour costs are directly associated with the given activity and which are not. Note that direct labour costs includes both employees and contractors since an assessment of the value added for an activity should be independent of labour engagement decisions.

³ The Bureau of Steel Manufacturers in Australia (BOSMA) submission to the Green Paper suggests that a reasonably good proxy for value add may be constructed by subtracting the three most significant input costs for a given activity. This may be a tractable way of implementing this "revenue ex" proxy for value added.

4.3. Assessment of the alternative approaches to calculate activity value added

Overall, the Department's assessment is that there is not a straightforward way of estimating the value added of all activities on the basis of the data that is already collected by the ABS or the data that is already collected by firms for financial auditing purposes. As a result, if value added was to be used to scale the emissions of different activities a rough estimate of, or proxy for, value added would have to be acceptable to industry and Government.

If such a proxy for value added was to be used, the 'Revenue less significant input costs' approach would appear to be the most tractable and transparent approach to estimating a proxy for value added for all industries. Decisions would then need to be made about whether just the top two or three input costs are adjusted for or whether a threshold is adopted to determine which input costs are adjusted for.

5. The advantages and disadvantages of a revenue versus a value added based metric

In the Green Paper, the Government outlined some of the advantages and disadvantages of alternative metrics and concluded that, on balance, it preferred the use of a revenue-based metric to assess the relative carbon cost exposures of different activities.

This measure was preferred for three reasons:

- (i) it provided a good indication of the relative size of the carbon cost impost relative to all other costs involved in producing a good across all industries in the economy (in most situations total production costs are highly correlated with total earnings or revenue);
- (ii) it exhibited less variability over time than other measures; and
- (iii) it was relatively straightforward to calculate transparently for most activities, given that the rationale for supporting these activities is that the goods they produce are highly traded on world markets and domestic producers of these goods have little pricing power.

The Government acknowledged, however, that this metric had its limitations. In particular, it acknowledged that the use of a revenue-based metric would result in lower measured emissions intensities for activities that have more significant input costs, such as those that are further down the supply chain.

The key advantage of a value added metric is that it may be more highly correlated with the likelihood of carbon leakage. This is because it reflects the costs that are under direct control of the firm and is most representative of the real economic value of an industrial activity.

As is clear from the discussion in section two, the key disadvantage of the use of a value added metric is that there are no single clearly defined estimates of value added for most activities. A clear and workable definition would need to be established to enable this metric to be used consistently across industries in the assessment of eligibility for EITE assistance, and industry would need to accept that a rough proxy for value added will need to be applied.

A further disadvantage of value added relative to revenue is that the ratio of emissions to value added will tend to exhibit more variability both over time and between firms conducting a given activity, in some cases considerably more. This is because firm-specific factors (particularly profitability) will always have a greater influence on such an assessment of emissions intensity.

As a consequence of this variability, the assessment of eligibility and in particular the choice of time period for such an assessment will become more contentious.

Overall, the challenges in operationalising and implementing a value-added based emissions intensity assessment are quite considerable.

6. Industry level comparison of the value added and revenue based emissions intensity metric

In the Green Paper, the Government presented analysis conducted by the Centre for Integrated Sustainability and Analysis (CISA), University of Sydney, which attributed emissions and production data to 115 industry sectors to enable estimation of emissions per unit of revenue for each of these industries in 2001/02. The CISA analysis also attributed value added data to each of these industries, supplementing the ABS input-output estimates of value added with industry-specific data for the disaggregated categories.⁴ This enables the calculation of emissions relative to value added at an industry level.

The tables below present 2001/02 estimates of the emissions intensity of the top 21 traded industries taken from the CISA analysis. Table one illustrates emissions to revenue and table two illustrates emissions to value added. In both tables, industries have been ranked from the most emissions intensive to the least.

⁴ For further details refer to Appendix D of the Green Paper and the CISA report which is available on the Department of Climate Change website. Disaggregating the value added of input-output categories is not straightforward because of the requirement to 'balance' the input-output tables. Value added estimates in the input output tables thus vary from the value added estimates provided in other ABS publications.

TABLE 1

Industry ⁵	Emissions Intensity (tCO ₂ -e/\$m revenue)
Aluminium	7,357
Beef cattle	6,687
Cement, lime & concrete slurry	4,720
Sheep	3,513
Dairy cattle	3,240
Pigs	1,958
Black coal	1,722
Ceramic products	1,675
Alumina	1,649
Iron and steel	1,568
Basic chemicals	1,288
Other non-metallic mineral products	1,260
Oil and gas	1,186
Pulp, paper and paperboard	1,133
Other mining	1,123
Sugar cane	1,054
Poultry	792
Glass and glass products	645
Other non-ferrous metals and products	628
Non-ferrous metal ores	571
Petroleum and coal products	542

TABLE 2

Industry ⁵	Emissions Intensity (tCO ₂ -e/\$m VA)
Aluminium	86,070
Cement, lime and concrete slurry	11,792
Beef cattle	9,493
Petroleum and coal products	6,846
Sheep	6,650
Dairy cattle	6,407
Iron and steel	5,876
Basic chemicals	5,194
Ceramic products	4,518
Pulp, paper and paperboard	4,392
Other non-ferrous metals and products	4,373
Alumina	4,199
Other mining	4,093
Pigs	3,679
Black coal	3,096
Other non-metallic mineral products	2,709
Sugar cane	1,862
Poultry	1,456
Oil and gas	1,400
Glass and glass products	1,296
Non-ferrous metal ores	1,224

These tables illustrate that at an industry level:

- the top 21 emissions intensive industries are exactly the same across the two metrics, suggesting that both metrics have identified the most emissions intensive traded industries in the economy, and 7 of the top 10 industries are the same across the two tables;
- the broad rankings of industries stay the same across the two tables, with the major exception being the petroleum and coal products industry which is 4th on a value added basis, but 21st on a revenue basis; and
- there is somewhat less variation in emissions intensities between industries on a value added basis, with the important exception of aluminium.⁶ The cement

⁵ Industry sectors are based on the 109 sectors in the National Accounts Input-Output tables. Refer to Appendix D of the Carbon Pollution Reduction Scheme Green Paper for further details.

⁶ The CISA analysis divided the value added attributed to the ABS input-output category 2702 between the Aluminium, Alumina and Other non-ferrous metals and products industries using the ABS publication

industry, for example is 3-5 times as emissions intensive as the next suite of industries on a revenue basis, while it is 2-4 times as emissions intensive on a value-added basis.

On average across these industries, emissions intensities on a value added basis are around 3 times those calculated on a revenue basis. This suggests that the revenue thresholds as proposed in the Green Paper would need to be roughly tripled if they were to be translated into comparable VA thresholds. That is, by way of illustration, if the same structure of assistance were maintained as proposed in the Green Paper, then the 60 per cent level of assistance would apply to activities with emissions intensities between 4500t/\$million value added and 6000t/\$million value added, with the 90 per cent rate of assistance for activities above 6000t/\$million value added.

As stated in the Green Paper, under the current policy approach these thresholds and rates of assistance would need to be calibrated in light of actual activity level data to ensure that the total quantum of EITE assistance is limited to around 30 per cent of permits (inclusive of agricultural emissions).

While these data are illustrative, it is important to recall that these data relate to 2001/02 and that significant changes in emission, production and commodity price data since then may have occurred since then affecting the relative rankings of different industries.

Furthermore, these data relate to industries rather than activities. Moving to a value-added based metric may imply that there are more significant differences between industry level and activity level estimates of emissions intensity, since the most emissions intensive activities in an industry may not necessarily be the activities in which value added is concentrated.

Nonetheless, given the overall similarities between the value added and revenue based estimates at an industry level, careful consideration needs to be given to whether the additional complication and transparency issues of moving to a value-added based metric are warranted.

5215.0 and assuming homogenous production within the industry. Their conclusion is that around 58% of the value added from the 2702 category should be attributed to Alumina, 35% to Other non-ferrous metals and products and only 6% to Aluminium. This split is somewhat inconsistent with the information provided in ABS publication 8221.0 - *Manufacturing Industry, Australia, 2006-07*. In 2001/02, this ABS publication has the shares at 52% of value added attributed to Alumina, 21% to other non-ferrous metals and products and 27% to Aluminium. The very small share attributed to the Aluminium industry accounts for the much higher measured emissions intensity of this industry. If 8221.0 data is used rather than input-output data, the intensities of the industries using a value added metric are 20,224 t CO₂-e/\$m, 6,872 t CO₂-e/\$m, 4,729 t CO₂-e/\$m, for Aluminium, Other non-ferrous metals, Alumina and respectively.

7. Conclusion

The option of using value added as a metric has considerable merit though it poses a number of critical issues that need to be resolved. Several of these issues and their consequences have been outlined in this paper.

The Government's intention is to use feedback from discussions with industry alongside feedback already provided through the submissions process and additional data provided by industry since the release of the Green Paper in the further development of the EITE assistance policy. Policy decisions are expected to be provided in the White Paper.

ATTACHMENT A

Proposed process for determining allocations to EITE entities

