Senate Select Committee on Scrutiny of New Taxes – inquiry into a carbon tax

SUBMISSION BY FRONTIER ECONOMICS

Context for this submission

Frontier Economics is pleased to respond to the invitation extended by the Senate Committee for the Scrutiny of New Taxes (the Committee) to present a submission on the issue of carbon taxes. Frontier Economics has previously provided submissions to the Committee which address broader aspects of emissions pricing policy. This submission addresses specific points related to the following recent developments:

- The Carbon Price Package released by the Commonwealth Government on 10, July 2011;
- Commonwealth Treasury modelling of the carbon price;
- Frontier Economics' modelling of the carbon price for the NSW Government (August 2011);[1]
- Commentary on the carbon price and Commonwealth/Frontier modelling raised by the media and by the Commonwealth.

Frontier Economics has prepared this submission entirely at its own cost. Our aim is to positively contribute to the debate on this crucial public policy matter.

About Frontier Economics

Frontier Economics has been involved in climate change policy for the last decade. We played a central role in designing and implementing the NSW Greenhouse Gas Abatement Scheme (GGAS) in 2001-02 – the world's first mandatory broad based emissions trading scheme (ETS).

Frontier Economic has also undertaken a number of studies regarding the implementation of emissions reduction policies. These include a joint study with AGL and the World Wildlife Fund in 2006. Frontier has provided extensive analysis and commentary of emissions pricing proposals under the CPRS. In 2009, it undertook work jointly for the Federal Coalition and Senator Xenophon that reviewed the operation of the CPRS, presented alternative policy options, and modelled the economic effects of each. In August 2011, the NSW

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1 Available in full: http://www.treasury.nsw.gov.au/site_plan/carbon_tax

Government released economic modelling conducted by Frontier Economics that assessed the economic impacts of the proposed Clean Energy Package, with particular emphasis on exploring the regional impacts of the scheme. This modelling was undertaken together with the Monash Centre of Policy Studies (CoPS) using the *MMRF-Green* model and using assumptions and inputs consistent, wherever possible, with the Commonwealth Treasury's own modelling.

Observations and issues related to the carbon price package and economic modelling

This section provides commentary on the Commonwealth Treasury modelling, drawing on Frontier Economics' modelling experience and results where relevant.

Scenarios modelled: the Reference Case differs from CPRS modelling (2008)

Summary:

The economic effects of a carbon price are typically measured as changes caused by the policy *relative to* results in a "Reference Case" scenario which excludes the carbon price. This means that changes in the Reference Case assumptions will change the effects of the policy (the carbon price) as measured by the economic modelling. The Reference Case scenario in the CPRS modelling conducted by Commonwealth Treasury (*Australia's Low Pollution Future*, 2008[2]) assumed no global action (other countries do not impose carbon prices) and no extension of the Australian renewable energy target. The Reference Case for the current carbon policy modelling (*Strong Growth, Low Pollution*, 2011[3]) includes the assumption of global action (other countries introduce carbon prices) and the extension of the Australian renewable energy target. Changes to the Reference Case assumptions partly explain differs in the modelling impacts of the CPRS in 2008 compared with the current carbon price modelling in 2011.

Commentary:

The modelling of the CPRS (*Australia's Low Pollution Future*, 2009) effectively included the combined effects of the renewable energy target, domestic action (a carbon price) and global action, since these were changes in the Policy case that were not included in the Reference Case. The modelling of the current carbon package (*Strong Growth, Low Pollution*, 2011) only looks at the incremental effects

2 http://www.treasury.gov.au/lowpollutionfuture/

3 http://www.treasury.gov.au/carbonpricemodelling/content/default.asp

of domestic action, as the effect of global action and the renewable energy target are included in the Reference Case. A summary is provided in Table 3, with changes in the Carbon Price scenario marked in red.

Table 1: Overview of scenarios

Scenario	CPRS modelling	Carbon Price Mechanism modelling
Reference case	No global action No domestic action No renewable energy target No energy efficiency target	Medium/High global action No domestic action Renewable energy target No energy efficiency target
Carbon price scenario	Global action Domestic action Renewable energy target No energy efficiency target	Medium/High global action Domestic action Renewable energy target No energy efficiency target

The most important differences between the modelling exercises are between the Reference Case assumptions. In the CPRS modelling, the Reference Case assumed no global carbon pricing action and no renewable energy target. This means that the relative impact of the carbon price scenario under the CPRS reflected the combined effects of global and domestic action and the renewable energy target. In the current modelling, the Reference Case includes assumed global climate change action. This means that any negative effects of global carbon price action (for example, reduced exports of emissions intensive products) or the renewable energy target will already be reflected in the Reference Case, and the Carbon price scenario will reflect only the incremental effects of domestic carbon price action. Treasury also assumes that the Terms of Trade rises higher and falls more slowly than was assumed under the CPRS, and assumes that commodity prices (coal, oil, gas) are broadly higher than was assumed for the CPRS.

But this also has implications for energy intensive export regions such as Hunter, NSW since it means that employment is no longer growing as quickly in the Reference Case (which now includes the assumption of "global action", and hence reduced demand for coal exports). From a modelling perspective this means that, although the incremental effects of introducing the carbon price are less severe, it is more likely that any policy impact of carbon will show an absolute reduction (on current levels) rather than just slowing of future growth.

"No global action" was not modelled by Treasury

Summary:

Commonwealth Treasury does not model the effects of 'no global action' in the current modelling of the carbon policy package. Treasury asserts that "no global action" would lower the global carbon price, and Australia would face lower economic costs to meet the emissions reduction target.[4] It is not clear that this would be the case.

Commentary:

Commonwealth Treasury has sought to pre-empt the argument that economic damages from reducing carbon emissions could be greater than modelled in a scenario where Australia moves 'ahead of the world' and there is less global effort to reduce emissions than is assumed in the modelling. The rationale provided by Treasury is that the carbon price faced by Australia is set by the level of international action due to global trade of carbon permits: Australia will be a price taker in the global carbon market. More stringent global action would reduce the global supply of permits, which would raise the global carbon price and increase the cost for Australia to meet domestic targets. Conversely, weaker global action would increase permit supply, reduce the carbon price and reduce the Australian cost of meeting a given emissions reduction target.

This argument is only true if Australia's economic damage is mostly caused by the absolute level of the carbon price, as opposed to the relative carbon price in different countries/regions (which is relevant to competitiveness effects). However, the modelling does not prove whether this is the case as the scenario is not modelled. It is not clear without modelling that a lower absolute carbon price (which may be higher relative to the carbon price faced by key competitors, and hence potentially weaken demand for Australia's energy exports) is less damaging to the economy than a higher absolute carbon price (which may be equal to key competitors), which Commonwealth Treasury simply asserts is the case.

The Commonwealth Treasury argument that there would be reduced global demand for permits also assumes that only countries expected to be 'net importers' of global permits may not take action in an alternative scenario. This would include countries expected to emit at higher levels than their pledges and rely on permit imports to meet their targets, if they were otherwise to adopt action to reduce emissions (which is the same position as Australia). This could include the US, for example. However, the greater risk is if countries expected to be 'net exporters' of permits (those expected to emit at lower levels than their

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4 This only refers to the economic cost of mitigation and excludes any economic impact of climate change on the Australian economy. Treasury implicitly assume that the economic benefit of "global action" in terms of the reduced effects of climate change exceed the economic cost of action (global and/or domestic).

targets and to sell the excess permits, if they were to adopt actions to reduce emissions) do not take action and do not provide a potential source of permit imports for Australia. This could include China and India, for example. This could reduce global ***supply*** of permits, which would raise global carbon prices unless some other form of offset or credit for emissions reduction in developing regions is recognised.

Given that the Treasury modelling projects a heavy reliance on permit imports to meet Australia's abatement targets (discussed below) this scenario warrants far more detailed consideration by the Government.

"Global action"/no domestic action was modelled by Treasury

Summary:

Commonwealth Treasury appear to have modelled the effects of a scenario of 'global action'/no domestic action, where other nations retaliate by imposing border tax adjustments on Australia. The results suggest a lower cost of accepting these border tax adjustments (0.3% reduction in GNI per person by 2020) than the proposed carbon price mechanism (0.5% reduction in GNI per person by 2020).

Commentary:

Treasury reports:

> "A sensitivity analysis was undertaken to examine the effect of other countries imposing a border tax adjustment (BTA) on Australia. Each of Australia's trading partners who act on climate change was assumed to apply a border tax on Australian exports to reflect their carbon content, and a subsidy on their own exports to Australia. A BTA on Australian trade leads to a slight improvement in gross world product compared with the medium global action scenario, as it partially brings Australia into the global mitigation effort. For Australia, such a border tax adjustment would reduce GNI per person, by around 0.3 per cent in 2020, compared to the medium global action scenario." p46, *Strong Growth, Low Pollution*, 2011

Elsewhere the reduction in GNI per person resulting from the carbon price is reported as 0.5% (*Core Policy Scenario*, Table 5.1, p72).

Frontier Economics disagrees with Treasury's concern about the robustness of regional results

Summary:

Commonwealth Treasury argues that the modelling of sub-state regional results in *MMRF-Green* is too uncertain, so chooses not to report them. It is noteworthy though that Commonwealth Treasury have no concern about modelling a reference case that assumes global action on carbon pricing.

In particular, consider the following interchange from the Senate Select Committee on the Scrutiny of New Taxes, Wednesday, August 10, 2011:

> Ms Quinn: We would question all of the results based on subregional information which assumes fixed shares from history and applies it to a dynamic forecast of the future. We think that does not provide balanced results and we do not consider them robust.

Commentary:

Reporting of aggregate results masks the impact of structural change between regions and sectors. Higher growth in some sectors/regions hides lower growth in other sectors/regions when only an aggregate figure such as the national or state total is reported. To compare two hypothetical scenarios: in Scenario A, 10,000 jobs are lost in Region X and 5,000 jobs are created in Region Y. In Scenario B, 100,000 jobs are lost in Region X and 95,000 jobs are created in Region Y. In both scenarios the aggregate impact is a net reduction of 5,000 total jobs, but clearly there is significantly greater structural adjustment in Scenario B. Reporting of regional/sectoral results is required to understand the extent of these effects and the extent of assistance required in regions. Without modelling (or reporting) of these effects, it is not clear how the Commonwealth Government can determine appropriate levels of assistance, or how State Governments can manage the transition.

Commonwealth Treasury argues that results at the regional level are too uncertain in the *MMRF-Green* model. On this score, we note the following:

- *MMRF-Green* is designed as a regional model - a full bottom-up model of the 6 states and 2 Territories. The disaggregation to the sub-state level is undertaken using a top-down disaggregation. The top-down disaggregation is dynamic in that it is based on updated state-level information each year, and the contribution of sectors by sub-state region are updated each year (not static, as Commonwealth Treasury suggests). In other words, the model recognises that the composition of regional economies will change through time;
- the results are highly intuitive as regions that are heavily dependent on adversely affected activities are likely to be more disadvantaged by a carbon price;
- regional modelling in this manner is a well accepted CGE methodology and the model developers (world leaders in the field) have expressed confidence in the methodology and are in a better position to determine how their model should be used compared to Commonwealth Treasury users of the model;
- Commonwealth Treasury report National and State modelling results out to 2050. We would argue that there is greater uncertainty associated with these results than there is for sub-state regional results forecast for a decade. It is simply unjustifiable for Commonwealth Treasury to defend their 40 year

forecast of the economy suffering major structural change while condemning our 10 year regional forecast;

- Commonwealth Treasury are critical of an approach that uses "fixed shares from history and applies it to a dynamic forecast of the future". As above, this is not an accurate characterisation of the modelling approach. However, the note on Tables 5.10 and 5.11 of *Strong Growth,Low Pollution*, 2011 (Figure 1) states that the sector aggregate outputs are based on industry average growth rates and 2005-06 gross output weights. This seems to suggest that Commonwealth Treasury have adopted the very same methodology that it argues is not robust for regional results.

Figure 1: Extract of Table 5.10: Gross output, by sector, 2020

	Medium global action	Core policy	Ambitious global action	High price
	Per cent	Per cent	Per cent	Per cent
Agriculture, forestry and fishing	**11**	**12**	**11**	**12**
Mining	**79**	**77**	**78**	**76**
Coal, oil and gas	62	60	60	55
Other mining industries	94	94	95	95
Manufacturing	**4**	**5**	**6**	**7**
High emission-intensive manufacturing	23	23	28	29
Low emission-intensive manufacturing	-7	-7	-7	-7
Construction	**52**	**51**	**51**	**48**
Services	**38**	**38**	**38**	**37**

Note: Sector aggregate gross output based on industry average growth rates and 2005-06 gross output weights.
Source: Treasury estimates from MMRF.

Source: Commonwealth Treasury, Strong Growth,Low Pollution, 2011[5]

Growth in regional output is not inconsistent with flat employment growth

Summary: Commonwealth Treasury has expressed surprise that in Frontier Economics' modelling for the NSW Government, Hunter economic output is projected to growth by 30% to 2020 yet employment growth is relatively flat. To see this refer to the Senate Select Committee on the Scrutiny of New Taxes, Wednesday, August 10, 2011:

> CHAIR: New South Wales Treasury also uses the MMRF-Green model to assess the regional impact of the carbon tax. Their modelling shows an absolute reduction of 18,500 jobs in the Hunter and 7,000 jobs lost through slower jobs growth in the Illawarra. Does Commonwealth Treasury have any evidence to question these findings?
>
> Ms Quinn: We do find the Hunter Valley estimates very surprising. In the report Frontier identify that there is growth in that region in the order of 30 per cent, yet employment is falling over that period. We find that a very surprising result.

5 http://www.treasury.gov.au/carbonpricemodelling/content/default.asp

Commentary: The difference between output and employment growth is explained by productivity growth and should not be surprising to an economist. Across NSW as a whole, the Commonwealth Treasury assumes NSW GSP growth of 2.5% per year from 2010-2020[6] (total growth of 28%) and population growth of 1.1% per year[7] (total growth of 12%). Due to the assumption of full employment in the modelling, population growth essentially represents aggregate employment growth (by assumption). So, in Commonwealth Treasury's own modelling, this demonstrates that output growth will significantly exceed employment growth across NSW as a whole. This implies productivity growth in NSW of 1.4% per year, on average across the State. It is to be expected that GSP (output) generally grows more quickly than employment. However, there are also differences across sectors and regions. In Frontier Economics' modelling Hunter output grows by 29% over that period (close to the State average), while total employment growth is less than 3% (less than the state average). This implies productivity growth (growth in GRP/employment) on average of around 3%, which is consistent with the growth rate of productivity in black coal assumed for the Commonwealth Treasury modelling.[8]

Assumption of full employment in CGE modelling

Summary: The CGE model used for the Commonwealth Treasury modelling assumes that full employment is maintained in the long-run to ensure that the model equations can be solved (the "closure rule"). Other model variables adjust to ensure that full employment is maintained. For example, real wages grow more slowly in the carbon price scenarios to ensure full employment in maintained. Although this closure rule is common practice, it is misleading to report long run full employment as an outcome of the modelling, like the Commonwealth Treasury do (and widely reported by the Climate Change Minister) as it is a model assumption. It is more important to consider and understand the impacts on wage growth and on structural adjustment (change in employment between regions and sectors).

Economic cost of abatement

Summary: The economic cost of abatement (measured by GDP or GNI) can be much higher than the direct cost of reducing emissions (the carbon price) due to the 'tax interaction' effect. This means that the carbon price exacerbates pre-existing distortions created by the tax system.

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6 Table B20, *Strong Growth, Low Pollution*, 2011

7 Table B21, *Strong Growth, Low Pollution*, 2011

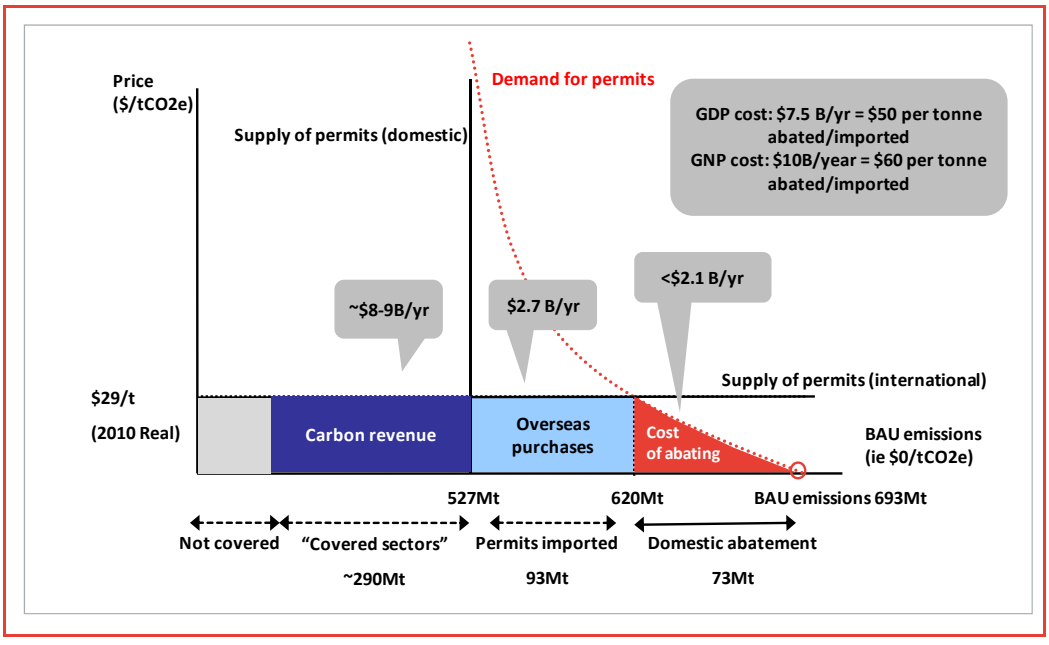
8 Chart B8, *Strong Growth, Low Pollution*, 2011

Commentary: An illustrative example of abatement, permit imports and costs is provided in Figure 1. The horizontal axis represents emissions of CO2 in Mt. The vertical axis represents the CO2 price or direct cost per tonne abated. The red dashed line ('demand for permits', also known as a 'marginal abatement cost curve') reflects options for reducing emissions: as the carbon price rises the level of emissions falls as companies and individuals prefer to incur costs to reduce emissions rather than pay the carbon price for emitting.

At a carbon price of zero there will be no abatement and emissions will be at 'Business as Usual' (BAU) levels, projected at 693Mt in the Frontier Economics modelling (679Mt in the Commonwealth Treasury modelling).

To reach a target of 527Mt (approximately 5% below 2000 levels by 2020) would be far more expensive if all abatement were to occur domestically but limited to the abatement options recognised in the Commonwealth Treasury modelling. The required *domestic* carbon price to achieve this abatement would be the point where demand for permits (the red line) intersects with the domestic supply of permits at 527Mt (the abatement cost curve is only illustrative in the diagram). Commonwealth Treasury assumes that there is an unlimited supply of international permits available at $29/tCO2 (2010 Real) so the target is met through a mix of permit imports and domestic abatement. The global carbon price acts more like a carbon tax, where the level is set by the international market and levels of domestic emissions are uncertain.

Figure 2: Costs and transfers in 2020



Source: Frontier Economics

The diagram reflects the following from the Frontier Economics modelling:

- domestic emissions by 2020 are projected at 620Mt for the given international carbon price (621Mt in the Commonwealth Treasury modelling). This reflects domestic abatement of 73Mt. For a price of $29/tCO2, the inferred *direct* cost of reducing emissions must be less than $2.1b (2010 Real) per year in 2020. This area is shaded red in the diagram.
- permit imports by 2020 are projected at 93Mt (compared with 94Mt in the Commonwealth Treasury modelling). This reflects expenditure of $2.7b (2010 Real) per year in 2020. This area is shaded light blue in the diagram. If the government maintained the fixed price until 2020, this $2.7b per year would reflect carbon revenue to the government as opposed to purchases from overseas.
- total carbon revenue would be around $15b per year if all emissions were "covered" by the scheme and required to pay a carbon price. Based on projections of covered sectors, total carbon revenue is projected at closer to $8.4b by 2020 (which implies around 290Mt of emissions are "covered").

Over time, the cost of abating (and purchasing permits from overseas) will continue to rise while the carbon revenue will flatten or fall (increases in the carbon price will be offset by falls in the number of permits sold). As such, it will not be possible to maintain compensation rates at the levels initially announced.

The economic cost (GDP) is projected to be around $7.5b per year by 2020, and impact on GNP is projected at around $10b ($400 per person). This is much greater than the direct cost of reducing emissions (<$2.1b). The reason for this is that the carbon price exacerbates pre-existing tax distortions (from income and company taxes) hence the economic cost is higher than the direct resource cost of reducing emissions. This equates to a GDP cost of $50 per tonne abated/imported in 2020, or a GNP cost of $60 per tonne abated/imported.

This point is implicitly confirmed in the latest Garnaut report (2011), which states at page 79 that:

> "using carbon price revenue to fund well-designed tax reform could halve the impact on GDP of achieving the minus 5 per cent emissions reduction target in the period to 2020"

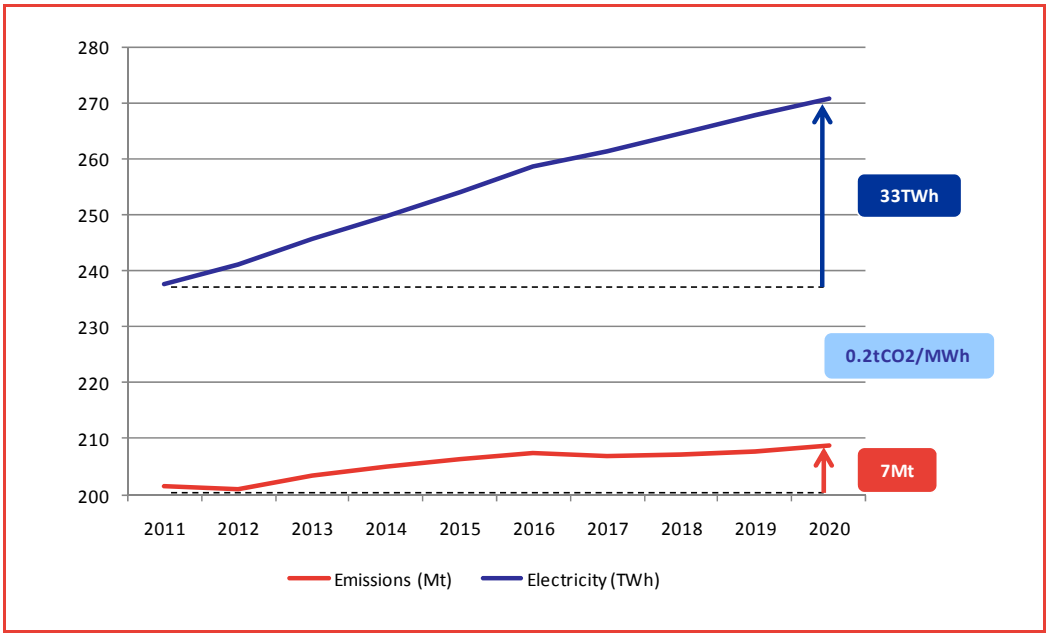
The converse must also be true: an emissions trading scheme without well designed tax reform can be twice as costly to the economy.

Electricity sector abatement and the impact of energy efficiency

Summary: Although energy efficiency measures should be encouraged due to significant costs savings, the benefit of emissions from such measures avoided are often overstated. This is because most partial estimates of energy efficiency emissions savings (based on simple spreadsheet models) assume that the rate of emissions avoided is based on the average emissions intensity of the market. This ignores the interaction of demand and supply and assumes that reductions in

future demand growth will reduce output from existing generation, or that the emissions intensity of new generation would be the same as the existing generation mix (current average of around 0.9tCO2/MWh). In reality, reductions in future demand growth will delay investment in new capacity, so it is more correct to consider energy efficiency emissions savings based on the average emissions intensity of *new* generation, not existing generation. Where new generation is generally the same as existing generation (predominantly coal) these approaches would be largely equivalent. However, due mostly to the renewable energy target almost all new generation over the next decade is projected to be renewable or gas – even in the absence of a carbon price. This has much lower emissions intensity than the existing stock. In the Commonwealth Treasury modelling between 2011-2020 the average emissions intensity of new generation in the Reference Case is 0.2tCO2/MWh. This is calculated as growth in electricity emissions (7Mt) divided by growth in electricity demand (33TWh): Figure 1. Energy efficiency measures will most likely defer this new investment rather than reduce output from existing generation. Any calculation of emissions savings from energy efficiency measures should take this into account.

Figure 3: Reference Case electricity demand and emissions



Source: Commonwealth Treasury, Strong Growth,Low Pollution, 2011[9]

9 http://www.treasury.gov.au/carbonpricemodelling/content/default.asp

Carbon pass-through/electricity impacts

Summary: Minister Combet has misrepresented Frontier Economics' modelling of the carbon price impacts for NSW Government, specifically with regard to the carbon pass-through effects.

Commentary:

In an address to the National Press Club (*"The political economy of carbon pricing"*, August 23, 2011), Minister Combet claimed that:

> Frontier Economics, when assessing the electricity price impact on households, assume a pass through rate of 1.5 to 1.6 tonnes of carbon pollution per megawatt hour.

This statement is misleading and incorrect. The modelling undertaken by Frontier Economics for IPART (as part of its independent regulatory price determination) does not show 150% pass-through rates. As part of the 2010 electricity price review IPART included the CPRS5 carbon prices. Frontier Economics' modelling for IPART included this carbon price including full details of the approach to carbon and the results of the modelling (with particular regard to carbon pass-through rates). This report is publicly available[10]. Frontier Economics' model does not assume a carbon cost pass-through rate. The carbon pass-through rate is an output of the model and depends largely on the carbon emissions intensity of marginal generation.

In FY2013 Frontier Economics' market modelling forecast a 111% pass-through rate for NSW annual average pool prices for an assumed carbon price of $26/t (real $2009/10). This rate is consistent with the first year pass-through rate in the current Commonwealth Treasury modelling: based on calculations from Chart 5.27 and Chart 5.1 from *Strong Growth, Low Pollution*, 2011[11], pass-through in 2012/13 is 93-109%).

It is wrong to assert that high pass-through rates in the first two years of the scheme are inconsistent with material losses to coal generators across the next two decades. The current Commonwealth Treasury work, the IPART work and the work performed by Frontier Economics for NSW Treasury all show high pass-through rates in the first year or two of the scheme before new investment in low emissions generation occurs. In this stage, marginal emissions intensity is high, carbon pass-through is high and hence NSW generators are unlikely to suffer significant financial impairment in those years. In the medium to long term, new investment in lower emissions generation (gas and renewables) leads to reduced carbon intensity and lower pass-through rates. This drives the material

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10 http://ipart.nsw.gov.au/files/Consultant Report - Frontier Economics - Final Report - Energy Purchase Costs - March 2010 - WEBSITE DOCUMENT.PDF

11 http://www.treasury.gov.au/carbonpricemodelling/content/chart_table_data/chapter5.asp

financial losses for coal generators in the longer term in Frontier Economics' modelling and presumably in the Commonwealth Treasury modelling as well.

NSW Government reporting of Frontier Economics macro modelling results

Summary: Some media outlets have criticised the NSW Government for its reporting of Frontier Economics' modelling of the carbon price effects, in particular the greater focus placed on the negative impacts on some NSW regions. Frontier Economics rejects this criticism as it is the responsibility of the Government (State and Commonwealth) to understand which regions and sectors will most require assistance to manage the transitional impacts of carbon pricing policies.

Commentary: The carbon tax is designed to shut down or curtail high emitting activities, so it is unsurprising that Frontier Economics' analysis found that economic sectors and regions that have a high dependence on carbon intensive activities suffer under the proposed carbon tax. If these sectors and regions didn't suffer then the tax wouldn't work.

As highlighted by Frontier Economics' report, the biggest structural adjustment issues arise for Governments where the carbon tax has a contractionary effect on regions or sectors that are growing slowly. It is understandable that NSW Government and other States focus on regions and sectors adversely affected because they will require assistance to manage the adjustment following the introduction of a new tax. Regions that benefit from a carbon tax will not require assistance, so they are not the focus of NSW Government. Regions such as the Hunter and Illawarra will need considerable assistance to manage the reduction in jobs, whereas communities that benefit from increased job growth won't need Government assistance.

The NSW Government is also more concerned about regions where the proportionate impact of the carbon tax is the greatest: the higher growth in employment in Sydney is less than 1% whereas the reduction in growth in the Hunter and Illawarra is over 15%, which is of significantly greater importance to the region.

Government assistance/green jobs is included in the Frontier modelling

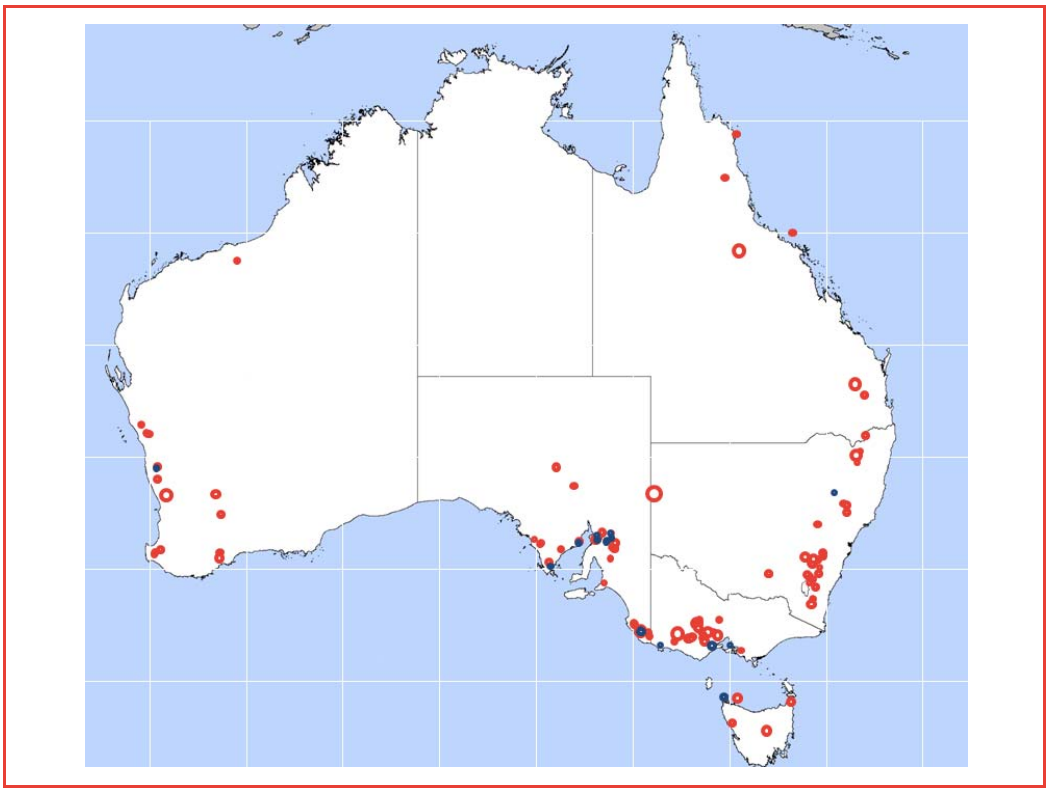
Some media have reported that:

> The federal Minister for Climate Change, Greg Combet, said the effect on regional jobs reported by the O'Farrell government was based on long-outdated work by a private sector consultancy which did "not take into account many elements of the

> Gillard government's carbon price package, including our $9.2 billion jobs and competitiveness program".[12]
>
> The NSW government did not respond to the Herald's questions about why the Treasury modelling appeared not to include potential jobs gained through the development of renewable technology.

These statements are misleading and incorrect. Frontier Economics' modelling for NSW Government is more current than the Commonwealth Treasury modelling (*Strong Growth, Low Pollution*, 2011), which commenced in December 2010 and was released July 10, 2011. Frontier Economics' modelling commenced after the Commonwealth package was announced. It does takes into account the Gillard Government's compensation packages, and the figures reported take account of new jobs created in other sectors, including the location of potential new renewable projects (indicated in Figure 2).

Figure 4: Locations of current and prospective wind farms



Source: Frontier Economics. Blue = current. Red = prospective

12 http://www.smh.com.au/environment/climate-change/carbon-tax-will-cost-31000-nsw-jobs-20110803-1ibrp.html. This article also incorrectly reports the job losses in Hunter NSW as 1,850. The correct figure is 18,500.