# Senate Committee of Scrutiny of New Taxes

## INQUIRY INTO A CARBON TAX – RESPONSE TO QUESTIONS ON NOTICE

*The following note represents Frontier Economics' response to the Questions on Notice arising from the presentation of our evidence to the Committee on 1 September 2011 at the Geelong Mercure Hotel, Victoria.*

## Questions of Notice

The following Questions on Notice, asked by Senators Cameron and Thistlethwaite, were taken at the public hearing of the Senate Select Committee (the Committee) on the Scrutiny of New Taxes held on 1 September 2011 in Geelong.

### Question on Notice 1.

**(1) Senator CAMERON:** How do you model the interplay between carbon pricing, industry growth, and wages and employment growth at regional level? I will ask you this on notice: can you tell me how you do that with the tools that are available to you now? I do not want the answer now; I would like you to take that away and give us a response on notice, because it might take a long time and I have got other questions I want to ask you.

**Mr Harris:** Sure.

### Response to Question on Notice 1.

Frontier Economics has described its modelling approach in several documents, including documents provide to the Committee. Rather than referring the Committee to these documents our modelling approach is explained below.

The effects of the carbon price are modelled using Frontier Economics' electricity investment model (*WHIRLYGIG)* interactively with Monash University's Centre of Policy Studies' (CoPS) *MMRF-GREEN*. Table 1 illustrates the structure of the interaction: key exogenous inputs are shown in black text in the middle column of the table. They include scenarios on macroeconomic variables and world prices taken from the Commonwealth Treasury modelling of the carbon price[1]. The outputs of the reference-case modelling (shown in the final column of Table 1) are projections of annual time paths for numerous

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1 Based on *Strong Growth, Low Pollution*. Data and assumptions from the report are available here: http://treasury.gov.au/carbonpricemodelling/content/default.asp

structural variables (e.g. outputs and employment by sector, prices, domestic usage, exports and imports by commodity), all with regional dimensions.

The relevant variables have been colour-coded in Table 1. Electricity demand by region (green-coded) is endogenous in *MMRF-GREEN* but exogenous in *WHIRLYGIG*. On the other hand, electricity output and fuel usage, wholesale electricity prices and the carbon price (red-coded in the table) are endogenous in *WHIRLYGIG* but exogenous in *MMRF-GREEN*.

Table 1: Interaction of models

| Model | Key exogenous variables | Key endogenous variables |
|---|---|---|
| MMRF-GREEN monash-CoPS CGE model | Macroeconomic variables<br>World prices (including fuels)<br>Oil and gas supplies<br>Technological and preference changes outside electricity generation<br>Electricity output and fuel usage by technology and region<br>Wholesale electricity prices by region<br>Carbon price | Numerous structural variables (sector by region)<br>Electricity demand by region |
| whirlygig electricity investment model | Electricity demand by region<br>Fuel prices<br>Oil and gas supplies<br>Technological specifications for existing and potential new generators | Electricity output and fuel usage by technology and region<br>Wholesale electricity prices by region<br>Carbon price |

Our modelling adopts the same Reference Case and Carbon Price scenarios as adopted in *Strong Growth, Low Pollution*, including the same assumptions regarding global and domestic action. The reported impacts of the carbon policy are measured relative to a Reference Case, hence changes in the Reference Case assumptions will impact the results, possibly as much as changes in the Carbon Case assumptions. Table 2 provides a high level summary of differences in scenarios between the Commonwealth Treasury modelling of the Carbon Pollution Reduction Scheme (CPRS) (*Australia's Low Pollution Future*[2]) and the current modelling (*Strong Growth, Low Pollution*). 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

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

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.

Table 2: Overview of scenarios

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

For the electricity sector, this report relies on Frontier Economics' electricity investment model – *WHIRLYGIG*. This model provides estimates of long-run marginal cost which can be used as an indicative proxy for long run wholesale electricity prices. In contrast, Commonwealth Treasury used a blended average of electricity modelling results from two consultants: SKM-MMA and ROAM. A comparison of the wholesale price average across Australia (for each scenario) is presented in Figure 1. The small differences in the price estimates between Commonwealth Treasury and Frontier Economics suggest that this is not a material cause of differences in the overall modelling results.

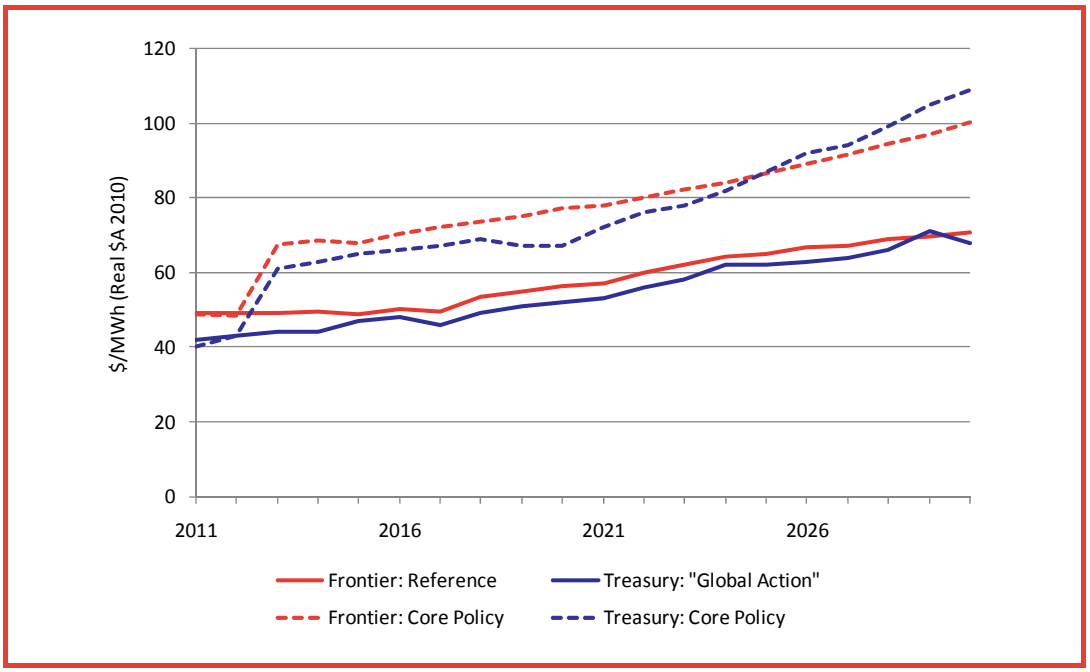


Figure 1: Average wholesale electricity prices[3]

## Question on Notice 2.

**(2) Senator CAMERON:** How much coalmining investment did you model for New South Wales in the Hunter Valley?

**Mr Price:** I will have to take that on notice and get back to you as to what the investment was.

**Senator CAMERON:** If you do not know the specific figure, did you model in a growth in coalmining investment?

## Response to Question on Notice 2.

The effect of the Government carbon tax was reported in detail in the work we undertook for the NSW Government. In particular we highlighted in our report sectors most adversely and positively affected by the carbon tax. In respect of the coal industry we found that in terms of output and employment, which reflect investment, it was one of the most adversely affected sectors. We found that growth would fall by over 6% but the industry would still grow overall. In terms of employment, we found that the combined effect of lower growth and productivity improvements meant that the absolute number of jobs in the coal mining sector in NSW did not increase over the modelling period.

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3 Frontier's electricity modelling for this analysis is based on LRMC as a proxy for prices. Current wholesale electricity prices (around $35/MWh) are below LRMC due to excess capacity/soft demand growth. This is not material to the broader economic results.

## Question on Notice 3.

**(3) Senator CAMERON:** That is what I am asking you. Can you provide the details of your analysis of the productivity growth? What factors are pushing the productivity growth? I do not know how you do this and I have some experience in the coal industry. The draglines are there, the longwall miners are there, there is round-the-clock operation, I would like you to tell me where this productivity growth is going to be an impediment to job growth. Could you take that on notice?

**Mr Price:** I do not think productivity growth is an impediment to job growth. Productivity growth is a good thing for the economy or it used to be anyway. The only point we are making here is that Ms Quinn used this result to cast doubt on our modelling. All I am saying is that any economist knows that if you include an assumption in a model, which is the same assumption that they use, that there is productivity growth across the economy and in the coal industry that it is not surprising at all that output will grow and employment will go flat.

## Response to Question on Notice 3.

Coal mining productivity increases will be driven by two main factors. The first relates to the quality of the mine resource. The coal in some mines is easier and cheaper to extract coal than in other mines. It is likely that while international coal prices remain high poorer quality existing mines will remain operational longer than they would under more sustainable coal price conditions. As coal prices revert back to the mean these less productive mines will close and these will be replaced by more productive, newer mines.

The other major contributor to improved mine productivity is investment in capital and mine design. There are two effects to consider in this regard in the context of the Australian coal industry. Firstly, in recent years, the Australian coal mining sector has accelerated its acquisition of capital so they can develop more mines in response to higher international coal prices. This rapid formation of capital has resulted in an initial decline in productivity, which will recover once these new mines are progressively brought into full production. The other source of productivity improvement relates to the steps taken by the former Labor Government in NSW to relieve transport and ship loading bottlenecks in, respectively, the Hunter and Newcastle. The relief of these bottlenecks will allow more efficient continuous operation of coal mines, thereby improving the utilisation of coal mining capital and, hence, productivity.

## Question on Notice 4.

**(4) Senator THISTLETHWAITE:** I have one more question. The coalition's approach is what they are calling 'direct action'. I look at their website and it says that the cost of this scheme will be roughly $11 billion over four years—I think that is what it says. One of their other policies is to oppose the minerals resource rent tax. They are opposed to carbon pricing. With no revenue from the minerals

resource rent tax or from carbon pricing and an $11 billion scheme, I am keen to hear your view on this: how are they going to achieve their commitment to bring the budget back into surplus without those revenues and that cost?

**Response to Question on Notice 4.**

This question implicitly assumes that the Federal Government's tax revenues will be the same under their carbon tax/emission trading scheme as it would be under the Coalition's Direct Action policy. This is not the case. Both policies will reduce the total tax revenues compared to a world without any carbon price or Direct Action activities paid for from an enhancement to consolidated revenue. However, the total tax revenues earned by the Government would be greater under the Direct Action policy than with a carbon tax.

Frontier Economics found from our previous analysis that a carbon price similar to the carbon tax proposed by the Government that Commonwealth tax revenues would decline by nearly $12b and State tax revenues would decline by around $1.5b. This was on top of a budget deficit induced by the CPRS of $3.7b (now estimated to be around $4b under the proposed carbon tax). Much of this reduction in tax revenue is a result of the depressing effect on the economy by raising electricity costs to consumers by more than $45b over the period to 2020 –this is six times as much revenue the Government needs to fund the technology required to achieve the reduction target. This excess taxing of the economy reduces the Government's other taxes because unnecessarily high energy prices depresses economic growth (this is known as the tax interaction effect).

Under Direct Action, as we understand it, the Opposition only intends charging consumers what it costs to acquire the technology, not six times the cost as it does under the Government's carbon tax arrangements. As a consequence the tax interaction is much smaller and therefore economic growth in not depressed nearly as much as under the Government's scheme and therefore the Opposition would have more tax revenues from other sources to pay for the abatement technology they acquire. In addition to these additional tax revenues, as we understand it, the Opposition has said it would not spend $10b of taxpayer funds the Gillard Government has allocated to the Clean Energy Fund (recognising that the $2b of funds that the Government has so far allocated to the Fund will come from taxpayers and not carbon revenues). This would mean that the Opposition would not have to raise $10b in taxes to pay for projects expected to be funded by Clean Energy Fund.

Finally, the Government estimates that its new bureaucracies will cost around a $100m p.a. once they are fully operational. In net present value terms this represents a burden on taxpayers of over $1b. Such a large expense is necessary to administer a broad based carbon tax but not a policy that conducts a tender for abatement for a smaller number of specific projects. Savings in the bureaucratic costs of the latter scheme can be used to acquire additional abatement options.