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The Impact of an Emissions Trading Scheme on State Government Budgets

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1. Introduction

The Rudd Government has announced its intention to introduce an Emissions Trading Scheme (ETS), now being referred to as a Carbon Pollution Reduction Scheme (CPRS), by 2010. Central to the scheme will be the sale by the Federal Government of permits to industrial interests which emit carbon pollution as part of their commercial activities. Businesses that have to purchase permits will pass the additional costs on to their customers. In its recently released Green Paper (Commonwealth of Australia 2008c), the Commonwealth outlined its intention to provide significant compensation to households and selected industries to help them offset the adjustment costs that are likely to be associated with the introduction of a price for carbon.

This paper highlights the need for an additional class of compensation payments that do not appear to have been considered in the debate so far, namely, payments to compensate the state and territory governments[1] for the likely increase in the costs they will face in delivering services to their residents.

In estimating the likely cost of the CPRS to the state governments the following method was used. Australian Bureau of Statistics (ABS) data on state government expenditure is combined with ABS input-output tables to determine the energy intensity of state government expenditures. This is then combined with a carbon price of $20 per tonne of CO_2 emissions (as forecast by the Green Paper) to estimate the amount of Commonwealth compensation required by the states to facilitate the same level of services they currently deliver after the CPRS is implemented.[2]

[1] The term states is used throughout this paper to mean states and territories.
[2] We ignore the possible issue of free permits which at best will provide a temporary reduction in the impact on the states.

The paper finds that the cost of emissions permits will impose a large burden on state and territory governments likely to be close to $1.5 billion in 2010-11 when the CPRS is planned to come into effect. That represents a charge of $1.5 billion on the state governments by the Federal Government. That is the equivalent of more than 15,000 teachers, nurses and police officers. The states have a strong claim for compensation from the Federal Government.

2. Method

In order to estimate the cost of the CPRS on the state and territory government the following method was used. First, ABS data on state outlays was collected to shed light on the composition of state and territory government expenditures. This data is summarised in Table 1.

Second, ABS input-output tables[3] were used to estimate the energy intensity of various categories of state government outlays, and in turn, to determine the different energy sources relied upon.

Third, the estimated impact of a $20 per tonne price of carbon on various forms of energy included in the Green Paper were applied to the energy demand of the various state governments to determine the direct impact of the CPRS on state government budgets.

Fourth, the 0.9 per cent increase in the CPI that the Green Paper estimates would result from the introduction of the CPRS was applied to non-energy related expenses, including wage costs, of the state governments.[4]

Further explanation of this method is provided in the body of the paper where necessary.

3. What do states spend their money on?

Table 1 shows the total amount spent by each state government in 2006-07 and illustrates how the pattern of services delivered by state governments varies widely. For example, expenditure on ógeneral public servicesô accounts for 15.3 per cent of total government expenditure in the ACT while Victoria, at the other extreme, spends only 1.5 per cent of their budget in the same category. Their different needs and circumstances would appear to require that South Australia and Western Australia respectively spend 1.9 and 2.7 per cent of their budgets on water supply compared with a more modest 0.3 per cent in NSW and 0.1 per cent in the ACT.

[3] These are tables that highlight the various raw materials and intermediate services used in the production of all final goods and services.

[4] In principle categories such as road transport expenditures should also be examined because of its high energy content and the fact that some states spend quite heavily on road transport. However, while road transport appears in both the ABS government finance statistics as well as the input-output tables, the content of the two items differs quite a lot. For example, road transport in the government finance figures includes items such as planning designing and constructing roads, vehicle registration and driver licensing functions. The input-output tables use a narrower definition of road transport.

Regardless of the reasons for these and other variations in government spending patterns across states, the extent of the interstate variations will have significant consequences for the future energy costs of the various states.

Table 1: State outlays by purpose: 2006-07, $m

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
General public services	1,310	507	1,298	166	350	265	111	439
Public order and safety	4,621	3,613	2,688	1,074	1,788	318	366	255
Education	11,807	9,082	7,219	2,940	3,991	948	684	621
Health	11,716	8,860	7,379	3,356	3,721	944	642	677
Social security and welfare	3,415	2,533	1,502	748	815	257	175	169
Housing and community amenities								
• Housing and community development	1,028	1,328	755	508	527	132	234	77
• Water supply	142	228	169	216	403	0	12	3
• Sanitation and protection of the environment	625	290	86	237	127	16	49	64
• Other community amenities	0	537	0	8	71	0	0	2
Total Housing and community amenities	1,795	2,383	1,010	969	1,128	148	294	145
Recreation and culture	1,204	739	696	291	443	131	137	79
Fuel and energy	42	100	942	40	97	19	114	0
Agriculture, forestry and fishing	866	424	1,118	193	378	83	42	1
Mining, manufacturing and construction	178	0	168	95	196	11	25	0
Transport and communications								
• Road transport	2,715	1,603	1,608	411	860	184	158	155
• Water transport	136	12	90	26	35	2	4	0
• Rail transport	2,658	1,787	867	9	85	4	4	0
• Air transport	0	0	12	0	5	0	5	0
• Communications and other transport	645	166	647	299	495	2	21	14
Total Transport and communications	6,154	3,568	3,223	745	1,478	192	191	169
Other economic affairs	775	378	786	178	353	125	107	47
Nominal interest on superannuation	776	419	1,154	316	289	148	105	173
Public debt transactions	1,224	459	181	204	112	25	139	61
Other	497	408	756	214	8	67	11	39
Total	**46,380**	**33,473**	**30,120**	**11,529**	**15,147**	**3,681**	**3,143**	**2,874**

Source: Australian Bureau of Statistics 2008 *Government Finance Statistics, 2006-07*, Cat No 5512.0, 15 April.

In order to make it easier to compare how states and territories allocate their resources across competing needs the following table, Table 1A, provides the data from Table 1 as a share of total spending for each state or territory.

Table 1A: State and Territory outlays by purpose, per cent of total

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
General public services	2.8	1.5	4.3	1.4	2.3	7.2	3.5	15.3
Defence	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Public order and safety	10.0	10.8	8.9	9.3	11.8	8.6	11.6	8.9
Education	25.5	27.1	24.0	25.5	26.3	25.8	21.8	21.6
Health	25.3	26.5	24.5	29.1	24.6	25.6	20.4	23.6
Social security and welfare	7.4	7.6	5.0	6.5	5.4	7.0	5.6	5.9
Housing and community amenities								
• Housing and community development	2.2	4.0	2.5	4.4	3.5	3.6	7.4	2.7
• Water supply	0.3	0.7	0.6	1.9	2.7	0.0	0.4	0.1
• Sanitation and protection of the environment	1.3	0.9	0.3	2.1	0.8	0.4	1.6	2.2
• Other community amenities	0.0	1.6	0.0	0.1	0.5	0.0	0.0	0.1
Total Housing and community amenities	3.9	7.1	3.4	8.4	7.4	4.0	9.4	5.0
Recreation and culture	2.6	2.2	2.3	2.5	2.9	3.6	4.4	2.7
Fuel and energy	0.1	0.3	3.1	0.3	0.6	0.5	3.6	0.0
Agriculture, forestry and fishing	1.9	1.3	3.7	1.7	2.5	2.3	1.3	0.0
Mining, manufacturing and construction	0.4	0.0	0.6	0.8	1.3	0.3	0.8	0.0
Transport and communications								
• Road transport	5.9	4.8	5.3	3.6	5.7	5.0	5.0	5.4
• Water transport	0.3	0.0	0.3	0.2	0.2	0.1	0.1	0.0
• Rail transport	5.7	5.3	2.9	0.1	0.6	0.1	0.1	0.0
• Air transport	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
• Communications and other transport	1.4	0.5	2.1	2.6	3.3	0.1	0.7	0.5
Total Transport and communications	13.3	10.7	10.7	6.5	9.8	5.2	6.1	5.9
Other economic affairs	1.7	1.1	2.6	1.5	2.3	3.4	3.4	1.6
Nominal interest on superannuation	1.7	1.3	3.8	2.7	1.9	4.0	3.3	6.0
Public debt transactions	2.6	1.4	0.6	1.8	0.7	0.7	4.4	2.1
Other	1.1	1.2	2.5	1.9	0.1	1.8	0.3	1.4
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Adapted from Australian Bureau of Statistics 2008 *Government Finance Statistics, 2006-07*, Cat No 5512.0, 15 April.

4. How much energy does each state government use?

As mentioned above, the energy intensity of the different types of state spending can be obtained through the ABS input-output tables. Input-output tables describe the various inputs that contribute to the output of each industry. The input-output tables contain a broad range of data on the inputs used by industries ranging from ósheepô to óother personal servicesô. They also include detailed data on the industries of most interest for this analysis including óelectricity supplyô, ógovernment administrationô, óhealthô and óeducationô.

A simplified version of the ABS input-output data is provided in Table 2. While the data in Table 2 relate to Australian economy in 2004-05 the structure of the economy has not changed significantly sine then. That said, while the structure of the economy has not changed significantly in recent years, the cost of energy has. This means that the data provided in Table 2 is likely to significantly understate the amount spent on energy (as opposed to the amount of energy used) to produce a given bundle of government services.

Table 2: Simplified input-output relations: 2004-05, $m

Uses **Supply**	Road transport	Government administration	Education	Health services	Community services
Petroleum and coal products	3,497	145	4	121	56
Electricity supply	67	315	682	147	116
Gas supply	2	18	25	29	32
Road transport	1,651	547	239	194	73
Total Intermediate Use	19,137	23,372	11,153	10,770	4,304
Employment costs	7,972	24,826	34,730	37,716	4,977
Total Use	**34,922**	**51,870**	**50,957**	**57,127**	**10,941**

Source: ABS 2008 Australian National Accounts: Input-Output Tables ï Electronic publication 2004-05, Cat No 5209.0.55.001

Table 2 can be interpreted as follows. For each of the óusesô listed across the top of the table the value of the raw materials, labour and other óintermediate goodsô required is listed beneath it. For example, in 2004-05 there was $57,127 million spent on health services of which $37,716 million was spent on wages and only $147 million was spent on electricity.

The energy intensity of different areas of government expenditure can be used to determine how much the cost of providing government services will increase as a result of the introduction of the CPRS. The Green Paper provides an estimate of the percentage increase in the costs of different sources of energy and fuels. For example, assuming carbon costs are $20 per tonne of emissions then electricity costs are

expected to increase by 16 per cent and household fuels are expected to increase by 9 per cent. The Green Paper also estimates that the CPI will increase by 0.9 per cent.[5]

While the Green Paper does not provide specific estimates, it can be assumed that other non-fuel costs incurred by state governments will increase by approximately the same amount as the CPI increase. It is also assumed that labour costs will increase by the CPI.[6]

Having applied the methodology outlined above the results provided in Table 3 were achieved. Note that these results use government spending figures for 2006-07 and so the results only show how costs would have been affected had the carbon permit costs been charged in that year. Hence the results are quite conservative as estimates of the costs that will be incurred in 2010 and subsequent years.

Table 3: Cost to State Budgets of the CPRS: 2006-07, $m

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Total spending	46,380	33,473	30,120	11,529	15,147	3681	3,143	2,874	146,347
Increase due to CPRS	425	312	264	101	139	32	27	25	1,325
Percentage increase	0.92%	0.93%	0.88%	0.87%	0.92%	0.87%	0.86%	0.87%	0.91%

Sources: Authors estimates based on Tables 1 and 2.

Table 3 shows that the introduction of a CPRS would result in an increase in state government expenditure of $1.3 billion in 2006-07 if they attempt to deliver the same level and quality of services offered before the introduction of a carbon price. As the CPRS will not be introduced until 2010, however, the likely impact on state budgets in 2010-11 is estimated below.

The estimates in Table 3 can be further refined as the electricity generated in the various states has different levels of carbon intensity. That is, while the national electricity price is likely to rise by 16 per cent, the actual electricity price in each state will rise by more or less than that figure due to the different emission intensities of the fuel used in each state.

In order to determine the differential impact on electricity prices by state, the Emissions Factors for Consumption of Purchased Electricity by End Users published by the Department of Climate Change can be used.[7] This data is based on the existing pattern of trade in electricity across state borders, and in turn, the forecast impact of

[5] Figures taken from the Green Paper (Commonwealth of Australia 2008c) p. 282.

[6] This seems a reasonable assumption since wages tend to increase in response to price increases albeit with delays in many cases. In principle it is possible to make more sophisticated estimates of the impact of the CPRS on the state budgets, for example, by using the input-output tables to determine the energy intensity of all the inputs into government services. However, given the existence of other sources of imprecision the case for such an approach is weak. For example, the energy intensity of health is known but this cannot be broken down into public and private health care. Likewise we have to make inferences from the year 2004-05 when we use the input output tables.

[7] Department of Climate Change 2008, *National Greenhouse Accounts (NGA) Factors*, January at http://www.climatechange.gov.au/workbook/pubs/workbook-feb2008.pdf

this effect is based on the assumption that similar patterns of cross border electricity trade remain after the introduction of the CPRS.

Table 4: Cost to State Budgets of the CPRS: 2006-07, Adjusting for differential CO_2 emissions intensities, $m

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Total spending	46,380	33,473	30,120	11,529	15,147	3681	3,143	2,874	146,347
Increase due to CPRS	427	324	264	100	138	29	27	25	1,333
Percentage increase	0.92%	0.97%	0.88%	0.87%	0.91%	0.77%	0.85%	0.87%	0.91%
Variation due to differing emission intensities	2	12	0	-1	-1	-3	0	0	8

Source: Table 3 and Department of Climate Change 2008 *National Greenhouse Accounts (NGA) Factors*, January.

It is interesting to note that in comparing Table 4 with the previous table there is only a modest difference in the results. As would be expected there is a significant increase in costs in Victoria reflecting its dependency on brown coal. There is a significant reduction in the costs in Tasmania reflecting that Stateôs heavy dependence on hydro electricity. However, changes seem modest given the diversity of emissions intensities between the states and territories. The effect of the diversity of emissions intensities is muffled somewhat by the other government costs which are assumed to be the same throughout Australia. For example it is assumed labour costs move uniformly throughout Australia.

If the carbon price is not $20 per tonne of CO_2 then the above results can be scaled up or down as the case may be. For example, to examine the case for Victoria where the additional costs are $324 million for $20 per tonne of CO_2 emissions, the result of a $40 carbon price would be obtained by simply doubling the figure to obtain $648 million.

The estimates provided above are likely to underestimate the final cost of the CPRS on state and territory government budgets for a number of reasons:

- The input-output tables are only available for 2004-05.
- There have already been substantial energy price increases since the ABS data was collected.
- Generators may discriminate among customers when they pass on costs.
- The cost of emissions may be significantly higher than $20 per tonne.

In addition to the factors listed above, it is also necessary to project the estimates through to 2010-11 when the costs will actually be incurred. Some of the factors that produce underestimates can be addressed below.

The use of the year 2004-05 for the input-output relationships between energy sources and final usage is likely to significantly understate the results. That is, the values reported in the input output tables are likely to be much higher following recent price

increases in energy. There is some consumer price information that relates to energy sources as well as some producer price information but it does not translate well to the categories in the input output tables. One methodological alternative is to use petroleum prices from the consumer price series to adjust for the category used here called ópetroleum and coal productsô. From the producer price index there is the ócelectricity and gasô series which can be applied to both of those products.[8] Using those price increases to adjust the base input-output relation in the construction of Table 2 and follow that through into the rest of our methodology we will replace Table 4 with the table below.

Table 5: Cost to State Budgets of the CPRS: 2006-07, Adjusting for CO_2 emissions intensities and recent cost changes, $m

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Total spending	46,380	33,473	30,120	11,529	15,147	3681	3,143	2,874	146,347
Increase due to CPRS	479	367	294	110	154	30	30	28	1,492
Percentage increase	1.03%	1.10%	0.98%	0.96%	1.02%	0.82%	0.95%	0.96%	1.02%

Source: Table 4, ABS *Producer Price Indexes*, Cat No 6427.0 various issues; ABS 2008 *Consumer Price Index, June 2008*, Cat No 6401.0 23 June.

The result of these calculations is that there will be an additional cost to the states of just under $1.5 billion if they attempt to provide the 2006-07 package of government services after the introduction of a CPRS. This amounts to a one per cent increase in total costs for state governments. Moving from Table 4 to Table 5 which incorporates more recent energy prices adds to the burden that a carbon tax will impose by an additional $159 million. That brings to $1,492 million the total burden of a $20 carbon price on state and territory governments. Note, however, that this is still a very conservative estimate since the ABS data on consumer and producer prices do not take account of the most recent electricity and gas price increases.

5. How will this look in 2010-11?

The estimates provided above refer to the burden on state governments in 2006-07 if there was currently a CPRS. To provide a better estimate for the burden in 2010-11 the behaviour of state government spending needs to be projected forwards a number of years. That spending will of course reflect a multitude of policy decisions at both the Commonwealth and state levels. However, an estimate can be made by assuming that state and territory spending will be a constant share of GDP. In that case the 2006-07 data can be scaled up to 2010-11 using the Federal Government estimates and projections for nominal GDP through to 2010-11.[9] The projection there is that nominal GDP will increase by 27.9 per cent between 2006-07 and 2010-11, which would imply that the additional burden of the $20 carbon tax would be $1,909 million when the carbon tax is introduced in 2010-11.

[8] ANZIC codes 36-37.

[9] Those forecasts and projections are given in the *Budget Strategy and Outlook; 2008-09 Budget Paper No 1* (Commonwealth of Australia 2008b) p.1-3.

There will be some offset to the burden of the CPRS on the states as a result of the expected increase in GST receipts. That will come about as the carbon permit price works its way through the system and drives up prices by the 0.9 per cent forecast in the Green Paper. Assuming volumes are unchanged that would mean the nominal value of sales attracting the GST should also increase by 0.9 per cent. That would also increase GST revenue by 0.9 per cent. The official forecast is that the GST will raise $52.7 billion in 2010-11. Hence the additional GST revenue would be 0.9 per cent of that or $474 million. That would have to be regarded as an upper estimate since it ignores any possible deflationary impacts due to the carbon price.[10]

The extra GST revenue will be distributed among the individual States and Territories according to the ‘state revenue sharing relativities’. The Treasury has provided projections of both the state and territory populations and the likely state revenue sharing relativities in 2010-11 (Commonwealth of Australia 2008a).

Table 6: Share of additional GST receipts, projections for 2010-11

	Population (millions)	State revenue sharing relativities	Share of additional GST revenue ($m)
NSW	7.169	0.95777	147
Vic	5.498	0.94529	111
Qld	4.505	0.91485	88
SA	1.644	1.20843	42
WA	2.282	0.77387	38
Tas	0.508	1.50247	16
NT	0.229	4.56482	22
ACT	0.359	1.17991	9
Australia	22.195	N/A	474[a]

Note: (a) Total does not add due to rounding.
Source: Commonwealth of Australia 2008a *Australia's Federal State Relations; 2008-09 Budget Paper No 3*

Table 7 combines the likely increase in state government costs associated with the introduction of the CPRS with the likely increase in GST revenues to determine the net impact.

Table 7: Net impact of CPRS costs and increased GST revenue 2010-11, $m

	NSW	**Vic**	**Qld**	**SA**	**WA**	**Tas**	**NT**	**ACT**	**Total**
Additional cost of government services	613	469	377	141	197	38	38	35	1,909
Additional GST receipts	147	111	88	42	38	16	22	9	474
Net additional burden	**466**	**358**	**289**	**99**	**159**	**22**	**16**	**26**	**1,435**
Net additional burden as share of total expenditures in 2010-11 (%)	**0.79**	**0.84**	**0.75**	**0.67**	**0.82**	**0.48**	**0.41**	**0.72**	**0.77**

Source: Tables 5 and 6, Commonwealth of Australia 2008a *Australia's Federal State Relations; 2008-09 Budget Paper No 3*Commonwealth of Australia 2008b *Budget Strategy and Outlook; 2008-09 Budget Paper No 1.*

[10] Normally it is assumed, for example, that the impact of rising petrol prices is to reduce spending on other items by consumers. That would have a deflationary impact on the economy.

Table 7 shows that the net additional burden on the States and Territories is $1,435 million in 2010-11 or just under $1.5 billion. NSW is worst hit in absolute terms incurring a net additional burden of $466 million. Worst affected in relative terms is Victoria. Least affected are the Northern Territory and Tasmania as a result of the GST formula working in their favour combined with the low carbon intensity of the electricity used in Tasmania.

6. Conclusions

This paper estimates that the introduction of a carbon permit system which prices carbon emissions at $20 per tonne will impose an annual net burden of $1,435 million on State and Territory Governments in the year 2010-11. That is the amount implied by the additional costs of $1,909 million and additional receipts of $474 million. Effectively that net burden represents a transfer of almost $1.5 billion from the States to the Federal Government.

The estimates were obtained using a number of steps summarised in Table 8.

Table 8: Obtaining the additional cost increases for State Governments, $m

	NSW	**Vic**	**Qld**	**SA**	**WA**	**Tas**	**NT**	**ACT**	**Total**
Step 1: Applying input-output relationships to Government spending-by-purpose data	425	312	264	101	139	32	27	25	1,325
Step 2: Adjusting for varying State CO_2 emissions intensities in electricity	427	324	264	100	138	29	27	25	1, 333
Step 3: Adjusting for recent energy cost increases	479	367	294	110	154	30	30	28	1,492
Step 4: Extending estimate to 2010-11 = total additional cost increases for State Governments	613	469	337	141	197	38	38	35	1,909
Step 5: Deducting the GST receipts = **net additional cost increases for State Governments**	**466**	**358**	**289**	**99**	**159**	**22**	**16**	**26**	**1,435**

The costs involved are substantial and amount to the equivalent of 15,000 teachers, nurses or police officers. State governments have a strong claim for compensation as do Australian households. Their claims are much stronger than the claims for compensation by the polluters themselves. The Commonwealth Green Paper makes clear that it intends to compensate households and business but it makes no mention of the need to compensate the states. Unless this oversight is addressed the needs of those dependent on state government services will be placed behind the desires of Australia largest emitters.

References

Australian Bureau of Statistics (ABS) 2008a *Australian National Accounts: Input-Output Tables – Electronic publication 2004-05, Cat No 5209.0.55.001*, 26 June.

ABS 2008b *Consumer Price Index June 2008, Cat No 6401.0,* 23 June.

ABS 2008c *Government Finance Statistics, 2006-07, Cat No 5512.0*, 15 April.

ABS various years *Producer Price Indexes, Cat No 6427.0.*

Commonwealth of Australia 2008a *Australia's Federal State Relations; 2008-09 Budget Paper No 3.*

Commonwealth of Australia 2008b *Budget Strategy and Outlook; 2008-09 Budget Paper No 1.*

Commonwealth of Australia 2008c *Carbon Pollution Reduction Scheme: Green Paper.*

Department of Climate Change 2008 *National Greenhouse Accounts (NGA) Factors*, January.