



# Fixing the Floor in the ETS

## The role of energy efficiency in reducing Australia's emissions

Research Paper No. 59

November 2008

**Dr Richard Denniss**

---

### Summary

The Australian Government has announced its intention to introduce emissions trading in 2010 by establishing the Carbon Pollution Reduction Scheme (CPRS), which will set a 'cap' on greenhouse gas emissions. Permits equivalent to this cap will be auctioned or given away to the largest 1000 polluters. These permits will then be bought and sold between the large polluters depending on their desire to increase their output or invest in energy efficiency measures.

These basic elements of the CPRS are well-known. What is not clearly understood, however, is that emissions trading will impose a 'floor' below which emissions cannot fall as well as a 'cap' above which emissions cannot rise. That is, once the government has decided on an acceptable level of pollution, it will issue a corresponding number of pollution permits. If households use less energy and create less pollution, they will simply free up permits to allow other families or other industries to increase their own emissions.

If, for example, it is decided that Australia needs to reduce its carbon emissions by 15 per cent on 2000 levels by 2020, emissions will total 85 per cent—not 84 per cent or 86 per cent. Under such an arrangement, there will be little scope for Australian households and small businesses to take deliberate action to reduce their emissions because whatever they do, Australia will continue to emit greenhouse gases at a level corresponding to 85 per cent of its emissions in 2000. The only varying factors will be *who pollutes* and *what price they pay* to do so.

As a result, concerned households and businesses will not be able to make any meaningful contribution to greenhouse gas abatement. In fact, the only way for individuals to lower Australia's total emissions will be to buy carbon permits themselves and not use them. This will prevent other parties, such as the cement or steel industries, from using those permits to pollute more.

The floor in the CPRS is not necessarily a problem if the emissions reduction target determined by government is in line with the latest climate science (that is, a 20 to 25 per cent reduction on 2000 levels). If, however, the target is determined by political expediency (that is, less than 20 per cent), Australia will end up emitting more than its fair share of greenhouse gases, regardless of what action Australian households and businesses take to reduce their carbon footprint.

To understand why this is the case, consider the following scenario.

After emissions trading is introduced, a number of concerned households decide to install solar hot water systems to reduce their climate impact. Demand for electricity falls as a result and electricity companies end up purchasing fewer permits to cover their emissions. Reduced demand causes the price of permits to fall, enabling other large polluters to purchase additional permits at a lower than expected price.

Having spent thousands of dollars to lower their climate impact, these households find themselves in an ambivalent position. Their actions have had no net effect on Australia's emissions; in fact, the only beneficiaries are large polluters, who are now able to purchase permits at a lower price. At this point, there are various options confronting households:

1. Continue to lower their energy use by, for example, cycling to work, installing energy-efficient light bulbs and using air conditioning less. This will have a similar effect to their earlier efforts: it will lower the price of permits for big polluters but will have no net effect on Australia's greenhouse gas emissions.
2. Increase their energy use, for example by taking longer showers and running air conditioners 24 hours a day with the windows open. While electricity bills may rise by approximately \$20 per week, these households would actually have spent far more if they had offset their emissions through tree-planting schemes or purchased more fuel-efficient vehicles. As a result of the increased energy use, electricity companies end up purchasing additional permits, thereby increasing the demand for permits and pushing prices up. This leaves fewer permits available for other polluters, who will need to pay more to cover their own emissions. Once again, there will be no net change to Australia's greenhouse gas emissions.
3. Buy carbon permits directly and then rip them up.<sup>1</sup> Because it is illegal for the top 1000 polluters to emit more greenhouse gases than the permits they have purchased allow, the only way to reduce Australia's overall greenhouse gas emissions is to remove carbon permits from the system. There will then be fewer permits available to polluters, who will need to pay a higher price for the right to pollute. Carbon emissions will experience a net decline as a result.

Under the proposed CPRS, households and small businesses will have no capacity to influence Australia's total level of emissions aside from buying carbon permits in order to rip them up. This counterintuitive situation emphasises the importance of

---

<sup>1</sup> It may be that case that permits will only be issued electronically and it would be impossible to rip them up physically. It would be possible, however, to purchase permits and not use them.

‘complementary measures’ to translate household energy savings into real financial and environmental benefits.

Such complementary measures would involve the creation of formal linkages between the CPRS and the household sector. Householders would then be able to ‘trade’ their carbon credits (earned by installing solar panels, for example) with big emitters who are willing to pay a price to pollute more. This will generate ‘gains from trade’, an important benefit that will not be fully realised under the CPRS in its proposed form. It will also allow existing voluntary offset schemes to remain viable.

As well as providing a substantial financial benefit for those households that can reduce their energy use, complementary measures linking households and big polluters will result in lower marginal abatement costs across the economy than would be the case under the CPRS in its current form. In other words, complementary measures would actually make the cost of acting on climate change cheaper than it would otherwise be.

This paper begins by describing in detail how the CPRS will prevent emissions falling below the target set by the Rudd Government and, in turn, the importance of setting a target that is consistent with what climate science demands. It then explains how the design characteristics of the proposed CPRS mean that, despite statements to the contrary, the CPRS will not deliver ‘least-cost’ emissions abatement. The paper concludes by outlining how complementary measures to empower households and deliver greater emissions savings at lower cost might operate.

## **1. Why the CPRS target works as a floor as well as a cap on emissions**

While the notion that the CPRS will impose a cap on emissions is widely understood, it does not seem to be widely understood that it will also impose a ‘floor’, below which greenhouse gas emissions cannot fall.

Emissions trading involves the issuing of a fixed number of permits to pollute, with the number of permits corresponding to the level of pollution desired by the government. Once these permits have been allocated, either by an auction or by giving them away, they can be freely traded. If the Rudd Government introduces a 15 per cent emissions reduction target compared to the level of emissions in 2000, it will issue only enough greenhouse gas emissions permits to allow polluters to release 85 per cent of the level of emissions in 2000. What that means, however, is that if one sector of the economy achieves deeper cuts in emissions than the 15 per cent target, other sectors can avoid making similar reductions.

It would be more accurate to describe the Carbon Pollution Reduction Scheme as the Carbon Pollution Allocation Scheme. It is the government that stipulates the level of emissions reduction at the outset, and emissions trading simply allocates that fixed level of pollution between different sectors of the economy.

It is important to note that the ability of different sectors to achieve different levels of emissions reduction (or even increase) is not a design flaw or an unintended consequence. On the contrary, such flexibility in the way that the burden of reducing emissions can be

shared between sectors is actually, from a theoretical point of view, one of the strengths of emissions trading.

Consider the following scenario.

1. In 2000, Australia produced 100 units of CO<sub>2</sub>-e.
2. In 2010, the CPRS is introduced with a reduction target of 15 per cent by 2020.
3. In 2020, the government issues 85 permits to pollute 1 unit of CO<sub>2</sub>-e (i.e. a 15 per cent reduction).
4. Households are even more concerned with global warming than the government is and invest heavily in energy efficiency, reducing household demand for energy (and therefore permits) by 50 per cent.
5. The reduced demand for electricity means that coal-fired power stations need to buy fewer pollution permits than they anticipated.
6. This frees up more permits to be bought, at a lower than anticipated price, by other big polluters such as the cement and steel industries.
7. On hearing that their first attempts to lower emissions have failed, households reduce their energy use by a further 10 per cent.
8. Again, this simply means that coal-fired power stations need to buy fewer permits, freeing up even more for large industrial users.
9. It is therefore likely that households will lose their enthusiasm for curbing energy use when they realise, in time, that their efforts have no impact on the level of emissions and, in fact, merely reduce the price of emissions permits to polluters.

Under the proposed CPRS there is virtually nothing households can do to reduce Australia's emissions below the target set by the government. So, in effect, this target is simultaneously a 'cap' and a 'floor'.

To highlight this problem even more starkly, consider the counterfactual to the example outlined above. If households decide they no longer care about climate change and begin running their air conditioners with windows open 24 hours a day, the result will be an increase in demand for emissions permits by coal-fired power stations. The price of permits will rise and some other industries will be forced to reduce their emissions or even cease operating altogether.

Therefore, the less households do to reduce their emissions, the more big polluters will be forced to do. This situation will remain the case unless the government is willing to supplement the proposed emissions trading scheme (ETS) with a mechanism to ensure that efficiency savings on the part of householders can deliver an actual reduction in the level of national emissions. A brief outline of such a scheme is discussed in the final section of this paper.

## 2. Why the CPRS won't work as well as the textbook says

Greenhouse gas emissions around the world have been growing too fast because those who generate them have not been required to pay for the pollution they cause. There are a number of possible solutions to this problem, including:

1. Regulation (for example, in the way that we restrict noise).
2. A carbon tax (such as the one we impose on petrol), which requires the government to set a price for pollution and allows the market to decide how much pollution it is willing to pay for.
3. An ETS (such as is being proposed in Australia), which requires the government to set the level of pollution (and therefore the number of permits it is willing to issue) and the market sets the price of the pollution.

The reason that economists generally prefer emissions trading to a carbon tax is that an ETS allows those with few alternatives to polluting to purchase additional permits from those who do have alternatives. Because permits can be sold to people who value them more highly, there is a much stronger incentive for those covered by the scheme to search for innovative ways to reduce their need for permits. In this way, an ETS creates the potential for 'gains from trade' where industries such as steel and airlines, both of which have very little capacity to reduce their emissions without reducing their levels of output, can buy permits from other industries that can reduce their emissions at a lower cost.

However, the CPRS will fail to achieve many of the 'gains from trade' suggested in the textbook because, although it will have a strong impact on the 'supply side' of the economy, in that it will encourage increased investment in renewable energy, it will have only a minor impact on the 'demand side'. A higher electricity price will reduce demand for electricity slightly, but it is unlikely to provide a strong enough price incentive for household investment in efficiency savings or behaviour change. Consider the following examples.

### **Example 1—The traffic snarl and the steel executive**

The steel industry is highly energy intensive. When the CPRS is introduced, and assuming that the steel industry is not granted an exemption, the cost of electricity will rise to reflect the cost of pollution permits. Given that there is little a steelmaker can do to lower its demand for electricity, the principal way it can soften the financial impact of the CPRS is to try to reduce the cost of its permits.

Now imagine that the CEO of a steel company drives to work every morning surrounded by thousands of people sitting alone in their large, inefficient cars also driving to work. She thinks about all the wasteful use of fuel, which is leading to an 'unnecessary' demand for emissions permits on the part of the petrol companies and therefore driving up the price of the permits her company needs to buy.

According to economic theory, her company should be able to negotiate with all of the drivers, or perhaps a representative of the drivers, to think up ways in which the steel company could help, or pay, the individuals to reduce their fuel use in exchange for the emissions permits that they would no longer need. But under the Australian CPRS this cannot happen for a number of reasons:

1. In order to ensure that the system is administratively simple, the CPRS is being designed so that only 'upstream polluters', such as petrol refineries, will have an obligation to buy permits—not individual drivers. This makes it impossible for the steel company to negotiate with the people actually wasting the petrol because they have no permits to trade.
2. In the textbook description of an ETS there are no 'transaction costs'. It is assumed that if a benefit of \$1 flows to both parties contemplating a contract, then they will enter into it. However, if there are transaction costs involved, such as time spent negotiating, time spent travelling to negotiations, and a stamp to post the contract costs 50 cents, in reality it is unlikely that such gains from trade will be pursued. Transaction costs may seem trivial but they have the potential to undermine the effectiveness of the ETS if the largest potential reductions in emissions result from small changes in the behaviour of large numbers of people.
3. While the cost of petrol is politically contentious, in fact it accounts for only a small percentage of household expenditure and, perhaps more surprisingly, a small percentage of the cost of car ownership. The impact of small increases in the price of petrol is, therefore, unlikely to stimulate significant behavioural change.
4. The Rudd Government has effectively exempted petrol from the CPRS by promising to reduce petrol excise by the amount necessary to offset any potential price rise due to the CPRS. As a result, car users will face no new pressure to reduce their fuel use.

A textbook ETS explicitly encourages all users of energy to explore ways to reduce their emissions in order to ensure that scarce permits are allocated to those who value them most highly. The design of the CPRS, however, combined with the large transaction costs associated with reductions from individual car users, suggests that it is unlikely to deliver 'least cost emissions reductions' in Australia.

In effect, large energy users will have to bid against parents' desire to drive their children to school and workers' lack of faith in the public transport system if they wish to purchase additional permits—and the result of that auction is unlikely to favour industry. This should be of concern to those worried about the impact of emissions trading on the economy.

## **Example 2—The coal-fired power station and surrounding homes**

Coal-fired power stations are among the largest greenhouse gas emitters in Australia and they will have to purchase permits for every tonne of CO<sub>2</sub> they emit. But not every tonne of coal burned is used to generate electricity for customers; around seven per cent of the electricity generated by power stations is actually used ‘on site’ to help run the enormous facilities. The introduction of emissions trading will see the cost of generating coal-fired electricity increase significantly, including the cost of the electricity consumed by the power station itself. So, if the station were to use energy more efficiently, it would not need to buy as many permits for its ‘on site’ consumption.

It is possible to distinguish between the amount of ‘gross’ electricity generated and the amount of ‘net’ electricity supplied to the market (termed ‘sent-out electricity’) and, with this distinction in mind, we can imagine again the thoughts of the CEO of a power station looking out from her office.

Imagine that the power station owned the 10 000 homes nearest to its site and rented those homes out to its employees and contractors. As part of the lease, the power company had agreed to pay for all the utility bills, including electricity. If the definition of ‘on site’ included those 10 000 homes, the CEO of the power company would be very keen to design and install energy-saving measures to reduce ‘on site’ electricity use and therefore the number of permits that the company would need to purchase simply to cover its own use of energy. If the cost of installing energy efficiency measures were less than the price of buying additional permits, a profit-maximising firm would pursue the efficiency savings.

In the economics textbook, however, power stations would not need to own the 10 000 homes to make them concerned about energy efficiency. They would simply negotiate with the householders, or new companies would form to take advantage of ‘arbitrage’ opportunities. In the textbook it does not matter who owns the homes, it only matters whether the costs of the activity are lower than the benefits.

But under the CPRS, as opposed to the textbook on which it was based, who owns the homes does matter. As with the example of the steel company outlined above, there will be no such ‘gains from trade’ between the household sector and the big polluters formally covered by the CPRS. While households may respond in some small way to higher electricity prices by slightly reducing their demand, the ‘upstream’ nature of the CPRS means that individual households will have no permits to trade with large polluters.

### **3. Won’t price increases make consumers change their behaviour?**

The introduction of the CPRS will increase the price of energy from fossil fuels, which will have some impact on the level of demand for such energy from households. This impact is, however, likely to be quite small for a number of reasons:

1. The price increase will be small for electricity and zero for petrol.

2. The percentage of household expenditure spent on electricity and petrol is low.
3. There are few alternatives available for many energy-intensive activities so households will not be able to substitute.
4. Habit carries more weight than price in many instances. To illustrate, many people forget to fill a water bottle each day but choose instead to pay around \$10 a litre for bottled water at lunchtime.

Economists refer to the relationship between the price of a product and the amount that is purchased as the 'price elasticity of demand'. The four factors outlined above suggest that the price elasticity of demand for energy in households is likely to be quite low, a fact supported by academic studies conducted around the world. The following factors provide further support for this conclusion.

1. Small increases in electricity bills will not stimulate large household expenditure on energy efficiency. On the one hand, the government is predicting (accurately) that the increase in the cost of energy might be as little as \$5 per week. On the other hand, it is assumed that households will begin to spend thousands of dollars installing solar hot water systems and other energy-saving devices as soon as the CPRS is in place. While it is a fact that these devices can pay for themselves over a decade, *this was already true before the CPRS was designed*. If people behaved 'rationally', they would already be investing in energy efficiency and if they aren't behaving rationally now, an extra \$5 per week cannot be expected to make them do so in the future.
2. Changes in fuel prices will not have a major impact on the choice of car people drive. First, most people buy a second-hand car, which means that they do not have unlimited choice and are forced to select from a fleet of cars chosen by others. Second, people who drive company cars do not usually pay for the full price of the petrol they use and so they are more likely to buy large cars. If rational people make decisions based on the full cost of owning a car, higher fuel prices will simply result in a reduction in the value of large cars, not a short-term reduction in the number of large cars on the market.
3. The Rudd Government has already stated that it will not let the CPRS lead to an increase in the price of petrol.
4. People cannot begin to switch towards public transport until the government begins to supply it. In Australia today, state governments such as NSW are, in fact, reducing investment in public transport, not increasing it.

#### **4. How bad is the proposed CPRS?**

The CPRS, as it is proposed, will impose a floor below which CO<sub>2</sub>-e emissions cannot fall. If the Rudd Government sets a significant reduction target of 20 to 25 per cent by 2020, the CPRS will help ensure Australia is on course to make a significant contribution

to the worldwide effort to stabilise the global climate. However, it is important to highlight that if the target chosen reflects the demands of polluters rather than the scientific evidence, the floor will prevent Australia achieving an optimal effect on climate change. In either case, Australian households will be largely disempowered and unable to help abate Australia's emissions through their own efforts but with a higher emissions target, the consequences will not be as dire.

If a person decides to ride their bike to work or installs a solar hot water system on their roof, they are removing the obligation of their electricity company or their fuel company to buy an extra emissions permit. This means that another polluter, perhaps a cement kiln or a steel works, can instead buy the permit to cover increased pollution from their plant.

If people decide to spend money on voluntary offsets so that they can become 'carbon neutral', all they will have done is increase the amount of pollution that others can emit although Australia, as a country, will continue to stay within its 'cap'.

Some state governments have expressed interest in the notion that they may set more aggressive targets for emissions than those fixed by the federal Government. However, under a national CPRS, if one state government establishes a higher emissions target for polluters in their state, it just frees up more national permits to be purchased by polluters in other states.

### **5. Is there nothing that can be done under the CPRS to reduce emissions below the government target?**

There is one option available to individuals who wish to reduce emissions below the level set by the government—they can purchase emissions permits and then 'rip them up'. If the government has issued one million permits to pollute and it is illegal to emit more pollution than the number of permits held, consumers will be able to purchase some of those permits directly and not use them. The more permits that households buy but do not use, the lower Australia's emissions will, of necessity, be.

Purchasing permits in this way will be the only way for households to reduce emissions, highlighting the absurdity of the proposed CPRS. For example, a household with \$3000 to spend would have no impact on greenhouse gas emissions if they used the money to replace their off-peak electric hot water heater with a solar hot water system. However, it would make a significant impact on the level of emissions if instead they purchased permits and ripped them up.

The belief that the CPRS will deliver lower-cost emissions reductions than a carbon tax is based on the capacity for a trading scheme to encourage all energy users to pursue gains from trade. But the reason that ripping up permits is more effective than installing a solar hot water system is due to the proposed structure of the CPRS, which explicitly prevents trade between the household sector and the large polluters.

## **6. What should be done instead?**

The first step towards effectively solving the problems outlined above is to ensure that the emissions reduction target set by the Rudd Government is consistent not with the wishes of large polluters but with the scientific evidence and with the expectations of Australians that their country will make a meaningful contribution towards reducing global greenhouse gas emissions. If the target is set at an appropriate level, there will be less incentive for households to purchase permits and not use them. Therefore, the first challenge is to prevent too many permits from being released by establishing a realistic target based on recommendations by climate scientists.

The second step is to develop a 'secondary market' in audited and verified emissions reductions at the household level, and to create a formal exchange mechanism between this secondary market and the CPRS. Such a market is described in the following section.

## **7. A way forward**

The primary concern in creating such a scheme, which is in many ways similar in principle to existing offset schemes, is to ensure the accuracy of the measurement of both the baseline and the discretionary reductions in energy use that can be attributed to the actions of a household or organisation not covered by the CPRS. The use of historic data from household electricity bills can provide an opportunity to gather verifiable information about the impact of household emissions reductions.

There is little doubt that the accuracy of estimates of emissions reductions from household behaviour is unlikely ever to match the accuracy of the measurement of emissions from the burning of fossil fuels. The solution to this problem is to create a fixed exchange rate of less than one for one between CPRS emissions permits and the proposed secondary permits for household reduction, because household savings are less 'valuable'.

For example, if two tonnes of household emissions reduction permits are exchanged for one tonne of CPRS credits, it is impossible for the secondary market in household efficiency permits to dilute the value of CPRS permits as long as the measurement error is less than 50 per cent.

The creation of a formal exchange rate of less than one for one has a major advantage—it creates the potential to deliver 'additionality'. That is, by having two tonnes of household emissions exchanged for one tonne of CPRS permits, the action of individual households will have a demonstrable effect on the overall level of greenhouse gas emissions across Australia.

A secondary market, as proposed, would deliver the following benefits:

1. The non-financial motivation for households to reduce energy use will be maintained.

2. Existing voluntary offset schemes can be continued as long as proper and consistent monitoring and verification take place.
3. Financial incentives to reduce energy use at the household level are increased over and above the price effects of the CPRS because households (and/or intermediaries) can be paid to reduce their emissions. It is the existence of such payments, not the elasticity of demand, that supports the assertion that emissions trading delivers least cost emissions reductions.
4. The marginal abatement cost across the economy will be lower and, in turn, the permit price associated with any given cap level will be lower.

In order to overcome the problem of transaction costs, it is likely that the most efficient scheme would rely on intermediaries to market savings in energy efficiency, package up such savings across multiple households and offer secondary household efficiency permits for sale. These intermediaries would be responsible to the Commonwealth for auditing and verifying the household efficiency savings. Penalties and make-good provisions would ensure that any overestimates of the offsets achieved would not have the capacity to undermine the certainty of the CPRS permit market.

## **Conclusion**

An ETS has the potential to deliver significant reductions in greenhouse gas emissions but it is not inevitable that the Rudd Government will convert that potential into reality. There are two important steps the government should take to establish a system that will contribute meaningfully to the alleviation of global warming and resulting climate change.

1. Set an ambitious target in line with the recommendations of the climate scientists of a 20 to 25 per cent reduction in emissions on 2000 levels by 2020. Anything less will not achieve optimal outcomes.
2. Ensure that household activity is able to deliver additional benefits by empowering individuals to make a difference by their own efforts. The largest potential reductions in emissions result from small changes in the behaviour of large numbers of people but if there is no nexus between households and small organisations and the CPRS, these changes will make no difference. This can be done by establishing a secondary market for household and small business reductions in emissions, a way of achieving additionality and recognising community achievements.