

## ECONOMIC IMPLICATIONS OF AUSTRALIA'S EMISSIONS REDUCTION GOALS

# 10

Australia can achieve the Authority's recommended 2020 target of 15 per cent plus carryover at a manageable cost.

Australia faces a substantial but achievable emissions reduction task to 2020. Emissions are projected to grow to 17 per cent above 2000 levels in the absence of a carbon price or new policies. This is less than the previous projection of 22 per cent above 2000 levels, making any emissions reduction target somewhat easier to achieve than previously expected.

The costs of achieving the recommended target, and the distribution of those costs across industries and households, depend heavily on the policies used to pursue it. At this time, the government is still developing the details of the Direct Action Plan to reduce Australia's emissions. The Authority has not speculated on the design; instead it has assessed the potential economic costs under the current carbon pricing legislation. This provides a useful benchmark.

The Authority's analysis shows Australia can achieve the recommended 2020 target while national income and the economy continue to grow.

Under the current legislation, gross national income (GNI) per person is projected to grow by an average of 0.80 per cent annually over the period to 2020 if Australia pursues a 5 per cent target, and by 0.78 per cent with a target of 15 per cent plus carryover.

In dollar terms, GNI per person is projected to grow from about \$62,350 in 2012 to \$66,450 in 2020 with a 5 per cent target, or to \$66,350 with a target of 15 per cent plus carryover (all in real terms).

This means if Australia adopted the recommended target, GNI per person could reach the same level it would have attained with a 5 per cent target, less than three months later. These costs would be broadly distributed across the economy; under the current legislation, moving to a stronger target is not projected to have a material impact on the compliance costs faced by business and the costs passed through to consumers.

One reason why the incremental cost of moving to a stronger target is so low is that the current legislation allows a mix of domestic and international reductions to be used to meet the target. Australia could meet the whole of the incremental emissions reduction task associated with moving from 5 per cent to the recommended target through the carryover and the use of additional international emissions reductions. The cost of achieving a 19 per cent target with carryover is essentially the same as the cost of achieving a 15 per cent target without it.

The level and distribution of costs will need to be revisited when the government finalises its policies. The incremental costs of moving to a stronger target than 5 per cent would, however, be comparable to the costs presented here so long as the stronger target was achieved through the use of international emissions reductions. Further, substantial genuine international emissions reductions are available at much lower prices than the carbon prices assumed in the Authority's analysis. If Australia purchases these lower cost reductions, it could achieve the recommended 2020 target at lower cost.

Chapter 10 examines the economic implications of achieving the Authority's recommended 2020 goals. It covers:

- the scale of Australia's emissions reduction task to 2020
- how the economy might change if Australia moved beyond 5 per cent to a stronger target
- how costs are affected by the mix of domestic and international emissions reductions used to meet the target
- the longer term economic implications of 2020 targets.

## 10.1 EXAMINING THE ECONOMIC IMPLICATIONS OF DIFFERENT 2020 TARGETS

Australia's emissions reduction goals set the overall scale of its contribution to global action on climate change and the pace of its transformation to a low-emissions economy.

Extensive analysis (such as Treasury 2011; Garnaut 2008), and Australia's own experience over the past two decades, shows it is possible to reduce emissions, grow the economy and improve wellbeing at the same time. Since 1990, the size of the Australian economy has approximately doubled, while emissions have remained relatively stable. This means the emissions intensity of the economy (emissions per dollar of GDP) has halved (Chapter 6).

Chapter 10 focuses on the cost of achieving different 2020 targets. It examines Australia's emissions trends in the absence of a carbon price or new policies to understand the scale of the emissions reduction task and the broad economic implications of achieving different targets. The 5 per cent target is a minimum unconditional commitment, so Australia's real choice is whether to stay with this or adopt a stronger 2020 target. The 5 per cent target therefore provides an appropriate baseline for assessing the potential incremental cost of pursuing stronger targets.

## 10.1.1 USING MODELS TO ESTIMATE AUSTRALIA'S EMISSIONS AND ECONOMIC OUTLOOK

The Authority has used economic modelling to help assess the economic implications of its recommended target. The modelling explores Australia's emissions trends, emissions reduction opportunities and economic outlook in the context of the global action required to reduce the risks of climate change. The modelling was conducted by Treasury and DIICCSRTE, in consultation with the Authority (referred to as Treasury and DIICCSRTE modelling).

Economic models are useful tools for exploring the impacts of climate change mitigation policies, as they ensure internally consistent long-term projections of economic activity and the resulting greenhouse gas emissions. While these models have their limitations, they integrate, in a comprehensive manner, economic and other data with economic theory about how the world responds to changing circumstances.

Treasury and DIICCSRTE modelling uses a suite of global, national and sectoral models. The detailed models for the electricity, transport and agriculture sectors provide granular analysis of the industrial sectors responsible for the majority of Australia's emissions, while the economy-wide models capture the longer term reallocation of resources. This approach is the most useful and appropriate framework currently available to assess the market costs of climate change mitigation in Australia. It builds on previous work to define Australia's goals and inform the design of Australia's policies (Garnaut 2008; Treasury 2011).

Further information on the modelling approach and assumptions is provided in the Treasury and DIICCSRTE modelling report (2013).

The analysis presented in Chapter 10 is limited to the costs of reducing emissions. As discussed in Chapter 2, the Authority understands the importance of considering the benefits of action in parallel with these costs. Its recommendations are guided by its analysis of both.

## 10.1.2 WHAT SCENARIOS HAVE BEEN MODELLED?

The Treasury and DIICCSRTE modelling examines a range of future scenarios to gauge Australia's potential economic and emissions outlook (see Box 10.1). The modelling makes assumptions about the future, including about the global economy, technology development, commodity prices and policy settings. These assumptions affect the identified emissions reduction opportunities and the estimated costs. The assumptions draw on international and Australian analysis, expert advice and public consultation as set out in detail in the modelling report.

Assumptions about policy settings are especially challenging, as Australia's climate policy is currently being revised. The government intends to repeal the carbon pricing mechanism and implement the Direct Action Plan. The details of this Plan, including the design of the Emissions Reduction Fund, are still being developed (Chapter 5). Key issues that are yet to be resolved include the form and level of baselines—both for crediting emissions reductions and for any penalties—and the policy settings for the electricity sector (DoE 2013). Rather than speculate on the design, the modelling is based on the current legislative settings. It uses high, medium and low carbon price scenarios; a scenario without the carbon price; and a number of sensitivity scenarios to explore the potential economic impacts of achieving different targets.

Even if the policy settings change, the modelling is informative because it estimates:

- The scale of the emissions reduction task to 2020 for the minimum 5 per cent target and the stronger targets being considered. The 'no price' scenario provides the basis for this estimate—it projects Australia's emissions with existing policies such as the RET and energy efficiency standards but excludes the carbon price and any new policies.

- The incremental cost of moving to stronger emissions reduction targets. The modelling shows that stronger targets are achievable while maintaining economic growth. Though the modelling reflects a different policy framework to that planned by the government, the costs provide a useful benchmark. Further, the incremental costs of moving to a stronger target would be broadly the same under new policy settings if the additional reductions were achieved through the purchase of international emissions reduction units.
- The emissions reduction opportunities that might be available in the Australian economy at different incentive (price) levels, and the associated economy-wide costs. The modelling shows Australia has substantial emissions reduction opportunities across all sectors. While the results show the opportunities likely to be mobilised by the carbon price, many of these could also be mobilised by other policies and incentives.

A key caveat on translating the modelling results to different policy settings is that the distributional effects for industry and households are highly sensitive to policy design. The level and distribution of costs will need to be revisited once the government settles the details of the Direct Action Plan.

#### BOX 10.1: CARBON PRICE SCENARIOS IN THE MODELLING

Treasury and DIICCSRTE modelling examines four core scenarios—one without a carbon price and three with different carbon prices.

The three price scenarios are largely based on the current legislation. Companies covered by the carbon pricing mechanism ('liable entities') have to pay for their emissions by surrendering emission units for each tonne of their emissions. The annual emissions cap determines the supply of Australian carbon units (ACUs). Liable entities can also use eligible international units, such as European Union allowances (EUAs), to meet up to a total of 50 per cent of their liability; this includes a 12.5 per cent sublimit on Kyoto Protocol units such as Certified Emission Reductions (CERs). Emissions-intensive, trade-exposed industries receive some free emissions units, and sectors such as agriculture and forestry can generate carbon offsets through the CFI.

The most important variable affecting emission levels is the price of ACUs (the carbon price). Given the links to international markets, the ACU price is assumed to follow the EUA price. The EUA price outlook is uncertain and market forecasts vary. The scenarios therefore span a plausible range, taking account of current market conditions, forecasts and long-term environmental goals.

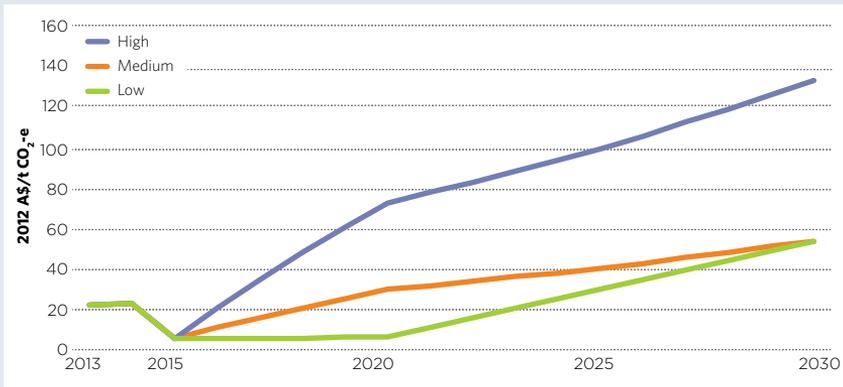
The four scenarios used in this chapter are:

- **No price scenario**—assumes there is no carbon price and no CFI. This scenario includes emissions reductions from pre-existing measures such as energy efficiency measures and the RET.
- **Low scenario**—additionally assumes the carbon price and CFI are in place. The carbon price is fixed for two years, then moves to a flexible price. The flexible price begins at \$5.49 /t CO<sub>2</sub>-e in 2015, and grows at 4 per cent per year in real terms to reach \$6.31 in 2020. The price then follows a linear transition to \$54.48 in 2030.<sup>1</sup>

<sup>1</sup> All dollar amounts (prices and costs) reported in this chapter are 2012 Australian dollars, unless otherwise stated.

- Medium scenario**—assumes the fixed price for two years, then a flexible price beginning at \$5.49/t CO<sub>2</sub>-e in 2015, and following a linear transition to \$30.14 in 2020. From 2021 onward, the price follows the international price from the medium global action scenario, which grows at 4 per cent per year in real terms in US dollars.
- High scenario**—assumes the fixed price for two years, then a flexible price beginning at \$5.49/t CO<sub>2</sub>-e in 2015, and following a linear transition to \$73.44 in 2020. From 2021 onward, the price follows the international price from the ambitious global action scenario, which grows at 4 per cent per year in real terms in US dollars.

**FIGURE 10.1: ACU PRICES FOR DIFFERENT SCENARIOS, 2013-2030**



Source: Treasury and DIICCSRTE 2013

Kyoto units such as CERs currently trade at prices well below the prices used in these scenarios, and the modelling assumes there is a price difference between CERs and ACUs for the period to 2020. As a result, liable entities face an effective carbon price below the ACU price; this effective price is a weighted average of the ACU and CER price each year, with weights reflecting the CER sub-limit.

The Authority notes that some assumptions in the modelled scenarios differ from the current legislation; for example, the legislation provides for a three-year fixed price. Sensitivity analysis indicated the differences have only a small impact on emissions and costs. The Authority therefore uses the modelled scenarios for its analysis of the potential economic impacts in this chapter.

## 10.2 AUSTRALIA'S EMISSIONS REDUCTION TASK TO 2020

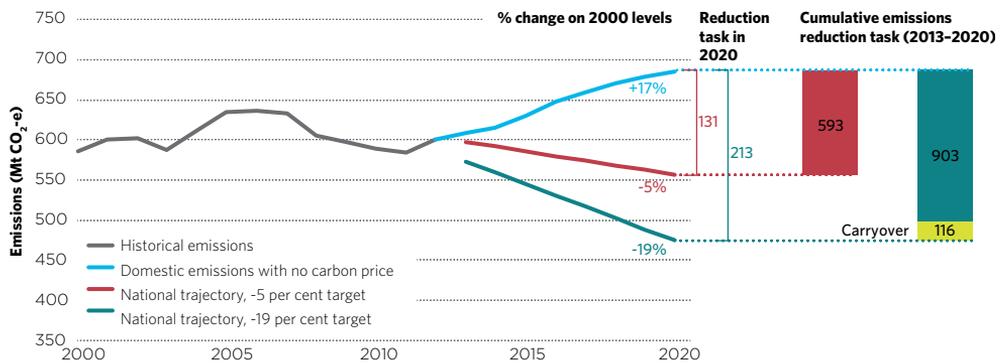
To assess the costs of achieving emissions reduction goals, we need to understand the scale of the task. The Authority has assessed the emissions outlook for Australia, taking into account existing policies such as the RET and energy efficiency programs, but excluding the carbon price and CFI. Figure 10.2 shows the national emissions reduction task—that is, the level of additional emissions reductions that Australia's climate change policies will need to achieve to meet different 2020 targets.

In the no price scenario, Australia's emissions are projected to grow to 17 per cent above 2000 levels by 2020. Australia's international commitments relate to the period 2013 to 2020, so it needs to reduce net emissions over the period to 2020. The cumulative emissions reduction task is estimated to be 593 Mt to achieve an emissions budget consistent with a 5 per cent target (131 Mt in 2020 alone) and 898 Mt for a 15 per cent target.

Adding carryover to give a 2020 target of 19 per cent gives a cumulative abatement task of 1,020 Mt. The increment beyond 15 per cent (122 Mt) is almost matched by carryover itself (116 Mt), so minimal extra effort is required (Figure 10.2).

These estimates assume the RET remains at the currently legislated level of 41,000 GWh in 2020; if reduced, the emissions reduction task would be greater.

**FIGURE 10.2: AUSTRALIA'S EMISSIONS REDUCTION TASK TO 2020**



**Notes:** Emissions reduction task is in Mt CO<sub>2</sub>-e. Figures may not add due to rounding. Emissions reduction task has been adjusted (increased) to account for voluntary action (see Appendix E for estimates). Assumes both the Authority's 2020 target recommendations are accepted (minimum 15 per cent plus carryover giving 19 per cent).

**Source:** Climate Change Authority based on Treasury and DIICCSRTE 2013

The national emissions reduction task to 2020 is substantial, but smaller than previous estimates. This reflects updates to historical emissions data, a lower outlook for electricity demand and lower rates of underlying growth in some emissions-intensive industries. It also reflects changes to the emissions accounting rules under the second commitment period of the Kyoto Protocol; these allow Australia to count more land sector activities towards its target (discussed in Chapter 7).

The smaller emissions reduction task makes it easier for Australia to pursue any particular target. For example, national emissions projections in 2012 suggested that Australia would need to cut emissions by 754 Mt over the period 2013 to 2020, including by 155 Mt in 2020, to achieve the minimum 5 per cent target (DCCEE 2012). The current estimate suggests less effort is now required to reach this target. Instead, if Australia achieved 754 Mt of reductions over the period to 2020, the latest projections suggest it would now reach an 11 per cent reduction target. Adding Australia's carryover from the first commitment period of the Kyoto Protocol would increase this to a 15 per cent target.

The Authority's abatement task estimate for a 5 per cent target is higher than the estimate in the most recent national emissions projections (DoE 2013) due to different treatment of the carbon price, carryover and voluntary action (see Box 10.2).

#### **BOX 10.2: DIFFERENT ESTIMATES OF THE EMISSIONS REDUCTION TASK TO 2020**

In December 2013, the government published the most recent national emissions projections (DoE 2013). These projections are based on the modelling conducted for this Review.

The projections report discusses Australia's emissions reduction task to 2020 for the minimum 5 per cent target. It estimates the task to be 431 Mt, lower than the Authority's estimate of 593 Mt. Three factors account for the difference:

- **Impact of the carbon price**—the government's estimate takes account of the impact of the first two years of the carbon price (2013 and 2014); the Authority's estimate does not. This reduces the government's estimate by 39 Mt.
- **Treatment of carryover**—the government's estimate assumes all surplus emission rights from the first commitment period of the Kyoto Protocol (an estimated 122 Mt) are used to meet the 5 per cent target; the Authority's estimate does not. This reduces the government's estimate by 122 Mt.
- **Treatment of voluntary action**—the government and the Authority both make an adjustment to recognise voluntary action over the period 2013–2020. The government's adjustment is based on projected GreenPower purchases only; the Authority's adjustment includes GreenPower and the voluntary cancellation of renewable energy certificates. This increases the Authority's estimate by 2 Mt.

## **CONCLUSION**

**C.12** Australia's emissions reduction task for 2013 to 2020 is projected to be 593 Mt for the minimum 5 per cent target. This is substantial but achievable, and smaller than the 754 Mt task previously projected. If Australia reduced emissions by 754 Mt over the period to 2020, it would now reach an 11 per cent target.

## 10.3 COSTS OF MOVING BEYOND 5 PER CENT TO A STRONGER TARGET

This section examines the incremental cost of moving from the minimum 5 per cent target to the Authority's recommended target.

The Authority recognises that the costs, and distribution of those costs, will depend on the policy implemented to achieve the targets. The Authority has assessed costs based on the current legislative settings; this provides a useful benchmark. The current legislation allows a mix of domestic and international emissions reductions to achieve the target. Emissions are reduced within Australia where the marginal cost of achieving the reduction is less than or equal to the international carbon price. Section 10.4 examines the costs of achieving a greater share of the emissions reductions domestically.

### 10.3.1 HOW COSTS ARISE

Under the current legislation, liable entities pay a price—the carbon price—for their emissions. This increases the cost of emitting activities and drives a shift in the economy from higher emitting to lower emitting activities.

Australia's carbon market is linked to the much larger international market. As a result, the level of the carbon price is largely determined by international markets rather than the level of Australia's own target. Moving to a stronger target would drive additional emissions reductions—contributing to stronger global climate action—but those reductions would largely occur overseas rather than within Australia.

As a result, moving to a stronger target is not expected to materially change the carbon price, and is not expected to have a material impact on the compliance costs faced by liable entities and the carbon costs passed through to consumers (see Section 10.3.4).

Nevertheless, a stronger target would have an impact on the Australian economy. It would reduce the number of Australian carbon units available for the government to sell and increase the number of international units imported. This is expected to have three broad economic effects on GNI:

- A direct income transfer from Australia to buy additional emissions units from overseas.
- A smaller indirect cost from the changes in the terms of trade due to this income transfer (the 'terms of trade effect'). This arises because direct income transfer affects the balance of payments—exports would have to be slightly higher to generate the additional foreign currency, entailing slightly lower export prices, which would tend to reduce the terms of trade.
- A smaller indirect cost associated with replacing the government revenue forgone from sales of Australian carbon units (the 'revenue effect'). To maintain the same level of government services, the forgone revenue would need to be replaced; this would typically involve an additional welfare cost reflecting the marginal excess burden of raising government revenue.

GNI is a broader measure of economic welfare than the more commonly used GDP. While GDP measures the total output of the Australian economy, GNI measures output, international income transfers and the impacts on the terms of trade. GNI provides a more complete measure of Australians' current and future consumption possibilities—what they can afford to buy.

The size of the direct income transfer would be equal to the number of additional international emissions reductions purchased from overseas to meet the stronger target, multiplied by the international carbon price. This income transfer would be small compared to the routine income flows associated with commodity trade, foreign investment and other factors.

The combined impact of these three effects on GNI is estimated to be 1.55 times the direct cost of the additional international units (Treasury and DIICCSRTE 2013). For example, if changing the target requires an additional \$100 of international emissions reductions, GNI is reduced by \$155, comprising:

- \$100 more emissions units bought from overseas—a direct income transfer
- \$30 through the terms of trade effect
- \$25 due to the revenue effect.

The same costs would arise whether the government purchased international units directly or liable entities purchased international units under the carbon pricing mechanism. The only difference would be that, instead of replacing auction revenue, the revenue effect would arise from raising funds to purchase the additional international units.

The distributional impacts of the income transfer and terms of trade effect are relatively small and would be broadly spread across the economy. The modelling results suggest the lower terms of trade would support growth in export-oriented and import-competing industries, such as agriculture, mining and manufacturing. On the other hand, more domestically focused industries, such as construction and services, would grow more slowly. The projected impact is relatively small; changes in sector output levels in 2020 are less than 0.4 of a percentage point (Treasury and DIICCSRTE 2013, p. 86).

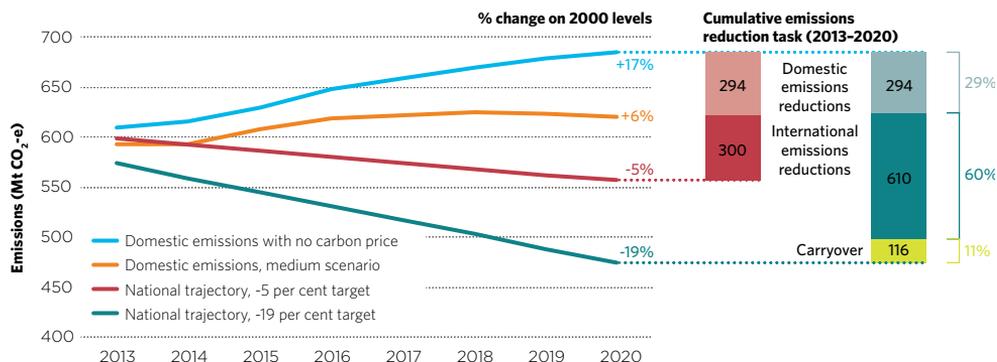
The distributional impact of the revenue effect would depend on how the additional revenue is raised.

### 10.3.2 THE COST OF ACHIEVING THE RECOMMENDED TARGET

Australia needs to reduce emissions by an estimated 593 Mt over the period 2013 to 2020 to achieve the minimum 5 per cent target, as discussed in Section 10.2. Moving from 5 to 15 per cent requires an additional 305 Mt of emissions reductions (for a total of 898 Mt over the period). Moving from 15 to 19 per cent is largely achieved through the use of carryover; Australia's 116 million surplus units from the first Kyoto commitment period almost entirely offset the 122 Mt of additional emissions reductions required.

Figure 10.3 shows Australia's domestic emissions under the medium scenario, where the carbon price starts at a fixed price of \$23 in 2013 and reaches \$30 in real terms by 2020. Australia's emissions grow to 6 per cent above 2000 levels by 2020; significantly less than the 17 per cent growth in the no price scenario. The remaining emissions reductions—reflected by the gap between domestic emissions and the indicative national trajectory—would be achieved by using carryover and purchasing emissions reductions from overseas.

**FIGURE 10.3: DOMESTIC EMISSIONS AND IMPORTS FOR DIFFERENT TARGETS, MEDIUM SCENARIO, 2013–2020**



Source: Climate Change Authority based on Treasury and DIICCSRTE 2013

This suggests that, under the current legislation, Australia would meet the whole of the additional 427 Mt emissions reduction task associated with moving from 5 per cent to the recommended target through 116 Mt of carryover and 310 Mt of imports.<sup>2</sup> The costs presented in this section are estimated on that basis.

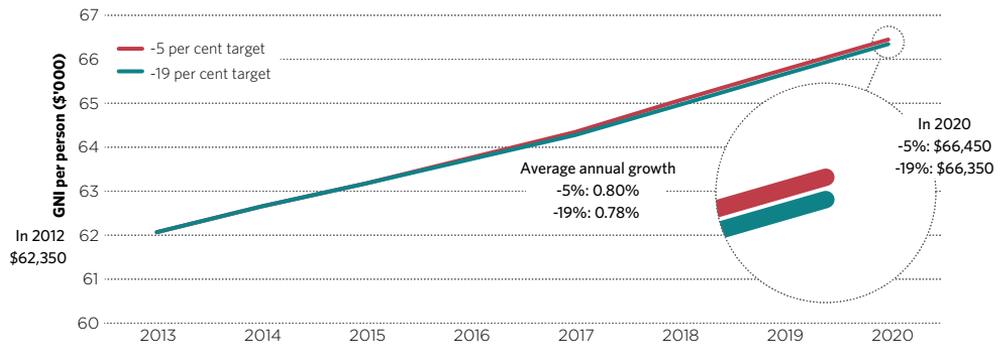
Purchasing the emissions reductions required to achieve this stronger target would lead to a slight slowing of GNI growth (Figure 10.4), due to the transfer of funds overseas, the associated terms of trade effect and the impact on government revenue.

The economic impact can be described using different metrics:

- **Growth in GNI per person**—with a 5 per cent target, GNI per person is projected to grow by an average of 0.80 per cent annually over the period to 2020. Moving to a 19 per cent target slows GNI per person growth to an average of 0.78 per cent.
- **Level of GNI per person**—in dollar terms, GNI per person is projected to grow from about \$62,350 in 2012 to about \$66,450 in 2020 with a 5 per cent target, and \$66,350 in 2020 with a 19 per cent target.
- **Time to attain the same level of GNI per person**—average Australian income continues to rise, but at a slightly slower rate. The level of GNI per person in 2020 with a 5 per cent target (\$66,450) would be attained less than three months later with a 19 per cent target.
- **Reduction in GNI level (economy-wide)**—GNI is projected to continue to grow with a 19 per cent target, but at a slightly slower rate. With slower growth, GNI in 2020 would be \$3.2 billion (0.18 per cent) lower with a 19 per cent target than it would have been with a 5 per cent target.

<sup>2</sup> Figures do not add due to rounding.

**FIGURE 10.4: GNI PER PERSON, MEDIUM SCENARIO, 2013-2020**



Source: Climate Change Authority based on Treasury and DIICCS RTE 2013

These impacts on GNI are small relative to other forces driving GNI. For example, the boom in Australia’s mining sector and terms of trade is estimated to have added 1.2 percentage points to average annual growth in GNI per person since 2000 (Dolman and Gruen 2012). In contrast, moving to a 19 per cent target is estimated to reduce average annual growth in GNI per person to 2020 by 0.02 percentage points.

**CONCLUSION**

**C.13** Stronger targets can be achieved with relatively small impacts on national income and economic growth, depending on policy design. Under the current legislation, moving from a 5 per cent to a 19 per cent target (15 per cent plus carryover) is projected to slow annual growth in GNI per person to 2020 from 0.80 per cent to 0.78 per cent.

**10.3.3 THE PRICE OF INTERNATIONAL EMISSIONS REDUCTIONS MATTERS IN DETERMINING THE COST OF STRONGER TARGETS**

As noted in Section 10.3.1, the costs of achieving targets depend on the policies used to pursue them. If Australia was to achieve stronger targets by purchasing international emissions reductions, this analysis provides a robust estimate of the economic impact. The costs would be essentially the same if the government purchased the emissions reductions directly rather than liable entities purchasing them under the carbon pricing mechanism. Costs could, however, be more or less, depending on the level of the carbon price.

The outlook for international carbon prices is uncertain and market forecasts vary widely. The modelling therefore examined a range of prices. The costs presented in Section 10.3.2 are based on the medium scenario; costs are lower in the low-price scenario, and higher in the high-price scenario. In all cases, moving from the minimum 5 per cent target to the stronger 19 per cent target requires an additional 427 Mt of emissions reductions; this is met through the use of carryover and international reductions.

- **Low-price scenario**—the lower price applies to both domestic emissions reductions and the price of international emissions reductions. The lower price has a smaller impact on GNI than in the medium scenario. Average annual growth in GNI per person is projected to be 0.823 per cent over the period to 2020 with the minimum 5 per cent target, and 0.819 per cent with a stronger 19 per cent target (see Appendix F7 for details). Slower growth means projected GNI is \$0.7 billion lower in 2020, relative to the 5 per cent target.
- **High-price scenario**—again, the higher price applies to both domestic and international emissions reductions. Impacts on GNI are slightly higher—average annual growth in GNI per person is projected to be 0.73 per cent over the period to 2020 with the minimum 5 per cent target, and 0.67 per cent with a stronger 19 per cent target. GNI is projected to be \$7.8 billion lower in 2020, relative to the 5 per cent target.

These impacts remain relatively small compared to other economic forces. The projected change to annual growth in GNI per person is less than 0.01 percentage points in the low scenario, and roughly 0.06 in the high scenario; a small fraction of the change due to the mining boom.

The type of international units purchased also affects the costs. The Authority's analysis and cost estimates are based on the modelled price for European units. Emissions reductions generated under the Kyoto Protocol are available at significantly lower prices (currently, Kyoto units are selling for less than \$1 per tonne). The impact on the economy would be lower again if, in the context of the government's new policy, Kyoto units were purchased to achieve the stronger target. This is discussed further in Section 10.4.4.

### 10.3.4 THE IMPACT OF THE TARGET IS DISTINCT FROM THE IMPACT OF THE CARBON PRICE

There is a common misconception that stronger targets would impose much higher costs on the economy and on liable entities. This is not the case. Under the current legislation, the economic impact of the 2020 target must be distinguished from the impact of the carbon price. This is explained below and further detail is provided in Appendix F7.

#### THE LEVEL OF THE CARBON PRICE SETS THE INCENTIVE TO REDUCE EMISSIONS AND DETERMINES MOST OF THE ECONOMIC COSTS

Under the current legislation, liable entities pay a price for their emissions. This increases the cost of emitting activities, so it encourages firms to reduce their emissions. As a result, the level of the carbon price is what matters most to business and households. The higher the carbon price, the more emissions reductions occur in the economy and the higher the overall costs.

The distribution of those costs between industries, regions and households depends on the emissions intensity of their activities and the goods and services they consume, as well as their ability to shift to less emissions-intensive options (Section 10.5).

#### MOVING TO A STRONGER TARGET DOES NOT CHANGE THE CARBON PRICE

Under the current legislation, the carbon price is not expected to be materially affected by the target. This seems counterintuitive at first, but is a result of the links between the Australian carbon market and international markets.

The carbon price is a function of supply (the number of emissions units available to liable entities) and demand (emissions from liable entities). Changing the target would have a substantial effect on supply in a domestic-only market, but has a much smaller effect in one linked to international markets.

- If Australia's carbon market was not linked to international markets, its target would determine the supply of emission units—and, as a result, determine the level of emissions reductions required within Australia. Moving to a stronger target would reduce the supply of emission units and increase the carbon price. The higher carbon price would drive greater emissions reduction efforts by liable entities, so that Australia's domestic emissions would fall to the target level. This extra effort would impose a relatively larger impact on the domestic economy.
- With international linking, Australia's target determines the supply of Australian carbon units. Moving to a stronger target would reduce the supply of Australian units, but have relatively little effect on global supply, as Australia is only a small share of the total market (Appendix F7 provides further detail). Moving to a stronger target is therefore not expected to have a material impact on the carbon price. If the carbon price does not change, incentives to reduce domestic emissions do not change; nor do the compliance costs faced by liable entities and the carbon costs passed on to consumers. Instead, liable entities would buy fewer Australian units and more international units (as long as they stayed within the overall 50 per cent limit). Moving to a stronger target would contribute to global climate action, but the additional reductions would largely occur overseas rather than within Australia. Economic activity within Australia would be largely unchanged.

This was acknowledged by the Australian Industry Group:

*[U]nder a fully internationally linked emissions trading scheme a deeper target would not increase burdens on industry and hence would not be a serious concern, subject to the very important caveat of the maintenance of the international link. (Draft Report submission, p. 5)*

Australia can achieve stronger targets at relatively small cost. One of the key reasons the costs are small is because the Authority assumes Australia achieves its targets using a mix of domestic and international emissions reductions. The next section considers Australia's emissions reduction opportunities, and how economic impacts could change if Australia pursued more reductions domestically.

## 10.4 USING A MIX OF DOMESTIC AND INTERNATIONAL EMISSIONS REDUCTIONS

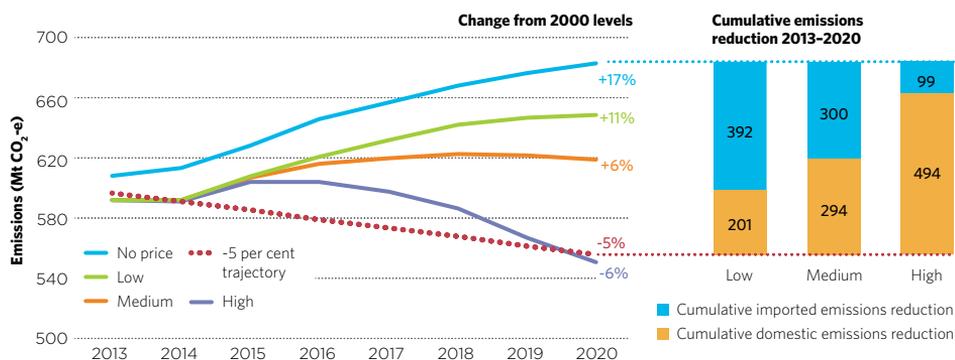
The government has committed to achieving Australia's minimum 5 per cent target through domestic emissions reductions alone. The modelling sheds light on the opportunities that may be available in Australia, and the associated economic impacts. It shows Australia has substantial potential to reduce its emissions, but suggests using some international reductions to complement its domestic efforts is a cost-effective way to meet stronger targets. As long as the imported reductions represent genuine reductions, the environmental outcome would be the same (Chapter 12).

### 10.4.1 DOMESTIC EMISSIONS REDUCTIONS UNDER DIFFERENT SCENARIOS

The Authority has assessed the outlook for Australia's emissions and economy under three carbon price scenarios—high, medium and low—in addition to the no price scenario. The higher the carbon price, the more domestic emissions fall. While emissions in the no price scenario grow to 17 per cent above 2000 levels in 2020, in the low scenario growth moderates to 11 per cent; in the medium scenario emissions grow to only 6 per cent; and in the high scenario they fall to 6 per cent below 2000 levels in 2020 (Figure 10.5). Reductions are projected to occur across all sectors, as discussed in Chapter 11.

These scenarios provide a broad indication of the emissions reductions opportunities that may be available over time at different prices, and useful insights for the development of the government’s Direct Action Plan.

**FIGURE 10.5: DOMESTIC EMISSIONS AND CUMULATIVE EMISSIONS REDUCTIONS FOR DIFFERENT SCENARIOS, 5 PER CENT TARGET, 2013–2020**



Source: Climate Change Authority based on Treasury and DIICCSRTE 2013

The high-price scenario nearly meets the minimum 5 per cent target using domestic emissions reductions alone—a total of 494 million of the required 593 million tonnes of emissions reductions is achieved domestically.<sup>3</sup> In the medium scenario, only half of the required emissions reductions over the period to 2020 are achieved domestically. This suggests very strong incentives and other policy drivers would be required to meet the government’s 5 per cent domestic commitment.

### 10.4.2 ECONOMIC IMPACTS OF REDUCING DOMESTIC EMISSIONS

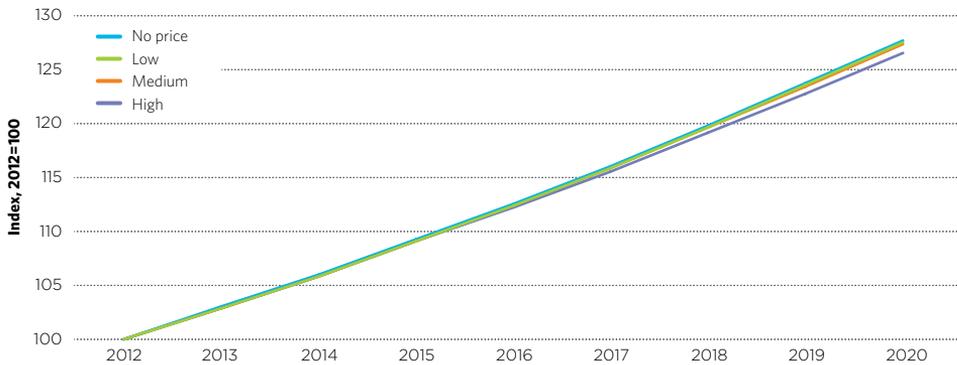
As with emissions, each scenario generates a different economic outcome. This section focuses on GDP results, which primarily reflect changes in domestic economic activity (in contrast, the GNI results in Section 10.3.2 primarily reflect the effects of international trade in emissions reductions).

All of the scenarios project economic growth, even with strong action to reduce emissions in Australia and globally. The effects on GDP growth are relatively small (Figure 10.6) and scale with the carbon price. The high scenario involves the largest shift from high- to low-emissions activities in the economy, and involves the greatest cost. Average annual growth in GDP to 2020 is 2.99 per cent in the high scenario compared with 3.06 per cent in the medium scenario and 3.08 per cent in the low scenario (Treasury and DIICCSRTE 2013).

3 Carryover from the first commitment period of the Kyoto Protocol could close this gap. The Authority considers, however, that the carryover should be used to strengthen Australia’s 2020 target.

If Australia chooses to reduce more emissions domestically, these results indicate it would increase costs to government (taxpayers) and the economy as a whole. The results broadly indicate the relative scale of potential macroeconomic impacts. If the government purchased the domestic emissions reductions using general revenue, these costs would be borne by taxpayers. The impacts on industries that generate emissions, and the consumers of those goods and services, would depend on the detailed policy design.

**FIGURE 10.6: GDP FOR EACH SCENARIO, 2012–2020**



Source: Climate Change Authority based on Treasury and DIICCSRTE 2013

### 10.4.3 USING INTERNATIONAL EMISSIONS REDUCTIONS CAN REDUCE COSTS

While Australia could achieve the minimum 5 per cent target through domestic reductions alone, the modelling suggests this would require a relatively high price for emissions reductions. This would impose higher costs on the Australian economy—and industry and households—than if some international reductions were used. Using international reductions to complement domestic reductions would reduce the cost of achieving Australia’s emissions reduction goals and make stronger targets more affordable.

This can be illustrated by an example in which the international price of emissions reductions follows the medium scenario path:

- If Australia chose to pursue most of its emissions reductions domestically, modelling suggests it would need a domestic incentive similar to the price in the high scenario. This would reduce reliance on imports but increase the cost to the economy. The effective carbon price would grow to \$65/t in 2020; Australia would achieve a total of 494 Mt of emissions reductions domestically and use 99 Mt of imports to achieve the minimum 5 per cent target. GDP would be 0.86 per cent lower than the no price scenario in 2020.<sup>4</sup>

<sup>4</sup> This cost is based on the high scenario in Treasury and DIICCSRTE modelling (2013), which assumes Australia achieves a 25 per cent target. The GDP result therefore reflects both the impact of the higher carbon price and a very small additional impact from the purchase of international emissions reductions.

- On the other hand, if Australia allowed a greater mix of domestic and international emissions reductions, there would be a greater reliance on imports and a smaller cost to the economy. The effective carbon price would, as in the medium scenario, grow to about \$27/t in 2020; Australia would achieve a total of 294 Mt of emissions reductions domestically and use 300 Mt of imports. GDP would be 0.31 per cent lower than the no price scenario in 2020; less than half the cost of achieving most of the emissions reductions domestically.

## CONCLUSION

**C.14** Using some international emissions reductions to meet Australia's emissions reduction goals reduces costs to the economy, businesses and households. Using a mix of domestic and international emissions reductions to meet the minimum 5 per cent target could halve the impact on GDP compared to only using domestic emissions reductions.

Of course, it is difficult to project exactly how Australia's emissions and economy will develop over time, and which emissions reduction opportunities will emerge. Projections often overestimate future emissions and economic analysis often overestimates the costs of reducing emissions. The Authority examined previous national emissions projections and found they overestimated emissions by roughly 10 per cent on average.<sup>5</sup> Analysis by the Grattan Institute found that environmental markets routinely reduce emissions at lower cost than expected (Daley and Edis 2010). One reason is that, with credible incentives in place, business and households find new and unanticipated ways to reduce emissions. Technology innovation can also change projections (see Box 10.3).

If Australia has more low-cost emissions reduction opportunities than projected in the modelling, then even under the current legislative settings the share of domestic emissions reductions would increase, use of international units would fall and the cost of achieving any given target would be lower. Nevertheless, it could remain cost-effective for Australia to use some international emissions reductions to help meet its target.

<sup>5</sup> The Authority compared projections for the period 2008-12 from annual projections published between 2004 and 2007, to Australia's actual emissions in 2008-12.

**BOX 10.3: IMPACT OF INNOVATION ON THE OUTLOOK FOR EMISSIONS AND COSTS**

The international analysis presented in the modelling shows that the cost and availability of low-emissions technologies affects the cost of achieving global and national emissions reductions. The modelling assumptions take account of innovation; technology costs fall over time and new low-emissions technologies gradually become available and competitive. As a result, Australia and the world can accelerate emissions reduction efforts over time.

The technology outlook is hard to predict, so the modelling uses sensitivity analysis to explore how emissions and costs change under different assumptions. For example, higher technology learning rates in the electricity and transport sectors would allow environmental objectives to be achieved with lower carbon prices and smaller reductions in Gross World Product. On the other hand, if carbon capture and storage proved commercially unviable, or no new nuclear power plants were built, carbon prices would need to be higher to achieve a given environmental goal, resulting in larger reductions in Gross World Product (Treasury and DIICSRTE 2013).

Similarly, domestic technology costs influence Australia's emissions outlook. As the electricity sector sensitivity analysis shows, if technology costs for solar are lower than currently projected, annual emissions could be about 50 Mt lower from the mid 2030s onwards compared to the medium scenario. This would reduce reliance on imported emissions reductions (ACIL 2013, p. 65).

**10.4.4 USING INTERNATIONAL EMISSIONS REDUCTIONS UNDER THE DIRECT ACTION PLAN**

In light of the government's new climate policy, the Authority recommends a government fund be established to purchase international emissions reductions to help meet the recommended 2020 target (Chapter 12). This would allow Australia to enhance the environmental effectiveness of its climate efforts in an economically efficient way.

The government has indicated it will achieve the minimum 5 per cent target through domestic reductions alone and use Australia's carryover to help meet the target. The Authority estimates this will require 477 Mt of emissions reductions over the period 2013 to 2020 (the 593 Mt gap to 5 per cent, minus 116 Mt from carryover). Strong incentives and policies will be required to achieve this goal.

Moving to the Authority's recommended 2020 target requires an additional 427 Mt of reductions over the period to 2020. International reductions are a robust and cost-effective way to meet this task, and would complement the significant domestic effort planned.

Australia can access a wide range of environmentally robust, low-cost international reductions. As discussed in Chapter 12, for a unit cost of between \$0.50 and \$2 per tonne, the total direct cost of purchasing the required additional reductions is estimated to be between \$210 and \$850 million.

## 10.5 DISTRIBUTIONAL CONSEQUENCES OF AUSTRALIA'S TARGETS

The Authority's analysis shows Australia can achieve stronger targets at modest overall cost—Australia's economy and per person income continue to grow as Australia pursues strong emissions reductions. The distribution of costs across households, regions and industry sectors is important, and depends heavily on policy design. Under the current legislative settings, the cost of stronger targets is spread broadly across the economy; this could be different under alternative policy settings. Distributional effects warrant careful consideration when designing policies to achieve emissions reduction goals.

In 2050, the composition of the Australian economy will be very different to its current structure, just as Australia's current economy is very different to that of the 1970s. Shifts in the global economy, technologies, national industry and trade policies, and the broad structural shift from manufacturing to the commercial and services sector, will all shape Australia's future economy, regardless of the action it takes to reduce emissions.

Set against these broader trends, climate policies are likely to have relatively small impacts, but they may be concentrated on particular groups. For example, emissions-intensive, trade-exposed sectors may face competitiveness challenges if they bear higher carbon costs in Australia than in competitor economies. Communities that depend on emissions-intensive industries for employment also face challenges in the move to a low-emissions economy, particularly where there are limited cost-effective opportunities to reduce emissions. Low-income households are more vulnerable to policies that increase the price of emissions-intensive goods and services, because these represent a bigger share of their consumption.

Careful policy design is required to ensure that mitigation policies help businesses and households to respond to these challenges. In combination with broader policies to reduce emissions from electricity generation, governments may provide assistance to low-income households to buy energy-efficient technologies or retrofit public housing to be more thermally efficient, and regional assistance may play a role. For example, under the current legislation, some industries were allocated free permits under the Jobs and Competitiveness Program; and the Regional Structural Assistance Package would have provided \$200 million support for workers, regions and communities strongly affected by carbon pricing.

In the context of the Direct Action Plan, the Authority's recommendations could still have limited distributional impacts—the stronger 2020 target can be achieved through government purchase of low-cost international emissions reductions. While the impacts depend on how the government raises the funds, the required amount is relatively small.

### CONCLUSION

**C.15** The costs of reducing emissions and how those costs are distributed through the economy are determined more by policy choice than the particular emissions reduction target. Careful policy design can help businesses and households respond to the challenges of moving to a low-emissions future.

## 10.6 STRONGER 2020 TARGETS MAY REDUCE COSTS OVER THE LONGER TERM

Australia's choice of 2020 target has implications for the cost of meeting targets beyond 2020. This is because the 2020 target affects the size of the remaining national emissions budget—stronger 2020 targets retain more of the national budget for later.

The international carbon price is currently much lower than the projected long-run price consistent with keeping global warming below 2 degrees. This suggests the carbon price could increase rapidly in the future, as the level of action becomes clearer and stronger. Many major global companies are already factoring in much higher carbon prices to their internal operations (CDP 2013). If the price does rise rapidly, it would be more efficient for Australia to have a stronger 2020 target and buy more international units in the period to 2020, while prices are low. This would leave more of the national emissions budget available for the period beyond 2020, when prices could be much higher.

Of course, there is a risk that the carbon price will not rise fast enough to deliver significant economic savings. However, given the low current prices, and the trend of strengthening international action (Chapter 4), the Authority considers this risk small; it is more likely that prices will rise and stronger 2020 targets will prove cost-effective.

There is also a broader rationale for taking stronger action now. Delaying action reduces the chances of keeping global warming below 2 degrees and increases the cost of future efforts. Sustaining and accelerating emissions reduction efforts now can smooth Australia's transition and help safeguard its competitiveness as the world moves to a lower emissions future.

