Australian Government
Climate Change Authority

COVERAGE, ADDITIONALITY AND BASELINES—LESSONS FROM THE CARBON FARMING INITIATIVE AND OTHER SCHEMES

CCA STUDY

APRIL
2014

COVERAGE, ADDITIONALITY AND BASELINES—LESSONS FROM THE CARBON FARMING INITIATIVE AND OTHER SCHEMES

CCA STUDY

APRIL
2014

CLIMATE
CHANGE
AUTHORITY

Published by the Climate Change Authority

www.climatechangeauthority.gov.au

ISBN: 978-0-9873828-7-0

KEY LESSONS

This research paper draws on experience from domestic and international baseline and credit schemes to provide lessons for the development of the Emissions Reduction Fund (ERF). It focuses on three key design issues—coverage and uptake, additionality and baseline setting.

Baseline and credit schemes involve a degree of unavoidable complexity—they require rules for participation and crediting, approval processes for projects, and rigorous reporting and auditing. The lessons identified here can help Australia implement a more effective and efficient scheme.

COVERAGE AND UPTAKE

The government has stated the primary objective of the ERF is to achieve lowest cost emissions reductions. It is yet to determine which activities will be eligible for crediting (that is, eligible for funding for emissions reductions), and which facilities will be subject to the safeguard (penalty) mechanism. Experience in other schemes suggests:

- Broad coverage provides access to the widest range of low-cost opportunities, but in practice most emissions reductions are likely to arise from the energy and industrial sectors.
  - The bulk of emissions reductions in other schemes come from large-scale, low-cost projects, and from activities with established or readily available technologies and easy-to-establish baselines.
- Excluding activities that are already subject to other policy measures would avoid double-counting and improve the cost-effectiveness of the scheme.
- It will take time for the ERF to achieve large-scale emissions reductions.
  - Early emissions reductions are likely to be from well-established technologies and activities, and pre-existing projects that transition into the scheme (for example, existing Carbon Farming Initiative projects).
- Baseline and credit schemes do not suit all emissions reduction opportunities. The ERF is likely to be most effective as part of a broader suite of policy measures.

ADDITIONALITY

The government has stated that the ERF will purchase emissions reductions that make a real and additional contribution to meeting Australia's target. As a result, the ERF needs to determine the 'additionality' of activities. Other schemes use a wide range of approaches and experience suggests:

- Additionality tests are important—they help exclude activities from the crediting mechanism that would have occurred anyway.
  - Crediting non-additional activity would crowd out real emissions reductions, reducing the cost-effectiveness of the scheme and making Australia's target more difficult to achieve.

- Additionality tests can be resource-intensive and administratively time-consuming.
  - There are trade-offs between the rigour of additionality tests and costs for scheme participants and administrators.
  - The additionality of an activity needs to be periodically reviewed. Once an activity is no longer additional, it should no longer receive funding under the ERF.
- Both project-specific and more standardised additionality tests could play a role for the ERF.
  - Regulatory additionality is a common and relatively straightforward test to screen out non-additional activities, but is not sufficient on its own.
  - Pre-existing projects are generally not additional. Projects established in response to the carbon price could be additional but only if they would cease without an ongoing incentive.
  - Standardised tests, such as common practice tests, may reduce costs for scheme participants but can risk crediting non-additional emissions reductions. These approaches are more appropriate for homogenous activities where participants have similar investment incentives, have similar access to capital and use similar technologies.
  - Project-specific additionality tests, such as financial and barrier analysis, may be appropriate for large one-off projects for which standardised tests are not well suited.
- The ERF can assess additionality in parallel with baseline setting (by removing the positive list). This does not eliminate the need for additionality testing.

BASELINE SETTING

Baselines define the counterfactual scenario against which actual performance is measured—leading to credits for emissions below the baseline. Methodologies set out the rules for calculating baselines. The government has indicated the ERF will have two types of methodologies—activity (for specific emissions reduction activities) and facility (for a combination of activities undertaken within the same facility). The ERF will therefore need to establish robust baselines at the activity and facility level. Experience from other crediting schemes suggests:

- Baseline-setting will be one of the major administrative elements and sources of cost for the ERF.
- Clear rules on how to set baselines help achieve consistent treatment of similar projects, reduce uncertainty for project proponents and simplify scheme administration.
  - Governance is important: roles and responsibilities for determining the rules and approving baselines should be clear. Baselines should be set according to established rules, in a transparent and predictable way.
  - Crediting under facility methodologies should be consistent with relevant activity methodologies; it may be helpful to develop related methodologies in parallel.
- Activity methodologies are commonly used in other schemes.
  - Many could be adapted for use in Australia, helping to accelerate the participation of a wider range of activities in the ERF.
  - The 'right' baseline depends on the type of activity and its particular application; both intensity (that is, emissions reductions per unit of activity) and absolute (total emissions) baselines could play a role.
- Facility methodologies are less common but, once established, can provide greater flexibility in the types of activities undertaken, and reduce measurement and audit costs (compared with activity methodologies).
  - Facility methodologies would still need to demonstrate that emissions reductions are additional.
  - Intensity baselines can be difficult to define for facilities with multiple products. Absolute baselines may be easier to establish, but risk crediting emissions reductions that result from a normal fluctuation in production.
- Historical emissions data is not necessarily a good proxy for future business-as-usual emissions.
- Emissions data is necessary but not sufficient for developing baselines—a good understanding of the emissions reduction activities and their alternatives (including data on technologies and production processes) is also required. Production data is also required for intensity baselines.
- It is important to clearly define how baselines change over time.
  - There is a trade-off between ensuring baselines are robust and providing more certainty to project proponents. The appropriate balance will vary across different activities and sectors, so a flexible methodology-by-methodology approach is warranted.

CONTENTS

1

INTRODUCTION

1.1 ABOUT THIS STUDY

The Climate Change Authority is an independent statutory agency, established to provide expert advice on Australian climate change policy, including through a scheduled series of reviews of climate programs and legislation. The Authority's work is guided by the principles listed in the *Climate Change Authority Act 2011* (Cth) including equity, environmental effectiveness and economic efficiency.

The Carbon Farming Initiative (CFI) was originally designed as a domestic offsets scheme focused on the land sector, to complement Australia's carbon pricing mechanism. It commenced operation in December 2011.

The government plans to replace the carbon pricing mechanism with the Direct Action Plan to reduce Australia's emissions, including an Emissions Reduction Fund (ERF). It has indicated the CFI will play a central role in the design of the ERF. The government plans to streamline the CFI and expand coverage beyond the land sector under the ERF (Green Paper 2013).

This study provides insights on key design issues facing the ERF. The CFI and the proposed ERF are types of 'baseline and credit schemes' that reward emissions reductions relative to a pre-defined baseline. There is extensive domestic and international experience with baseline and credit schemes. This paper draws on that experience, with a preliminary analysis of the CFI and a desktop review of other domestic and international schemes (see Appendix A). It investigates:

- the types of activities well suited to baseline and credit schemes, and lessons from the performance of such schemes to date (Section 3: Coverage and uptake)
- how baseline and credit schemes ensure they credit only genuine and additional emissions reductions, and the trade-offs involved (Section 4: Additionality)
- key considerations for setting baselines (Section 5: Baseline setting).

How these three areas—coverage, additionality and baseline setting—are approached is central to the design of any baseline and credit scheme. It is intended that this research paper, by assessing different approaches and experiences and drawing insights from domestic and international schemes, will contribute to development of the ERF.

1.2 ABOUT THE CARBON FARMING INITIATIVE

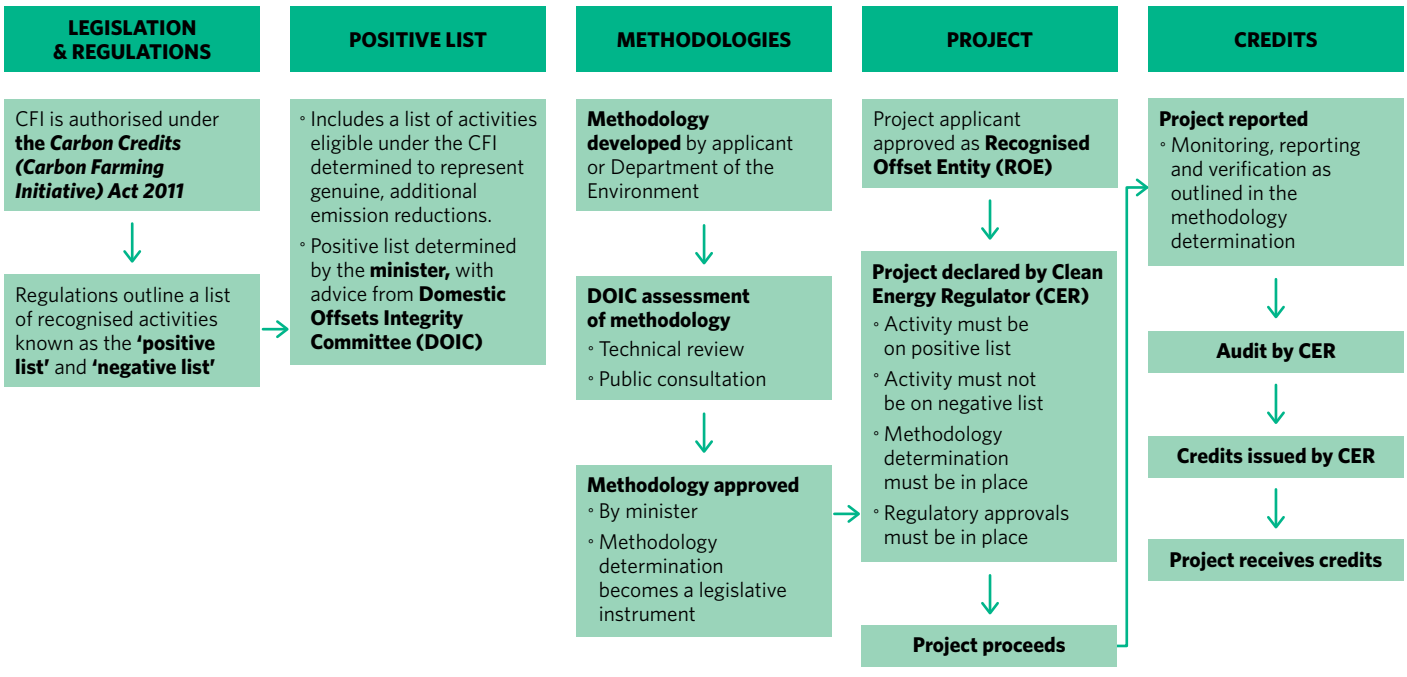
The CFI is a national, voluntary project-based scheme that provides incentives for individuals and organisations to sequester carbon and avoid or reduce greenhouse gas emissions.

The CFI was originally established to complement Australia's carbon pricing mechanism and help Australia meet its emissions reduction target. The CFI covers emissions from a number of sectors not covered under the carbon pricing mechanism—namely agriculture; legacy waste (emissions from waste deposited prior to 1 July 2012, when the carbon pricing mechanism was introduced); and land use, land use change and forestry (LULUCF).

A number of steps are necessary in a baseline and credit scheme such as the CFI. To ensure their environmental integrity, emissions reductions need to be accurately measured at an activity level and the regulator needs to be satisfied that reductions are real. The CFI involves multiple processes and institutions. Figures 1.1 and 1.2 provide an overview of the CFI process, highlighting the main institutions and governance structures important to the scheme. The main elements of the CFI, discussed in more detail below, are:

- the overarching legislation and accompanying regulations, which specify the sectoral coverage and governing principles for the scheme
- the positive list, the primary form of additionality test, which specifies eligible activities under the CFI
- methodologies, which set out rules for undertaking and monitoring a project and generating credits
- projects (that is, activities that reduce emissions) that are proposed and operated by individuals and organisations
- crediting, where emissions reductions or sequestration from approved projects are verified and credits issued by an independent administrator, the Clean Energy Regulator.

FIGURE 1.1: OVERVIEW OF CFI PROCESS



Notes: CER: Clean Energy Regulator; DOIC: Domestic Offsets Integrity Committee.
Source: Climate Change Authority based on CFI Handbook 2012.

FIGURE 1.2: OVERVIEW OF CFI GOVERNANCE STRUCTURE

Source: Climate Change Authority based on CFI Handbook 2012.

LEGISLATION AND REGULATIONS

The CFI is authorised under *the Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth). It is underpinned by a number of key concepts common to many baseline and credit schemes. These are outlined in the 'integrity standards' that form part of the CFI legislation. They are based on internationally accepted principles to ensure that CFI credits are only issued for genuine emissions reductions and ensure that:

- emissions reductions are measurable and verifiable
- measurement methods are supported by peer-reviewed science and consistent with Australia's international greenhouse gas emissions accounts
- measurement methods account for leakage and variability, and use conservative assumptions
- emissions reductions are additional to what would occur in the absence of the project
- carbon sequestration is permanent (carbon stocks maintained on average for a 100-year period).

The CFI also has a negative list, which identifies types of projects that are likely to cause negative social or environmental consequences, including impacts on water availability, biodiversity conservation, employment and other values. The negative list is contained in the Carbon Credits (Carbon Farming Initiative) Regulations 2011 (Cth).

POSITIVE LIST

Activities that are eligible under the CFI are listed on a 'positive list'—these are not common practice in an industry, and are therefore considered to represent genuine additional emissions reductions.

The positive list is established in the Carbon Credits (Carbon Farming Initiative) Regulations by the Minister for the Environment, on advice from the independent Domestic Offsets Integrity Committee (DOIC). The positive list is discussed further in Section 4.1.

METHODOLOGIES

Methodologies establish detailed rules for how projects must be carried out, including setting project boundaries and baselines, and how emissions reductions must be measured and verified.

CFI methodologies have been developed for:

- sequestration projects (for example, planting of trees)
- agriculture emissions avoidance projects (for example, managed savanna burning, methane capture in piggeries)
- landfill legacy emissions capture and avoidance projects (for example, the capture and destruction of emissions from waste deposited prior to the introduction of the carbon pricing mechanism).

Methodologies can either be developed by the Department of the Environment or proposed by an individual, company or project proponent. They are then submitted to the DOIC for review, which includes a period of public consultation, and ultimately to the Minister for the Environment for approval.

PROJECTS

The CFI is a project-based mechanism, meaning that emissions reductions activities occur and are credited at the project level. Each project must operate in accordance with a methodology determination.

Anyone wishing to undertake a CFI project must first apply to the Clean Energy Regulator to become a 'registered offsets entity', which ensures the applicant is a fit and proper person. The next step is to have the project declared, which involves meeting a range of eligibility criteria, including that it:

- is covered by a methodology
- passes the 'additionality test' (discussed further in Section 4.1)
- meets the environmental integrity requirements.

CREDITING

Credits are only awarded for emissions reductions by approved projects conducted and calculated in accordance with the methodology. Once the Clean Energy Regulator is satisfied that the claimed amount of emissions reductions has occurred, it awards the project Australian Carbon Credit Units (ACCUs). Each ACCU is equivalent to one tonne of carbon dioxide equivalent (CO_2-e). All ACCUs can be traded or sold in Australia, and some can be exchanged for an equivalent number of Kyoto units and be sold or traded internationally. ACCUs do not have an expiry date, and can be 'banked' or sold for future use. The Clean Energy Regulator is responsible for approving all projects, issuing credits and managing the ACCU registry.

1.3 ABOUT THE EMISSIONS REDUCTION FUND

The ERF is the government's centrepiece policy to reduce Australia's emissions and is planned to commence operation on 1 July 2014. The ERF will provide a price incentive to reduce emissions. Unlike a cap and trade scheme, the government will purchase emissions reductions from individuals or businesses. In December 2013, the government released the *Emissions Reduction Fund Green Paper* to consult on its design.

The primary objective of the ERF is to achieve lowest cost emissions reductions across the economy. The government has indicated that the CFI will play a central role in the design of the ERF, with CFI coverage expanded to other eligible activities across the economy. In a departure from the operation of the CFI to date, it may include both project- and facility-level activities. Emissions reductions would be purchased through a 'reverse auction' where bids would be ranked and accepted on a least-cost basis.

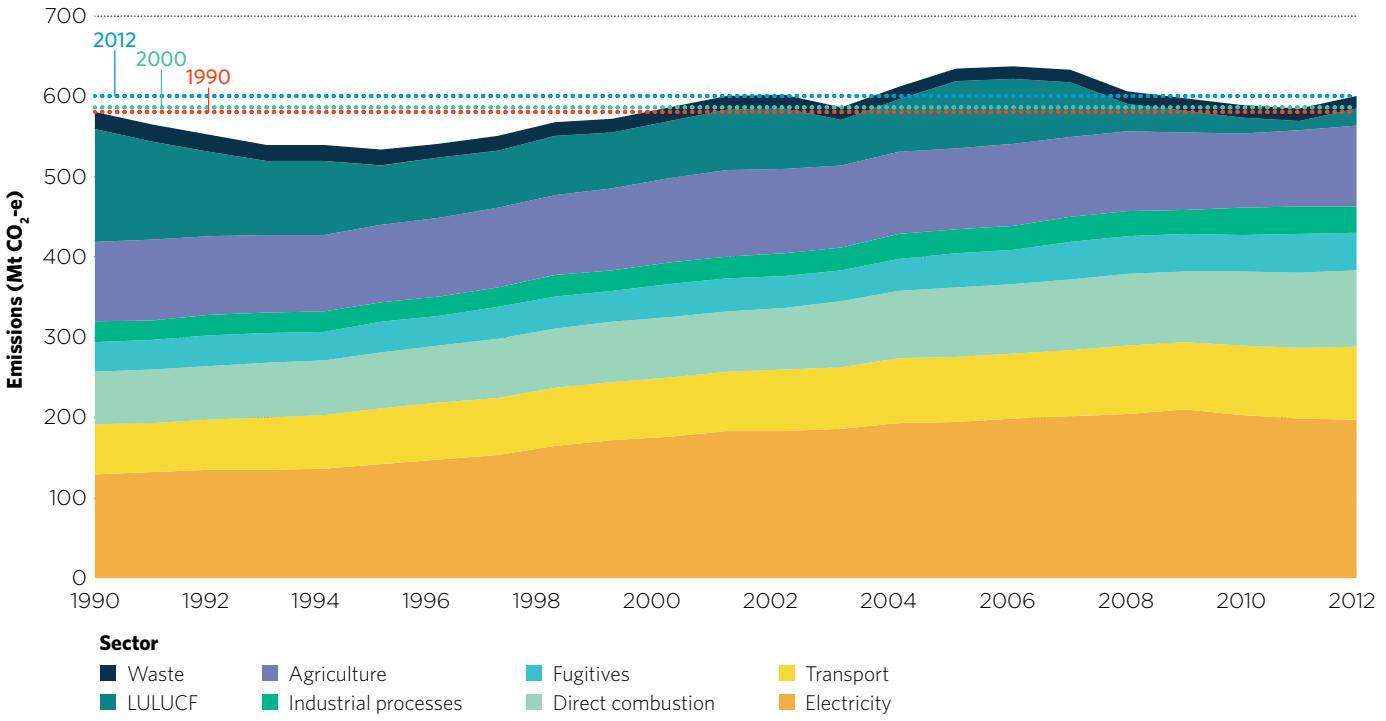
The ERF Green Paper also outlines a mechanism for 'safeguarding' emissions reductions, which would impose compliance obligations on facilities that exceed their historical emissions baseline. This is not a feature of the existing CFI. The government has indicated that safeguard arrangements would be introduced in mid-2015, to allow sufficient time for industry consultation.

1.4 AUSTRALIA'S EMISSIONS REDUCTION TASK AND OPPORTUNITIES

Before discussing the design of the ERF, it is important to have an understanding of Australia's emissions trends, emissions goals and the emissions reduction opportunities. The ERF and any complementary policies will need to be designed to capture those opportunities in an effective and efficient manner.

In 2012, Australia's total greenhouse gas emissions were about 600 Mt CO_2-e. The majority (72 per cent) are energy-related (Treasury and DIICCSRTE 2013). That is, they are produced in the production and combustion of fossil fuels for transport and stationary energy. The remainder of Australia's emissions result from agriculture, fossil fuel extraction and distribution, waste, LULUCF and industrial processes.

FIGURE 1.3: AUSTRALIA'S EMISSIONS BY SECTOR 1990–2012



Source: Climate Change Authority 2014.

Australia's total greenhouse gas emissions in 2012 were 3.5 per cent higher than in 1990 and 2.5 per cent higher than in 2000 (Figure 1.3). Emissions in most sectors have grown steadily, resulting in a 32 per cent increase in emissions excluding LULUCF in the period 1990–2012. In contrast, LULUCF emissions fell by 85 per cent in the same period, primarily due to more stringent land-clearing regulations and weaker economic conditions for farmers. These steep reductions offset the increase in emissions from the rest of the economy.

In the absence of either the Direct Action Plan or a carbon price, Australian emissions are projected to grow to 17 per cent above 2000 levels by 2020, well above the minimum reduction target of 5 per cent below 2000 levels by 2020 (Figure 1.4). To achieve this minimum target, emission reductions of 593 Mt CO_2-e are required over the period to 2020 (Climate Change Authority 2014).

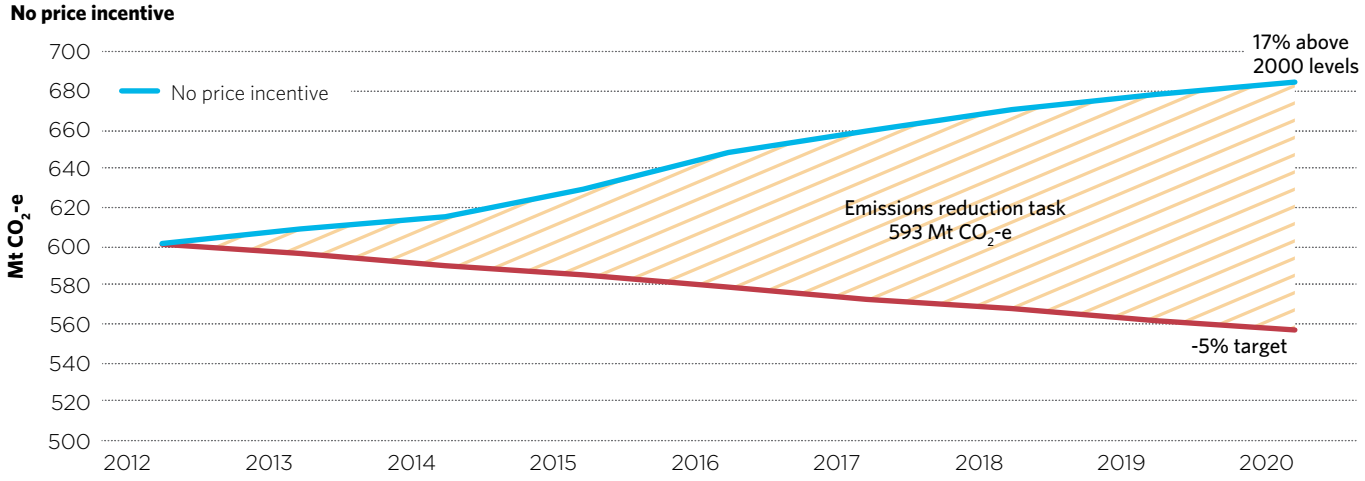
The Authority recently completed a major assessment of Australia's emissions reduction opportunities (Climate Change Authority 2014). This highlighted significant opportunities across the Australian economy. These opportunities vary considerably, depending on each sector's proportion of Australia's total emissions and its responsiveness to incentives.

An incentive, such as that provided through the ERF, could moderate growth in Australia's emissions—and the stronger the incentive, the greater the emissions reductions.

The Authority's assessment highlights the following emissions reduction opportunities.

- Electricity offers the largest opportunity for emissions reductions by lowering the emissions intensity of generation, including through the continued deployment of wind and solar technologies, increased energy efficiency improvements, and retrofitting of existing fossil fuel-fired plant and equipment.
- Sectors that are primarily driven by export demand—direct combustion, fugitives and agriculture—present the greatest challenge. Emissions growth is projected for these even with an incentive.
  - Direct combustion emissions could be reduced through improvements in emissions intensity—such as increased gas turbine and machinery efficiency—and a switch to alternative lower emissions energy sources, such as biofuels.
  - Fugitive emissions could be reduced through a shift away from higher emission mines, an expansion of lower emissions mines, and the deployment of additional pre- and post-mine drainage, where gas could be flared or used to generate electricity.

FIGURE 1.4: AUSTRALIA'S PROJECTED EMISSIONS REDUCTION TASK



Source: Climate Change Authority 2014.

  - Agriculture emissions reduction opportunities are limited to manure management, animal feed supplementation, feedlot finishing and pasture improvements. Most technologies and practices for reducing livestock emissions are still in development and not ready for commercial use.
- Transport emissions can be reduced in three ways:
  - increasing vehicle efficiency
  - reducing the emissions intensity of fuels
  - improving demand management through mode shift from road freight to rail or shipping, and from private vehicles to public transport and physical activity (cycling and walking).
- Industrial process emissions are projected to be highly responsive to an incentive. Emissions could be significantly reduced through the use of nitrous oxide conversion catalysts for nitric acid production and the destruction and replacement of synthetic greenhouse gases.
- Greater reforestation and afforestation activities, avoided deforestation and improved land management could deliver emissions reductions from the land sector.
- Waste emissions reductions are still available through the expansion of alternative waste treatment facilities to reduce waste volumes being sent to landfill.

In recent years, there have been a number of other assessments of the likely emissions reductions opportunities in the Australian economy, including analysis by ClimateWorks Australia in 2010 (partially updated in 2013). While the ClimateWorks studies use a different approach to the *Targets and Progress Review*, they reach similar conclusions on the magnitude of the emissions reduction task and the sectors likely to offer the greatest opportunities. ClimateWorks has highlighted that non-financial barriers exist in some sectors; for example, in the industrial sector where many profitable opportunities to improve energy efficiency have not been taken up. This suggests that a combination of incentives and complementary policies and practices will be required to harness Australia's emissions reduction opportunities.

KEY CHARACTERISTICS OF BASELINE AND CREDIT SCHEMES

2

Baseline and credit schemes identify, measure and provide incentives for activities that reduce emissions. Australia has implemented a range of baseline and credit schemes at the state and national level, including the Renewable Energy Target (RET), the New South Wales Greenhouse Gas Reduction Scheme (GGAS) and the New South Wales Energy Savings Scheme (ESS). The CFI is a baseline and credit scheme, as is the government's ERF.

This section explains the key characteristics of baseline and credit schemes, introduces the different schemes and design features that have been surveyed as part of this study, and discusses the types of emissions reduction activities driven by those schemes.

Baseline and credit schemes can be designed in a variety of ways to suit a range of different policy objectives, including promoting energy efficiency and meeting emissions reduction targets. A baseline is established against which performance can be measured; it forms a pathway between now and the future, and represents a scenario of emissions levels in the absence of the project. If actual emissions are below the baseline, the difference between the two represents emissions reductions, and is eligible for credits.

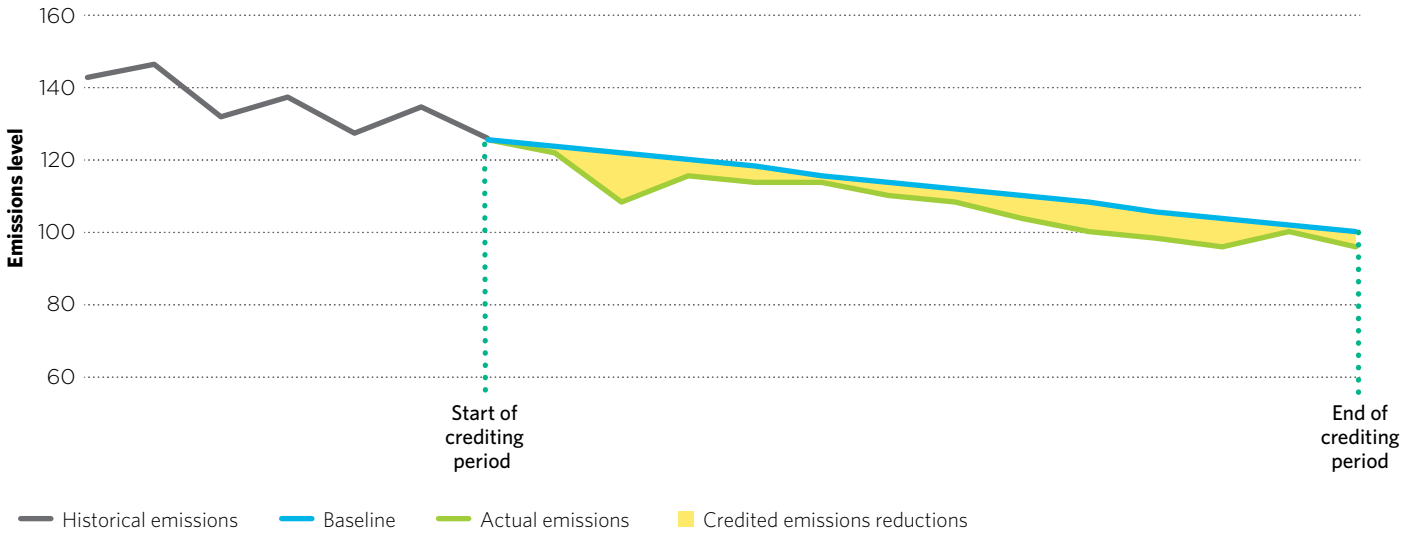
Offset schemes are designed to provide financial incentives (credits) to undertake projects that reduce emissions below a baseline (Figure 2.1). Participation is typically voluntary. Offset schemes often complement other policies that create a liability for emissions, such as a carbon tax or cap-and-trade scheme. In this context, offset schemes can provide a way for liable entities to meet their liabilities at lower cost and drive emissions reductions in a wider set of sectors. The CFI is an offset scheme—it was designed to complement the carbon pricing mechanism and encourage emissions reductions in the land and waste sectors. The credits can be sold to firms in the electricity, industrial and other sectors to offset their carbon price liabilities.

Some baseline and credit schemes also include a penalty for entities whose emissions are above the baseline. The design of a scheme that has both penalties and crediting can vary. For example:

- The entity liable under the penalty and the entity eligible to generate credits could be one and the same—a firm could generate credits if it performs under the baseline, and be subject to a liability if it performs above the baseline. Alternatively, the entity liable under the penalty could be different to an entity eligible to generate credits—a firm that is not subject to the penalty mechanism could generate credits that can be sold to a different firm that has a liability for performance above than the baseline.
- In some schemes, the penalty and crediting baseline are exactly the same. In others, they can be different, depending on the objectives of the scheme.

This study focuses on baselines for crediting (see Section 5).

FIGURE 2.1: OFFSETS BASELINE AND CREDIT SCHEME



Source: Climate Change Authority.

The ERF, as proposed in the government's Green Paper, places a strong emphasis on the crediting side of the scheme. The ERF Green Paper proposes a potential penalty in the form of the 'safeguarding' mechanism; the penalty baseline may be different to the crediting baseline.

While there are many different configurations of baseline and credit schemes, they all share some common design elements that are relevant to the design of the ERF. This study will focus on three key baseline and credit design features:

- coverage and uptake—what entities or sectors are included in the scheme and likely to participate
- additionality—how to distinguish activities that are eligible to receive credits from ones that would have happened anyway
- baseline setting—how to appropriately measure the amount of emissions reductions generated.

This study draws on a range of experiences with baseline and credit schemes from Australia and around the world to provide insights for the design of the ERF. The schemes considered include:

- Australia—Carbon Farming Initiative (CFI)
- NSW—Greenhouse Gas Reduction Scheme (GGAS)
- NSW—Energy Savings Scheme (ESS)
- Clean Development Mechanism (CDM)
- China—Certified Emission Reduction Scheme (CCER)
- India—Perform Achieve Trade scheme (PAT)
- Alberta—Specified Greenhouse Emission Reductions
- California—Air Resource Board Compliance Offsets.

Detailed summaries of each of these schemes are in Appendix A.

Baseline and credit schemes have the potential to drive a wide range of different emissions reduction activities. Box 2.1 categorises these into different types of activities to facilitate comparison. These activity types are common across schemes and provide a good reference for the sorts of emissions reduction activities that could be achieved under the ERF. They typically would not occur without the incentive of the crediting scheme, and therefore would require an ongoing incentive over time.

BOX 2.1: EMISSIONS REDUCTION ACTIVITIES

EMISSIONS AVOIDANCE

These are activities where the release of emissions into the atmosphere is avoided. For example, the treatment of waste streams before entering landfill to avoid the methane emissions that would occur if the waste was deposited into landfill. Other emissions avoidance activities include reduced fertiliser use, wastewater emissions avoidance, biomass projects, reduced leakage from gas distribution systems and avoided deforestation. These types of activities have been credited in the CFI, Clean Development Mechanism (CDM), Alberta and California.

EMISSIONS DESTRUCTION

These activities destroy emissions and often include the capture and burning of gases. For example, the capture and burning of methane from landfills, which prevents methane being released into the atmosphere. Other activities include the capture and burning of methane from piggeries and coal mines, and the destruction of ozone-depleting gases. These sorts of activities have been credited in the CFI, GGAS, ESS, CDM, Alberta, and California.

REMOVAL BY SINKS

These are activities that remove and store CO_2 from the atmosphere—for example, establishing new forestry plantations. These types of methodologies have been credited in the CFI, CDM, Alberta, California and GGAS.

EMISSIONS DISPLACEMENT

Activities where the consumption of a more emissions-intensive output is displaced with a less emissions-intensive output. These types of activities include, for example, the displacement of fossil fuel-generated electricity with renewable energy or a less emissions-intensive fossil fuel. They also include fuel- or feedstock-switching where an emissions-intensive fossil fuel or feedstock is replaced by a less emissions-intensive alternative. Some avoidance projects might also displace more emissions intensive output—for example, if a landfill captures methane and burns it to generate electricity. The energy from this process displaces fossil fuel-generated electricity. Displacement activities have been credited in GGAS, the CDM and Alberta. The RET is based on the displacement premise—that additional renewable energy displaces more emissions-intensive generation from coal and gas.

ENERGY EFFICIENCY

These are activities that enhance energy efficiency. They are typically demand-side measures and relate to the consumption of energy or other inputs. By reducing the energy used, the activity also reduces emissions resulting from the generation of energy.

The New South Wales ESS includes methodologies for a range of energy efficiency activities, including improving efficiency of commercial buildings (through re-design, and improved use of air conditioning and lighting), replacing commercial lighting and halogen lights, and upgrading and replacing domestic whitegoods. Methodologies for these types of activities have also been used in the CDM and Alberta.

3

COVERAGE AND UPTAKE

The government intends to expand and streamline the CFI so it becomes an integral part of the ERF. It will need to decide what emissions reduction activities will be eligible under the crediting mechanism as well as what facilities will be subject to the safeguard mechanism. Wider coverage should increase the scheme's access to low-cost emissions reductions and the quantity of emissions reductions relative to the current CFI. Not all covered sources of emissions reductions will be brought forward under the ERF, however, because mitigation costs and barriers vary across sectors and activities.

This section considers experiences with the CFI and other baseline and credit schemes to address the following questions:

- What are the important considerations when deciding coverage?
- What types of abatement activities are well suited to baseline and credit schemes, and what are not?

3.1 CFI APPROACH TO COVERAGE AND UPTAKE

The CFI is an offset mechanism designed to credit emissions reductions and sequestration in the land sector—namely through agriculture, legacy waste and LULUCF. Under the carbon pricing mechanism, the land sector does not face an emissions liability; instead, projects in the sector are able to generate and sell CFI credits to entities that do face an emissions liability. Business and individuals who voluntarily wish to offset their emissions may also purchase CFI credits.

Activities that are eligible under the CFI are listed on a 'positive list'—these are not common practice in an industry, and are therefore considered to represent genuine additional emissions reductions. The 'negative list' identifies activities that are not eligible under the CFI—practices that cause negative social or environmental consequences, including impacts on water availability, biodiversity conservation, employment and other values.

The CFI has been operating for just over two years at a time of significant broader change in Australia's emissions reduction policies. This makes it difficult to assess its effectiveness and draw conclusive lessons or insights. However, because the CFI is a voluntary scheme, the activities and projects established to date are likely to represent emissions reductions that were relatively easy and low cost (the 'low-hanging fruit'), or were encouraged in other ways (for example, through previous policies). It is also instructive to consider what eligible activities are not well represented in the scheme to date.

The type and mix of methodologies approved under the CFI provide a good starting point to review the activities the scheme supports (see Figure 3.1). As many methodologies have been initiated and developed by industry, they broadly represent the areas of greatest perceived opportunity. To date, 22 CFI methodology determinations have been made; the majority for activities in the forestry and waste sectors:

- permanent environmental plantings and revegetation (eight)
- methane capture at landfills and alternative waste treatment (six)
- capture and disposal of methane generated in piggeries and dairies (four)
- management of savanna burning (two)
- avoided deforestation (one)
- reduced methane generation through dietary additives for dairy (one).

At present, there are six methodologies under DOIC consideration. The DOIC has not approved eight methodology proposals, including for avoided deforestation, grazing management of livestock, removal of feral camels and the addition of feed additives for livestock. These proposals were not approved on numerous grounds, with a lack of clarity around baseline setting and additionality assessment dominating many decisions.

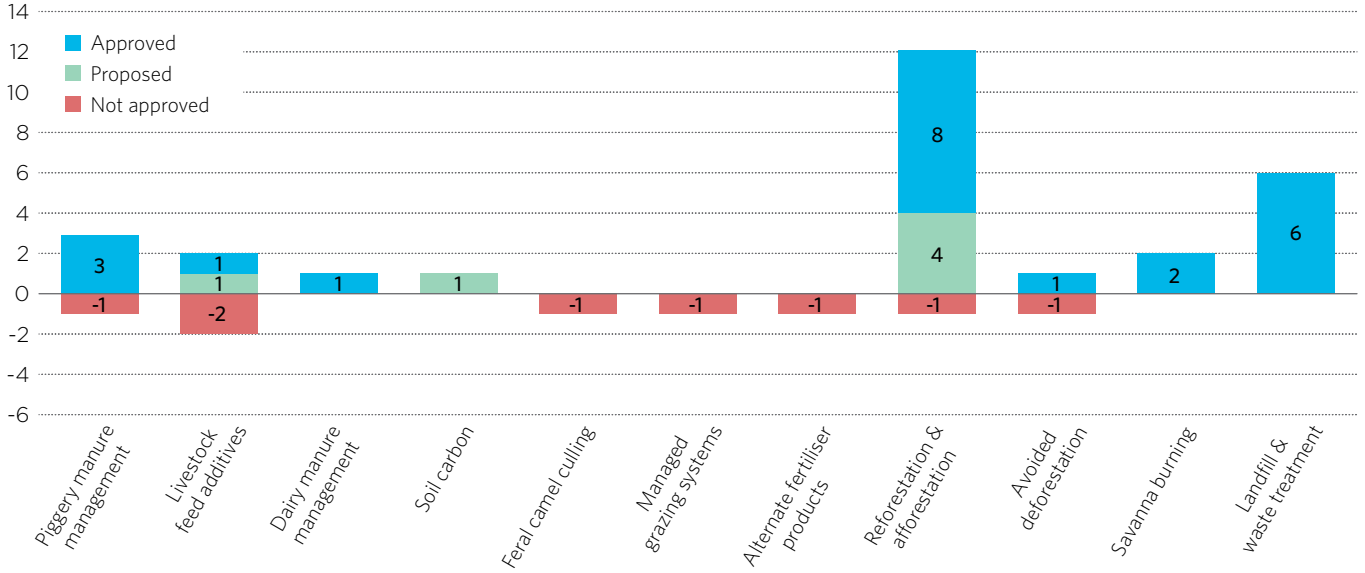
Since the release of the first CFI methodology in June 2012, 108 projects have been approved to create credits under the CFI. About two-thirds have been credited with ACCUs—meaning the project has reduced emissions, the emissions reductions have been verified and the credits have been awarded by the Clean Energy Regulator. The total amount of ACCUs generated at 24 February 2014 was 4.54 million, representing over 4.5 Mt CO_2-e of abatement. Most of these reductions (about 85 per cent) were generated from waste activities, principally from landfill gas capture activities, as shown in Figure 3.2.

The prevalence of waste sector projects is partly explained by arrangements that allowed eligible projects under the pre-existing Greenhouse Friendly and GGAS schemes to transition to the CFI when it commenced in 2011. As of 20 January 2014, 59 projects registered under the CFI had transitioned from these schemes, collectively representing more than 3.7 Mt CO_2-e. These projects could begin creating ACCUs straight away as the emissions reduction technologies were already installed. This level of uptake also likely reflects the relatively simple and mature technology available to capture and measure methane from waste facilities, which translates to straightforward baseline setting and measurement, reporting and verification. In the waste sector, landfill gas capture is also supported in a number of other ways, including through regulatory standards and the ability to generate electricity and receive renewable energy certificates.

Non-waste-related activities account for about 15 per cent of the total ACCUs generated to date. The forestry sector is well represented in methodologies developed under the CFI and has the second largest number of projects registered.

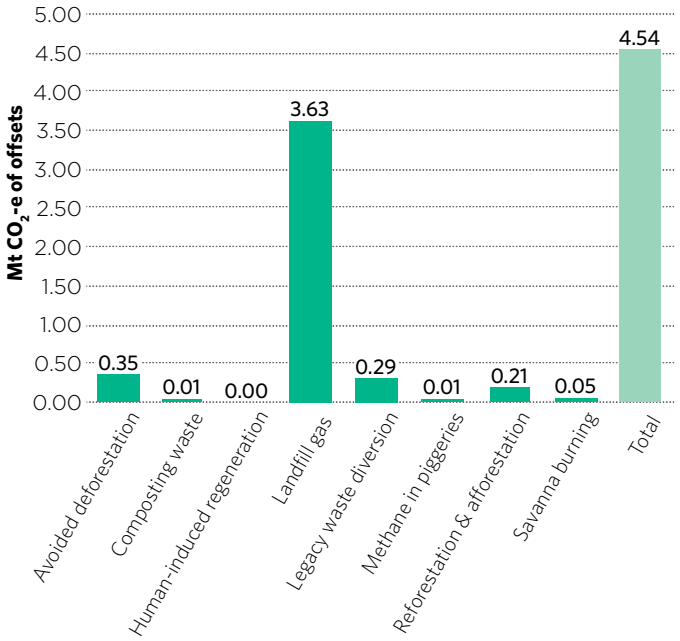
Involvement from traditional 'farmers'—the agriculture sector—has been more limited. To date, only five agriculture sector projects have been registered and only one has generated credits—a project in the piggery industry that captures methane from manure. While a methodology aimed at reducing methane emissions through the use of dietary feed additives has been approved, no projects utilising this methodology have yet been registered.

FIGURE 3.1: NUMBER OF METHODOLOGIES BY PROJECT TYPE AND STATUS



Source: Climate Change Authority based on Department of the Environment website, 2014.

FIGURE 3.2: QUANTITY OF EMISSIONS AND NUMBER OF PROJECTS



	NUMBER OF REGISTERED PROJECTS
Avoided deforestation	5
Landfill gas	62
Piggeries	5
Reforestation & afforestation	15
Savanna burning	10
Waste - composting	2
Legacy waste diversion	8
Human induced regeneration	1
Total	108

Note: Data current as at 24 February 2014.
Source: Clean Energy Regulator, Register of Offset Projects, 2014.

3.2 EXPERIENCES FROM OTHER SCHEMES

This section examines the scope of coverage and actual abatement resulting from other baseline and credit schemes.

3.2.1 SCOPE OF COVERAGE

Coverage varies across baseline and credit schemes, reflecting different policy objectives and government priorities.

White certificate schemes, such as the New South Wales ESS and Victorian Energy Efficiency Target, tend to be focused on energy efficiency and generally limit coverage to electricity consumption in relevant sectors (for example, commercial, industrial and residential electricity use). The Indian PAT scheme also has relatively narrow coverage, reflecting the scheme's objective to reduce energy consumption. Coverage is targeted to eight major energy and industrial sectors, with no external offsets. Narrower sectoral coverage may improve scheme performance by allowing administrators and participants to develop specific expertise and by reducing administrative costs.

Greenhouse gas baseline and credit schemes generally include a wider range of sectors. The Alberta and California offset programs have potentially very wide coverage, subject to the development of methodologies to measure and verify additional emissions reductions. In both, the key limitation is that offset projects may not be carried out in a sector or operation that is covered by the corresponding liability scheme (this avoids double-counting of the emissions reductions). The Alberta scheme currently has 34 methodologies covering a range of sectors, while the California scheme has four methodologies for forestry, destruction of ozone-depleting substances and destruction of methane from manure management systems.

Similarly, the United Nations CDM is an offset mechanism with very wide coverage, covering all sources and gases with only two exclusions (for nuclear projects and land use change and forestry projects other than afforestation and reforestation). The main limitation on coverage is a geographical one; CDM projects can only be undertaken in developing nations. This is because CDM offset credits are used by developed nations with emissions reduction targets under the Kyoto Protocol. Emissions reduction projects in developed countries already contribute to achieving these targets, so crediting those projects would double-count emissions reductions.

The New South Wales GGAS imposed liabilities on electricity retailers and some large electricity consumers. It allowed crediting in a wider set of defined activities, including by liable parties and separate offset providers without a scheme liability.

Wider coverage increases the scope for the scheme to identify and realise low-cost emissions reduction opportunities. Where this is the objective of the scheme, limitations on coverage are generally driven by interactions with other measures, particularly a desire to avoid double-counting emissions reductions achieved by other measures.

3.2.2 SOURCES OF EMISSIONS REDUCTIONS

Some baseline and credit schemes with wide coverage have been operating for an extended period. The CDM (operating since 2005) and Alberta's program (since 2007) are the two main examples. Domestically, the GGAS operated from 2003–12, although with a narrower scope. Some of the energy efficiency activities now credited under the New South Wales ESS were originally part of the GGAS. In addition, several schemes have been operating for a shorter period, such as the California scheme.

In the CDM, crediting has been heavily weighted towards industrial gas disposal projects (for example, hydrofluorocarbons created as a by-product in hydrochlorofluorocarbon (HCFC) production, and nitrous oxide created in adipic and nitric acid production). These account for about 75 per cent of credits allocated since the commencement of the CDM. Renewable energy has a substantial and growing share; it overtook industrial gases as a source of credits in 2013 (Figure 3.3).

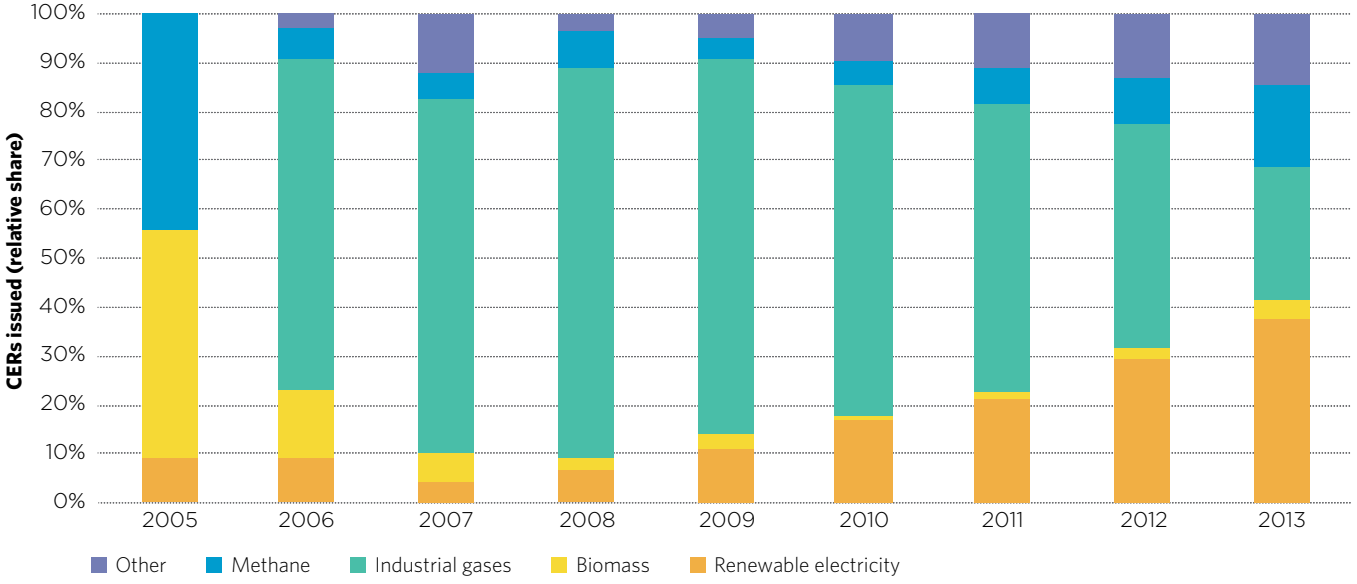
The prevalence of industrial gas projects in the CDM was driven by the very low cost and high volumes of emissions reductions available in those projects (Wara 2006). The use of pre-existing technologies and relatively straightforward methodologies to assess emissions reductions and additionality for these projects are also likely to be important factors. Crediting of industrial gas projects has declined following tightening of crediting rules for HCFC projects in 2011.

The increasing significance of renewables is attributable to rapid growth in the electricity sector in many developing countries; this provides project opportunities, often at large scale. The electricity sector also has simple and standardised methodologies to measure emissions reductions and develop baselines.

By contrast, forestry and agriculture projects are poorly represented, at about 2.5 per cent and 0.6 per cent of credits issued to date respectively (Australian Government 2013). The agriculture and forestry sectors account for a much larger share of global emissions—about 22 per cent in 2010—and tend to comprise a larger share again in developing countries (UNEP 2012, pp. 11, 14). A key challenge for forestry projects is 'permanence'. There is a risk that credited forestry sequestration will be reversed in future (if, for example, the forest is harvested or damaged). As a result, the CDM only issues temporary units for forestry projects—these must be replaced or renewed by the purchaser of the credits after a period of time. These temporary credits have a much lower value than credits issued to other activities. Relatively complex and specific methodologies are also required to measure sequestration and emissions reductions from forestry and agriculture activities, in part because the abatement achieved by those projects relies on natural systems.

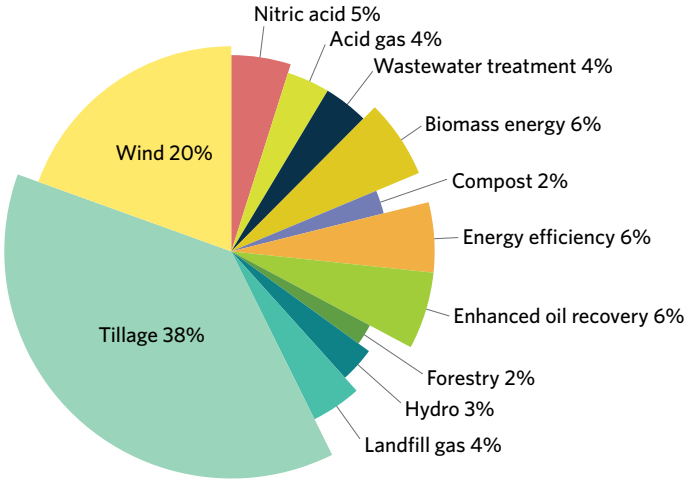
The Alberta offset program is unique in bringing forward substantial quantities of non-forestry carbon sequestration from the land sector. Projects that reduce or eliminate tillage of agricultural soils to increase carbon sequestration have generated 38 per cent of offset credits used under the program. Most of the remainder of the credits are from the energy and industrial sectors (Figure 3.4).

FIGURE 3.3: CDM CREDITING BY PROJECT TYPE, 2005–2013



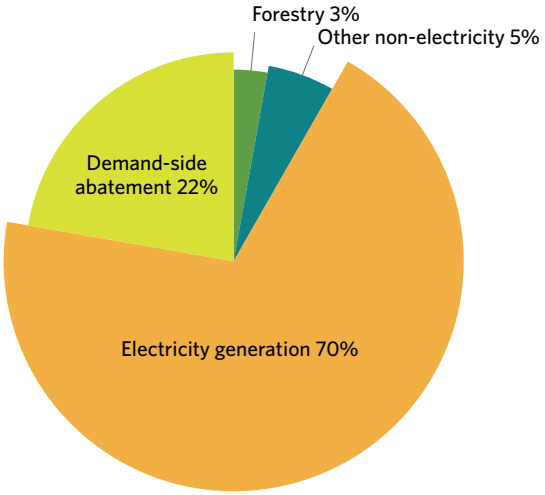
Source: Climate Change Authority, based on UNFCCC, 2014.

FIGURE 3.4: ALBERTA OFFSETS PROGRAM—CREDITS RETIRED FOR COMPLIANCE BY PROJECT TYPE, 2007–2012



Source: Alberta Environment and Sustainable Resource Development Department, 2014.

FIGURE 3.5: GGAS—CERTIFICATES ALLOCATED BY PROJECT TYPE, 2003–2012



Source: IPART, 2012.

A number of factors have contributed to this outcome. The Alberta scheme reduced barriers to uptake by allowing credit for up to five years of early action, increasing the immediate return to participants. Feedback from the administrators of the Alberta scheme suggests that many smaller participants do not find continued participation cost-effective and may drop out after taking up this one-off larger opportunity. The risk of reversal of sequestration was dealt with in the Alberta scheme by reducing the number of credits allocated to reflect an estimate of future reversals, rather than by requiring that sequestration be maintained for a minimum period as in other schemes (such as the 100-year requirement currently used in the CFI). This approach reduces the need for ongoing monitoring (beyond the crediting period) and therefore lowers scheme costs, but requires a high level of confidence in the estimate used.

In addition, low tillage was already a relatively well-established practice, and so avoided some of the technology and measurement difficulties often faced in the agriculture sector. This experience may therefore have limited relevance for the ERF, as historical emissions reductions made through relatively common technology or practices are unlikely to be considered additional (see Section 4).

GGAS abatement certificates were predominantly allocated to generation activities, reflecting a scheme focus on the electricity sector. About 70 per cent of total certificates were allocated to generation that had lower-than-average grid emissions intensity, while 22 per cent were allocated to demand-side abatement, including energy efficiency measures and on-site generation by consumers to displace grid generation. In 2009, energy efficiency activities under the GGAS were transferred to the New South Wales ESS and expanded to include more activities (IPART 2013).

Certificates could also be created by non-electricity projects; however, only eight per cent of certificates were allocated to these—about five per cent for on-site non-electricity abatement by large electricity consumers, and three per cent to afforestation and reforestation activities (Figure 3.5).

The New South Wales ESS issued 4.7 million certificates for energy efficiency activities from 2009-12, with approximately 60 per cent provided for the use of more efficient commercial lighting, 16 per cent for more efficient shower heads and 14 per cent for more efficient commercial processes or control systems. Commercial and industrial projects accounted for 86 per cent of certificates issued, with the remaining 14 per cent for residential uses (IPART 2013, pp. 41–42).

The California scheme has only been in operation since 2012 and currently only has four methodologies in place. Crediting to date has been dominated by projects to destroy ozone-depleting refrigerant gases (which also have strong global warming effects) and existing forestry projects that have transitioned from earlier voluntary schemes.

Overall, the schemes surveyed show that emissions reductions tend to be concentrated in a limited number of sectors. Generally, large volumes of emissions reductions have been achieved in the industrial and energy sectors, with agriculture, forestry and transport making relatively small contributions to emissions reductions.

TABLE 3.1: CREDITS ISSUED BY THE CALIFORNIA OFFSETS SCHEME

PROJECT TYPE	OZONE-DEPLETING SUBSTANCES	LIVESTOCK DIGESTER	US FOREST	URBAN FOREST
Compliance	827,746	–	–	–
Early action	2,697,690	105,957	1,649,864	–

Source: California Air Resources Board, 2014.

3.3 INSIGHTS FOR THE ERF—COVERAGE AND UPTAKE

Scheme coverage—that is, which emitting facilities and activities are eligible for crediting, and which are subject to penalties under the safeguard mechanism—will be a key decision in the design of the ERF. Given the ERF's primary objective of achieving low-cost emissions reductions, broad coverage of emitting sectors would seem appropriate, as it provides access to the widest range of low-cost opportunities. There may, however, be good reasons to apply some limitations on coverage. Further, even with broad coverage, some sectors are more likely to participate and generate more emissions reductions than other sectors.

3.3.1 KEY CONSIDERATIONS FOR COVERAGE

Experience illustrates that one of the key reasons for limiting coverage of baseline and credit schemes is the interactions with other measures.

The ERF Green Paper notes the importance of avoiding overlaps with other measures that provide direct incentives for activities that reduce emissions. This is important because activities that receive incentives under these schemes will occur anyway, without the need for crediting under the ERF. For example, the RET and state based energy efficiency schemes encourage emissions reductions in the electricity sector. As a result, coverage of that sector under the ERF is an open question. However, these schemes do not provide general incentives for emissions reductions across the entire electricity sector—the sector identified as having the greatest emissions reduction potential.

- The RET provides incentives for additional renewable generation, but does not provide incentives for fuel-switching by electricity generators (for example, from coal to lower emitting natural gas).
- Existing energy efficiency schemes in Victoria, New South Wales, South Australia and the Australian Capital Territory provide incentives for some energy efficiency activities, but the same incentives are not present in other states.
- The electricity sector has the greatest identified emissions reduction opportunities. A blanket exclusion of the electricity sector from the ERF would therefore forego important emissions reduction opportunities. On the supply side, renewable generation could be excluded from coverage under the ERF given the overlaps with the RET, however, the ERF or other policies could play a role in encouraging fuel-switching.

On the demand side, coverage of energy efficiency activities could lead to overlaps with state-based energy efficiency schemes in Victoria, New South Wales, South Australia and the Australian Capital Territory. There are no easy solutions to avoid these overlaps; the broad options are to:

1. Exclude types of activities that are eligible for the state-based schemes from the ERF entirely, regardless of where they occur in Australia (resulting in non-coverage of energy efficiency activities in the other states and territories).
2. Include these activities in the ERF to provide the same incentives for the whole of Australia under the ERF (this could lead to double crediting, unless the state-based schemes were replaced with the national ERF scheme).
3. Exclude activities that receive an incentive under the state-based schemes from eligibility for crediting under the ERF. Include activities that are eligible but not paid for under those schemes and activities in other states and territories.

Option one would narrow the coverage of the ERF and provide no incentive for energy efficiency opportunities outside of Victoria, New South Wales, South Australia and the Australian Capital Territory. Option two would decrease the overall amount of emissions reductions brought forward by using ERF funds to pay for reductions that would otherwise be made under state-based schemes. Option two could also be time-consuming to develop and implement, requiring negotiation with the states and territories to withdraw their programs. States may be reluctant to discontinue programs due to uncertainties about the final ERF design, duration and long term funding.

Option three would maximise the extra incentive for emissions reductions provided by the ERF by avoiding double crediting while retaining the incentives provided by state-based schemes. The main limitation of this option is that it may be seen as inequitable, favouring states and territories without existing energy efficiency programs. This option would, however, allow the ERF to purchase emission reductions in states and territories with programs provided that the emissions reductions went beyond the requirements of the program. This option could also create a perverse incentive for states and territories to change regulations, or avoid introducing new regulation, to shift costs to the Commonwealth. On balance, however, option three appears the best fit with the objectives set out in the ERF Green Paper.

3.3.2 SOME SECTORS MAY NOT BE WELL SUITED TO BASELINE AND CREDIT SCHEMES

Experience demonstrates that extending coverage to particular activities or sectors will not necessarily result in matching uptake of emissions reduction opportunities in these sectors. Schemes such as the CDM show that even with nominally broad coverage, some activities and sectors have very low representation and crediting rates.

The bulk of emissions reductions from baseline and credit schemes arise from activities with low costs, established or readily available technologies, where baselines (the business-as-usual scenario) are easily established and with relatively large emissions sources. This is evident in the CFI, where emissions reductions to date have been dominated by projects for the capture and destruction of methane from landfill. Industrial gas projects have traditionally dominated the CDM for similar reasons. Australia does not currently manufacture HCFCs and adipic acid, which have accounted for the bulk of crediting from industrial gas projects in the CDM. The stationary energy, industrial and fugitive sectors tend to be the main sources of emissions reductions in schemes that have broad coverage. This matches what appear to be Australia's main emissions reduction opportunities, suggesting that expanding the CFI to these sectors could increase the volume of emissions reductions.

Conversely, baseline and credit schemes have not generally been effective at driving emissions reductions in the agriculture, transport and forestry sectors. There are a number of potential reasons for this:

- In the agriculture sector, there are challenges associated with measuring and verifying emissions reductions in natural systems, and high levels of local variability, making it difficult to set emissions baselines (Saddler and King 2008).
- Many potential emissions reduction options in the agriculture sector remain at an early stage of development and may be years away from commercial deployment (ABARES 2011).
- For projects that sequester carbon, the risk of reversal introduces additional requirements to guarantee 'permanent' storage of carbon (currently for 100 years on average in the CFI).
- Emissions reductions opportunities in the agriculture, forestry and transport sectors tend to be more dispersed and of a smaller scale, making it difficult for projects to compete with larger opportunities in other sectors with lower transaction costs per tonne of emissions reductions.

Uptake will inevitably be affected by perceptions of the scheme's likely stability and longevity. Some activities such as those with high up-front capital costs and/or long payback periods require confidence that an incentive will be provided over the long term. Uncertainty about the policy time horizon will deter participation.

In some cases, alternative policy measures may be more appropriate to target emissions reductions. For instance, fuel economy standards for passenger vehicles or direct regulation to phase down usage of synthetic greenhouse gases in refrigerants have both been successfully applied in other countries.

For those sectors or activities where alternative regulation is not used, tailoring ERF settings to the sector could help to realise emissions reduction opportunities. For instance, projects that have high up-front capital costs would be assisted by longer term contracts for purchase of emissions reductions, reducing uncertainties about future income streams and improving access to capital. In cases where individual project monitoring, reporting and verification is especially challenging or costly (for instance forestry projects, livestock and small-scale energy efficiency projects), there may be a role for default values or for centralised development of monitoring, reporting and verification tools. These have helped smaller emissions sources that are relatively homogenous and can be readily aggregated make an important contribution in the NSW GGAS and Alberta schemes.

Another approach that could help uptake in difficult sectors is for the government to provide support for the development of projects. This could include direct assistance in completing applications and developing methodologies, education and outreach, and complementary financial assistance such as research and development funding.

The government has provided substantial assistance for CFI project application grant funding under the Carbon Farming Futures program, the Biodiversity Fund and the Indigenous Carbon Farming Fund, and extension and outreach services such as the Carbon Farming Skills program. Other examples include the Alberta offsets program, where the government of Alberta disseminates information to help with agriculture projects, including listing aggregators and providing information on carbon contract and company best practices. In the CDM, some complementary measures have been applied on a regional basis. These include a loan facility to support methodology development, and regional collaboration centres to help with capacity-building and reducing investor risk.

Providing supporting resources will add to the costs of the ERF (beyond the price paid to project providers per tonne of emissions reductions), with higher costs likely in sectors where there are many small projects or less well-resourced participants. These resources could, however, deliver increased participation and boost the environmental effectiveness of the ERF.

3.3.3 IT TAKES TIME TO BRING FORWARD EMISSIONS REDUCTIONS AT SCALE

Most baseline and credit schemes show a significant delay between commencement and delivering large volumes of emissions reductions. A number of steps need to be undertaken before credits can be issued to projects, with one of the most important being the development of methodologies to measure and credit emissions reductions. There can also be substantial lead times for businesses to develop capacity and identify opportunities for emissions reductions in new sectors or activities.

In the first two years of the CDM, about 26 million (year one) and 77 million credits (year two), were issued. Volumes increased significantly over time; the CDM has issued an average of about 180 million credits annually since 2006 (UNFCCC CDM Registry 2014). Early projects were heavily dominated by relatively easy and large-scale opportunities for the destruction of industrial gases, with other opportunities such as renewable energy taking longer to come through at scale.

In the CFI, crediting in the first year (2012–13) was about 1.7 million, increasing to 2.8 million in 2013–14 (to date). The majority of these credits were, however, from existing landfill gas projects that had transitioned from the GGAS and Greenhouse Friendly programs. If landfill gas projects were excluded, crediting from other activities in the CFI was about 0.2 million in 2012–13, more than tripling to about 0.7 million in 2013–14 (to date).

This experience shows it will take time to develop methodologies and implement projects in the ERF for new activities not already covered by the CFI. The Government is currently undertaking preparatory work so that methodologies are available as soon as possible upon commencement of the scheme. Activities already approved under the CFI are likely to dominate initially in the ERF but provide limited scale. This suggests that the scale of abatement achieved by the ERF will increase over time.

4

ADDITIONALITY

Assessing additionality is a key feature of all baseline and credit schemes. An additionality test assesses *whether* a project or activity creates 'additional' emissions reductions that would not have occurred in the absence of the incentive. The baseline for the project assesses *how much* emissions have been reduced.

Additionality is important to ensure that a baseline and credit scheme does not pay for emissions reductions that would have occurred anyway. Purchasing non-additional reductions would reduce both the environmental effectiveness and economic efficiency of the scheme. Additionality can never be determined with certainty as it involves a prediction of future circumstances; it will always require analysis and some judgment. Costs and uncertainty to projects can, however, be reduced with clear and consistent rules.

Testing additionality can involve trade-offs; more stringent tests raise confidence that emissions reductions are additional, but are likely to increase administration costs, which may deter participation in the scheme.

This section looks at the approaches taken to additionality under the CFI and other schemes to provide lessons for the ERF.

4.1 CFI APPROACH TO ADDITIONALITY

The CFI has a strong focus on environmental integrity. This design choice results from its role as an offset scheme complementary to Australia's carbon pricing mechanism and its initial links to international carbon markets. The majority of emissions reductions from the CFI are expected to help Australia meet its international emissions reduction commitments (such as its Kyoto Protocol target), and can be exported and used by other countries to meet their commitments. If emissions reductions from the CFI were not additional, Australia would need to make extra reductions (or purchase extra reductions from overseas) to meet its emissions reduction goals.

In the CFI, additionality is considered at two stages: activity level approval and methodology approval. These are discussed in turn below.

4.1.1 ADDITIONALITY AT THE ACTIVITY LEVEL

For a CFI project to qualify as additional it must initially fulfil two requirements:

1. The law must not require the activity—this prevents proponents from receiving credits for activities that they are already required to do.
2. The activity must be on the 'positive list'—a register of abatement activities that are eligible to earn carbon credits under the CFI.

The positive list can be thought of as a simplified or standardised form of additionality test. The positive list was adopted as part of the CFI scheme to remove the need for project-level additionality tests, which can be complex and limit scheme opportunities (Carbon Credits (Carbon Farming Initiative Bill) 2011, *Explanatory Memorandum*). It identifies a broad set of abatement activities that are not 'common practice' in an industry or region, and are therefore deemed additional. Activities that are already common practice or in widespread use are considered 'not additional'. The key perceived benefits of the positive list are providing rigorous advice on whether or not activities are common practice in a particular industry or sector and,

as a result, providing greater certainty to potential project proponents at an early stage of the process. This may prevent participants expending time and resources on pursuing projects that are likely to be non-additional.

Where activities are common in specific areas, but not on a large scale, the positive list can identify parts of an industry or environmental conditions that qualify. The 19 activities currently on the positive list fall under the following categories—vegetation and wetland restoration projects, legacy landfill gas projects, early dry season burning of savannah, livestock management and other activities. The positive list is intended to be reviewed to keep pace with technological developments and latest scientific research (DCCEE 2012a).

An activity is usually uncommon due to barriers to uptake, which may include high establishment costs relative to financial returns, requirements for additional skills or information barriers. The common practice assessment compares an activity's uptake with an industry reference group (Australian Government CFI positive list brochure 2014). Project-specific factors such as the property size, scale of operations, distance to facilities and socioeconomic conditions are also considered (DAFF ABARES 2012). Broadly speaking, if the activity has less than 20 per cent uptake and adoption is not rapidly accelerating, the activity may be viewed as not being common practice, and therefore eligible for the positive list (DCCEE 2012a).

To assess common practice, the Department of the Environment typically undertakes in-house research, drawing on expertise from relevant government departments and agencies. The Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) often provides assistance on agriculture and forestry related proposals, analysing the level and rate of adoption for the activity (DAFF ABARES 2012). The DOIC receives advice on whether an activity is common practice from these sources, and ultimately makes recommendations to the Minister for the Environment. Feedback from stakeholders indicates that completing a common practice assessment and putting the activity on the positive list (which includes having new regulations made) generally takes six to 12 months.

Several activities have not been approved for the positive list as they have failed to meet the above additionality test. For example, reducing nitrous oxide emissions using tractor exhaust technology was not approved because there was insufficient scientific evidence that it reduces emissions. In addition, sequestering carbon in soil through cell grazing, which is a system of livestock management that involves movements of stock matched to pasture growth rates, was also not approved due to insufficient scientific evidence that it will deliver long-term sequestration (DoE 2014a).

4.1.2 ADDITIONALITY AT THE METHODOLOGY APPROVAL STAGE

In addition to the positive list, additionality is also assessed at the methodology stage. This ensures that each individual project produces additional emissions reductions. For example, while a general activity may be additional because it is not common practice, a given project must demonstrate that the activity is not already being undertaken in that particular facility or location.

Methodologies must contain the following:

- a description of the activity
- a list of emissions sources and sinks affected by the project
- monitoring, verification and reporting requirements
- instructions for determining a baseline that represents what would occur in the absence of the project, and
- procedures for measuring or estimating abatement or sequestration relative to the baseline (DCCEE 2012b).

4.2 EXPERIENCE FROM OTHER SCHEMES

This section examines how other baseline and credit schemes test additionality, and the strengths and weaknesses of the different approaches. Schemes generally use a combination of approaches.

4.2.1 FINANCIAL OR INVESTMENT ADDITIONALITY

Financial additionality, also known as investment additionality, directly assesses whether a particular project would go ahead without the financial incentive from the scheme. For instance, an energy efficiency project might go ahead without crediting because it reduces electricity consumption and therefore energy costs. A financial additionality test requires a scheme administrator to assess the investment environment, business operations and motivations of the project provider or investor to determine their likely actions in the absence of the scheme incentive. Several schemes provide for explicit tests of financial additionality, including the CDM and the Alberta scheme.

A financial additionality test specifically addresses the circumstances of the particular project provider and directly focuses on the effect of the scheme incentive. In theory, this should allow the test to be effective in sectors where different project providers have different investment incentives and technologies—so that the same activity may be genuinely additional for some providers but not others.

Financial additionality can, however, be difficult to test as it requires detailed knowledge of the investment environment for a project and the intentions and motivations of the project provider or investor. In response, baseline and credit schemes tend to employ proxies for financial additionality that are more objective and verifiable (for instance, statements from potential lenders that the project does not meet financing criteria without the incentive from the baseline and credit scheme). The CDM has developed a number of simplified tools for financial additionality (see Box 4.1). The trade-off is that more objective and verifiable financial additionality tests may be less project-specific and therefore less effective in assuring additionality.

BOX 4.1: THE CDM FINANCIAL ADDITIONALITY TEST

The CDM *Tool for the demonstration and assessment of additionality* details the process to be adopted to test for financial additionality. It does this to ensure that the CDM project:

- is *not* the most economically attractive option (that is, that an alternative, more GHG-intensive and financially attractive activity would have occurred in the absence of the CDM project); or
- would *not* have been financially feasible without the revenue gained from undertaking the activity.

The first step in undertaking the additionality test is selecting an appropriate analysis method. The tool provides three options:

1. **A simple cost analysis**—this option can be used if the CDM project, or any identified alternatives, generates no financial or economic benefits other than CDM-related income. It requires a comparison of costs between the project and alternatives to show that there is at least one alternative that is less costly than the CDM project.
2. **An investment comparison analysis**—this option can be used if the CDM project, or any identified alternatives, generates financial or economic benefits in addition to CDM-related income. This option requires an analysis of financial indicators of the project such as internal rates of return or net present values. These indicators will then be compared against the alternatives.
3. **A benchmark analysis**—this option can be also used if the CDM project generates financial or economic benefits in addition to CDM-related income. It requires selection of a key indicator (such as internal rate of return), which will then be compared to a benchmark. The benchmark can be derived from an approved internal benchmark (for example, weighted average cost of capital for the company), a commonly used benchmark for similar activities, or a government or other officially approved benchmark used for investment decisions.

Once the appropriate test has been chosen, the next step is to calculate and compare financial indicators and other information. This process will assess whether the alternative project is more financially attractive or whether it has a less favourable indicator than the benchmark. The final step in the financial additionality test is to perform a sensitivity analysis showing the robustness of the conclusion(s) to variations in key assumptions.

If the project passes the financial additionality test, it will progress to the next CDM additionality test—a common practice test. If the project does not pass, it may still progress to the next phase of testing if it instead passes a barrier test (see Section 4.2.4). The barrier test assesses whether there are non-financial barriers that would prevent the project going forward despite its financial viability.

4.2.2 REGULATORY ADDITIONALITY

Regulatory additionality looks at whether the project activity is required by regulation and is therefore business-as-usual. For instance, the capture and flaring of methane from waste or mines would be disqualified from receiving credits if there were environmental or safety regulations requiring it. A regulatory additionality test is commonly used in baseline and credit schemes, including in the CFI, GGAS, New South Wales ESS and Alberta Offsets Program.

The advantage of the regulatory additionality test is that it is relatively simple to apply and very reliable; an emissions-reducing activity is clearly non-additional if it is required by law. This test is limited, however—just because an activity is not required by law does *not* mean it is additional. Regulatory tests need to be used in conjunction with other tests.

Regulatory tests may also create perverse incentives for state or regional governments not to regulate activities so that local project proponents can continue to take advantage of financial incentives. This risk is recognised by the CDM in its 'E-' policy, where regulation that provides an incentive for emissions reductions will not be considered when assessing additionality for a period of seven years after the regulation is introduced.

4.2.3 COMMON PRACTICE

A common practice test looks at whether or not a practice or technology is already in common use. A practice that is commonly used in the same sector or comparable businesses is likely to be commercially viable on its own merits and therefore not additional. An example of a common practice test is in the Alberta scheme, where a set level of 40 per cent adoption of a practice or technology in a sector is generally taken as amounting to common practice (Alberta Government 2011, p. 23). A common practice test can be carried out at a project level, as it is in the CDM, or centrally by a scheme regulator before a methodology is developed, as it is in the California scheme.

A strength of common practice tests is that they focus on, and can help bring forward new or underutilised technologies and practices. Depending on the industry involved, it can also be relatively straightforward to determine which activities are common practice. A common practice test can, however, result in genuinely additional projects being assessed as non-additional (and vice versa) if a sector is not homogenous and parties have different incentives to invest in emissions reducing technologies or practices. The boundaries that are used for assessing common practice will also have an influence on outcomes; practices that are common in one country or region may not be common in another, and practices may be common in some industry sectors but not others. Where to place boundaries will depend on an assessment of the likelihood that practices will transfer to new sectors or areas without an incentive.

Common practice tests on their own have limitations. For example, newly developed technologies and practices may be financially viable but simply not yet taken up. What is a 'common' practice is hard to judge where there is a limited sample size (for example, where there are only one or two industrial plants that could use a particular technology in a country). It is also important to periodically reassess common practice, as new practices become more widely used and commercially viable over time.

4.2.4 BARRIER ANALYSIS

Barrier analysis looks at whether there are non-financial barriers to uptake of emissions reduction technology and practices, such as lack of information or scarcity of capital. Barrier analysis is used in the CDM and the Alberta scheme (see Box 4.2).

Barrier tests may be effective in recognising situations where, despite apparent profitability, emissions reduction opportunities are not taken up under business-as-usual. For instance, research by ClimateWorks suggest that there are substantial industrial energy efficiency opportunities that have negative costs in Australia, but have not been taken up for a variety of reasons. A lack of access to internal capital, the payback period of energy efficiency projects, opportunity cost and operational risk, lack of information and access to low-cost energy are all inhibiting energy efficiency activity, with internal practices appearing to strongly influence uptake (ClimateWorks 2013, pp. 35–42).

If barriers to uptake are not financial, then a financial incentive provided through a crediting mechanism may not be the most effective or cheapest policy option. Measures that directly target particular barriers, such as appliance and building standards, information campaigns and demonstration programs may be cheaper ways to bring forward opportunities. Barriers may also be difficult to objectively assess and quantify, although this is an area where aggregators can play a role. For instance, with household energy efficiency programs, businesses involved with installing or selling efficient equipment generally apply for credits rather than individual householders.

BOX 4.2: THE ALBERTA BARRIER TEST

The Alberta scheme uses a barrier analysis method to test for additionality, which was adapted from the CDM 'barriers assessment tool'.

Barriers are primarily tested on technological, financial and social limitations:

- **Technological barriers**—tests whether a less emissions-intensive technology is available for the project but faces significant deployment or capital constraints, preventing it from being used. If the technology is readily available and economical to deploy, then it would not be considered additional.
- **Financial barriers**—tests whether the payback horizon for a project is sufficient to deter investment in the project. Where no barriers are evident, the project is not considered additional. Alberta does not weight this test heavily.
- **Social limitations**—tests whether there are limits to public perception and understanding that are preventing a particular activity from being undertaken. If social limitation barriers are identified, this may be grounds to accept that the project is additional.

4.2.5 CREDIT FOR EARLY ACTION

If a project is implemented prior to the existence of the baseline and credit scheme, it is generally assumed that it did not need the scheme incentive and is not additional. Consequently, credit is generally not given for 'early action'.

However, in some situations a project is implemented in anticipation of future eligibility for credits or under an earlier scheme that is superseded by a new scheme.

The Alberta offsets scheme allows for five years of credit for early action for offset activities that commenced from 2002. This is because the Government of Alberta released its first climate change strategy in 2002, five years before passing legislation in 2007 to enable emission reduction obligations and the offset trading program. In the CDM, evidence of 'prior consideration' of offset credits must be demonstrated for certain projects commencing before August 2008, to show that continuing and real actions were taken to secure CDM approval in parallel with project implementation. The CFI allowed for transition of projects from existing schemes, such as waste generation projects from the GGAS, and the California offsets scheme allows for crediting of projects established under earlier voluntary programs.

4.2.6 POSITIVE LIST/DEEMED ADDITIONALITY

A number of schemes directly specify types of activities that are eligible for crediting. This can be implemented in a number of ways. For instance, the New South Wales ESS allows automatic crediting for replacing residential lighting and whitegoods with more efficient equipment at specified default rates, without the need for explicit additionality tests, whereas the CFI provides a positive list of eligible activities. Normally an assessment is undertaken of whether an activity is additional before it is put on a positive list. The scheme regulator can use additionality tests such as regulatory, financial and common practice for all activities of a certain type, removing the need for project proponents to carry out the additionality assessment on a project-by-project basis.

4.3 INSIGHTS FOR THE ERF—ADDITIONALITY

The ERF Green Paper retains additionality as a key principle, stating that 'emissions reduction methods will be developed to calculate genuine and additional emissions reductions from new actions that are not mandatory and have not been paid for under any other program'. Overall, however, the ERF Green Paper signals a shift away from the stringent multi-stage approach taken by the CFI towards a simpler approach that minimises costs and encourages participation at scale. The ERF Green Paper proposes eliminating the positive list, and developing simple methodologies that would credit emissions reductions relative to past practice.

The additionality test(s) chosen will have significant implications for the cost of the ERF, the level of participation and scale of emissions reductions achieved, and the financial and environmental integrity of the ERF.

4.3.1 ASSESSING ADDITIONALITY IS CENTRAL TO MOST BASELINE AND CREDIT SCHEMES

Some kind of additionality test is essential to most crediting schemes. Even in cases where schemes do not provide for separate additionality tests, additionality is generally assessed as part of the development of baseline methodologies or implicitly carried out by the scheme regulator when developing lists of eligible activities or technologies. Additionality testing is important for the ERF because it will have a finite fund for purchasing credits; buying non-additional emissions reductions will reduce the reductions achieved

per dollar spent, potentially crowd out genuinely additional reductions and make it harder to achieve Australia's target. Regular review will also be required to ensure that practices or technologies are still additional.

4.3.2 ASSESSING ADDITIONALITY INVOLVES BALANCES AND TRADE-OFFS

There are potential trade-offs between the level of detail and rigour required for additionality testing and costs for scheme participants and administrators (which is in turn borne by taxpayers).

More rigorous and detailed tests, such as project-level financial additionality and barrier analysis, are likely to increase the environmental and economic integrity of the scheme by providing greater certainty that abatement purchased is additional to business-as-usual. This can, however, reduce the scale of emissions reductions, as the higher compliance costs may discourage project providers taking up opportunities. In some cases, this could be seen as a trade-off between environmental integrity and environmental effectiveness—a choice between, for example, five tonnes of emissions reductions with absolute confidence of additionality (high environmental integrity, lower environmental effectiveness) or 100 tonnes of emissions reductions including five tonnes of non-additional emissions reductions (higher environmental effectiveness, lower environmental integrity).

The ERF Green Paper does not support the use of a financial additionality test for individual projects, on the basis that they are resource-intensive for project proponents and scheme regulators. It proposes that the ERF tests additionality in a way that minimises costs and encourages participation. More generic additionality tests such as deeming and common practice can encourage participation and place greater emphasis on large-scale emissions reductions. These approaches can, however, increase the risk of crediting non-additional emissions reductions for specific projects that differ from the norm.

It is unlikely that the trade-offs involved will be uniform across the economy. Some sectors or activities are likely to be better suited to simple additionality tests. More homogenous activities, where participants have similar investment incentives and equal access to capital and technologies, are likely to present less risk for the use of generic tests. For example, projects to install energy efficient halogen lighting are likely to be suited to generic testing: the technology used is homogenous; incentives to install and use lights are similar across users; and it is relative easy to calculate average emissions savings during the life of a light bulb.

There may be some classes of activities that are very clearly additional and require minimal testing. A good example is industrial gas projects in the CDM and California offset scheme—there is no economic reason for collecting and destroying waste gases from industrial processes or refrigeration in the absence of regulation, suggesting in these cases a regulatory additionality test may be sufficient.

In other cases more tailored, project-specific approaches may be appropriate. For instance, a large energy efficiency project that uses specialised new technology and is not required by regulation could not be adequately tested by either a common practice test (as it is a new technology) or a regulatory additionality test (as the absence of regulatory requirements on its own does not prove additionality). In this case, a financial test could be used to assess the rate of return of the project. A barrier test could be used to augment the analysis in cases where the project was not found to be financially additional. In the case of large projects, the extra cost of a project-specific financial and/or barrier additionality test would be spread over a larger amount of emissions reductions.

A standardised assessment of financial additionality may also be useful at a sectoral level (that is, whether an emissions reduction activity is commercially viable without a financial incentive), in cases where a generic assessment of additionality is applied for particular technologies or activities.

4.3.3 EARLY ACTION IS GENERALLY NOT ADDITIONAL

The ERF Green Paper states that only new actions to reduce emissions will be credited. This approach is consistent with other baseline and credit schemes, which do not generally credit 'early action', given the activity has already occurred, it is highly unlikely that it would be additional. Two exceptions to this rule are the crediting of existing projects from earlier schemes that have been superseded (for example, the CFI crediting landfill gas projects established under the discontinued GGAS) or were started in anticipation of receiving the project incentive (which is allowed in the CDM and the Alberta scheme).

The proposed abolition of the carbon pricing mechanism complicates this aspect of additionality for the ERF. Emitting facilities may have made changes to their operations to reduce liabilities under the carbon pricing mechanism; for instance, by switching to lower emitting fuels. These activities may no longer be viable without the price incentive from the carbon pricing mechanism, but would technically be ineligible for crediting under the ERF as they are not 'new'.

There could be an argument for the ERF to provide some flexibility to credit existing activities if those emissions reductions would otherwise cease or be reversed. Only where this can be clearly demonstrated could the activity be considered additional. In practice, most existing activities will not cease or be reversed with the removal of the carbon price and determining those that would, could be difficult. The project proponent would need to demonstrate it would be better off ceasing or reversing the activity, taking into account the costs of stopping the activity, the ongoing costs of maintaining the activity, and any other implications (for example, reputational damage). Testing this could be time consuming, subjective and difficult to verify.

While the CFI was not designed to allow credits to be created from pre-existing projects, a recent decision by the Administrative Appeals Tribunal found a pre-existing activity eligible for crediting (Administrative Appeals Tribunal of Australia 2014). This suggests that, to the extent that the government wishes to exclude certain pre-existing activities from the ERF as non-additional, boundaries for crediting should be clearly defined in legislation.

4.3.4 ADDITIONALITY TESTING IS CLOSELY RELATED TO BASELINE DEVELOPMENT

Additionality testing is closely related to baseline setting, as both require establishing what would happen in the absence of the project. The CFI has a two-step process to assessing additionality: the first assessment being the development of the positive list of eligible activities; the second being at the methodology development stage. The ERF Green Paper proposes streamlining this process to a single step—at the methodology development stage.

The positive list approach used in the original design of the CFI aimed to give early guidance to participants engaging in design of bottom-up baseline methodologies. Feedback from stakeholders suggests, however, that in practice the process has been duplicative and time-consuming, and has often proceeded in parallel with the development of methodologies by project proponents.

The removal of the positive list therefore has potential to streamline the ERF and reduce costs for project proponents. It is important to understand, however, that the core task of determining which activities create genuine and additional emissions reductions will remain; removing the positive list just eliminates duplication and shifts this assessment to the methodology development phase.

This will require more than an examination of historical activity; it will also require an assessment of whether the project would have occurred anyway, including the commercial viability of the activity, rates of technology change, common practice and other barriers.

4.3.5 ADDITIONALITY TESTING CAN BE RESOURCE-INTENSIVE

Testing additionality—however it is done—requires access to data, analysis and the exercise of some level of judgment, as it is not possible to know for certain what would happen without the project incentive. Ongoing assessment of whether an activity is additional is likely to be required as circumstances change, for example, if an activity faces new regulations or becomes common practice for an industry over time. Consequently, additionality testing can be time-consuming and resource-intensive. Costs and uncertainty for projects can be reduced by setting out clear and consistent rules for demonstrating additionality. If rules are not clear in advance, it increases risks for the project proponent and could result in inconsistent treatment of projects.

In some cases, overall costs might be reduced by standardised approaches; for instance, using common practice testing in sectors with homogenous activities, or centrally collecting and making publicly available regularly used data (for example, emissions factors, industry average data) to minimise duplication of effort. This can reduce costs to project providers, but is likely to increase costs borne by the scheme regulator. Processing and analysis by a regulator can also be time-consuming—for example, completing a common practice assessment and putting an activity on the positive list in the CFI generally takes six to 12 months (see Section 4.1.1). In the California offset scheme it takes two to three years to complete common practice testing and develop methodologies.

4.3.6 ADDITIONALITY TESTING INTERACTS WITH STATE AND TERRITORY REGULATION

Regulatory additionality is a common and relatively straightforward test to screen out non-additional activities. In the ERF context, regulatory additionality may be more complicated as it covers multiple state and territory jurisdictions in which activities that reduce emissions are subject to different regulatory regimes. For instance, there are varying requirements for collecting and destroying waste gas from landfill. These different regulatory regimes could lead to uneven access to funding between individuals and businesses in different states and territories under the ERF. As discussed in Section 3.3.1, the ERF could also create perverse incentives for states and territories *not* to regulate activities to allow local businesses to access ERF funding, reducing the overall emissions reductions achieved.

The California offset scheme uses a conservative approach to addressing differing regulatory regimes; it applies California laws as a minimum standard for its regulatory additionality test, regardless of whether a project is located in California or not. Under this approach, genuinely additional emissions reductions from states with less rigorous regulation are ineligible for crediting.

5

BASELINE SETTING

Establishing a robust baseline is central to baseline and credit schemes:

- In crediting mechanisms, the baseline represents a scenario of emissions levels in the absence of the project (business-as-usual). When actual emissions from a project are below the baseline emissions, the difference between the two is eligible for credits.
- In penalty mechanisms, the baseline is generally a specified performance target. An entity is penalised for emissions above the baseline, and some schemes may credit for performance below the same baseline. In others, the penalty and crediting baselines could be set at different levels or in different ways.

Baselines will be an important design feature of the ERF for both the crediting mechanism and the safeguard mechanism. Some of the options, concepts and data requirements for crediting and penalty baselines are similar. Their different objectives, however, mean that some have very different implications for crediting and penalties. For example:

- Setting baselines consistent with business-as-usual emissions is important in crediting mechanisms (to ensure that emissions reductions are additional) but is not important in a penalty mechanism. Baselines in penalty systems are instead designed to achieve some kind of performance target, such as maintaining emissions at historical levels or reducing emissions in absolute terms. It is incidental if the baseline is at or below business-as-usual emissions, what matters is meeting the target.
- Participating in a crediting mechanism is normally voluntary, so participants expect to recoup the cost of the emissions reductions through the sale of the credit. Overly strict baselines in a crediting system could deter participation, or increase the cost of credits. Participation in a penalty system, on the other hand, is mandatory and the incidence of cost will depend on the objectives of the scheme and how the baseline is set.

This section focuses on crediting baselines as these are more relevant to the immediate design of the ERF. The Government has indicated that baselines for the safeguard mechanism will be subject to further consultation and the mechanism will not operate until 1 July 2015. This section looks across a range of schemes, including the CFI (crediting only) and international experience to draw insights relevant for the ERF's crediting mechanism.

5.1 CFI APPROACH TO BASELINES

CFI projects must use an applicable methodology that sets out the baseline for the project against which emissions reductions are measured. While the additionality tests discussed in Section 4.1 determine that the project is genuinely additional, the baseline is the mechanism by which the quantity of additional reductions (therefore credits) is measured.

Baselines can be determined on an absolute or emissions intensity basis (discussed below). As outlined in Box 5.1, the approach to determining baselines under the CFI varies by activity and project-specific variables. Reforestation and afforestation projects are likely to have constant baselines (that is, emissions are assumed/expected to stay constant in the absence of the project, and sequestration increases under the project scenario). On the other hand, emissions reduction activities are likely to either have declining or inclining baselines. A declining baseline means that a reduction in emissions was expected in the absence of the project, and there is an additional reduction under the project scenario. For an inclining baseline, an increase in emissions was expected in the absence of the project, and emissions increase at less than this rate under the project (DoE 2014b).

BOX 5.1: BASELINES UNDER THE CFI (SIMPLIFIED)

LANDFILL GAS PROJECTS

Landfill gas projects capture methane emissions that would otherwise be released to the atmosphere. The baseline here is calculated in light of business-as-usual capture rates, which are determined through a three-step process:

1. Where there is a qualitative requirement to capture emissions (which does not include specific instructions or directions), apply a capture rate of 30 per cent. If there is no qualitative requirement, the capture rate is zero.
2. Calculate the quantitative regulatory requirement from the relevant state and territory guidelines. If there is no quantitative requirement, the capture rate is zero.
3. Use the higher of the two capture rates to calculate the emissions baseline. Where there are no quantitative or qualitative regulatory requirements, the capture rate is zero and the emissions baseline assumes 100 per cent release of methane emissions.

PIGGERY PROJECTS

The baseline for a piggery methane capture project represents the annual methane emissions that would have been generated and released from each project lagoon in the absence of the abatement activity.

The baseline is calculated based on the amount of volatile solids in the effluent stream deposited into each project lagoon.

The amount of volatile solids in the effluent stream is calculated using the PigBal model, which was developed by the Queensland Department of Primary Industries. Project proponents input all required data (such as the number of pigs, breed of pigs and the type of feed used) into the PigBal model in accordance with the procedures and requirements set out in the PigBal Manual.

REFORESTATION AND AFFORESTATION PROJECTS

The baseline for these types of project is taken to be zero and all new sequestration activity is credited.

SAVANNA BURNING

The baseline is the average emissions for the 10 years prior to the commencement of the project. Abatement is calculated by determining the annual emissions in the reporting period and comparing it to the baseline. Annual emissions in both the baseline period and the reporting period are calculated using vegetation and fire maps.

Total emissions from fire for a project are calculated by determining how many hectares of each vegetation type are burnt in each fire season and multiplying this area by several values that take the variation in emissions in each vegetation type and season into account.

DIVERTING WASTE TO AN ALTERNATIVE WASTE TREATMENT FACILITY

The baseline is the methane that would have been emitted from a landfill if the waste had gone to landfill rather than being diverted.

This baseline assumes that, in the absence of the project, the waste would be transported to a nearby landfill, which would comply with state average landfill performance (DCCEE 2013).

Appropriate consideration of project-specific factors helps set accurate baselines, but can lead to multiple methodologies for essentially the same activity. For example, in the CFI there are three separate methodologies for the destruction of methane from piggeries. Each has a different baseline taking account of project-specific variables such as the size of the project, location, technologies used, state-based regulations and other factors.

If methodologies become more standardised or principles-based and devolve more of the specific analysis to project approval assessment, there may be implications for determining baselines and crediting emissions reductions. If the methodology simply devolves baseline setting to the project-approval phase, this increases the burden on the CER to assess baselines, or on the proponent to establish the project baseline. Alternatively, if the methodology sets a very standardised baseline, this leaves less consideration for project-specific variables. For heterogeneous activities, this runs the risk of crediting non-additional abatement. Any attempt to simplify baselines will need to be weighed against these consequences.

5.2 EXPERIENCES FROM OTHER SCHEMES

Most schemes set out detailed rules for how baselines are to be determined in a methodology. While these may be tailored for the specific circumstances, there are some commonalities across schemes.

The approaches to baseline design from other schemes provide a useful starting point for developing baselines in Australia. These would need to be tailored to Australia's particular circumstances.

5.2.1 ABSOLUTE OR INTENSITY BASELINES

All baseline emissions are a product of the baseline activity (the action that would occur in the absence of the project) and the baseline emissions factor of that activity (emissions per unit of baseline activity). Baselines can be defined on either an absolute or intensity basis.

An absolute baseline calculates baseline emissions by estimating both the level of activity and emissions factor for the crediting period. Intensity baselines only determine the baseline emissions factor in advance; baseline emissions are then established at the time of crediting by multiplying the actual activity by that emissions factor. In both cases credits are still in absolute terms (one tonne of emissions reduction per credit), reflecting the difference between the baseline emissions and actual emissions. The key difference is that an absolute baseline estimates activity in advance (ex-ante).

One disadvantage of an absolute baseline is that the baseline activity may be influenced by a range of external factors that could change over the period, so the activity used to set the baseline could prove to be a poor estimate. In this case, credits issued under an absolute baseline may not reflect additional emissions reductions and may instead result from unexpected variations in activity.

Intensity baselines assume that baseline activity is equal to actual activity—a reasonable assumption provided that undertaking the project does not influence activity levels. If activity increases, an intensity baseline allows a project to receive credits for improvements in intensity even if its total emissions increased over the period. This is because it is assumed that the improvement in intensity has reduced emissions from business-as-usual. If the additional income from crediting makes it worthwhile to do more of an activity, then actual activity is not a good proxy for baseline activity. In these circumstances, an intensity baseline would lead to over-crediting. An absolute baseline that estimates activity in advance would be better.

One disadvantage of an intensity baseline is that both the actual emissions and actual activity must be measured for crediting. If an absolute baseline is used then only actual emissions need to be measured. Another disadvantage of an intensity baseline is that the activity must be defined, so they are better suited to activities that can be clearly defined. For example, intensity baselines could be measured in terms of a unit of input or output, such as tonnes of CO_2-e per square metre of building space used. Intensity baselines are more challenging if an activity is not as easily defined; for example, for a facility that produces multiple products.

Both absolute and intensity baselines have a role to play in crediting mechanisms. The choice of which to use depends on the specific nature of the activity and the availability and suitability of the activity data. Absolute baselines are often used in emissions destruction methodologies. This is because it is assumed that all destroyed emissions would otherwise be released into the atmosphere. For instance, in the CDM methodology for the capture and utilisation or destruction of mine methane, baselines are estimated ex-ante and assume that prior to the project all methane was either released into the atmosphere or only partially used for heat generation.

Similarly, baselines for forestry projects assume that no emissions would have been removed from the atmosphere. For example, the *Greenhouse Gas Benchmark Rule (Carbon Sequestration) No. 5 of 2003* measured the direct changes in carbon stock on eligible land.

Many energy efficiency methodologies and displacement methodologies use intensity baselines. For example, the New South Wales ESS methodologies use intensity baselines for measuring improvements in building energy efficiency. The baseline is the emissions intensity of the floor space in the building ($kgCO_2/m^2$) required by regulation. In the CDM, fossil fuel displacement methodologies often define baseline emissions as the emissions intensity of grid electricity, with the volume of electricity displaced measured over the period.

5.2.2 HISTORICAL OR PROJECTED DATA

The second issue is whether to use historical or projected data to develop the baseline. Each of these data sources has strengths and weaknesses, and in practice most schemes use a combination of both. The choice between historical and projected data will depend on the nature of the activity or facility being credited, what is known about the future and how (or if) any expected changes will impact the activity. There is also a trade-off between the improved accuracy of projections and the convenience of historical data.

Historical approaches establish baselines based on previous emissions and activities. Historical data are relatively easy to objectively measure and verify (if measurement systems are already in place), and may provide a good guide to the future where activity and production methods are expected to remain relatively stable.

Historical data does not, on its own, account well for circumstances where activities or emissions intensity are changing or are expected to change in the future. For instance, the use of historic emissions as an absolute baseline could credit a firm simply for reducing its production in response to an economic downturn, rather than for doing anything to reduce emissions.

Projected baselines forecast future emissions based on expected future changes in external circumstances, such as changes in technologies, the regulatory environment or other economic drivers. In this regard, they can achieve a more accurate business-as-usual baseline than historical data. Like all forecasts, however, projected baselines rely on assumptions about the future and are subject to uncertainty. Projections also require more data and judgment than historical data, which can lead to additional complexity and costs.

The PAT scheme uses three years of historical data to determine baselines for liable entities. Where data does not present a reliable picture of future output, the scheme has rules for smoothing or excluding data. The methodologies for PAT were developed through an extensive four-year consultation period with affected firms. Many other schemes also use historical data. For example, the CDM has a methodology for improving the electrical energy efficiency of submerged electric arc furnaces used in industrial production. This specifically requires that 'data for the most recent three years preceding the implementation of the project activity is available to estimate the baseline emissions'.

Other CDM methodologies use projected data in baselines. For example, the CDM methodology for the manufacturing of energy-efficient domestic refrigerators incorporates into the baseline the 'autonomous improvement' of energy efficiency of refrigerators, which estimates how the technology would improve over time in the absence of the activity.

5.2.3 INDIVIDUAL OR STANDARDISED BASELINES

A third issue to consider when establishing baselines is whether a project or activity is assessed based on its own specific information, some common industry or standardised information, or a fully standardised set of information, including industry-level benchmarking.

An individualised baseline accurately reflects the circumstances of the project, activity or entity. Collecting and assessing data, however, can be time-consuming and costly. Some schemes use common data such as default emissions factors, to simplify the baseline setting process. The resulting baseline, however, may not accurately reflect the true business-as-usual scenario of the specific project.

The New South Wales ESS uses a partial standardised approach to assessing energy savings from commercial lighting projects. A range of standardised factors, including default efficiencies for a range of lamp types and standard number of operating hours are used to deem the energy savings. Similarly, the CDM also uses standardised baselines, for example, methodologies for new grid-connected renewable power plants use standardised baseline emissions factors (IETA 2009) (see Box 5.2).

A fully standardised approach uses data from multiple facilities or scheme participants to develop a single standard baseline, against which individual activities or facilities are compared. This baseline is effectively an average, so there will inevitably be some projects or facilities above or below. This could lead to the crediting of non-additional emissions reductions, for instance, to facilities that may have already invested in emissions-reducing technologies or practices. In a voluntary scheme this could lead to selection bias where non-additional projects crowd out the genuinely additional ones. On the other hand, while setting a standardised baseline may initially be data-intensive, when weighed against the costs of establishing multiple individual baselines it may prove cost-effective. It could be particularly useful when there is likely to be broad uptake, or in a penalty scheme where participation is mandatory and achieving specific targets is the focus.

Benchmark approaches are a more stringent form of standardised baselines. They set a performance level (for example, that emissions levels not exceed the average of the top 10 per cent of emitters in a sector), which usually reflects a scheme objective or target. The performance of individual facilities or projects is then measured against that benchmark. The PAT scheme, for instance, adopts sector-level targets for energy consumption. Within each sector, individual facilities are benchmarked against the best-performing facility. Like standardised baselines, the calculation of a benchmark requires sufficient information on sectoral and facility performance levels to identify the cut-off point (Prag and Briner 2012).

BOX 5.2: THE CLEAN DEVELOPMENT MECHANISM AND STANDARDISATION

The CDM has traditionally assessed baselines on a project-by-project basis. There have been many reform calls over the years to develop more standardised approaches.

In response, in 2011 the CDM Executive Board approved the *Guideline for the Establishment of Sector Specific Standardized Baselines*. This guideline allows for baselines that are not specific to one type of project activity in a sector, but can be applicable to most of the possible project activities in that sector. It specifies that standardised baselines can be submitted for the following activities (subject to eligibility criteria):

- fuel and feed stock switch
- switch of technology with or without change of energy sources (including energy efficiency improvement)
- methane destruction
- methane formation avoidance
- emission factors for a sector.

To date there have been four approved standardised baselines:

- grid emission factor for the Southern African power pool
- fuel switch, technology switch and methane destruction in the charcoal sector of Uganda
- grid emission factors for the Republic of Uzbekistan
- technology switch in the rice mill sector of Cambodia.

These baselines have been used in a small number of methodologies to date.

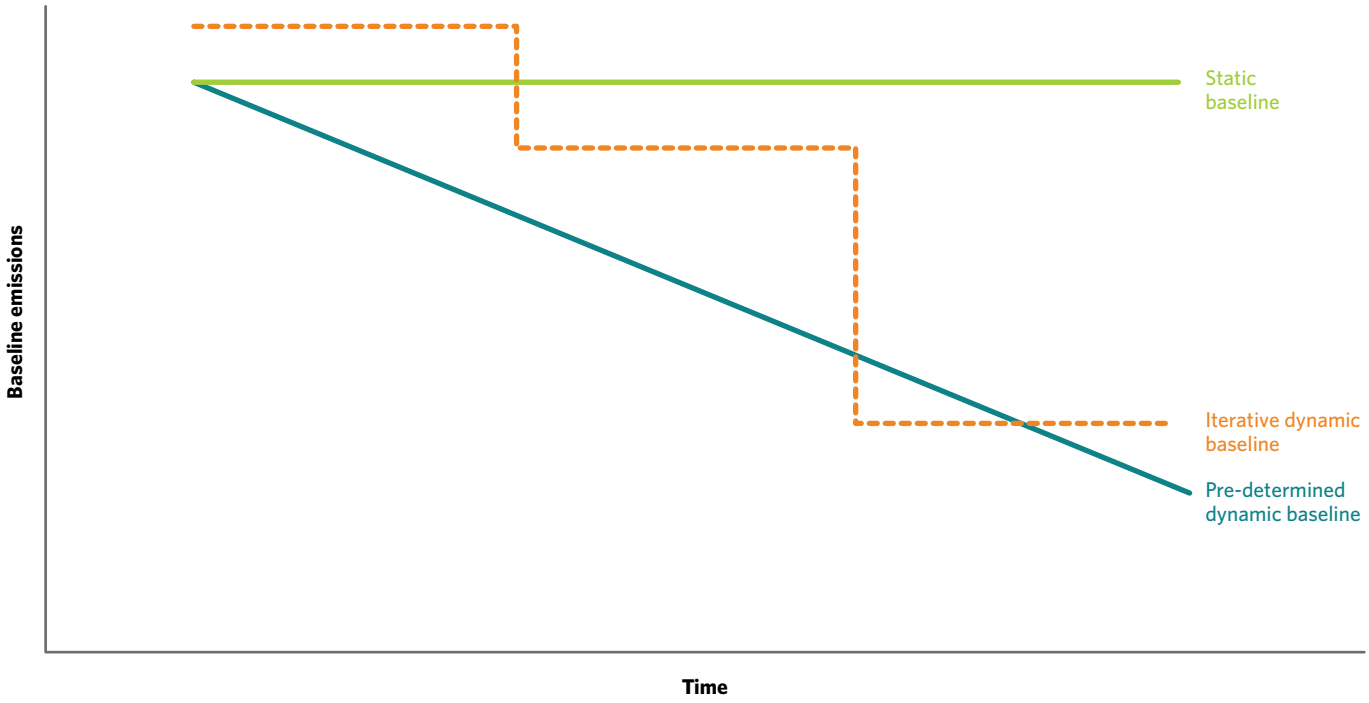
5.2.4 HOW TO UPDATE BASELINES OVER TIME

A fourth issue is whether, and how, the baseline should change over time. Once a baseline is established, some underlying factors may change in ways that shift business-as-usual emissions, leading to under- or over-crediting. There are several options for updating baselines.

A static baseline does not change over the crediting period, providing certainty for investors by holding emissions factors and activity data used to establish the baseline fixed. Most schemes employ static baselines, including Alberta and the CDM. Static baselines can be reviewed at the end of the crediting period prior to renewal, allowing more up-to-date emissions factors and activity data to be used for the next baseline. The risks associated with static baselines can be mitigated by using shorter crediting periods. This allows for more frequent reviews of the baseline, but may prove more costly for project proponents and administrators.

The crediting period length need not be the same for all projects – it should be informed by implications for project certainty (which generally suggests a longer crediting period) and the robustness of the baseline. For example, California's protocols specify different crediting periods—generally between seven and 10 years, but up to 25 years for forestry. A key consideration is the likely period for the return on investment and expected future changes in regulations. If it is expected that the regulatory environment for an activity is likely to change in the near term, then a shorter crediting period would be established.

FIGURE 5.1: STATIC AND DYNAMIC BASELINES



Source: Climate Change Authority based on Prag & Briner 2012.

Dynamic baselines can be more suitable where changing external circumstances are expected to affect the 'additionality' of the emissions reductions. For example, a future change in local laws requiring the activity to be undertaken can be accommodated in a dynamic baseline. These can be set upfront (pre-determined) or adjusted periodically (iterative) (see Figure 5.1).

Pre-determined dynamic baselines incorporate expected changes into the baseline in advance. The baseline adjusts over the crediting period, reducing risks of over- or under-crediting. As this is established in advance, it provides predictability for project operators while also taking account of expected changes in circumstances. The Alberta offsets scheme, for instance, utilises dynamic baselines for some offset projects as well as for new entrants.

Iterative baselines revise the baseline during the crediting period—not in advance. This offers scheme administrators more flexibility and accuracy, tailoring adjustments to actual changes in circumstances. This, however, provides much less certainty for project operators. Reviews can impose substantial administrative costs on project operators and scheme administrators.

Alberta uses an iterative baseline for a fugitive gas destruction methodology, the *Protocol for Solution Gas Conservation*. This activity captures small solution gas (methane) streams released as part of oil and bitumen extraction processes and flares the captured gas. The methodology specifies that the baseline is recalculated annually to account for variations in the emissions factor.

In summary:

- Static baselines are simpler to calculate and increase certainty to project proponents, but may not be as accurate if factors influencing the baseline change over the period. This risk could be mitigated through shorter crediting periods.
- Dynamic baselines provide more accurate measurement of emissions reductions but increase uncertainty to project proponents. Specifying the timing of baseline reviews or defined improvement rates upfront can increase predictability.

5.2.5 FACILITY OR ACTIVITY LEVEL

A fifth issue is whether the baseline is set for a single activity or for the facility as a whole. This can influence scale (the total amount of emissions covered) and scope (the types of emitting activities covered).

Setting the crediting baseline at the activity level can more precisely measure the emissions reductions from a specific activity (for example, replacing a boiler with a more efficient boiler). Each different activity to reduce emissions would have its own baseline, and reductions would be measured and audited by activity. An 'activity' for the purposes of a crediting baseline is an action that reduces emissions, not an economic activity such as producing a certain product. There is a clear distinction between the concept of an activity in the ERF and that which underpins the free allocation of emissions units under the carbon pricing mechanism.

Setting the baseline at the facility level allows multiple activities in a facility to be measured simultaneously. The baseline would need to establish the business-as-usual emissions for the facility; this would require a good understanding of the facility and may be as complex as determining activity baselines. Once the facility baseline is determined, however, it provides flexibility in the emissions reductions activities that can be credited over the period and can reduce measurement and audit costs.

Most voluntary crediting schemes set baselines at the activity level. Facility baselines are only used in those schemes where penalties and crediting are determined off the same baseline.

Alberta uses facility-level baselines for liable entities under its mandatory scheme. These are measured on emissions intensity per production unit, and are more complicated for facilities that have multiple products.

Similarly, India's PAT adopts facility-level baselines. The baselines for the PAT are intensity-based (per unit of production). The PAT rules specify that the main product produced in the facility is adopted for the baseline or an 'equivalent product' is calculated based on the product mix.

Setting the crediting baseline at a facility level can promote scale efficiencies, as a greater quantity of emissions reductions would usually be measured and credited than at the individual activity level.

5.3 INSIGHTS FOR THE ERF—BASELINES

The ERF will use baselines for the crediting mechanism and safeguard mechanism. This section focuses on crediting baselines.

Baseline setting will be central to the operation and success of the ERF. While getting it right may be difficult, it is important. Good baselines help ensure that the credits issued are additional, encourage participation and enhance Australia's capacity to meet its emissions reduction targets.

The ERF Green Paper sets out a number of instances where activities that reduce emissions will be ineligible for crediting on the basis that they would have occurred anyway. These include:

- declines in business activity due to normal market conditions
- activities already occurring as part of normal business practice
- activities that were implemented before the introduction of the ERF
- actions required by law
- activities already receiving an incentive through other policy measures.

Baselines will need to be set with these objectives in mind to ensure that crediting is not applied in these circumstances.

5.3.1 CLEAR RULES AND GOVERNANCE ARE IMPORTANT FOR DETERMINING THE BASELINE

Establishing a clear set of rules for how baselines are to be determined will help to achieve consistent treatment of similar projects, reduce uncertainty for project proponents and allow for scheme administrators to more easily approve baselines.

All schemes have methodologies that set out detailed instructions for determining baselines. Some methodologies allow a degree of flexibility by incorporating different options for calculating baselines, but otherwise there is little discretion to determine how the baseline will be set.

Making methodologies less prescriptive could reduce the costs and the time it takes to develop them, potentially making them more broadly applicable. This needs to be weighed against the costs of determining and approving baselines at the project development and approval stage. Less prescriptive methodologies would shift the burden of determining whether a baseline is robust to the regulator, and increase risk and uncertainty to project developers. To ensure a consistent approach, the regulator would likely need to develop rules or precedents in any event. It may therefore be more efficient if these are established at the time of developing the methodology.

Experience suggests that good governance is also important when establishing baselines. There are clear incentives for project proponents to try to negotiate generous baselines. Roles and responsibilities for determining the rules and approving baselines should be well established. Ideally, baselines will be set according to established rules, in a transparent and predictable way.

5.3.2 MOST SCHEMES USE ACTIVITY METHODOLOGIES

The ERF Green Paper proposes that two types of methodologies be developed:

1. Activity methods—for a specified action that reduces emissions.
2. Facility methods—aggregate emissions reductions from multiple activities at a facility level, with baselines calculated using historical emissions data collected under the *National Greenhouse and Energy Reporting Act 2007* (Cth).

Activity methods are more closely aligned with the methodologies that have been developed and used in other schemes. Both intensity and absolute baselines could have a role in the ERF, depending on the nature of the activity.

Facility methods for crediting emissions reductions are not common in other schemes, but some parallels can be made with those that use the same baseline for crediting and penalty (for example, the Indian PAT and Alberta scheme).

Intensity baselines can be difficult to develop at a facility level. This is a particular problem for facilities that produce multiple products, as the ERF methodology will need to combine them into a single intensity metric. Absolute baselines could be easier to establish at the facility level because the ERF could use existing definitions of facility and data available in the National Greenhouse and Energy Reporting System. Either approach, however, would require an understanding of the facility and the actions that have resulted in any emissions reductions to ensure that credits are not provided for actions that would have happened anyway.

The ERF Green Paper states that facility methods will be based on historical emissions data. This may not provide a good proxy for business-as-usual, without consideration of other factors such as changes in production, the rate of technology improvement, capital replacement plans and whether the historical data used is representative. It may be necessary to apply extra tests that identify reasons for the emissions reductions, to help ensure additionality and apply some exclusions. This would need to be completed on a facility-by-facility basis, and is likely to be time-consuming and resource-intensive.

The ERF Green Paper proposes that operators of an emitting facility could choose between facility and activity methods. Given that facility methods are intended to aggregate emissions reductions from multiple activities within the same facility, it will be desirable for crediting to be as consistent as possible between activities and facilities. Any facility methods may therefore need to be developed in accordance with the same principles and process as activity methods.

5.3.3 HIGH-QUALITY HISTORICAL EMISSIONS DATA ARE AVAILABLE FOR MANY EMITTERS—BUT OTHER DATA ARE ALSO NEEDED

The National Greenhouse and Energy Reporting System provides high-quality historical emissions data for large emitters in many, but not all, sectors. This can be informative when developing baselines, but will need to be supplemented with data from other sources. Baseline calculations may also require data on production and activity, the technology and other viable alternatives, and other relevant factors.

Developing robust baselines can be data-intensive and time-consuming. There may be some opportunity to use methodologies from other schemes as a basis of methodologies in Australia. However, varying degrees of customisation for Australian circumstances will be required.

5.3.4 METHODOLOGIES SHOULD CLARIFY HOW BASELINES WILL CHANGE OVER TIME

To remain robust, both activity and facility methods will need to be updated over time. This is the norm in other schemes. Ideally, methods should be updated regularly, so that baselines for new projects using that methodology incorporate the latest information. As this will take time and effort to administer, the factors that change more frequently should be prioritised.

A related question is whether baselines for existing projects should be updated during the crediting period. Most schemes use static baselines that do not change; dynamic baselines are less common.

- Where the ERF uses static baselines, the length of the crediting period will be important. Shorter crediting periods mean that baselines will be updated more frequently, increasing uncertainty about returns for project proponents. This would in turn push up the bid price for emissions reductions bidding into the ERF.
- Where the ERF uses dynamic baselines, administrators will need to decide whether to set 'improvement rates' upfront to pre-determine the baseline or to schedule iterative reviews. Pre-defined rates give greater certainty about returns, helping reduce bid prices.

A flexible approach is preferable to a one-size-fits-all approach. If the activity is expected to be relatively stable, then a static baseline with longer crediting periods may be appropriate. If the activity is expected to change, then either a static baseline with a shorter crediting period or a dynamic baseline may be preferable. The mechanics of updating the baseline can be tailored to individual activities and be embedded in the methodology for clarity.

6

CONCLUSION

A review of experience with baseline and credit schemes is particularly useful at this time as the government finalises the design of the ERF. This paper has drawn insights from numerous domestic and international schemes to highlight lessons for the ERF, and is intended as a useful resource to inform the government's deliberations.

This review suggests a certain level of complexity is unavoidable in baseline and credit schemes. Emissions reductions need to be measured relative to a counterfactual scenario—constructing this scenario can be difficult but is critical to ensuring that credits are only allocated for genuine and additional emissions reductions. Other schemes have developed a wide range of approaches; selecting among the options involves trade-offs between accuracy and administrative cost and complexity.

Experience in these schemes suggests that the scale of emissions reductions, environmental integrity and cost-effectiveness of the ERF will depend on design decisions relating to coverage, additionality and baselines. Clear rules, processes and governance arrangements for these design features will be critical to the scheme's success.

Even with clear rules and streamlined governance arrangements, it will take time for the ERF to deliver large-scale emissions reductions. Methodologies need to be established, projects developed and approved, and activity reported and audited. Early emissions reductions are likely to be from well-established technologies and activities, and pre-existing projects that transition into the scheme (for example, existing CFI projects).

Experience in other schemes indicates that not all low-cost abatement is well suited to a baseline and credit approach. A broader suite of policies is needed to deliver the emissions reductions required to meet Australia's goals.

APPENDIX A

INTERNATIONAL AND DOMESTIC BASELINE AND CREDIT SCHEMES

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
Australia—Carbon Farming Initiative (CFI)	The Carbon Farming Initiative (CFI) is an Australian crediting scheme that began in December 2011. It is a voluntary scheme that provides incentives to landowners for activities to sequester carbon, and avoid or reduce greenhouse gas emissions. The CFI is created under the Carbon Credits *(Carbon Farming Initiative)* Act 2011 and is administered by the Clean Energy Regulator. The CFI is also supported by the Domestic Offsets Integrity Committee (DOIC)—an independent expert committee that assess proposals for methodologies and advises the relevant minister. The scheme was established to complement Australia's carbon pricing mechanism and thus includes emissions from a number of sectors not covered under that mechanism. Projects that either reduce emissions or sequester carbon are approved in accordance with a methodology, which establishes rules for undertaking and monitoring the project and generating credits. Credits are known as Australian Carbon Credit Units (ACCUs), each representing at least one tonne of CO_2-e emissions. Demand for ACCUs is primarily from liable entities under Australia's carbon pricing mechanism, which purchase credits to offset their emissions liabilities. All ACCUs can be traded or sold in Australia, and some can be exchanged for an equivalent number of Kyoto units and be sold or traded internationally. To date, the CFI has credited over four million ACCUs and has registered over 100 projects.	The CFI covers sequestration and emissions reductions from some of the sources that are not covered by the carbon pricing mechanism, namely from agriculture, legacy waste (emissions from waste deposited prior to the introduction of the carbon pricing mechanism) and land use, land use change and forestry (LULUCF). Participation is open to individuals; sole traders; businesses; local, state and territory government bodies; and trusts. Participants must be registered as a 'recognised offsets entity' and be assessed as 'fit and proper' prior to participation in the scheme. Section 27 of the Carbon Credits (Carbon Farming Initiative) Act outlines the criteria for project eligibility. To be eligible, the regulator must be satisfied that the project: • is undertaken in Australia • uses an approved methodology • passes the additionality test • has an applicant who is the project proponent and is a 'recognised offsets entity' • meets the requirements for sequestration projects (where applicable) • does not involve the clearing of (or use products derived from) native forests • is not an excluded project on the negative list. To date, most ACCUs have been generated from the waste sector (86 per cent), comprising landfill gas capture and destruction projects (80 per cent), alternative waste treatments (six per cent) and waste composting (less than one per cent). ACCUs have also been generated in forestry (13 per cent), and agriculture (less than one per cent).	Additionality is tested at both the project level and methodology approval stages of the process. At the activity level, a regulatory test is applied to ensure that the activity is not already required by law. The activity type must also be included on the 'positive list', specified in the Carbon Credits (Carbon Farming Initiative) Regulations 2011. Positive list of activities are considered to be additional to business-as-usual and are therefore considered to generate genuine, additional abatement. A negative-list excludes activities due to the existence of adverse impacts on employment, water, local community etc. The Minister for the Environment makes decisions on activities on the positive list, and considers advice from both the Department of Environment and the DOIC. Each methodology also provides instructions for determining a baseline that represents what would occur in the absence of the project (business-as-usual). A project's abatement beyond this baseline is deemed to be additional and is credited.	Each CFI project must use an approved methodology that sets out the baseline against which abatement is measured. Identifying the most likely baseline scenario will depend upon the proposed activity. For example, baselines can be determined on an absolute or emissions intensity basis, all CFI projects must reflect a reduction in absolute emissions levels. All baselines in the CFI are specified at the project activity level. While all CFI projects adopt static baselines, new information such as emissions factor data can be incorporated into the baseline methodology and apply when projects come up for renewal. Baselines are generally static and can only be reviewed at the start of a new crediting period unless approved by the project operator. Crediting periods are generally seven years but reforestation has 15 years, and native forest protection projects have a 20-year crediting period. A number of methodologies have been developed in-house by the department; for example, piggery methodologies, but anyone can submit new methodologies for consideration. To date, a range of government departments, councils and third parties have submitted methodologies. All methodologies are assessed by the DOIC and must then be approved by the minister before being eligible for use.

Sources: Climate Change and Energy Efficiency 2013; Department of the Environment 2014a, 2014b.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
Australia—New South Wales Greenhouse Gas Reduction Scheme (GGAS)	The Greenhouse Gas Reduction Scheme (GGAS) was a baseline and credit scheme established in New South Wales, Australia, in 2003. The Australian Capital Territory introduced GGAS in 2005. The scheme was terminated in 2012 when the national carbon pricing mechanism commenced. GGAS was a market-based penalty scheme that allowed offsets. Its objective was twofold: • to reduce GHG emissions associated with the generation and use of electricity • to develop and encourage lowest-cost emissions reduction activities to offset the production of greenhouse gas emissions For the **penalty component**, GGAS legislation imposed a mandatory benchmark target for per capita GHG emissions reductions to 2021 on electricity retailers and certain other parties in NSW and the ACT. These parties were referred to as 'benchmark participants'. Benchmark participants (liable entities) were required to reduce per capita GHG emissions to the benchmark level. If participants could not meet the benchmark, they could surrender offsetting 'abatement certificates' against their liability. These **offset certificates** were created by accredited certificate providers for four emissions-reducing activities and could be traded to benchmark participants. Each certificate represented one tonne CO_2-e. GGAS also allowed benchmark participants to count Renewable Energy Certificates from Australia's Renewable Energy Target towards their greenhouse gas benchmark. GGAS stimulated a wide range of accredited abatement projects. Together, these projects created 144 million abatement certificates.	For the **liability component** of GGAS, benchmark participants were firms and other entities that were either captured or volunteered into the scheme. Benchmark targets were imposed on all electricity retailers and market buyers that took electricity directly from the grid. Some large consumers and state projects (over 100 MW per year) could opt in to the scheme for a variety of reasons, such as boosting environmental profiles or meeting internal energy efficiency targets. For the **offset component** of GGAS, only accredited Abatement Certificate Providers could undertake projects. Eligibility for the four offset activities was specified in their respective rules (methodologies): • power generation—for a range of different power generation activities (in NSW and interstate). • demand-side abatement—for actions taken on the customer side of an electricity meter (i.e., the 'demand side'). • large electricity users—for the abatement of on-site greenhouse gas emissions (from industrial processes) not directly related to the consumption of electricity. • carbon sequestration—for carbon sequestered in eligible forests in NSW. Activities had some restrictions and exclusions—sequestration projects were to be carried out in NSW only, demand-side abatement in NSW or ACT, electricity generation projects in any jurisdiction connected to the national grid no creation of certificates under another GGAS rule or scheme; no r educing electricity consumption by reducing the economic benefit from the use of the electricity; and activities to reduce losses in electricity transmission or distribution networks were ineligible. Sequestration projects were required to be from Kyoto-compliant forestry (afforestation or reforestation).	Additionality was tested at the eligibility and methodology stage. GGAS specified that accredited projects should be: • environmental—the project reduced or offset greenhouse gas emissions from the electricity sector • regulatory—the project exceeded any statutory requirements under other legislative or mandatory requirements in NSW. In practice, this meant that credits were given where current greenhouse performance improved below prior practice and business-as-usual or, in some cases, current industry practice. For example, under the carbon sequestration methodology, land for forestry activities must be on Kyoto-compliant 'Eligible Land'. Any additional sequestration is deemed beyond business-as-usual provided it is undertaken in accordance with the Carbon Sequestration Estimation Methodology.	The **penalty baseline** for the liability component was expressed as an intensity metric—tonnes of carbon dioxide equivalent per capita. This was a benchmark target and was set in legislation. The initial level was set at 8.65 tonnes per capita, which reduced to 7.27 tonnes in 2007 and was set to remain at this level until 2021. A compliance rule converted electricity sector benchmarks into individual annual benchmarks. Each benchmark participant was allocated a share of the electricity sector benchmark based on the level of their electricity sales as a proportion of the total state electricity demand. For the **offsets component**, a variety of baseline methodologies were employed for abatement projects. These were developed by policy makers. There was no scope for submissions for new methodologies, although rules allowed for any policy changes to be made via Ministerial sign-off rather than Parliamentary approval. For power generation abatement projects, emissions intensity was required to be lower than average for NSW generation. For demand-side projects, emission reductions were measured as the energy inputs from alternative (renewable) sources—metered electricity changes from baseline energy consumption. For large electricity user projects, three baseline methodologies were provided: • a project impact assessment model for one-off projects • two baseline methods for multiple ongoing activities aimed at reducing the emissions intensity of the plant. For sequestration projects, the Carbon Sequestration Rule specified the acceptable parameters to be used in estimating carbon sequestration and calculating carbon stock changes. There was no scope for methodologies to be developed by third parties.

Sources: Electricity Supply Amendment (Greenhouse Gas Emission Reduction) Act 2002 and Regulations 2002; Greenhouse Gas Benchmark Rules; Greenhouse Gas Reduction Scheme website; IPART 2012, 2013; New South Wales Government 2011.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
Australia—New South Wales Energy Savings Scheme (ESS)	The NSW Energy Savings Scheme (ESS) began 1 July 2009 and was designed to encourage lowest cost energy efficiency activities and reduce energy consumption without reducing production levels or service quality. It was developed as a complementary measure to the proposed national carbon pricing mechanism and was modelled on a component of the Demand-Side Abatement Rule under GGAS. The scheme provides incentives for electricity retailers and certain other parties to improve their energy efficiency. The ESS is a market-based **penalty scheme** and requires electricity retailers to meet individual annual energy savings targets based on their electricity market share in NSW. The retailers and other parties captured in the scheme are referred to as 'Liable Entities'. Obligations for liable entities under the scheme can be met by surrendering offsetting 'energy savings certificates' or by paying a penalty for the shortfall. For 2014, the scheme shortfall penalty rate is set at $25.97 per certificate and is adjusted for inflation annually. The **offset certificates** can be generated by Accredited Certificate Providers (ACPs) that undertake energy savings activities. Demand for 'energy savings certificates' comes from: • liable entities • intermediary agents—traders who subsequently sell the 'energy savings certificates' to liable entities • the voluntary market—organisations or individuals interested in managing their carbon footprint. To date, 7.7 million certificates have been created and 3.8 million have been surrendered against compliance obligations (as at 7 March 2014).	The ESS **penalty scheme** covers electricity consumption. Liable entities are: • all holders of electricity retail licenses in NSW • certain electricity generators that supply directly to retail customers in NSW • market customers in NSW who purchase their electricity directly from the National Electricity Market. Exemptions may be granted by the minister for emissions-intensive and trade-exposed industries. For the **complementary offsets component**, ACPs are voluntary participants in the scheme and are eligible to create and sell 'energy savings certificates' related to energy savings in commercial, residential and industrial sectors. Eligible activities relate to the modification, installation, replacement and removal of end-user equipment for the purposes of improving energy efficiency. Excluded activities include energy generation (i.e., solar or bi/tri-generations systems), fuel-switching and energy savings that are not linked to the national grid. The offsets scheme allows aggregators to 'aggregate' the savings from a number of clients to make it feasible for them and their clients to participate in the ESS. By participating through an aggregator, a business or householder can receive a benefit from the ESS without the compliance obligations. A supplier, installer or service provider can be the aggregator.	Additionality is tested at both the eligibility stage and in the baseline measurement stage. For the eligibility criteria, ACPs activities, certificates and benefits must: • not be undertaken in order to comply with a statutory requirement (regulatory additionality) • not have been previously created from the same energy savings or from other schemes, to avoid double-counting • not have a negative effect on production or service levels • have an implementation date on or after 1 July 2008—no credit for early action. Additionality is also tested via the three baselines measurement methodologies. For instance, when using the Project Impact Assessment method, evidence is required to demonstrate that the energy savings project did not result in a decrease of service levels or output from a site or process.	For the **penalty scheme**, liable entities are required to self-assess their individual energy savings target. This starts at approximately 0.4 per cent of total electricity sales in 2009, increasing gradually to four per cent in 2014 and then remaining constant until 2020. Liable entities have met individual energy savings target for a compliance year if the energy savings attributable are equivalent to (or exceed) their individual energy savings target. For the **offsets component**, there are three baselines methods to calculate emissions reductions: • Deemed Energy Savings—involves installing or replacing low-efficiency end-user equipment such as lighting and commercial or industrial equipment with more efficient ones. It measures the lifetime (deemed) savings of an energy savings project upfront at the time of project implementation. • Metered Baseline—compares energy use before the activity is implemented (the baseline) with that after the activity. This methodology is based on electricity consumption of a whole facility or discrete part of a facility. • Project Impact Assessment—for smaller projects on a facility where their impact on overall electricity use is small relative to total site use. It measures energy consumption before and after the project is implemented. Depending on the activity or methodology, a variety of baseline measures can be adopted, including absolute or intensity baselines—using historical or proxies where historical is not available. There is no scope for methodologies to be developed by third parties. The use of a rule allows, however, for any policy changes to be made via Ministerial sign-off (rather than parliamentary approval). There is no specified crediting period length, which can be based on the project specifics and the ESS Rule for the methodology.

Sources: IPART 2013b; ESS website; New South Wales Government 2009, 2011; Electricity Supply (General) Regulation 2001.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
International—Clean Development Mechanism (CDM)	The Clean Development Mechanism (CDM) is a global baseline and credit scheme used to credit emissions-reducing projects. It is established under the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol and has operated since the beginning of 2005. The CDM has two objectives: • to assist non-Annex I Parties to meet sustainability goals by hosting projects that contribute to the UNFCCC's overall objective to stabilise global concentrations of GHGs • to assist Annex I Parties (developed) to meet their Kyoto targets at a lower cost. Emissions-reducing projects are undertaken in developing countries (non-Annex I), which generate credits. Projects are issued Certified Emission Reductions (CER) (offset credits) for each tonne of CO2-e they abate. CERs can be purchased by Annex I countries to meet their Kyoto targets. As of 31 January 2014, there were 7,426 registered projects, which have had 1.43 billion CERs issued. It is estimated that by 2020, the CDM will generate between 2.8 and 3.7 billion CERs for emissions reductions, destructions or sequesters. The Program of Activities (PoA) is a feature of the CDM that provides a framework to generate large quantities of GHG reductions. Each PoA registers with the CDM as a single program activity, and then registers a larger number of sub-projects undertaking the same activity. There are currently 243 registered PoAs, which cover 1,611 individual activities that have generated about 138,000 CERs.	CDM projects must be carried out in a non-Annex I country that has ratified the Kyoto Protocol and the project participant must be approved by the host country. The CDM is open to all sources of emissions reductions except nuclear and forestry-based projects (other than afforestation and reforestation). Parties can be private and/or public entities. There are differing eligibility requirements for large-scale, small-scale, forestry and PoA projects. The eligibility requirements for large-scale projects are: • the country hosting the project has met the participation requirements • stakeholders have been consulted • the socioeconomic and environmental impacts of the project have been considered • emissions reductions are additional • baseline, monitoring and verification methodologies comply with requirements • the project complies with all other relevant requirements. Small-scale projects must meet the same requirements but have simplified procedures. To be classed as small-scale, projects must be: • small renewable energy project activities (max output 15 MW) • energy efficiency improvement project activities (up to 60 GW hours per year or equivalent) • other project activities that both reduce emissions by sources (less than 60 Kt of CO_2-e). Forestry projects must also meet similar rules, but also demonstrate that the land is 'eligible land' and address non-permanence. Each PoA project activity must meet eligibility criteria, along with each individual sub-project, which must be satisfied before inclusion in the PoA project. Most of the CERs issued to date have come from destroying industrial gases (52 per cent), hydro (13 per cent) and wind projects (10 per cent).	Additionality is tested at the methodology stage and there is a positive list for some specific activity types. The methodology specifies what additionality test will apply. These have been standardised over the life of the CDM. Large-scale projects must pass a series of tests: • a prior consideration test • a financial additionality test—whether the project would be feasible without the revenue from CDM offsets • a barrier analysis test—whether there are significant barriers to the project in the absence of CDM • a common practice test—comparing emissions performance to common practice—or a first-of-its-kind test. • Small-scale projects are required to address one of the following simplified tests: • investment barrier—more attractive alternatives to the project would have led to higher emissions • access-to-finance barrier—no access to appropriate capital without consideration of the CDM revenue • technological barrier—identification of higher risks due to the performance uncertainty or low market share of the new project technology • barrier due to prevailing practice—prevailing practice, regulation or policy would have led to implementation of a higher emissions technology • other barriers—institutional barriers, limited information, managerial resources, organisational capacity or capacity to absorb new technologies. There is a positive list for some small-scale electricity projects (e.g., up to 15 MW) including solar, off-shore wind, marine (wave, tidal) and wind turbines (up to 100 kW). These are assumed to be additional.	All CDM baselines are set at the project level. Depending on the project, baselines can be set using historical or projected data, using absolute or intensity baselines, and can be specified with reference to a standardised level. Baselines may also be modified to account for future increases in emissions where they are expected to rise above current levels in the host country—known as a suppressed demand baseline. Instructions for setting baselines are set out in methodologies. CDM methodologies can be developed by project operators or other agents, and must be approved by the CDM Executive Board. Some methodologies are also developed by the Secretariat to the CDM Executive Board. Baseline methodologies are regularly updated—these are applied to new projects adopting the methodology or to existing projects undergoing renewal. Crediting periods for CDM project activities are set at either seven years (repeatable twice), or a single 10-year period. Project operators can choose which crediting period to use. Each PoA must have its own baseline established. Each sub-project must also provide a calculation of the particular project's baseline.

Sources: IETA 2009; CDM website and Rulebook; UNFCCC 2004, 2011a, 2011b, 2012a, 2012b, 2013, 2014, 2014b.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
China—China Certified Emissions Reduction (CCER) Scheme	The China Certified Emissions Reduction (CCER) scheme is an offset scheme that is complementary to the country's pilot emissions trading schemes. It provides liable entities in the pilots with the flexibility to access cost-effective emission reductions from uncovered sectors. This was developed under China's 12th Five-Year Plan (2011–15), which specifies plans to develop a carbon trading market to help reduce GHG emissions. The scheme rules were established in 2012, and the market commenced with the pilots. The offsets are issued by China's National Development and Reform Commission (NDRC) under a voluntary, government-administered Chinese offset program that uses either domestic-specific methodologies, or adapted CDM ones. The NDRC must approve these methodologies. While the CCER offsets are eligible for use in the seven ETS pilots, their use is limited to between five and 10 per cent of compliance obligation. Two wind power projects have been approved, three CDM projects are under review for transition to the CCERs, and about 60 projects, mostly relating to renewables and energy efficiency projects, are currently under review.	The CCER covers a wide range of activities similar in scope to the CDM. National and international organisations, enterprises and individuals are all under consideration for eligibility to participate in the scheme. Covered entities in the Chinese pilot ETSs cannot develop or generate CCERs within the geographic scope of the pilot schemes. Projects can be located around China, not just in ETS zones. The CCERs covers a wide range of emissions sources including renewables and non-renewables in a variety of sectors, fugitive emissions, waste, afforestation, bamboo forest carbon sinks and agriculture. It also includes scope for HFC-23 and N_2O industrial gas offsets. If a CDM project is transitioning to CCER, the registered CDM project must first be withdrawn from the CDM, and then an application can be made for entry into the CCER scheme. However, if the registered CDM project has already issued credits, it would not be eligible for CCERs.	The CCER does not allow credit for early action as projects that started before 16 February 2005 are not eligible. There is no specific reference to other additionality requirements in the guiding regulations. However, the scheme will use adapted CDM methodologies, which will include the same or similar additionality tests as the CDM.	All CCER projects must use an NDRC-certified methodology for calculating their baseline. CCER projects are based on activity/project level baselines, and there are no current active scaled baselines available, such as at the facility or sector/industry level. The NDRC will review emissions factors annually. Revisions to emissions factors will apply to all new projects and those being renewed. It is not confirmed whether the revisions to the emissions factors will affect baselines for existing projects. Baselines can be only be reviewed and revised at renewal. This crediting duration is the same as the CDM—a single 10-year crediting period or a seven year period (repeatable twice). Carbon sink projects may have different arrangements. New methodologies can also be proposed; for example, by project developers or research institutions, which would also need to be approved by the NDRC. 175 methodologies have been approved as CCER methodologies, 171 of these are adapted from the CDM.

Sources: Carbon Market Watch 2013, Climate Bridge 2013, 2013b; The Climate Group 2012; NDRC website; NDRC 2013; Yin, D 2013.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
India—Perform, Achieve Trade (PAT)	PAT is a mandatory national market-based mechanism. It will contribute to meeting India's national emissions target of a 2025 per cent reduction in carbon intensity (of GDP) from 2005 levels by 2020. PAT is a **penalty-based** mechanism and creates liable entities. The scheme is a closed trading scheme with no provision for offset credits from uncovered sectors or third parties. The price of the certificates is determined by the market. Its objective is to reduce the energy consumption intensity of large industrial facilities. This is achieved by establishing energy consumption targets that are set by the regulator, India's Bureau of Energy Efficiency. The PAT covers high-energy-consuming industries in eight sectors, in which covered facilities are required to meet, or exceed, individual energy consumption intensity targets. The scheme allows for the creation of **credits** by liable entities. If a facility exceeds its energy saving target, it is issued with energy saving certificates (ESCert), which can be banked or traded. If it fails to meet its target, it is required to purchase ESCerts or pay a penalty. While the overall intensity reduction targets vary from facility to facility, reductions will average 4.8 per cent by the end of the scheme's first compliance period (2012–15). The energy efficiency measures under PAT will help drive energy savings of an estimated 6.7 million tonnes of oil equivalent (28.6 Mt CO_2-e) during the PAT's first cycle (2012-15).	Both the **penalty and credit** components of PAT cover eight major sectors of the Indian economy. This represents nearly 60 per cent of India's primary energy consumption. The sectors include: • thermal power • iron and steel • cement • fertilizer • pulp and paper • aluminium • textiles • chlor-alkali. Nearly half (48 per cent) of the energy savings will come from the thermal power sector, with iron and steel accounting for 22 per cent. Within each sector, large energy-intensive industrial facilities (plants or factories) have been identified and issued individual energy consumption targets. There are currently 478 facilities in the program for the first compliance period. PAT includes both publicly and privately owned facilities.	There are no specific additionality tests in the PAT scheme. As the PAT scheme is a mandatory national level scheme that sets binding efficiency targets for covered facilities, it does not matter if the efficiency improvements are not truly additional. The sum of the individual targets ensures that overall net efficiency improves.	PAT sets baselines at the facility level, and is established on the average of three years historical activity. The baseline is an intensity-based measure, specified as metric tonnes of oil equivalent per unit of production (in units of product). Where there is significant variation in historical activity due to uncontrollable factors (such as volatile exchange rates), this data can be smoothed for use in establishing the baseline. PAT apportions reduction targets pro rata across sectors—high-consuming sectors are allocated a more stringent target. Within each sector, facilities are benchmarked against the best facility in the sector. More inefficient plants will be assigned higher targets relevant to their estimated baseline energy consumption. As emissions intensity is measured per unit of product, this varies across facilities and sectors. Where a facility has multiple products, the PAT rules specify that the main product made in the facility is used (or an equivalent product worked out from the product mix). There is only one baseline for each facility. Baselines in PAT were the result of an extensive consultation between government departments and firms. New methodologies would only relate to new facilities. New facilities can be included in PAT. Baselines for new facilities can be set using appropriate historical data where available. If only one year of data is provided, then this full year of data can be used to set the baseline.

Sources: Bureau of Energy Efficiency 2012; BNEF 2013; Climate and Development Knowledge Index 2013; Khan, M, Tanwar, N, Shankar, S, & Climate Connect 2011; Ministry of Power 2012; Regan, K, & Mehta, N 2012.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
Canada—Alberta Specified Greenhouse Gas Emitters Regulation (SGER)	The SGER is an emissions reduction system established in Alberta, Canada in 2007. It is a single penalty and credit trading scheme that allows for a separate offsets component. The **penalty component** specifies emissions reduction targets for large emitters. These liable entities are required to reduce their emissions intensity to 12 per cent below their 2003–05 baseline emissions intensity. Liable entities can **generate credits**. Facilities that emit below their baseline can generate bankable and tradable credits—'emission performance credits'. Those that do not meet their targets can use any combination of the following compliance options: • purchase emission performance credits from other entities • purchase offset credits • purchase fund credits (penalty). The price ceiling on the fund credit penalty is $15 per tonne CO_2-e. The **offsets component** is a voluntary market based compliance option available to liable entities. Offset credits can be generated by facilities and sectors not captured under the penalty scheme who are able to reduce GHG emissions according to an approved protocol (methodology). The offsets scheme has 145 projects registered, with 28.6 Mt CO_2-e emissions reductions registered (19.8 Mt CO_2-e emissions reductions retired as at September 2013).	The **penalty and credit scheme** covers all GHGs at facilities generating more than 100kt CO_2-e annually in industrial sectors: • chemical manufacturing • coal mining • conventional oil and gas extraction • fertilizer and mineral product manufacturing • oil sands, petroleum and coal products • pipeline transportation • primary metal manufacturing • utilities • waste • wood product manufacturing. In 2012, this included 106 facilities from 13 sectors, about 70 per cent of industrial emissions and about half of Alberta's provincial emissions. **The offset scheme** covers electricity generation, agriculture, energy efficiency, forestry, geological sequestration, methane/waste management, renewable energy, transportation, biofuels and some industrial activities. The offset scheme specifies that project-based emission reductions/removals must: • occur in Alberta • be additional to regulations, and be beyond business-as-usual and sector common practices • be from actions taken on or after 1 January 2002 • be real, demonstrable, quantifiable and verifiable • have clearly established ownership • be counted once for compliance purposes • use a government-approved methodology • be verified by a suitable auditor. The largest volume of offsets has come from agricultural tillage (38 per cent), which has been driven by the use of aggregators and an early action policy (to 2002). Wind energy projects have generated 19 per cent of the credits in the scheme.	In the **penalty and credit scheme**, there is no specific additionality test—as long as the baseline is met or exceeded, it does not matter whether the reductions are additional. **Offset credits** must be generated from activities that go beyond both business-as-usual and regulatory. Alberta assesses additionality during methodology development and periodically during the methodology review. The 'Offset Protocol Development Guidance' document outlines integrity standards for additionality, including regulatory and financial tests, available technology tests, and a common practice test in which common practice is defined as a 40 per cent level of adoption of the activity in the sector. Alberta also uses a discount factor in some sequestration projects to help ensure additionality; for instance, tillage projects apply a discount of 10 per cent on credits to hedge against future reversal risk.	For the **penalty scheme**, liable entities are measured at the facility level and on an emissions intensity basis (units, tonnes CO_2-e per production unit). Production units are the various products produced on the facility, which is summed together to get a single unit. A facility's stated baseline emissions intensity value must represent the facility's business-as-usual scenario. Baselines are set using historical data. New facilities can be included in the trading scheme and are gradually introduced over a period of up to six years. For **offset projects**, the baseline represents business-as-usual emissions. Offset baselines can be specified as historic benchmark, performance standard, comparison approach, projection-based or adjusted baselines. Baselines can also be static or dynamic. Methodologies are subject to periodic review. New projects must use the current methodology. Where revisions occur, active projects will be allowed to finish the current crediting period unless the project operator agrees to the revision. These crediting periods are generally eight years, with a possible five-year extension. Conservation cropping projects have a longer crediting period of up to two 10-year periods Afforestation can have up to three 20-year crediting periods. One Carbon Capture and Storage project was given a project specific variance of 25 years to assist this technology innovation. Methodologies were originally started by federal–provincial and territorial governments. Project providers can also submit methodologies. These must be assessed and approved by Alberta Government prior to use.

Sources: Auditor General Alberta 2011; Alberta Government 2012, 2013, 2013b; BNEF 2013; Environment and Sustainable Resource Development website; International Institute for Sustainable Development 2011; Specified Gas Emitters Regulation 2007.

SCHEME	DESCRIPTION	ELIGIBILITY AND COVERAGE	ADDITIONALITY	BASELINE SETTING
United States—California Air Resources Board (ARB) Compliance Offset scheme	The ARB Compliance Offset scheme is a crediting mechanism that is complementary to the Californian Cap-and-Trade scheme, which commenced in 2013. Liable entities under the Cap-and-Trade scheme are required to reduce their emissions, or acquire allowances or a limited number of offset credits (up to eight per cent of total compliance obligation) to comply with the program. ARB Offset credits represent verified emissions reductions or removals achieved under ARB's Compliance Offset Protocols (methodologies approved by he Board). Californian law requires that offsets used for compliance must be real, additional, quantifiable, verifiable, permanent and enforceable. These criteria are met through the: • design of the regulation • use of standardised, Board-approved methodologies • use of accredited third-party verification bodies and verifiers • ARB review of offset project documentation related to reporting and verification.	ARB offset credits are issued by ARB and are the only type of offset credit that can be used to meet compliance obligations for liable entities. The program includes older Californian offset scheme credits which may be cancelled and transitioned to ARB offset credits: • early action offset credits - voluntary offset credits that were issued under approved early action methodologies • registry offset credits - voluntary offset credits issued by an approved third party registry prior to ARB consideration for compliance issuance ARB offset credits can only be earned by activities not covered under the cap. ARB offset projects must use an approved methodology. There are four areas covered: • urban forestry • US forestry • livestock digesters • destruction of ozone-depleting substances (ODS), which relates specifically to Montreal Protocol gases. A mine methane capture protocol will be proposed to the Board for approval in Spring 2014. A rice cultivation methodology is under development for draft release. Offset projects must start after 31 December 2006, unless otherwise specified in the applicable methodology. Projects originally developed under an approved early action methodology may have a start date before 31 December 2006 and must transition to a Compliance Offset Protocol beginning in 2015. Offset projects must be located in the US and its territories, Canada or Mexico. Currently, all approved methodologies are for US based projects only, and would need to be modified for projects located in Canada or Mexico and be approved by the Board. About 5.5 million ARB credits have been issued—about 15 per cent for compliance ODS projects; 53 per cent for early action ODS projects; 30 per cent for early action US Forest projects and around two per cent for early action livestock digester projects. No credits have been issued for urban forest projects.	Emissions reductions used for compliance are required to be beyond what would otherwise be required by law, regulation, or legally binding mandate, and that exceeds a conservative business-as-usual scenario. For each proposed project, tests are applied to determine whether the activity is additional to local, state, or federal regulation. Each individual methodology also tests for additionality by establishing if the activity is common practice in the applicable geographic area. For instance, livestock projects: • It must be demonstrated that the activity is beyond business-as-usual—whether the physical depth of the anaerobic lagoons or ponds prior to implementation were sufficient to prevent the activity from occurring anyway. • For new livestock projects, it can be demonstrated that the project activity is not common practice in the industry and geographic region. The ODS destruction methodology adds an additional criteria to the standard tests—projects can only be undertaken by the non-public sector (as ODS destruction is common practice for the US Government and is therefore non-additional).	Baselines in the ARB offset scheme are mostly project-based and some are specified at the facility level. Methodologies include standardized methods for determining project baselines for each project type. The standardized baseline methodologies reflect a conservative estimate of business-as-usual. Baseline quantifications are specified for the four methodologies. Each baseline is measured differently depending on the specifics of the project; for instance: • ODS baselines estimate GHG emissions within the project boundary that would have occurred in the absence of the project. • livestock digester baselines estimate GHG emissions resulting from the installation of biogas control systems that capture and destroy methane from livestock operations. • urban forestry baselines estimate the amount of carbon sequestered in eligible project trees, minus emissions from the planting, care and maintenance of those trees over the reporting period. • US Forest baselines calculate the onsite carbon stock of the project area, which are then annually compared to the actual onsite carbon stock. Activities are either metered/monitored (for GHG destruction), or measured as changes in carbon stock (carbon sink). Accordingly, absolute baselines are used for these activities. Crediting periods in the scheme are generally seven to 10 years for non-sequestration projects, and up to 25 years for forestry. Depending on the methodology, a range of data can be used including historical, projections and standardised default factors. New methodologies can be developed by ARB, with public input and Board adoption, to satisfy the requirements of the regulation.

Sources: ARB Offset Credit Issuance, Article 5: California Cap On Greenhouse Gas Emissions And Market-Based Compliance Mechanisms, Subchapter 10 Climate Change; California Air Resources Board, California ARB 2011a, 2011b, 2011c, 2011d, 2012, 2012b, 2013; Global Warming Solutions Act of 2006.

LIST OF BOXES, FIGURES AND TABLES

GLOSSARY

additionality	A requirement that a project or activity produces emissions reductions that are additional to any that would have occurred in the absence of the project or activity.
agriculture emissions	Emissions resulting from livestock digestive processes (enteric fermentation), manure management, nitrous oxide emissions from cropping and pastureland soils, prescribed burning of savannas and burning of agricultural residues.
Australian Carbon Unit	An emissions unit established by the Clean Energy Act, issued for the purposes of the carbon pricing mechanism. The total number of units issued each year does not exceed the cap.
Australian Carbon Credit Unit	A type of emissions unit issued for verified emissions reductions under the Carbon Farming Initiative and held in the Australian National Registry of Emissions Units.
baseline	A counterfactual scenario of future emissions that would have occurred without the emissions-reducing activity.
business-as-usual	Emissions that would occur without any additional policy intervention.
carbon dioxide equivalent	A measure that quantifies different greenhouse gases in terms of the amount of carbon dioxide that would deliver the same global warming.
Carbon Farming Initiative	An Australian emissions offset scheme that credits emissions reductions from certain sources, such as forestry and agriculture, that are not covered by the carbon pricing mechanism.
carbon price	The price of an emissions unit.
Carbon Pricing Mechanism	An emissions trading scheme that puts a price on Australia's greenhouse gas emissions. It was introduced under the Clean Energy Act and applies to Australia's biggest emitters (called 'liable entities').
Certified Emission Reduction	An emissions unit issued under the Clean Development Mechanism, for emissions reduction projects in developing countries. These CERs can be traded and sold, and used by industrialised countries to help meet their emissions reduction targets under the Kyoto Protocol.
common practice	A requirement that a project or activity produces additional environmental benefits that would not occur as part of normal business practice.
coverage	Which entities would be eligible or required to participate in a scheme, and which emissions would be included.
covered emissions	Emissions from sources covered by the carbon pricing mechanism.
Direct Action Plan	The government's policy to reduce greenhouse gas emissions and establish a clean-up and environment conservation program. A central element of the plan is the Emissions Reduction Fund.
direct combustion emissions	Emissions released when fuels are combusted for stationary energy purposes, such as generating heat, steam or pressure (excluding electricity generation). These emissions are released by large industrial users, and by small, dispersed residential and commercial consumers.
Domestic Offsets Integrity Committee (DOIC)	An independent expert committee that assesses proposals for methodologies under the Carbon Farming Initiative and advises the Minister for the Environment on their approval.
electricity emissions	Emissions released when fuels, such as coal and natural gas, are combusted to generate electricity.
emissions factor	A data source used to construct a baseline. The emissions factor relates to the emissions intensity of a production process or activity.
emissions intensity	A measure of the amount of emissions associated with a unit of output; for example, emissions per unit of gross domestic product.
emissions reduction	The act or process of limiting,r restricting or sequestering greenhouse gas emissions.
Emissions Reduction Fund	A $3 billion fund proposed by the government to allocate money through a reverse auction to emissions reduction tenders to projects that to reduce emissions.
emissions reduction target	A goal for national emissions in a specific year.
emissions trading scheme	A market-based approach to reducing emissions that places a limit on emissions allowed from all sources covered by the scheme. Emissions trading allows entities to trade emissions units with other entities. In general, trading can occur at the domestic, international and intra-company levels.
fugitive emissions	Greenhouse gases emitted during the extraction, production, processing, storage, transmission and distribution of fossil fuels such as coal, oil and gas.

greenhouse gas	Any gas (natural or produced by human activities) that absorbs infrared radiation in the atmosphere. Key greenhouse gases include carbon dioxide, water vapour, nitrous oxide, methane and ozone.
industrial process emissions	Emissions from industrial processes including metal production, synthetic greenhouse gases, chemical processes, mineral production and other processes. Excludes emissions from combustion for energy purposes.
Kyoto Protocol	An international agreement adopted under the United Nations Framework Convention on Climate Change in 1997. It includes binding national targets for developed countries and flexible mechanisms including the Clean Development Mechanism (CDM).
Kyoto unit	Emissions units eligible for compliance with Kyoto Protocol targets—these include assigned amount units (AAUs), certified emission reduction units (CERs), emission reduction units (ERUs) and removal units.
land use, land use change and forestry (LULUCF) emissions	Emissions associated with human-induced changes in land use, such as deforestation, afforestation and forest management.
National Greenhouse Gas Inventory	An annual time series compilation of Australia's emissions data, prepared by the Department of Environment in line with UNFCCC guidelines.
National Greenhouse and Energy Reporting System	A system established for the reporting of emissions, energy consumption and production by large emitters. This was established under the National Greenhouse and Energy Act 2007.
positive list	A register of emissions reduction activities eligible to earn carbon credits under the Carbon Farming Initiative. The positive list aims to ensure credits are issued only for additional emissions reductions. A methodology cannot be approved for use under the Carbon Farming Initiative unless it relates to an activity on the positive list.
Renewable Energy Target	A Commonwealth Government scheme that places a legal obligation on electricity retailers and large electricity users to buy a certain proportion of their electricity from renewables-based generation.
stationary energy emissions	Emissions from electricity generation and direct combustion.
transport emissions	Emissions from vehicles, combusting or otherwise, converting fuels to move people and freight, reported across four modes—road, rail, domestic aviation and domestic shipping. International aviation and shipping emissions are excluded from Australia's national inventory.
United Nations Framework Convention on Climate Change (UNFCCC)	An international treaty that commits signatory countries (Parties) to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system.
voluntary action	The autonomous decision of individuals, companies or governments to reduce greenhouse gas emissions, such as to offset emissions to be carbon-neutral.
waste emissions	Emissions, mainly methane and nitrous oxide, that arise as organic waste decomposes in the absence of oxygen.
white certificate	A tradable instrument issued to certify that a certain reduction of energy consumption has been attained. White certificates are used to certify that a liable party has achieved its part of an obligation under a mandatory energy efficiency scheme.

ABBREVIATIONS AND ACRONYMS

ACU	Australian Carbon Unit, issued under the carbon pricing mechanism
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACCU	Australian Carbon Credit Unit, issued under the Carbon Farming Initiative
ARB	California Air Resource Board
BAU	business-as-usual
CCER	China Certified Emissions Reduction Scheme
CCS	carbon capture and storage
CDM	Clean Development Mechanism of the Kyoto Protocol
CER	Clean Energy Regulator
CFI	Carbon Farming Initiative
CO_2-e	carbon dioxide equivalent
DAFF	Department of Agriculture
DIICCSRTE	Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education
DoE	Department of the Environment
DOIC	Domestic Offsets Integrity Committee, Carbon Farming Initiative methodology review body
ERF	Emissions Reduction Fund
ESS	Energy Efficiency Scheme, a New South Wales scheme to improve energy efficiency
EU	European Union
EU ETS	European Union Emissions Trading System
EUA	European Union Allowance, emissions rights issued under the EU ETS
GGAS	Greenhouse Gas Reduction Scheme, a New South Wales policy to reduce emissions
GHG	greenhouse gas
HCFC	hydrochlorofluorocarbon, a greenhouse gas
HFC	hydrofluorocarbons, a greenhouse gas
LULUCF	land use, land use change and forestry
Mt	megatonne (mass, one million metric tonnes)
NGER	National Greenhouse and Energy Reporting
NGGI	National Greenhouse Gas Inventory
PAT	India Perform Achieve Trade
RET	Renewable Energy Target
SGER	Alberta Specified Greenhouse Emissions Reductions
UNFCCC	United Nations Framework Convention on Climate Change

REFERENCES

1. INTRODUCTION

Climate Change Authority Act 2011 (Cth).

Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth).

Carbon Credits (Carbon Farming Initiative) Regulations 2011 (Cth).

Climate Change Authority 2014, *Targets and Progress Review*, Melbourne.

ClimateWorks 2010, *Low Carbon Growth Plan*, ClimateWorks Australia, Melbourne.

ClimateWorks 2013, *Tracking Progress Towards a Low Carbon Economy*, Melbourne.

Department of Climate Change and Energy Efficiency (DCCEE) 2012, *The Carbon Farming Initiative Handbook*, Canberra.

Department of Environment (DOE) 2013, *Emissions Reduction Fund Green Paper*, Canberra.

Treasury and Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) 2013, *Climate Change Mitigation Scenarios*, modelling report to the Climate Change Authority in support of its Caps and Targets Review, Canberra.

2. KEY CHARACTERISTICS OF BASELINE AND CREDIT SCHEMES

Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003 (NSW).

Energy Savings Scheme (ESS), *Projects and equipment*, viewed 4 March 2014, www.ess.nsw.gov.au/Home

3. COVERAGE

Australian Government 2013, *Carbon Farming Initiative: The first z18 months, Fact Sheet*, viewed 11 March 2014, www.climatechange.gov.au/sites/climatechange/files/documents/07_2013/cfi-the-first-18-months.pdf

The Australia Institute 2008, *Agriculture and Emissions Trading, The impossible dream?* Saddler and King Canberra.

Australian Bureau of Agricultural and Resource Economics and Science (ABARES) 2011, *The economics of Australian agriculture's participation in carbon-offset markets*, Canberra.

Clean Energy Regulator (CER) 2014, *Register of Offset Projects 2014*, viewed 28 February 2014, www.cleanenergyregulator.gov.au/Carbon-Farming-Initiative/Register-of-Offsets-Projects/Pages/default.aspx

Department of the Environment 2014, *CFI Methodologies*, viewed 28 February 2014, http://www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies

California Air Resources Board 2014, ARB Offset Credits Issued: www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf, viewed on 8 March 2014.

Independent Pricing and Regulatory Tribunal (IPART) 2012, *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*, New South Wales.

Independent Pricing and Regulatory Tribunal (IPART) 2013, *Compliance and Operation of the NSW Greenhouse Energy Savings Scheme during 2012*, New South Wales.

Wara, M 2006, *Measuring the Clean Development Mechanism's Performance and Potential*, Working Paper # 56, Program on Energy and Sustainable Development, Stanford California.

4. ADDITIONALITY

Administrative Appeals of Tribunal Australia 2014, Charles IFE Pty Ltd and Domestic Offsets Integrity Committee [2014] AATA 33.

Alberta Government 2013, *Technical Guidance for Offset Project Developers*, version 4, Specified Gas Emitters Regulation, Alberta.

Carbon Credits (Carbon Farming Initiative Bill) 2011, *Explanatory Memorandum,* (Cth).

ClimateWorks 2013, *Tracking Progress Towards a Low Carbon Economy – Special Report*, ClimateWorks, Melbourne.

Department of Agriculture, Fisheries, and Forestry (DAFF) ABARES 2012, *the Carbon Farming Initiative - a proposed common practice framework for assessing additionality, Technical Report 12.2*, 2012.

Department of Climate Change and Energy Efficiency (DCCEE) 2012a, *The Positive list Carbon Farming Initiative*, viewed 10 February 2014, www.climatechange.gov.au/sites/climatechange/files/files/reducing-carbon/cfi/cfi-positive-list-brochure.pdf

DCCEE 2012b, *The Carbon Farming Initiative Handbook*, Canberra.

Department of the Environment (DoE) 2014a, *Activities not approved for the positive list*, Viewed 11 February 2014, www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/activities-eligible-and-excluded/positive-list/activities-not-approved-positive-list.

United Nations Framework Convention on Climate Change (UNFCCC) 2004, *Methodological tool: Tool for the demonstration and assessment of additionality*, Version 07.0.0, viewed 26 February 2014, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

5. BASELINE SETTING

Alberta Environment 2012, *Quantification Protocol for Solution Gas Conservation*, Version 1.0, Specified Gas Emitters Regulation, Alberta.

Clean Development Mechanism (CDM) Executive Board 2010, *Manufacturing of energy efficient domestic refrigerators*, Approved baseline and monitoring methodology AM0070, Version 3.1.0.

CDM Executive Board 2011, *Co-firing of biomass residues for heat generation and/or electricity generation in grid connected power plants*, Approved consolidated baseline and monitoring methodology ACM0020, Version 1.0.0.

CDM Executive Board 2011b, *Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of silicon and ferry alloys*, Approved baseline and monitoring methodology AM0038, Version 03.0.0.

CDM Executive Board 2012, *Capture and utilisation or destruction of mine methane (excluding coal mines) or non-mine methane 2012*, Approved baseline and monitoring methodology AM0064, Version 03.0.0.

CDM Executive Board 2012b, *Introduction of low-emission vehicles/technologies to commercial vehicle fleets*, AMS-III.S. Version 04.0.

CDM Executive Board 2012c, *Methane recovery in agricultural activities at household/small farm level*, AMS-III.R, Version 03.0.

Department of the Environment (DoE) 2014b, *Methodology Determinations*, viewed 13 February 2014, www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies/methodology-determinations

DoE 2013, *Guide for submitting Methodologies*, viewed 13 February 2014, www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies/guidelines-submitting-methodologies

Energy Savings Scheme (ESS) 2014, website, viewed 4 March 2014, www.ess.nsw.gov.au/

Greenhouse Gas Benchmark Rule (Carbon Sequestration) No. 5 of 2003 (NSW).

Ministry of Power 2012, 'Energy Conservation Rules', *Gazette of India*, Extraordinary, Part II, Section 3, Sub-section (i), New Delhi, 30 March.

Partnership for Market Readiness (PMR) 2012, *PMR Technical Note 1: Crediting mechanisms overview*, PMR Technical Note 1 (1 December 2012), Germany.

PMR 2012b, *PMR Technical Note 3: The nuts and bolts of baseline setting: why, what, and how?*, PMR Technical Note 3 (16 August 2012), Prepared by Derik Broekhoff for the PMR Secretariat, Germany.

PMR 2013 *Draft Technical Note 5: Options and guidance for the development of baselines*, Technical Note 5 (October 2013), Prepared by Derik Broekhoff and Michael Lazarus for the PMR Secretariat, Germany.

Prag, A & Briner, G 2012, *Crossing the Threshold: Ambitious Baselines for the UNFCCC New Market Mechanism*, OECD/IEA Project for the Climate Change Expert Group on the UNFCCC.

United Nations Framework Convention on Climate Change (UNFCCC), Clean Development Mechanism website, viewed 4 March 2014, http://cdm.unfccc.int/

UNFCCCb, Clean Development Mechanism Rulebook website, viewed 4 March 2014, http://cdmrulebook.org/

APPENDIX A

Carbon Farming Initiative

Department of Agriculture, Fisheries, and Forestry ABARES 2012, *The Carbon Farming Initiative - a proposed common practice framework for assessing additionality,* Technical Report 12.2.

Department of Climate Change and Energy Efficiency 2012a, *The Positive list Carbon Farming Initiative*, viewed 10 February 2014, www.climatechange.gov.au/sites/climatechange/files/files/reducing-carbon/cfi/cfi-positive-list-brochure.pdf

Department of Climate Change and Energy Efficiency 2012b, *The Carbon Farming Initiative Handbook*, Canberra.

Department of Climate Change and Energy Efficiency 2013, *Carbon Farming Initiative Guidelines for Submitting Methodologies*, viewed 13 February 2014, www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies/guidelines-submitting-methodologies

Department of the Environment 2014a, *Activities not approved for the positive list*, viewed 11 February 2014, www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/activities-eligible-and-excluded/positive-list/activities-not-approved-positive-list

Department of the Environment 2014b, *Methodology Determinations*, viewed 13 February 2014, www.climatechange.gov.au/reducingcarbon/carbonfarminginitiative/methodologies/methodology-determinations

New South Wales Greenhouse Gas Reduction Scheme

Electricity Supply Amendment (Greenhouse Gas Emission Reduction) Act 2002 (NSW).

Electricity Supply Amendment (Greenhouse Gas Emission Reduction) Regulation 2002 (NSW).

Electricity (Greenhouse Gas Emissions) Act 2004 (ACT).

Electricity (Greenhouse Gas Emissions) Regulation 2004 (ACT).

Greenhouse Gas Benchmark Rule (Compliance) No.1 of 2003 (NSW).

Greenhouse Gas Benchmark Rule (Generation) No. 2 of 2003 (NSW).

Greenhouse Gas Benchmark Rule (Demand Side Abatement) No. 3 of 2003 (1 July 2009) (NSW).

Greenhouse Gas Benchmark Rule (Large User Abatement Certificates) No. 4 of 2003 (NSW).

Greenhouse Gas Benchmark Rule (Carbon Sequestration) No. 5 of 2003 (NSW).

Greenhouse Gas Reduction Scheme 2014, website, viewed 26 February 2014, www.greenhousegas.nsw.gov.au/

Independent Pricing and Regulatory Tribunal (IPART) 2012, *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012: Report to Minister*, New South Wales.

IPART 2013, NSW *Greenhouse Reduction Scheme: Strengths, weaknesses and lessons learned*, New South Wales.

New South Wales (NSW) Government 2011, *Introduction to GGAS*, New South Wales.

New South Wales Energy Saving Scheme

Independent Pricing and Regulatory Tribunal (IPART) 2013, *Guide to Completing the Annual Energy Saving Statement*, New South Wales.

Energy Savings Scheme (ESS) 2014, website, viewed 4 March 2014, www.ess.nsw.gov.au/Home

New South Wales (NSW) Government 2009, *Preparing for the Energy Savings Scheme*, New South Wales.

NSW Government 2011, 'Energy Savings Scheme Rule of 2009', Special Supplement, *Government Gazette*, No. 131, New South Wales.

Electricity Supply (General) Regulation 2001 (NSW).

The Clean Development Mechanism

International Emissions Trading Association (IETA) 2009, *Multi-Project, Standardized Baselines and Beyond: Explaining a key issue in the reform of the Clean Development Mechanism*, IETA Climate Challenges, Market Solutions, Geneva, Switzerland.

United Nations Framework Convention on Climate Change (UNFCCC) 2004, *Methodological tool: Tool for the demonstration and assessment of additionality*, Version 07.0.0, viewed 26 February 2014, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

UNFCCC 2011, Annex 6: *Guidelines on the Consideration of Suppressed Demand in CDM Methodologies*, viewed 26 February 2014, http://cdm.unfccc.int/filestorage/9/D/8/9D86VZY2RQTNUGOW7EKSCA4MHFLI05/eb62_repan06.pdf?t=S298bjFuMTVzfDBGwIEHOYhT-D_B8O8nGkrx

UNFCCC 2011b *Annex 8: Guideline for the Establishment of Sector Specific Standardized Baselines*, Version 1.0, viewed 26 February 2014, http://cdm.unfccc.int/filestorage/4/I/Y/4IY1RB7DMKLWPGF59XC3UE6JNH8Q2A/eb62_repan08.pdf?t=Vnh8bjFuMWJ2fDDZTLGL3joCY10DJZbp0sbY

UNFCCC 2012, *Annex 27 Guidelines on the Demonstration of Additionality of Small-Scale Project Activities*, Version 09.0.

UNFCCC 2012b, *Methodological tool: Combined tool to identify the baseline scenario and demonstrate additionality*, Version 05.0.0.

UNFCCC 2013, *CDM Methodology Booklet*, Fifth Edition, Bonn, Germany.

UNFCCC 2014, Clean Development Mechanism website, viewed 4 March 2014, http://cdm.unfccc.int/

UNFCCC 2014b, Clean Development Mechanism Rulebook website, viewed 4 March 2014, http://cdmrulebook.org/

China's Certified Emissions Reduction Scheme

Carbon Market Watch 2013, *Scrutinising Carbon Markets*, Newsletter, Issue 3, May 2013, Brussels

ClimateBridge 2013, *Bridge to China's Carbon Market*, Issue 3, June 2013, China.

ClimateBridge 2013b, *Bridge to China's Carbon Market*, Issue 5, October 2013, China.

The Climate Group 2012, *The Interim Regulation of Voluntary Greenhouse Gases Emission Trading in China*, Translated government document, July 2012, viewed 3 March 2014, http://thecleanrevolution.org/_assets/files/Interim-Regulation-of-Voluntary-Greenhouse-Gases-Emission-Trading-in-China%281%29.pdf

The National Development and Reform Commission (NDRC) 2013, *China's Policies and Actions for Addressing Climate Change*, The People's Republic of China, Beijing.

NDRC 2014, website, viewed 4 March 2014, http://203.207.195.145:92/sdxm.aspx?clmId=163&page=0

Yin, D 2013, 'China's Carbon Emissions Traders Await Offset Demand', *Ecosystems Marketplace*, viewed 3 March 2014, www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=9820

India's Perform Achieve Trade

Bloomberg New Energy Finance (BNEF) 2013 *India – energy efficiency – research note,* 20 April.

Bureau of Energy Efficiency 2012, *PAT: Perform, Achieve and Trade*, Ministry of Power, Government of India.

Climate and Development Knowledge Index 2013, *Creating market support for energy efficiency: India's Perform Achieve and Trade scheme*, World Resources Institute, United Kingdom.

Khan, M, Tanwar, N, Shankar, S & Climate Connect 2011, *Primer to India's Perform, Achieve and Trade Scheme for Enhanced Energy Efficiency*, in Greenhouse Gas Market Report 2011: Asia Pacific Market On The Rise, IETA, Geneva.

Ministry of Power 2012, 'Energy Conservation Rules', *Gazette of India*, Extraordinary, Part II, Section 3, Sub-section (i), New Delhi, 30 March.

Regan, K & Mehta, N 2012, *International finance and the PAT scheme*, Verco Global, viewed 6 January 2014, www.vercoglobal.com/images/uploads/insightsreports/International_finance_and_the_PAT_scheme.pdf

Alberta's Specified Greenhouse Gas Reduction Scheme

Auditor General Alberta 2011, 'Climate Change and Emissions Management Fund - Use of Offsets - Follow-up Audit', in *Report of the Auditor General of Alberta*, Edmonton, Alberta.

Alberta Government 2012, *Technical Guidance for Completing Specified Gas Baseline Emission Intensity Applications*, Version 4, Specified Gas Emitters Regulation, Alberta.

Alberta Government 2013, *Technical Guidance for Offset Project Developers*, Version 4, Specified Gas Emitters Regulation, Alberta.

Alberta Government 2013b, *2013 Large Final Emitter Update*, Presentation for Air and Climate Change Policy Branch Environment and Sustainable Resource Development, viewed 3 March 2014, http://environment.gov.ab.ca/info/library/8735.pdf

Environment and Sustainable Resource Development, Alberta-based Offset Credit System Website, viewed 4 March 2014, http://environment.alberta.ca/0923.html

International Institute for Sustainable Development 2011, *Regulating Carbon Emissions in Canada Offsets and Canada's GHG Regulations: Reducing costs, improving competitiveness and lowering emissions*, Policy Brief for the Industry Provincial Offsets Group (IPOG), IISD's Climate Change and Energy Program, Manitoba, Canada.

Specified Gas Emitters Regulation 2007, Alberta Regulation 139/2007, Alberta, Canada.

California's Air Resources Board Compliance Offsets Scheme

ARB Offset Credit Issuance, viewed 3 March 2014, www.arb.ca.gov/cc/capandtrade/offsets/issuance/issuance.htm

Article 5: California Cap On Greenhouse Gas Emissions And Market-Based Compliance Mechanisms, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, California Code of Regulations, California.

California Air Resources Board (ARB) 2011, *Compliance Offset Protocol Ozone Depleting Substances Projects: Destruction of U.S. ozone depleting substances banks*, 20 October, California.

California ARB 2011b, *Compliance Offset Protocol Livestock Projects: Capturing and destroying methane from manure management systems*, 20 October, California.

California ARB 2011c, *Compliance Offset Protocol Urban Forest Projects*, 20 October, California.

California ARB 2011d, *Compliance Offset Protocol U.S. Forest Projects*, 20 October, California.

California ARB 2012, 'Chapter 1: How Does The Cap-And-Trade Program Work?', *Cap-and-Trade Regulation Instructional Guidance*, California Code of Regulations.

California ARB 2012b, 'Chapter 6: What Are The Requirements For Offset Credits And How Are They Issued?', *Cap-and-Trade Regulation Instructional Guidance*, California Code of Regulations.

California ARB 2013, *Proposed Amendments to the California Cap On Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*, Staff Report: Initial Statement of Reasons, Public hearing to consider proposed amendments to the California cap-and-trade program, California.

California ARB 2014, Compliance Offset Program website, viewed 4 March 2014, www.arb.ca.gov/cc/capandtrade/offsets/offsets.htm

Global Warming Solutions Act of 2006 (California).

APPENDIX B

Climate Change Authority 2014, *Targets and Progress Review*, Melbourne.

Treasury and Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) 2013, *Climate Change Mitigation Scenarios*, modelling report to the Climate Change Authority in support of its Caps and Targets Review, Canberra.

CLIMATE
CHANGE
AUTHORITY

LEVEL 10
90 COLLINS STREET
MELBOURNE

GPO BOX 194
MELBOURNE VIC 3001

FREECALL
1800 475 869

EMAIL
ENQUIRIES@CLIMATECHANGEAUTHORITY.GOV.AU