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Purpose and Structure of the Document

The purpose of this document is to provide guidance for local government agencies and other similar organisations seeking to reduce their greenhouse gas emissions, manage their carbon inventory, increase their efficiency and save money. For the purposes of this document the user will be referred to as an agency.

This document sets out a step-by-step process for measuring emissions and developing and implementing an emissions reduction or abatement strategy. For agencies seeking to offset their emissions, guidance on how to do this is also provided.

The document has been divided into two sections:

- **Section A** sets out a step-by-step process for estimating and implementing a strategy to reduce greenhouse gas emissions.
- **Section B** provides an example of how a fictional agency might follow the process set out in Section A.

A supplementary guideline is also available to assist users to develop their own Marginal Abatement Cost Curve (MACC). This tool has been specifically developed as a resource to assist agencies to identify cost-effective greenhouse gas emissions reduction measures.

It should be noted that following these guidelines does not guarantee compliance with any reduction or offset standards and protocol nor are they intended to guarantee the agency the right to declare or position itself as carbon neutral. Agencies wishing to make public claims regarding their emission reduction activities such as claims of carbon neutrality should refer to the National Carbon Offset Standard (NCOS) for guidance and seek other advice as required.
SECTION A: The Emissions Reduction Process

Overview

Australia has committed to reducing its emissions in 2050 by 80 per cent below 2000 levels. It has also committed to reducing its emissions by between five and 15 or 25 per cent below 2000 levels by 2020. The five per cent target is unconditional and the up to 15 per cent and 25 per cent targets are conditional on the extent of international action.

Australian corporations that generate more than 25,000 tonnes of carbon dioxide equivalent (tCO₂-e) emissions each year are required to report their greenhouse gas emissions under the National Greenhouse and Energy Reporting Scheme (NGERS).

Though many local government agencies are unlikely to be captured under either the carbon price or the National Greenhouse and Energy Reporting Scheme, many are looking to monitor and manage their carbon missions for a number of reasons including:

- A wide range of abatement activities can be achieved at a negative net cost, and increase operational efficiencies.
- Agencies can alleviate the affects of rising fuel and energy prices by implementing initiatives to reduce energy and fuel use and therefore reduce future costs.
- Reducing emissions voluntarily can help an agency demonstrate its leadership and commitment to environmental responsibility to the community and key stakeholders.
- Offsetting emissions can have additional positive impact on the environment. For example, trees planted can also help to address other environmental issues such as salinity and biodiversity.

This guide aligns closely with the processes outlined within the National Carbon Offset Standard (NCOS) and provides additional project management guidance as well as considerations where carbon neutrality is not the end goal of the carbon management project.

The Emissions Reduction Process

An emissions management process consists broadly of five main activities:

1. Developing the project framework
2. Quantifying emissions
3. Reducing emissions
4. Offsetting emissions
5. Reporting on achievements.

Incorporating these activities within a project management framework will allow agencies to plan and implement them in a way that is credible and robust. Taking a structured approach will also enable agencies to anticipate key project challenges and identify and manage potential barriers in the process. Ensuring that the project is set up within a good governance framework increases the project’s chances of success.

The following diagram provides an overview of the emissions management project and shows the relationship between each of the core project activities.
Figure 1 Project Overview

A summary of each of the steps follows:

- **Develop the project framework**: The first step is to develop a framework for the emissions management project setting out the project’s goals and objectives; its governance structure; its implementation timeframe; resourcing and the roles and responsibilities of those involved with the project.

- **Measure**: The next step of the project is to determine the greenhouse gas emissions inventory boundary for the agency identifying the agency’s emission sources and sinks. Then an emissions estimation methodology must be chosen and the agency’s emissions can be estimated.

- **Reduce**: Once the agency’s emissions are known, measures to reduce these can be identified, analysed and implemented.

- **Offset**: In some instances, it may be more cost effective for agencies to offset emissions that are too expensive to reduce. If that is the case, agencies should develop an offsetting strategy that identifies the quantity; type and quality of offset they wish to purchase.

- **Report results**: The final step involves reporting on the actions and results achieved from the agency’s carbon management project. While some agencies may have mandatory reporting requirements, for example, under the National Greenhouse and Energy Reporting Scheme, others may choose to disclose their results voluntarily.

More information on each step of the project is provided in the following sections of the document.
1. Develop the project framework

An agency undertaking a project to manage and reduce CO$_2$-e emissions should approach the task as any other significant project. Creating a solid project framework at the beginning of the project is critical to providing the foundations for a successful project outcome. Applying standard project management principles will also enable the agency to identify and reduce project risks in a timely manner which will likely result in time and cost savings.

The purpose of the project framework is to ensure that the project plan accurately reflects the project goals and objectives and that there is sufficient resourcing and governance throughout the project to ensure these goals and objectives are met. The quality of the planning and the time and consideration involved in developing, sharing, discussing and agreeing on project components will be a key element in determining the successful completion of the project. Information on the key steps to developing the project framework follows.

1.1 Define the project’s purpose

Before undertaking a project to manage its carbon emissions the agency needs to be able to answer the following key questions:

- What are our motives?
- Why are we doing the project?
- What are our expectations?
- What are we trying to achieve from the project?
- What outcome do we want?
- What are we going to do with the results/findings of the project?

The motives and expectations for the project should be aligned to the project’s goals and objectives. The responses to these questions will shape the project and largely determine its scale, likely cost and required resourcing.

The two tables below shows two different scenarios illustrating how different responses to the questions above will impact on the project plan and its scale. Essentially, the more public and far-reaching any claims expect to be made relating to the project outcomes, the more rigorous the process must be supporting the project.

Scenario 1: small agency undertaking a carbon management plan to raise employee awareness

<table>
<thead>
<tr>
<th>Key questions</th>
<th>Response</th>
<th>Impact on project scale and approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why are we doing the project?</td>
<td>To raise awareness and encourage employees to reduce personal emissions as well as the agency’s emissions.</td>
<td>The profile of the project will need to be high within the agency and its methodology will need to be transparent. The Project manager should adopt a pro-active approach to marketing the project and advise</td>
</tr>
</tbody>
</table>
individuals how they can reduce their personal emissions, using the project methodology as an example of the process that could be duplicated. Consideration should be given to encouraging individuals to calculate their carbon inventory alongside the agency’s carbon management project. It will be important for agency executive and senior staff to adopt a leadership approach and demonstrate their commitment to the project.

### Expectations

**What are we trying to achieve from the project?**

The agency wishes to develop a robust carbon inventory and implement a cost effective emission reduction strategy. The agency may consider offsetting only residual emissions (emissions too costly to reduce through the implementation of abatement projects).

The National Carbon Offset Standard maintained by the Department of Environment will be used for guidance on how the agency’s emissions will be offset.

### Outcomes

**What are we going to do with the results?**

Promote results within the agency only and use these as the basis for annual review and continued emissions reduction.

The results from the project will be disclosed internally only. Therefore while the agency will not be publicly liable for any errors, inconsistencies or misrepresentation in statements made about their project results, care will still need to be taken to ensure that results are accurate and the process is transparent. Good project management and appropriate governance of the project should ensure this.

| Table 1 Impact on project scale and approach for a small agency undertaking a carbon management plan to raise employee awareness |
|---|---|---|
| **Expectations** | **Outcomes** |
| What are we trying to achieve from the project? | The agency wishes to develop a robust carbon inventory and implement a cost effective emission reduction strategy. The agency may consider offsetting only residual emissions (emissions too costly to reduce through the implementation of abatement projects). | The results from the project will be disclosed internally only. Therefore while the agency will not be publicly liable for any errors, inconsistencies or misrepresentation in statements made about their project results, care will still need to be taken to ensure that results are accurate and the process is transparent. Good project management and appropriate governance of the project should ensure this. |
Scenario 2: a medium sized agency seeking to gain carbon neutrality

<table>
<thead>
<tr>
<th>Key questions</th>
<th>Response</th>
<th>Impact on project scale and approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why are we doing the project?</td>
<td>The agency seeks to achieve carbon neutrality.</td>
<td>Carbon neutrality is difficult to legally quantify. The organisation should clearly define what it is trying to achieve and define a rigorous and credible process. The National Carbon Offset Standard sets out the nationally accepted process for achieving carbon neutrality.</td>
</tr>
<tr>
<td><strong>Expectations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are we trying to achieve from the project?</td>
<td>A robust carbon management framework for ongoing measurement, reduction and offsetting emissions.</td>
<td>These guidelines provide a robust carbon management framework and the National Carbon Offset Standard sets out the nationally accepted process for achieving carbon neutrality. It is recommended that the agency seek independent verification of its carbon inventory and on its strategy for achieving least cost abatement to provide additional confidence any claims made regarding carbon neutrality.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are we going to do with the results?</td>
<td>Promote and advertise results publicly to raise profile of the agency</td>
<td>The results and claims of the agency are being made public and being used to promote the organisation. There are risks and penalties associated with making misleading claims regarding carbon neutrality. It is recommended that independent verification and advice is sought to support public claims.</td>
</tr>
</tbody>
</table>

Table 2 Impact on project scale and approach for a medium sized agency undertaking a carbon management project to gain carbon neutrality
1.2 Establish a project charter

The project charter provides the documented framework for the project, clearly defining key elements of the project. It should consist of a mission statement and clearly set out the following information in relation to the project:

- Background
- Purpose
- Goals
- Objectives
- Scope
- Benefits
- Assumptions
- Constraints

The charter will need to be agreed on and signed off by the project sponsor and project manager before the commencement of the project.

1.3 Set up project team

A Project Manager should be chosen to take overall responsibility for organising and running the carbon management process. In many cases, the Project Manager will want to draw information from different areas of the agency, therefore a core team of individuals may need to be appointed, who will work with the project manager to complete all required tasks.

Key tasks that the Project Manager should perform include:

- Coordinating the efforts of the project team so that the required work is completed on time and is of high quality
- Identifying resources needed and assigning individual responsibilities, managing day-to-day operational aspects of the project and scope, reviewing deliverables before completion, and enforcing project standards
- Liaising with the members of the project team and ensuring that members are given the appropriate support to complete their tasks efficiently
- Managing the project budget and any external resources brought in for the project
- Problem solving in partnership with relevant members of the team to resolve issues and implement solutions.

Another important member of the project team is the Project Sponsor. The Project Sponsor is generally a senior executive in the agency, nominally in charge of the project but with little day-to-day involvement in the project details. Their role is to champion the project at a senior or executive level, secure funding and ensure that the Project Manager is able to deliver the project on time and on budget.

Carbon management and reducing emissions is not just an environmental issue. Key project team members should therefore be selected from areas across the agency, including finance and operations. Team members should be selected based on their ability to either contribute input to the project or run particular project tasks, for example, data management or collection.
1.4 Obtain project support and budget

The budget for the project is generally obtained by the Project Sponsor and controlled on a day-to-day basis by the Project Manager (with oversight by the Sponsor). A budget for a carbon management and emissions reduction project will typically include a budget for resources (man-hours) and direct expenditure.

The resource and financial requirements for a carbon management project may vary significantly between projects based on the motives and expectations of the individual agency and also the size of the agency. Typical budget costs could include:

- Procurement of external assurance/verification of carbon inventory, calculations and/or abatement achievement
- Undertaking abatement opportunities
- Purchase of offsets; external marketing/corporate communications
- Procurement of legal advice on any claims made publicly

Budgets for the purchase of offsets and cost effective abatement activities may be considered outside of the general project budget and scope. This is because the scale of offset purchase and positive cost abatement activities may not be known until the carbon inventory calculation has been undertaken. It is recommended that this is made clear within the project charter and communicated to all stakeholders.

The agency may wish to consider implementing a pilot, high-level estimation ‘back of an envelope’ carbon inventory calculation to provide indicative figures of the amount of emissions it will need to reduce, and to create scenarios for different abatement and offset strategies. This would provide some guidance as to total project costs for consideration and ‘approval in principle’ prior to commencement of the full project.

Staff (resources) will be required to fulfill the following roles:

- Managing the project
- Collecting and validating data
- Data validation
- Estimating the inventory
- Developing and implementing the reduction and abatement strategies
- Marketing and corporate communications.

It is generally the role of the Project Sponsor to secure the financial and human resources for the project.

1.5 Identify key project stakeholders

Once the Project Team has been appointed, it should identify all relevant stakeholders to the business or for the project. It might be of benefit to perform a stakeholder analysis, as this will help identify how key stakeholders might influence the project, the support they will offer, as well what influence the project will have on them. For a typical agency, key stakeholders may include council members, representatives from key contractors or suppliers of services to the agency and community leaders or representatives.
At this stage, it is also important to identify internal stakeholders (employees within the agency) who will need to be actively engaged in the project. This may be in a consultative capacity, to gather, provide or analyse information or approve the project as required.

The process of effectively identifying and engaging with stakeholders, participants and decision makers during the initial stages of project planning will provide a solid base for the project, and should make it easier and more efficient to execute.

1.6 Develop a project plan

A high quality, detailed and easy-to-follow project plan provides the best opportunity for the project to be a success and to produce outcomes that meet the goals, objectives and expectations of the agency and its stakeholders. It should be informed by the outcomes of the preceding steps in the carbon management project and operationalise the project charter by turning it into a series of actions against which roles and responsibilities are assigned.

The project plan as a minimum should:

- Define the project scope and establish the boundaries of the carbon management project by:
  - Setting out the agreed terms of reference for the project
  - Setting out the agreed project definitions and protocols
  - Defining the baseline year for the carbon inventory (described in more detail in the following section)
  - Identifying which operations/activities across the agency are included in the project
  - Identifying any activities that are excluded from the project
  - Identifying any external/third-party service providers involved with the project and defining their roles and responsibilities within the project
- Assign roles and responsibilities for task and resource management, including budget management
- Set out the project methodology and approach to data collection, analysis and validation
- Include a project timeline show that shows the time allocated to each step of the project. The timeline should also highlight inter-dependencies between individual tasks, project milestones, decision and reporting points
- Include a communication plan setting out how the project will be communicated throughout the agency and to stakeholders.

Once the project plan has been completed and approved by the project sponsor and received executive approval, the project can begin.
Project Framework Checklist

The following checklist can be used to ensure all key steps involved in setting the project framework have been completed.

<table>
<thead>
<tr>
<th>Have the following been completed?</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have the agency’s motives, expectations and expected use of project outcomes been identified and agreed to?</td>
<td></td>
</tr>
<tr>
<td>Have a Project Manager and Project Sponsor been appointed?</td>
<td></td>
</tr>
<tr>
<td>Have the aims and approach (for example, the scope and calculation methodologies) been identified?</td>
<td></td>
</tr>
<tr>
<td>Is the necessary team in place, and have resources been allocated to carry out the project tasks?</td>
<td></td>
</tr>
<tr>
<td>Have roles and responsibilities been defined and agreed?</td>
<td></td>
</tr>
<tr>
<td>Has a project plan been prepared, complete with milestones and deliverables?</td>
<td></td>
</tr>
<tr>
<td>Have key stakeholders been identified?</td>
<td></td>
</tr>
<tr>
<td>Has a communication plan been prepared?</td>
<td></td>
</tr>
</tbody>
</table>
2. Measure Emissions

Establishing an emissions baseline is an important step in determining how best to manage the agency’s greenhouse gas emissions. An agency’s baseline is essentially its first greenhouse gas emissions inventory against which future performance is assessed.

By establishing a robust baseline the agency will be better placed to identify opportunities and potential strategies to reduce emissions and increase efficiency. Without a robust baseline, agencies will not be able to make well-informed decisions regarding emissions management.

This section provides step-by-step guidance on how an agency can establish a robust greenhouse gas emissions inventory. These steps should be taken when calculating the inventory for the agency’s emissions baseline year and in subsequent years.

2.1 Define the agency’s organisational boundary

The first step to calculating an agency’s inventory is to determine which emissions the agency is ‘responsible for’, for the purposes of the project. These emissions comprise the agency’s organisational boundary. There are two approaches to determining and agency’s organisational boundary — the operational control approach or the equity share approach.

For consistency with the national mandatory reporting scheme, the National Greenhouse and Energy Reporting System, it is recommended that agencies apply the operational control approach to determine their organisational boundary. This approach is also the approached endorsed by the National Carbon Offset Standard.

Under the operational control approach an agency should account for and report the emissions from facilities, operations or activities over which it has operational control. The agency is deemed to have operational control over a facility, operation or activity if it has the greatest authority to introduce and implement its operational and environmental, health and safety policies at that operation or over the activity.

General guidance on how to determine operational control is contained in Figure 2. Some agencies have differing and complex contractual arrangements in place and therefore may wish to seek advice to determine operational control in their specific situation.
As an example, if an agency is considered to have operational control over facilities such as landfill sites, community centers or works depots, it should include the emissions generated by all these facilities in its greenhouse gas inventory. The agency’s vehicle fleet should also be included in the agency’s organisational boundary if the agency’s operational and environmental; health and safety policies govern the use of the fleet.

It is important to note that agencies may NOT have operational control over all activities undertaken on its behalf (e.g. certain contracted services may be considered to be under the
operational control of another organisation). These activities are therefore not considered within the organisational boundary of the agency and not within the scope of its inventory.

Agencies may wish to refer to the guidance provided on determining operational boundaries under the NGER Act for further information. A link has been provided at the end of this guide.

2.2 Define operational boundary

The next step in calculating an agency’s inventory is to define its operational boundary. This involves identifying all sources and sinks of emissions within its organisational boundary.

Emission sources can broadly be defined as those assets, activities or processes that emit greenhouse gases into the atmosphere. They could for example, include vehicles that emit greenhouse gases as a result of their combustion of fuel. Sinks are defined as assets, activities or processes that result in removal or capture of greenhouse gases from the environment. Forests that remove carbon dioxide (CO2) from the atmosphere are considered carbon sinks.

The table below identifies common emission sources that might comprise an agency’s carbon inventory. It should be noted that each agency’s inventory will vary depending on its own activities. Therefore each agency must consider its own circumstances when preparing its inventory. The table also provides detail on what information is required in relation to each carbon source to develop the agency’s greenhouse gas inventory.

<table>
<thead>
<tr>
<th>Emission source</th>
<th>Information required</th>
<th>Source of required data</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchased electricity</td>
<td>Listing of all office, residential or warehouse buildings</td>
<td>Electricity bills</td>
<td>Physical location of asset (WA or Inter-State)</td>
</tr>
<tr>
<td></td>
<td>Ownership and tenancy details</td>
<td></td>
<td>Source of electricity e.g. renewable</td>
</tr>
<tr>
<td>Purchased gas</td>
<td>List of gas fired / powered equipment by gas source</td>
<td>Domestic Gas bills</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contracted gas bills</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier statements</td>
<td></td>
</tr>
<tr>
<td>Electricity generated</td>
<td>Listing of all electricity generation equipment</td>
<td>Diesel/gas purchases</td>
<td>Physical location of asset and fuel source (WA or Inter-State)</td>
</tr>
<tr>
<td>Vehicle fleet (light and heavy vehicles)</td>
<td>Asset register of vehicle fleet</td>
<td>Annual mileage undertaken</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fuel purchase records</td>
<td></td>
</tr>
</tbody>
</table>
Air travel | Number of business related flights undertaken | Travel agent statements | Sector distances (see Step 3 below)
---|---|---|---
Waste processing | Listing and detail of activities and processing plant | Plant records | Emission measurement may be required (see note below)
| Shared plants | Throughput records | Landfill data |
Paper consumed | Volume of paper consumed | Invoices | Paper size and type (ie recycled or virgin paper)

Table 3 Potential emission sources and information required to estimate emissions from these

Note: If the agency has landfill operations it is recommended that additional support is sought to assist in developing the emissions profile. Landfill emissions reporting can create a number of complex measurement and verification issues that these guidelines are not designed to address.

In order to establish the agency’s operational boundary, emissions from various sources under the agency’s operational control should then be categorised as one of the following:

**Scope 1**: Direct greenhouse gas emissions— These are emissions from sources under the operational control of the agency. They are produced from sources within the boundary of the agency and are a direct result of the agency’s activities. Common sources of Scope 1 emissions include emissions from the combustion of fuels (LPG, petroleum, automotive diesel oil, natural gas etc) in vehicles operated by the agency and combustion of natural gas and diesel in generators operated by the agency.

**Scope 2**: Indirect emissions— These are the emissions associated with generating the electricity, heat and steam purchased and consumed by the agency. While emissions associated with generating the electricity, heat or steam are physically produced by the burning of fuels at the power station or facility (and therefore reported as Scope 1 emissions by the generator), they are also allocated to the agency as Scope 2 emissions as they are considered to have been produced as a result of the agency’s activities.

**Scope 3**: Other indirect emissions—These are all other indirect emissions (not including Scope 2 emissions) that are produced as a consequence of the agency’s activities but are not from sources controlled by (under the operational control of) the agency. Common sources of Scope 3 emissions include from waste generated by the agency but disposed of by another organisation and from fuel burnt in vehicles not under the operational control of the agency including for the purposes of employee business travel by air, rail, road including public transport.

Figure 3 on the following page provides a visual representation of how emissions can be categorised according to Scope.
Most reporting protocols and programs (for example, the Greenhouse Gas Protocol, NGER and NCOS) require that Scope 1 and Scope 2 emissions are included in any inventory. However they do not require reporting of Scope 3 emissions and advise that these can be reported voluntarily. The do however recommend that organisations consider calculating their Scope 3 emissions and identify opportunities for emission reduction activities. The reporting principles of relevance, completeness, accuracy, consistency and transparency should be followed when considering whether to include Scope 3 emissions in an inventory.

Agencies considering whether to include Scope 3 emissions in their inventories should refer to the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard for guidance. A link to this Standard can be found in the resources section at the end of this guide.

In general, agencies should consider including their Scope 3 emissions in their inventories if:

- They are relatively large compared to the agency's Scope 1 and 2 emissions and excluding Scope 3 emissions would compromise the overall integrity of the agency's inventory
- They contribute to the agency's emissions risk exposure
- They are deemed critical by key stakeholders
- The agency could influence the reduction of these emissions through its own actions.

As an example, if business related travel (e.g. air, taxis, hire-cars, etc) is a significant source of scope 3 emissions for an agency, then it should consider including these emissions in its inventory.

In addition it is recommended that:

- Where an agency excludes Scope 3 activities from its inventory, this must be disclosed and justified
- The agency must transparently disclose included and excluded Scope 3 emissions when making any assertions about emissions reductions.

Table 4 provides an example of common emissions sources categorised by Scope for a typical medium sized agency.
Type of emissions | Report
--- | ---
**Scope 1 Direct emissions**
Diesel generators | Yes
Natural Gas consumed | Yes
Agency operated vehicles | Yes

**Scope 2 Indirect emissions**
Purchased electricity | Yes

**Scope 3 Other indirect emissions**
Waste processed outside of an agency (general office, food, organic) | Voluntary
Business related air-travel | Voluntary
Paper | Voluntary

Table 4 Potential emission sources by Scope for a medium sized agency

2.3 Choose calculation methodology and collect data

There are three broad approaches that can be taken to quantifying an agency’s inventory:

- Calculation based on accepted formulae or theoretical models
- Direct measurement; or
- A combination of calculation and measurement.

The most commonly used approach to estimating emissions is by using accepted formulas and emissions factors that convert activity data (for example, quantity of a certain type of fuel consumed in vehicles) to greenhouse gas emissions. The direct measurement approach is generally applied by industrial reporters with highly complex operations.

It is recommended that agencies use the current version of the Australian Government Department of Environment’s National Greenhouse Accounts (NGA) Factors to calculate emissions from their activities.

This document is available from: [http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications#factors](http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications#factors). In addition, the Australian Government’s Clean Energy Regulator has developed a number of calculators to assist corporations prepare NGER compliant reports. Agencies could use these calculators to estimate their emissions.


The methodology selected by the agency to calculate its emissions will dictate what activity data it will need to collect in order to perform the required calculations. The agency should then put into place the mechanisms to collect this data for the relevant reporting period. Agencies may
find they have the activity data needed for calculation of their inventory located in different places across their operations and in different formats and measures. It is also possible that different buildings and sites operated by the agency will be billed differently and to different locations. In gathering the required data, the agency should maintain careful records noting the various data sources in order to ensure that the data collection can be replicated in future years. Where raw data is not available, assumptions can be made based on estimated use.

The following list provides a list of the data sources that agencies may need to refer to gather data to calculate their inventories:

- Electricity bills from all properties or operations
- Gas bills for all properties or operations
- Fleet fuel card details (if applicable)
- Type and quantity of fuel consumed in vehicle fleet
- Records of liquid fuels delivered/purchased (e.g. diesel, petrol, LPG, propane)
- Make and model of all heavy and light vehicles owned and operated
- Vehicle mileage information
- Amount (in litres or kilograms) of general rubbish, recycling and garden waste generated (if the agency does not treat its waste but chooses to calculate its emissions from this source, this will be a Scope 3 emission)
- Flight details (departure and destination airports) for all business related travel for the baseline year (where air travel forms a significant aspect of the agency’s activity and the agency has decided to include these emissions in its inventory as Scope 3 emissions)
- Invoices for purchased paper
- Details of any offsets purchased in the year, if applicable.

2.4 Calculate emissions

Once it has gathered the required activity data, the agency can then calculate its emissions. A worked example of a fictional agency applying emissions calculation methodologies is provided in Section B of this document.

2.5 Aggregate emissions

The final step in preparing an inventory is to aggregate all emissions from within the agency’s organisational and operational boundaries. This will provide a greenhouse gas emissions inventory split between Scope 1, 2 and 3 emissions. While the total figure is useful in reporting and disclosure, the breakdown by scope is useful to track progress against emission reduction activities.

When presenting the data it may also be beneficial for an agency to break down the information further as this can affect the way it is interpreted and how subsequent emissions reduction activities are planned. For example, by breaking emissions down by source type an agency may notice that the majority of their emissions come from their landfill site or vehicle use. This information can in turn be used to shape discussions on emissions reductions and to focus efforts on finding opportunities that will address the largest emitters first. Similarly, identifying facilities consume the most electricity may help identify which buildings would benefit most from measures that improve energy efficiency.
2.6 Verify inventory

It may be appropriate at this stage to consider whether to seek external expert assistance to verify the agency's inventory. External support could also be used to provide positive assurance over calculations that could form the foundation for public disclosure and reporting of emissions to regulators, customers and the general public through publications such as annual reports, or sustainability reports. For more information on verification is available in ISO 14064-3:2006 Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions, which is available from: http://www.iso.org/iso/home.htm

Measure Emissions Checklist

The following checklist can be used to ensure all key steps involved in measuring the agency’s emissions have been completed.

<table>
<thead>
<tr>
<th>Have the following been completed?</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have the agency’s organisational boundaries been defined?</td>
<td></td>
</tr>
<tr>
<td>Have all the emission sources over which the agency has operational control been identified and the agency’s organisational boundaries been defined?</td>
<td></td>
</tr>
<tr>
<td>Has the agency’s operational boundary been defined?</td>
<td></td>
</tr>
<tr>
<td>Has the agency’s emissions been categorised as Scope 1, 2 or 3 emissions?</td>
<td></td>
</tr>
<tr>
<td>Has the agency decided whether to include its Scope 3 emissions as part of its inventory?</td>
<td></td>
</tr>
<tr>
<td>Has raw data been gathered and/or assumptions made in areas where raw data is not available?</td>
<td></td>
</tr>
<tr>
<td>Have appropriate calculation methods been selected?</td>
<td></td>
</tr>
<tr>
<td>Have all emission calculations been aggregated appropriately?</td>
<td></td>
</tr>
<tr>
<td>Has external expert assistance been considered/sought to verify and provide assurance over the inventory?</td>
<td></td>
</tr>
</tbody>
</table>
3. Reduce Emissions

The next step in the emissions management process is for the agency to identify how best to reduce its emissions. Greenhouse gas emissions reductions or abatement can be achieved in one of two ways:

- Doing less of something that generates emissions. For example, flying or driving less.
- Employing a technology that allows for the same level of activity to be performed using fewer resources. For example by installing energy efficient light bulbs or switching vehicles to use high quality diesel instead of petrol.

This section provides an overview of the steps agencies should take to reduce emissions.

3.1 Identify reduction measures

Before the agency can decide on which reduction activities to implement, it should undertake an exercise to identify possible reduction activities to be assessed. This can be achieved through a variety of activities such as:

- Speaking with subject matter experts (ie, mechanics may know of new technologies to increase vehicle fuel efficiency.
- Speaking with stakeholders familiar with the activity. For example, a Facilities Manager responsible for a community centre may have some ideas on how the facility could be run more efficiently.
- Conducting research online such as investigate different renewable energy or cogeneration options
- Speaking with suppliers

Often simply speaking with stakeholders who interact the most with the facility or activity in question can result in the identification of many reduction opportunities.

3.2 Establish the costs and benefits of abatement measures

The key steps to undertake in determining the costs and benefits of abatement opportunities are:

- Identify the most significant emission sources in the agency’s carbon inventory.
- Using available tools (such as the Marginal Abatement Cost Curve) to identify least cost opportunities for achieving emissions reductions, applying the principles of capital investment decision making to abatement opportunities, i.e. consider payback periods and cost of capital
- Determine how the abatement options rate against other criteria (for example, environmental and social criteria)
- Focus on changing behaviours. Often the cheapest ways to reduce emissions involve reducing consumption and reducing waste. A campaign to raise awareness and encourage energy efficient behaviours (e.g. turn of the lights, recycle, and reuse ‘waste’) can be a very low cost way of achieving emission reductions.

The agency may wish to use analysis tools to help determine which abatement measures will reveal the greatest benefit at least cost. For this purpose a Marginal Abatement Cost Curve (MACC) is one such aid to decision-making that provides agencies with a simple way of identifying which abatement projects are the most cost effective per tCO₂-e abated and which options offer the greatest abatement potential.
A MACC enables agencies to develop a visual representation of their greenhouse gas abatement projects listed from the most cost effective tCO$_2$-e abated to the least cost effective. Figure 4 provides an example of a MACC. The height of the column represents the cost of the project based on its payback period (the length of time taken to pay off the cost of implementing the measure taking into account energy and cost savings from it). The width of the column represents the project’s abatement opportunity (the amount of tCO$_2$-e that can be achieved from the project). A project that is below the X-axis has a negative cost, and results in CO$_2$-e reductions and financial savings to the agency. Items that appear above the X-axis are those that result in CO$_2$-e reductions but at a cost. A sample MACC is provided in Figure 4.

![Figure 4 Example of a marginal abatement cost curve](image)

### 3.3 Develop a reduction strategy

An agency’s reduction strategy should identify a range of measures it could take to reduce its greenhouse gas emissions from its baseline inventory. The strategy should identify when the abatement measures will be implemented and identify the quantity of abatement that is expected. It should be developed taking into account the cost of abatement, the impact on emissions as well as any other relevant environmental and social considerations. For the strategy to effectively consider environmental and social considerations it should use a multi-criteria assessment process. Multi criteria assessment decision-making allows for projects to be considered on many different merits. This allows an agency to give consideration to additional environmental or social benefits of a project, its risk or technical feasibility, the need for external financing or tax implications. For example, if an agency operates a landfill site, it may place a higher preference on projects that address waste emissions than those that address electricity or...
fuel emissions. As such, even if a project to install gas capture technology at the landfill site resulted in a higher marginal abatement cost than say, a renewable energy project, the agency may still choose to endorse the waste project based on their preference for projects that address waste emissions.

The reduction strategy for an agency will depend on its emissions inventory and the major emission sources that make up its carbon inventory. For many of the agencies in Western Australia, the majority of carbon emissions will be related to electricity purchased from the grid. As such, it is likely that most common reduction strategies will be focused on reducing energy consumption and/or increasing energy efficiency.

Agencies may also wish to explore whether it would be appropriate to set a target for reducing emissions from its baseline or to take an iterative approach and decide what it wishes to achieve within shorter timeframes. Emission reduction targets are generally expressed in either one of the following ways:

- **Absolute targets** – to reduce absolute emissions by a certain time. For example, to reduce the agency’s emissions by 20 per cent from its baseline by 2020.
- **Intensity targets** – to reduce the ratio of emissions relative to a relevant business measure over time. For example, reduce the agency’s emissions by 10 per cent per full time staff member or resident.

Any target an agency sets will be influenced by the feasibility of different abatement measures. Assessment of each potential measure against criteria such as costs, payback periods, reduction potential, ease of implementation, acceptance and any environmental and social considerations will determine which measures are more appropriate and acceptable to the agency.

Agencies may also wish to consider whether offsetting its greenhouse gas emissions is a viable activity to be included in its reduction strategy. Offsets are discrete greenhouse gas reductions that are purchased from outside of the agency’s boundary that are used to compensate for its emissions. One tonne of CO$_2$-e purchased as an offset by an agency cancels out the same quantity of emissions from the agency (provided that the offset is legitimate). Further information on how offsetting can be a part of an agency’s emissions reduction strategy is provided in Section 4. Identify reduction measures

Based on an assessment of an agency’s carbon inventory, a number of different measures may exist for it to achieve cost effective and meaningful emissions reductions. Table 5 provides examples of the range of reduction strategies that are available to agencies to implement. Agencies should do their own analysis to determine which activities might be most appropriate given their individual circumstances.

<table>
<thead>
<tr>
<th>Scope</th>
<th>Emission sources</th>
<th>Potential measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope 1 – Direct emissions</td>
<td>Stationary combustion</td>
<td>Fuel switching from fossil to renewable fuels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installing solar hot water heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installing combined heat and power systems</td>
</tr>
<tr>
<td></td>
<td>Transport</td>
<td>Replacing old vehicles with fuel efficient vehicles</td>
</tr>
</tbody>
</table>
### Guidelines for Developing a Marginal Abatement Cost Curve

August 2014

- **Fuel switching to less carbon intense fuels**
- Encouraging the use of alternative travel options such as public transport, carpooling and walking
- Encouraging the use of teleconferencing
- Provide remote access to staff and offer flexible working arrangements, for example, work from home opportunities

### Table 5: Potential emission reduction measures by scope

<table>
<thead>
<tr>
<th>Scope</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope 2 – Indirect emissions</td>
<td>Electricity consumption</td>
<td>Installing roof and wall insulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installing internal blinds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installing energy efficient lighting (light bulbs and intelligent lighting)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Investigate energy efficient public lighting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Installing occupancy sensors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjusting the agency’s heating, ventilation and air-conditioning systems (HVAC) to reduce excessive heating and cooling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using energy efficient appliances</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switching off appliances at the wall rather than placing on standby</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reducing water heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing GreenPower</td>
</tr>
<tr>
<td>Scope 3 – Other indirect emissions</td>
<td>Waste</td>
<td>Minimise, reuse and recycle waste</td>
</tr>
<tr>
<td></td>
<td>Contracted services</td>
<td>Create a low carbon value chain, for example, purchase low carbon products and services</td>
</tr>
<tr>
<td></td>
<td>Business related transport</td>
<td>Reduce business transport, for example, by encouraging teleconferencing over encouraging air travel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide incentives and contractors to walk, catch public transport or carpool to work</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td>Encourage less printing or double-sided printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchase carbon neutral paper</td>
</tr>
</tbody>
</table>
3.4 Implement abatement measures and recalculate inventory

Once abatement options have been considered and agreed in principle, a budgeting process and implementation plan should be developed. While many abatement opportunities may have a negative cost over their lifecycle, most will require an initial investment to be implemented. The implementation plan should set out the timeframes for implementation of the various projects, key project milestones, any budget or resources associated with these and the roles and responsibilities of various staff in the organisation in relation to implementing the abatement measures. The implementation plans should also set out how the implementation of reduction measures will be monitored and tracked to ensure that abatement is achieved. The implementation plan should also indicate how changes to organisational culture will be managed and facilitated within the agency.

Agencies should recalculate their greenhouse gas emissions inventories annually to assess the impact of reduction and offsetting activities and inform the future emission reduction efforts.

Agencies may also wish to develop emissions forecasts for future years. Forecasting emissions allows agencies to plan for and manage their reduction and offset strategies. For example, while a 20 per cent reduction in emissions over five years may at first seem feasible, if an agency’s emissions were forecast to grow by 15 percent over that time, it may opt for a lower target or choose to use an intensity target such as emissions per resident to allow for intended growth.

Reduce Emissions Checklist

The following checklist can be used to ensure all key steps involved in reducing the agency’s emissions have been completed.

<table>
<thead>
<tr>
<th>Have the following been completed?</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has a reduction strategy been developed?</td>
<td></td>
</tr>
<tr>
<td>Are the overall project goals and objectives aligned to the reduction strategy?</td>
<td></td>
</tr>
<tr>
<td>Have abatement options from all emission sectors been explored (transport, energy efficiency, waste and renewable power)?</td>
<td></td>
</tr>
<tr>
<td>Has the agency assessed the cost efficiency of all its abatement options?</td>
<td></td>
</tr>
<tr>
<td>Has the agency assessed its abatement options against other relevant criteria, for example, their environmental and social impact?</td>
<td></td>
</tr>
<tr>
<td>Has the agency identified which abatement options it will implement?</td>
<td></td>
</tr>
<tr>
<td>Has the agency developed an implementation plan which sets out the implementation timeframes and associated resources (including budget and staffing) for the implementation of initiatives?</td>
<td></td>
</tr>
<tr>
<td>Has the agency put into place the required framework to allow it to assess the impact of the abatement measures it has implemented?</td>
<td></td>
</tr>
<tr>
<td>Has the agency put into place the required framework to allow it to collect the necessary data and recalculate its inventory in the following year?</td>
<td></td>
</tr>
</tbody>
</table>
4. Offset emissions

A carbon offset is a tradable unit of reduction, removal or avoidance of a tonne of emissions (tCO$_2$-e) from a specific project outside of the agency’s organisational boundary. Once the agency has exhausted its cost effective abatement options, it may wish to consider offsetting any residual emissions. Offset credits can also be purchased but not acquitted against the agency’s emissions and used as a hedge against unexpected increases in costs of abatement activities or lower than anticipated results in future years.

This section sets out the steps agencies should follow to offset their emissions.

Agencies should note that the Australian Competition and Consumer Commission (ACCC) has investigated the credibility of offsetting claims made by a number of companies and has taken action against companies it has judged have mislead the public by the claims they have made. Agencies should therefore be cautious about any claims made regarding offsetting or carbon neutrality and seek legal advice around the veracity of any claims they wish to make. Agencies should also show due diligence and ensure that any offsets they purchase deliver what they claim to.

Agencies should refer to the ACCC’s guide on Green Marketing and the Australian Consumer Law ([https://www.accc.gov.au/publications/green-marketing-and-the-australian-consumer-law](https://www.accc.gov.au/publications/green-marketing-and-the-australian-consumer-law)) for advice on their obligations regarding making environmental claims under the Competition and Consumer Act 2010. This publication is intended to allow agencies to assess the strength of any environmental claims they make and to improve the accuracy and usefulness to consumers of their labelling, packaging and advertising.

4.1 Develop offset strategy

Offsetting is an important activity within a carbon management and reduction project. It allows agencies to further reduce their greenhouse gas emissions in a cost effective way after they have implemented all their cost effective emission reduction measures. An agency’s offset strategy will depend largely on the agency’s carbon management project goals and objectives and identify it should set out the type and the quantity of offsets that the agency will purchase to meet these.

- The agency’s offset strategy should identify the following:
- The emissions that the agency will be offsetting, for example, will the offsets cover all the agency’s residual emissions, a percentage of these or emissions related to specific activities.
- The agency’s preferred source of offsets. For example:
  - Does the agency prefer purchasing offsets produced in Australia? Does it prefer to purchase offsets that come from a certain region of the country?
  - Does it prefer offsets that are generated by land management activities, from renewable energy sources, from waste management or as a result of energy efficiency measures?
  - Is sustainability of the offsets an important consideration?
- The budget for offsets noting that offsets are available at a range of costs and agencies should be aware that the least cost options may not be of a high quality.
- How the decision to offset its emissions will be communicated within and external to the agency and what, if any, claims it wishes to make in relation to its offset achievements.
4.2 Identify suitable offset standard

There are a wide range of offset products available for purchase in the market with many varying characteristics. Table 6 identifies the characteristics of high quality offsets.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional</td>
<td>Abatement must go beyond what would be required to meet regulatory obligations or undertaken as part of ‘business-as-usual’.</td>
</tr>
<tr>
<td>Permanent</td>
<td>Offsets must represent permanent reductions in greenhouse gas emissions. In the case of sinks, this requires that the carbon stored is sequestered and will not be released into the atmosphere, generally for a period of 100 years.</td>
</tr>
<tr>
<td>Measurable</td>
<td>Methodologies used to quantify the amount of emissions reductions generated must be robust and based on defensible scientific methods. Methodologies must clearly define the greenhouse gas assessment boundary, emissions sources and sinks, and methods for calculating baseline emissions and project abatement.</td>
</tr>
<tr>
<td>Transparent</td>
<td>Consumers and other interested stakeholders must have access to information about offset projects, including the applied methodology, abatement estimates and project monitoring arrangements.</td>
</tr>
<tr>
<td>Demonstrate avoidance of leakage</td>
<td>The offset project must not cause material increases in emissions elsewhere which nullify or reduce the abatement that would otherwise result under the project.</td>
</tr>
<tr>
<td>Independently audited</td>
<td>Greenhouse gas emissions reductions generated by offset projects must be audited by an independent, qualified third party.</td>
</tr>
<tr>
<td>Registered</td>
<td>Offset units must be listed and tracked in a publicly transparent registry.</td>
</tr>
</tbody>
</table>

Table 6 Characteristics of high quality offsets (Sourced from the National Carbon Offset Standard)

It is recommended that agencies consider seeking out offsets that possess the characteristics in Table 6 if they want to be assured of the quality of their purchases. It is also recommended that agencies seek independent assurances from their offset provider to support any claims relating to the quality, integrity and credibility of their products.

There are a number of standards that have been developed both nationally and internationally to support mandatory compliance schemes and voluntary initiatives. Compliance markets are
created and regulated by mandatory national, regional or international carbon reduction regimes. Voluntary carbon markets function outside of the compliance market. They enable businesses, governments, non-government organisations and individuals to voluntarily offset their emissions by purchasing offsets that are generated under a number of mandatory and voluntary offset programs.

In the absence of a mandatory carbon market in Australia, the National Carbon Offset Standard (http://www.environment.gov.au/climate-change/carbon-neutral/ncos) and the Carbon Farming Initiative (http://www.climatechange.gov.au/government/initiatives/carbon-farming-initiative.aspx) set out the nationally accepted requirements for offsets in the Australian voluntary carbon market. Agencies that purchase offsets approved either of these initiatives can be assured that they meet the quality standards of the Australian Government.

The National Carbon Offset Standard (NCOS) specifies:

- The types of carbon offsets that constitute genuine, additional emissions reductions
- The general principles and requirements for calculating the carbon inventory of a product, organisation or event
- Requirements for reporting the carbon inventory, measures taken to reduce emissions and the amount reduced, the emissions offset, and the type of carbon offsets purchased and cancelled
- Requirements for auditing carbon inventory calculations and offset claims.

The Carbon Farming Initiative (CFI) is a national voluntary offsets scheme that allows farmers and land managers to earn carbon credits (Australian Carbon Credit Units or ACCUs) which can be sold to people and businesses wishing to offset their emissions. The CFI identifies various land management activities that are eligible to generate ACCUs and approves methodologies by which these can be generated.

Agencies may also wish to consider offsets that are accredited under international standards including:

- **Clean Development Mechanism (CDM)** – The CDM is one of two programs under which project based emissions reductions can be certified under the Kyoto Protocol. CDM projects take place in countries that have not ratified the Kyoto Protocol. Under the CDM, removal units (RMUs) are generated from land use activities and land-use change and forestry activities such as reforestation. Certified emission reductions (CERs) are generated from all other CDM project activities. More information is available from: http://cdm.unfccc.int/

- **Joint Implementation (JI)** - JI is the other programs under which project based emissions reductions can be certified under the Kyoto Protocol. JI projects take place in countries that have ratified the Kyoto Protocol. JI projects generate emission reduction units (ERUs). More information is available from: http://ji.unfccc.int/index.html

- **Verified Carbon Standard (VCS)** – The VCS is based on the CDM framework and its main objectives are to standardise and provide transparency and credibility to the voluntary offset market and encourage innovation in offset design. Tradable Voluntary Carbon Units (VCUs) are generated under the VCS. More information is available from: http://v-c-s.org/

- **Gold Standard (GS)** - The GS is a standard for the voluntary market which aims to ensure that sustainable development and environmental co-benefits are maximised by
approved carbon offset projects. Voluntary Emission Reductions (VERs) are generated by GS projects. More information is available from: [http://www.cdmgoldstandard.org/](http://www.cdmgoldstandard.org/)

It should be noted that the price of offsets will vary depending on which standard they are accredited under and where they are generated. It is recommended that agencies undertake due diligence to ensure that the offsets they purchase will be appropriate for their needs. Agencies may wish to seek professional assistance to undertake this task.


4.3 Select an offset provider

Once the agency has identified which offset standard meets its needs, it should then determine where it will purchase its offsets from. The agency should consider the following when making this decision:

- Is the offset provider able to provide written evidence to substantiate any claims it makes in relation to the quality and integrity of its offsets?
- Is the offset provider able to provide offsets from the types of projects that the agency requires? As previously noted, the agency might have a preference for its offsets to be generated in a particular region of the country or from a specific type of project, for example, a bio-sequestration project.
- Are the offsets available generated from a single project or from a pool of projects. Offsets sourced from a pool of projects present are considered to present less risk to the purchaser.
- Is the offset provider selling credits that have already been issued or credits from projects that will generate emission reductions in the future? While agencies can choose to purchase offsets that are not yet generated, it should be noted that best practice carbon accounting conventions do not allow for organisations to acquit ‘future credits’ against their inventory. This is only allowed when the emission reductions are generated, verified and credited.

4.4 Purchase and retire offsets

Once the agency has identified the offset provider and the offsets it wishes to purchase, it can then purchase the quantity of offsets it needs to fulfil the aims of its offset strategy.

The agency should then ensure that it retires the offsets that it has purchased to ensure that they will not be able to be sold again to another organisation and double counted. There are a number of private and government run registries that agencies can access to retire their offsets and in many cases the agency’s offset provider may be able to enable access to these. For example, Renewable Energy Certificates (RECs) can be retired under the Clean Energy Regulator’s REC Registry at: [https://www.rec-registry.gov.au/home.shtml](https://www.rec-registry.gov.au/home.shtml). Agencies may wish to seek out registries that are independently audited and should always seek written evidence to substantiate the acquittal/retirement of their offsets.
4.5 Disclose information transparently

If the agency wishes publicise its offsetting actions, it should ensure that any of the claims it makes are transparent. It is recommended that agencies disclose the following information to substantiate any of their offset claims:

- The aims and objectives of the agency's carbon management strategy, which includes its offset strategy.
- How the agency has calculated its greenhouse gas inventory, noting any emissions and uncertainties.
- What actions the agency has taken to reduce its greenhouse gas emissions.
- The characteristics of the offsets it has purchased, for example, the offset source, where the offset was purchased from, the offset standard applicable, evidence of any accreditiation of the offsets and evidence that the offsets have been retired.

The agency may wish to obtain independent advice before making any claims about its offsetting actions and refer to the guidance provided in the ACCC’s guide on Green Marketing and the Australian Consumer Law (https://www.accc.gov.au/publications/green-marketing-and-the-australian-consumer-law) before making any claims.

Offset Emissions Checklist

The following checklist can be used to ensure all key steps involved in offsetting the agency’s emissions have been completed.

<table>
<thead>
<tr>
<th>Have the following been completed?</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has an offset strategy been developed and agreed to?</td>
<td></td>
</tr>
<tr>
<td>Has a budget been obtained for the purchase of the required volume of offsets?</td>
<td></td>
</tr>
<tr>
<td>Do the offsets the agency wishes to purchase meet offset integrity standards?</td>
<td></td>
</tr>
<tr>
<td>Are the offsets accredited to an appropriate standard?</td>
<td></td>
</tr>
<tr>
<td>Has the agency identified a reputable offset provider?</td>
<td></td>
</tr>
<tr>
<td>Has the agency sourced document from the offset provider to substantiate any claims made regarding the offsets it has purchased?</td>
<td></td>
</tr>
<tr>
<td>Has the agency retired the offsets on a reputable registry and received written confirmation that this has occurred?</td>
<td></td>
</tr>
<tr>
<td>Are any claims that the agency wishes to make about its offsetting activities transparent and supported by relevant documentation?</td>
<td></td>
</tr>
</tbody>
</table>
5. Report

Reporting is an integral part of the emissions reduction process. The Greenhouse Gas Protocol defines a reporting as a process that presents relevant emissions information that is complete, consistent, accurate and transparent. It is in the agency’s best interest to use the best information available to prepare any reports on its carbon management project. Reporting may be voluntary or mandatory and may involve disclosing information to internal stakeholders, targeted stakeholders or to the general public. The communications plan for agency’s emissions reduction project should identify if and how the agency intends to report and what information it wishes to communicate.

5.1 Why report?

Agencies may be required to report their emissions through mandatory programs such as the National Greenhouse and Energy Reporting Scheme or to fulfil corporate reporting requirements, for example, Annual Reports or Sustainability Reports. Conversely agencies may wish to report their emissions or emission reduction achievements voluntarily for a number of reasons including:

- To raise awareness of their contributions to National or State emission reduction targets
- To increase understanding of their contribution to global emissions
- To communicate performance to external stakeholders, demonstrate leadership and improve reputation
- To encourage changes across their supply chains
- To better prepare for future policy developments related to greenhouse gas emissions and increase their ability to influence such policy development
- To share any successes with the wider community.

5.2 What and when to report?

Agencies’ overall emissions reductions project goals will determine when they should report and what they might report. For example, if the aim of an agency’s emissions reduction strategy and project is to achieve carbon neutrality over a five year period, it may choose to report at the end of the five years or to provide annual updates advising stakeholders of their interim progress in achieving its goal. However if an agency has mandatory reporting requirements, its timeframe for reporting and the information it will need to report will be dictated by the framework it is required to report under.

Table 7 sets out major milestones in an emissions management project and identifies what an agency might report when it achieves each of these.

<table>
<thead>
<tr>
<th>Emissions reductions project step</th>
<th>Potential information to report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project plan</td>
<td>Project motivations, expectations and outcomes</td>
</tr>
<tr>
<td></td>
<td>The project charter</td>
</tr>
<tr>
<td></td>
<td>Project goals (for example, the agency’s reduction target)</td>
</tr>
<tr>
<td>Measure emissions</td>
<td>Organisational boundaries and emission sources</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Accounting methodology used</td>
</tr>
<tr>
<td></td>
<td>Calculation methods</td>
</tr>
<tr>
<td></td>
<td>Any assumptions made, gaps in information or uncertainties</td>
</tr>
<tr>
<td></td>
<td>Baseline emissions (total emissions, emissions by scope, emissions by source and emissions intensity)</td>
</tr>
<tr>
<td>Reduce emissions</td>
<td>The agreed reduction strategy</td>
</tr>
<tr>
<td></td>
<td>Abatement projects to be implemented</td>
</tr>
<tr>
<td></td>
<td>Abatement projects considered but not implemented</td>
</tr>
<tr>
<td></td>
<td>The agency’s Marginal Abatement Cost Curve</td>
</tr>
<tr>
<td></td>
<td>Total tonnes CO2-e reduced through abatement measures</td>
</tr>
<tr>
<td>Offset</td>
<td>The agreed offset strategy</td>
</tr>
<tr>
<td></td>
<td>Total volume of offsets purchased</td>
</tr>
<tr>
<td></td>
<td>Details of offsets purchased (project/s offsets are generated from, offset provider, accreditation standard, proof of verification and offset retirement)</td>
</tr>
<tr>
<td>Report</td>
<td>Results of project (including assessment of results against any agreed targets)</td>
</tr>
</tbody>
</table>

Table 7 Potential reporting options in a carbon management project


5.3 Where to report?

Where agencies report will be largely determined by whether they are reporting because they are required to or because they choose to. Mandatory reporting schemes such as the National Greenhouse and Energy Reporting Scheme determine where their reporter’s emissions information will be reported publicly. Agencies that report voluntarily however will be able to choose where they will report. Internal reporting options include bulletin boards, intranet and staff newsletters. External reporting options include via media releases, on websites or in Annual Reports or Sustainability Reports.
The forum through which the agency decides to report its results will determine the amount of information and the level of detail it chooses to report. For example, press releases are usually kept short and simple whereas if the agency chooses to report on its website it has the option of providing more information on its baseline emissions, abatement and offsetting activities.

It should be noted that the public reporting does present a number of risks to agencies. These risks include:

- Reputation risk if reported information is not accurate or verifiable
- Legal risk if reported information is misleading or false
- Fiduciary risk if public money has been spent on a project that has failed to produce ‘value for money’.

Agencies may therefore wish to consider having any claims they wish to make independently verified before these are made publicly.
SECTION B – Wombat Creek Shire case study

This case study sets out how Wombat Creek, a FICTIONAL local government agency undertakes a carbon management and emissions reduction project following the guidelines provided in Section A of this document.

Wombat Creek Shire is located on the South West coast of Australia, in a town called Kanowa. It is responsible for supplying the local street lighting and a local bus service. The Shire office has 40 full time employees and six part time employees. Its office is located in a 17 year old building which is leased. It operates a fleet of cars and buses and is responsible for managing and disposing of its own waste.

The Shire’s Financial Accountant, who has a personal interest in emissions management and increasing efficiency, suggested undertaking the carbon management and emissions reduction project. The Mayor supported the initiative and appointed him as the project manager.

The Shire undertook the following steps to implement its carbon management and emissions reduction project.

1. Develop the Project Framework

The first step Wombat Creek undertook was to define the framework for the project defining the key project characteristics.

1.1 Define the project’s purpose

The Shire’s aims in undertaking the project were to demonstrate its commitment to reducing greenhouse gas emissions and improving the energy efficiency of its operations and to encourage employees and the local community to reduce their emissions.

1.2 Establish a project charter

The Shire’s goals for the project were to:

- Establish its baseline inventory for the 2012–13 financial year
- Reduce its emissions by 10 per cent through implementing cost-effective abatement projects and offsetting any residual emissions to reach its 10 per cent target. The Shire aims to have completed this by 30 June 2016
- To raise awareness of climate change issues within its office and work towards doing the same in its community.

The project manager’s aim was to account for all the emissions within the Shire’s control in its greenhouse gas emissions inventory, as long as data was available to estimate these emissions. Once the Shire’s inventory was estimated, the Project Team with the assistance of relevant staff in the Shire would identify, analyse and agree on the measures that would reduce the Shire’s emissions. If the emission reduction projects did not result in the Shire reducing its emissions by 10 per cent, the Shire would purchase offsets to assist it to achieve this goal.
1.3 Set up project team

To successfully implement the project, the project manager established a Carbon Management Team. The team consists of four members who have been selected from different departments to ensure the team has widespread knowledge of the Shire. The team members’ roles and responsibilities are set out in Section 1.6.

1.4 Obtain project support and budget

The Wombat Creek Mayor agreed to be the Project Sponsor and together with the Project Manager they established that the initial budget would include the time and resources (including money) required to collect emissions data and measure the Shire’s carbon inventory, as well as to implement its abatement strategy and purchase carbon offsets if required. A rough estimation of the budget was made and agreed to by the Shire Council.

1.5 Identify key project stakeholders

While the Carbon Management Team is responsible for initiating and facilitating the project, the team needs involvement and support from key stakeholders across the Shire to identify and approve the actions for implementation. A number of key managers and councillors have been identified to engage and keep informed of the project. Any significant decisions, including budget decisions, would be referred to the council members during their scheduled regular meetings.

1.6 Develop a detailed project plan

The Carbon Management Team prepared a project plan that defined team members’ roles and responsibilities, and identified timeframes for achieving the key project milestones. These are set out in Table 8. The implementation of the abatement actions chosen by the Carbon Management Team would be carried out by the area of the Shire office that had oversight over the relevant area that the action was to be implemented in. For example, actions related to the Shire’s vehicle fleet would be managed by the Shire’s finance officer who is responsible for overseeing the management of the fleet. The Carbon Management Team planned to hold weekly meetings to monitor the progress of the project.

<table>
<thead>
<tr>
<th>Team member</th>
<th>Responsibility</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project sponsor</td>
<td>Secure funding to implement the project</td>
<td>Before the commencement of project</td>
</tr>
<tr>
<td></td>
<td>Be the public face of the project and promote the project when possible including in the media when relevant and to the community</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Project manager</td>
<td>Define the project</td>
<td>Before the commencement of project</td>
</tr>
<tr>
<td></td>
<td>Secure funding and a project sponsor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Define roles and responsibilities of the project team</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identify key project milestones and timeframes</td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td>Task</td>
<td>Timeframe</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Team Member 1</td>
<td>Define the Shire’s reporting boundary and with other team members, identify all emissions sources and oversee the development of the Shire’s emissions inventory</td>
<td>Week 0–6</td>
</tr>
<tr>
<td></td>
<td>With the Carbon Management Team and other relevant staff, identify opportunities to reduce the Shire’s emissions</td>
<td>Weeks 7–9</td>
</tr>
<tr>
<td></td>
<td>Lead the development of the Shire’s emissions reduction strategy in consultation with the Carbon Management Team</td>
<td>Weeks 10–12</td>
</tr>
<tr>
<td></td>
<td>Oversee the implementation of the Shire’s emissions reduction strategy</td>
<td>As required</td>
</tr>
<tr>
<td></td>
<td>Lead the development of the Shire’s offset strategy in consultation with the Carbon Management Team</td>
<td>Weeks 13–15</td>
</tr>
<tr>
<td></td>
<td>Implement the Shire’s offset strategy including purchasing and acquitting the Shire’s offsets</td>
<td>Once emission reductions have been quantified and quantity of offsets required has been determined</td>
</tr>
<tr>
<td></td>
<td>Monitor the day-to-day progress of the team and ensure they stay on track to complete the project within budget and timeframe</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Team Member 2</td>
<td>Work with project manager to identify all emission sources within the Shire’s reporting boundary</td>
<td>Week 0–2</td>
</tr>
<tr>
<td></td>
<td>Identify how to determine usage of purchased electricity for the 2013–14 year and to calculate associated emissions</td>
<td>Week 2–4</td>
</tr>
<tr>
<td></td>
<td>Collect data on electricity consumption over the 2013–14 year and estimate emissions associated with this</td>
<td>Week 4–6</td>
</tr>
<tr>
<td></td>
<td>Participate in the development and implementation of the Shire’s emissions reduction strategy</td>
<td>From week 10 onwards through duration of project</td>
</tr>
<tr>
<td></td>
<td>Participate in the development and implementation of the Shire’s offset strategy</td>
<td>From week 13 onwards through duration of project</td>
</tr>
<tr>
<td>Team Member 2</td>
<td>Work with project manager to identify all emission sources within the Shire’s reporting boundary</td>
<td>Week 0–2</td>
</tr>
<tr>
<td></td>
<td>Identify how fuel consumed in vehicles during the 2013–14 year will be measured and emissions from</td>
<td>Week 2–4</td>
</tr>
<tr>
<td>Team Member 3</td>
<td>Task Description</td>
<td>Time Frame</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Work with project manager to identify all emission sources within the Shire’s reporting boundary</td>
<td>Week 0–2</td>
</tr>
<tr>
<td></td>
<td>Identify how waste produced during the 2013–14 year will be measured and emissions from this source calculated</td>
<td>Week 2–4</td>
</tr>
<tr>
<td></td>
<td>Collect data on waste produced and estimate associated emissions</td>
<td>Week 4–6</td>
</tr>
<tr>
<td></td>
<td>Participate in the development and implementation of the Shire’s emissions reduction strategy</td>
<td>From week 10 onwards through duration of project</td>
</tr>
<tr>
<td></td>
<td>Participate in the development and implementation of the Shire’s offset strategy</td>
<td>From week 13 onwards through duration of project</td>
</tr>
</tbody>
</table>

Table 8 Wombat Shire Council’s Project Plan
2. Measure Emissions, Establish Baseline Inventory

Once the project had been defined, the Carbon Management Team went about estimating the Shire’s greenhouse gas emissions inventory or carbon inventory by following the process set out in Section A of these guidelines. The steps taken by the team are set out below.

2.1 Define the Shire’s organisational boundary

The Carbon Management Team’s first task was to define the Shire’s organisational boundary and determine the emissions it was responsible for accounting for in its greenhouse gas emissions inventory. To do this the team first mapped out the Shire’s assets, activities and processes that generated emissions. It then determined which of these emission sources the Shire had operational control over and was therefore should be included in its greenhouse gas emissions inventory. The sources of emissions identified under the agency’s organisational boundary included electricity consumption in buildings and street lights and fuel consumed in the Shire’s vehicle fleet. While the Shire did not treat the waste it generated, and therefore the emissions generated from this source are not within its operational control, the Carbon Management Team decided to include emissions from waste within its inventory to provide an incentive for staff to reduce the emissions associated with it.

2.2 Define the Shire’s operational boundary

The team then determined the Shire’s operational boundary by categorising its emissions as either Scope 1 (Direct emissions), Scope 2 (Indirect emissions) or Scope 3 emissions (Other indirect emissions). The outcomes of these first two steps are illustrated in Figure 5.

![Figure 5 The Shire’s emissions sources by scope](image_url)
2.3 Choose calculation method and collect data

In order to identify what data the Carbon Management Team needed to collect, it first identified what calculation method it would use. The Carbon Management Team decided that in order to remain consistent with national greenhouse gas emissions accounting approaches it that it would use methods set out in the Department Environment’s National Greenhouse Accounts Factors publication to calculate its emissions (available at: http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/publications#factors).

After considering the methods for calculating its emissions from electricity consumption, fuel consumed in vehicles and waste, it identified the data it needed to collect to perform these calculations. The team then identified the data sources and the team member responsible for collecting this data. The relevant team member then went about collecting the data required. The Shire’s data needs, its data sources and the data collected are summarised in Table 9.

<table>
<thead>
<tr>
<th>Emission source</th>
<th>Data needed</th>
<th>Data source</th>
<th>Activity data collected for 2012–13 financial year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity consumed by street lighting</td>
<td>Amount of electricity consumed by street lights over the financial year.</td>
<td>Monthly electricity bill indicating electricity consumed by street lighting. Monthly data aggregated to give total electricity consumed by street lights during the financial year.</td>
<td>548,683 kWh (kilowatt hour) electricity consumed by street lighting.</td>
</tr>
<tr>
<td>Electricity consumed in Shire building</td>
<td>Amount of electricity consumed in the Shire’s building over the financial year.</td>
<td>Monthly electricity bills sourced from building manager. Monthly data aggregated to give total electricity consumed in the Shire’s buildings during the financial year.</td>
<td>412,889 kWh (kilowatt hour) electricity consumed in Shire’s buildings</td>
</tr>
<tr>
<td>Fuel consumed in vehicle fleet (Shire operates a fleet of cars and buses. The cars consume petrol and the buses consume diesel)</td>
<td>Amount of petrol consumed by the Shire’s cars and diesel consumed by the Shire’s buses over the financial year.</td>
<td>Fuel for the cars and buses are purchased on a fuel card allocated to each vehicle. The Shire is provided with monthly statements that summarise the amount and type of fuel purchased by each vehicle. Monthly data is aggregated to give total quantity of petrol and diesel consumed by the Shire’s vehicles during the financial year.</td>
<td>52L (kilolitres) petrol consumed in cars 78L (kilolitres) diesel consumed in buses</td>
</tr>
</tbody>
</table>
Waste generated | Amount of mixed/comingled waste generated by the Shire over the financial year. | The Carbon Management Team conducted a pilot during which it measured the amount of waste generated by the Shire’s offices and subsequently sent to landfill during a two week period and used this to estimate the total waste generated during the financial year. | 4.8t (tonnes) mixed/comingled waste generated

<table>
<thead>
<tr>
<th>Emission source</th>
<th>Calculation method</th>
<th>Data input</th>
<th>Emissions (tCO2-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity consumed by street lighting</td>
<td>Y = Q x (EF/1000)</td>
<td>Q = 548, 683kWh, EF = 0.82 kgCO2-e/kWh</td>
<td>Y = 548, 683 x (0.82/1000) = 477.35tCO2-e</td>
</tr>
<tr>
<td>Where:</td>
<td>Y is the Scope 2 emissions measured in tCO2-e.</td>
<td>Q is the quantity of electricity purchased and consumed in street lights (kilowatt hours).</td>
<td>EF is the emission factor for the South West Interconnected System or SWIS</td>
</tr>
<tr>
<td>Electricity consumed in Shire building</td>
<td>Y = Q x (EF/1000)</td>
<td>Q = 412, 889kWh, EF = 0.82kgCO2-e/kWh</td>
<td>Y = 412, 889 x (0.82/1000) = 359.21tCO2-e</td>
</tr>
<tr>
<td>Where:</td>
<td>Y is the Scope 2 emissions measured in tCO2-e.</td>
<td>Q is the quantity of electricity purchased and consumed the Shire’s buildings (kilowatt hours).</td>
<td></td>
</tr>
</tbody>
</table>
EF is the emission factor for the South West Interconnected System or SWIS

**Petrol consumed Shire’s cars**

\[ Y = Q \times EC \times EF/1000 \]

Where:
- Y is the Scope 1 emissions measured in tCO\(_2\)-e.
- Q is the quantity of petrol purchased and consumed in the Shire’s cars (kilo litres).
- EC is the energy content of the petrol (kgCO\(_2\)-e/GJ)
- EF is the relevant Scope 1 emission factor

\[ Q = 52kL \]
\[ EC = 34.2GJ/kL \]
\[ EF = 67.0kgCO_2\text{-e/GJ} \]

\[ Y = Q \times EC \times EF/1000 \]
\[ = 52 \times 34.2 \times 67/1000 \]
\[ = 119.15\text{tCO}_2\text{-e} \]

**Diesel consumed Shire’s buses**

\[ Y = Q \times EC \times EF/1000 \]

Where:
- Y is the Scope 1 emissions measured in tCO\(_2\)-e.
- Q is the quantity of petrol purchased and consumed in the Shire’s cars (kilo litres).
- EC is the energy content of the petrol (kgCO\(_2\)-e/GJ)
- EF is the relevant Scope 1 emission factor

\[ Q = 78kL \]
\[ EC = 38.6GJ/kL \]
\[ EF = 69.8kgCO_2\text{-e/GJ} \]

\[ Y = Q \times EC \times EF/1000 \]
\[ = 78 \times 38.6 \times 69.8/1000 \]
\[ = 210.15\text{tCO}_2\text{-e} \]

**Waste generated**

\[ Y = Q \times EF \]

Where:
- Y is the Scope 3 emissions measured in tCO\(_2\)-e.
- Q is the quantity of comingled waste produced (tonnes).
- EF is the relevant Scope 3 emission factor

\[ Q = 4.8t \]
\[ EF = 0.9 \]

\[ Y = Q \times EF \]
\[ = 4.8 \times 0.9 \]
\[ = 4.32\text{tCO}_2\text{-e} \]

**Table 10** Shire’s emissions calculations and emissions by source
2.5 Aggregate emissions

The Carbon Management Team then aggregated the emissions from the various sources to determine the Shire’s greenhouse gas emissions inventory for the 2011-2012 financial year. This is set out in Table 11.

<table>
<thead>
<tr>
<th>Emissions source</th>
<th>Scope 1 emissions (tCO2-e)</th>
<th>Scope 2 emissions (tCO2-e)</th>
<th>Scope 3 emissions (tCO2-e)</th>
<th>Total emissions (tCO2-e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity consumed by street lighting</td>
<td></td>
<td>477.35</td>
<td></td>
<td>477.35</td>
</tr>
<tr>
<td>Electricity consumed in Shire building</td>
<td></td>
<td>359.21</td>
<td></td>
<td>359.21</td>
</tr>
<tr>
<td>Petrol consumed Shire’s cars</td>
<td>119.15</td>
<td></td>
<td></td>
<td>119.15</td>
</tr>
<tr>
<td>Diesel consumed Shire’s buses</td>
<td>210.15</td>
<td></td>
<td></td>
<td>210.15</td>
</tr>
<tr>
<td>Waste generated</td>
<td></td>
<td>4.32</td>
<td></td>
<td>4.32</td>
</tr>
<tr>
<td><strong>Total emissions (tCO2-e)</strong></td>
<td><strong>329.3</strong></td>
<td><strong>836.56</strong></td>
<td><strong>4.32</strong></td>
<td><strong>1,170.18</strong></td>
</tr>
</tbody>
</table>

Table 11: Shire’s greenhouse gas emissions inventory for the 2012–13 financial year

2.6 Verify inventory

As the Shire’s inventory is not going to be publicly released, the Carbon Management Team decided that it was not necessary to have it verified externally. Instead, a member of the Shire’s Business Management section, reviewed the source data and calculations to verify it internally.

3. Reducing the Shire’s emissions

Once the calculation of the Shire’s 2012–13 inventory was complete, the Carbon Management Team went about determining how to reduce the Shire’s emissions.

3.1 Identify reduction measures

The project manager ran a workshop to identify potential measures to reduce the Shire’s greenhouse gas emissions. The workshop was attended by key operational staff from various areas of the Shire and was informed by the project manager’s research on the actions other similar organisations had successfully implemented to reduce their emissions. Table 11 sets out the emission reduction measures identified by the workshop attendees that could potentially be implemented by the Shire.
### Table 11 Potential emission reduction opportunities available to the Shire

* This project has been used to illustrate how to plot the project onto a MACC

#### 3.2 Establish costs and benefits of abatement measures
The Carbon Management Team then undertook the development of a Marginal Abatement Cost Curve (MACC) of the emission reduction projects identified to assist it to determine which reduction or abatement measures were the most cost effective. The example below shows the project to upgrade the energy efficiency of appliances (fridges, dishwashers and microwaves) was mapped onto a MACC. Similar analysis was undertaken for the other options deemed worthy of consideration by the Carbon Management Team.

In the 2012–13 financial year, the Shire’s emissions from purchased electricity consumed in its offices was approximately 400 tCO\(_2\)-e (see Table 10).

The Carbon Management Team estimated the following:

- 10 per cent of the electricity consumed in its offices (i.e. 40 tCO\(_2\)-e/year) could be attributed to the use of appliances and
- Upgrading the existing appliances to more energy efficiency options would reduce energy consumption and emissions by 30 per cent (i.e. 12 tCO\(_2\)-e/year).

Based on this information, the Carbon Management Team concluded that over five years, upgrading to energy efficiency appliances will result emissions reductions of 60 tCO\(_2\)-e emissions (i.e. 12 tCO\(_2\)-e/year for five years).

The Carbon Management Team then conducted a net present value (NPV) calculation to determine the total abatement cost associated with the project. This calculation is set out in Table 12.

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital cost ($)(^1)</td>
<td>6,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating cost/saving ($)(^2)</td>
<td>1,898</td>
<td>1,898</td>
<td>1,898</td>
<td>1,898</td>
<td>1,898</td>
</tr>
<tr>
<td>Net cash flows ($)(^3)</td>
<td>-4,102</td>
<td>1,898</td>
<td>1,898</td>
<td>1,898</td>
<td>1,898</td>
</tr>
<tr>
<td>NPV(^4) (at 8% discount rate)($)</td>
<td>2,184</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emissions avoided (tCO(_2)-e)</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Cost of abatement ($/tCO(_2)-e)</td>
<td>36.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 12 Cost of abatement associated with upgrading to energy efficiency appliances

1 Capital outlay for the purchase the following energy efficiency equipment: two fridges ($1,000 each), two dishwashers ($1,500 each) and two microwaves ($500 each).

2 It was estimated that 10 per cent of building electricity (i.e. 10\% \times 412,889 kWh = 41,289 kWh / year) is consumed to power appliances. Therefore amount of electricity used to power appliances = 10\% \times 412,889 kWh = 41,289 kWh/year. Cost of electricity = 15.32c/kWh. Therefore total cost of electricity to operate appliances = 15.32c \times 41,289 kWh = $6,325 per year. A 30 per cent electricity saving is expected by switching to energy efficient appliances. Annual electricity cost saved is therefore 30\% of $6,325 = $1,898 per year.
3 Net cash flows = Operating cost savings – Capital cost

4 The Net Present Value (NPV) represents the total value of the project by summing all its costs and savings and adjusted for the time value of money (the discount rate). Where costs exceed the savings, the NPV will be a negative value representing a net cost to the agency. Conversely, where the savings exceed the costs, the NPV will be a positive number evidencing that the project will pay for itself.

The NPV of a project is calculated according to the formula \( \frac{R_t}{(1+i)^t} \)
where: \( R_t \) is the net cash flow, \( t \) is the project lifetime and \( i \) is the discount rate.

Based on these calculations, the Carbon Management Team concluded that upgrading to energy efficiency appliances would abate 12 tonnes of \( \text{CO}_2\text{-e} \) at a cost of $36.40 per tonne. The Carbon Management Team then calculated the payback period for the project. The cost of implementation was capital expenditure of $6,000 and the project resulted in operational cost savings of $1,898 annually. According to the payback period for the project was calculated at three years and two months.

The calculations above were carried out for all of the other abatement measures and were plotted on a Marginal Abatement Cost Curve below.

![Figure 6 Example MACC showing placement of Shire’s appliance efficiency upgrade project](image)

3.3 Develop a reduction strategy

The Shire’s aims in undertaking a carbon management project were to:

- Establish its baseline inventory for the 2012–13 financial year
- Reduce its emissions by 10 per cent through implementing cost-effective abatement projects and offsetting any residual emissions to reach its 10 per cent target. The Shire aims to have completed this by 30 June 2016.
The Shire determined that it would not implement any projects that cost over $40 per tonne of CO$_2$-e, and that it would implement those with a payback period of less than five years.

As is evidenced by the MACC, there were five projects that cost less than $40 per tonne of CO$_2$-e, including three that could be implemented at a negative cost.

The Carbon Management Team also identified four other projects which have a payback of less than five years. They included the following:

- Upgrading all street lights to more energy efficient models with the aim to have this completed within eight months.
- Replacing the Shire’s Petrol fleet cars with LPG vehicles when their leases expire. Its aim is to replace six of its cars with LPG models in the following nine months.
- Replacing its bus fleet with smaller special purpose vehicles (small people movers) when their ten-year leases are up for renewal. It aims to replace three buses with special purpose vehicles over the next 14 months and the remainder over five years.
- The building owner has agreed to upgrade all appliances in the next six months, as well as switch to 50 per cent GreenPower. The Carbon Management Team did note that the switch to 50 per cent GreenPower would negatively impact the abatement potential of the other energy efficiency measures but still decided that this was an option worth pursuing.
- The building owner conditionally agreed to upgrade the current building insulation within the next year. This will keep the building cooler in summer and warmer in winter, reducing the need for air-conditioning and heating. The building owner has agreed to implement these changes if both the Shire and the other tenant in the building agree to a 10 per cent increase in rental costs and further agree to an increase to the fixed term of the tenancy agreement. Both the Shire and the other tenant have agreed to these terms on condition that they are both included in all business decisions during the upgrade.

A proposal with further information on each of these activities was prepared and presented to the Mayor (the Project Sponsor) to take to the Council for consideration for funding.

4. Offsetting the Shire’s residual emissions

The Shire has committed to offset residual emissions to achieve its 10 per cent emissions reductions target and undertook the following steps to achieve this goal. The Shire made the decision to consider the offsetting component of the carbon management project independently of the emissions reductions component of the project. However, through experience gathered through this project, the project manager identified that the cost efficiency of purchasing offsets would have been better considered alongside that of the emission reduction projects guaranteeing that decisions to implement either emission reduction or offset projects would be based on consideration of the financial impact and cost effectiveness of all options available.

4.1 Develop offset strategy

The project manager oversaw the implementation of the selected emissions reduction projects selected during the financial year. At the end of that year, the Project Management Team recalculated the Shire’s inventory and determine the quantity of offsets that it was required to purchase to meet its 10 per cent reduction target. The Project Management Team decided that it would also purchase an additional 10 per cent (of the quantity of offsets it needs to achieve the 10 per cent reduction in emissions) as a buffer. The team has decided that it would only
purchase offsets that have been produced in Western Australia and accredited by a reputable organisation, thus guaranteeing that they are real, verified, additional and credible. The team also identified the maximum cost at which it would purchase these offsets.

4.2 Identify suitable offset standard

The project manager in consultation with the project team and sponsor determined that the Shire would only purchase offsets accredited under the Australian Government’s National Carbon Offset Standard because this would ensure that the offsets purchased would meet national standards for additionality, permanence, measurability and transparency. In addition the integrity of the offsets purchased would be independently verified.

4.3 Select an offset provider

The Carbon Management Team decided that the Shire’s offsets would be sourced from Western Australian renewable energy projects and projects that reduced methane emissions from landfill.

4.4 Purchase and retire offsets

The project manager purchased the predetermined quantity of offsets on behalf of the Shire and authorised these to be retired on the offset provider’s registry.
5. Reporting

While the Shire has no legal obligations to report its greenhouse gas emissions or any emissions reductions activities that it has undertaken, the Carbon Management Team decided to publicise the outcomes of the Shire’s carbon management project internally through a series of staff email bulletins.

It also decided to report on the project’s outcomes externally to demonstrate to its community that it is committed to reducing its carbon inventory and increasing the energy efficiency of its operations. The Shire subsequently published information on the project in its annual report with further information provided on the project methodology on its website.
Glossary

A number of key terms will be referred to throughout this document. To help with understanding these, some definitions have been provided below.

**Abatement Project**  
Any project which will reduce an agency’s net greenhouse gas (GHG) emissions

**Baseline year**  
A criterion for assessing whether a project has resulted in greenhouse gas emission reductions or removals in addition to what would have occurred in its absence. This is an important criterion when the goal of the project is to offset emissions elsewhere.

**Carbon Offset (or Offset)**  
Represents a reduction in greenhouse gases, or enhancement of greenhouse gas removal from the atmosphere by sinks, relative to a business-as-usual baseline. Carbon offsets are tradeable and often used to negate (or offset) all or part of another entity’s emissions.

**Carbon sink**  
Any physical unit or process that stores greenhouse gases. Examples of these include forests and underground/deep sea reservoirs of CO2.

**CO₂ equivalent (CO₂-e)**  
The universal unit of measurement to indicate the global warming potential (GWP) of each of the six greenhouse gases, expressed in terms of the GWP of one unit of carbon dioxide. It is used to evaluate releasing (or avoiding releasing) different greenhouse gases against a common basis.

**Direct emissions**  
Emissions from sources that are owned or controlled by the reporting agency.

**Discount Rate**  
A discount rate is applied to Net Present Value (NPV – see definition below) calculations to allow for the diminishing value of money over time (i.e. $100 today will not buy the same value of goods in 5 years time).

Similarly, a discount rate can be applied to forecast GHG abatement to reflect the preference for earlier abatement and the risk that future abatement may not occur at the rate forecast.

**Double counting**  
Two or more reporting organisations take ownership of the same emissions or reductions.

**Emissions**  
The release of greenhouse gases into the atmosphere.

**Emissions factors**  
Emission factors are used to calculate greenhouse gas emissions by multiplying the factor (e.g. kg CO₂-e/GJ energy in petrol) with the activity data (e.g. kilolitres x energy density of petrol used).

**Global Warming Potential (GWP)**  
A factor describing the radiative forcing impact (degree of harm to the atmosphere) of one unit of a given GREENHOUSE GAS relative to one unit of CO2.

**Greenhouse Gas (GHG)**  
The atmospheric gases responsible for causing global warming and climate change. The six Kyoto Protocol classes of greenhouse gases are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydro-fluorocarbons (HFCs), per-fluorocarbons (PFCs) and sulphur hexafluoride (SF₆).
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Greenhouse gas registry</td>
<td>A public database of organisational greenhouse gas emissions and/or project reductions. To ensure that they are not double counted, offsets are generally retired on greenhouse gas registries.</td>
</tr>
<tr>
<td>Greenhouse gas removal</td>
<td>Absorption or sequestration of greenhouse gases from the atmosphere.</td>
</tr>
<tr>
<td>Greenhouse gas sink</td>
<td>Any physical unit or process that stores greenhouse gases; usually refers to forests and underground/deep sea reservoirs of CO2.</td>
</tr>
<tr>
<td>Greenhouse gas source</td>
<td>Any physical unit or process which greenhouse gas into the atmosphere.</td>
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<tr>
<td>Indirect emissions</td>
<td>Emissions that are a consequence of the operations of the reporting organisation, but occur at sources owned or controlled by another company or organisation (e.g. Power purchase, third party transport of fuels, materials and finished products to and from locations).</td>
</tr>
<tr>
<td>Inventory</td>
<td>A quantified list of an organization’s greenhouse gas emissions and sources.</td>
</tr>
<tr>
<td>Inventory boundary</td>
<td>An imaginary line that encompasses the direct and indirect emissions that are included in the inventory. It results from the chosen organizational and operational boundaries.</td>
</tr>
<tr>
<td>Investment Timeframe</td>
<td>The period of time in which an agency will invest in the project. This does not need to be the same as the Project Lifetime.</td>
</tr>
<tr>
<td>Marginal Abatement Cost (MAC)</td>
<td>The cost per unit of GHG emissions abated throughout the lifetime of the Project. The Marginal Abatement Cost is commonly referred to in terms of $/tonne of CO$_2$-e abated.</td>
</tr>
<tr>
<td>Marginal Abatement Cost Curve (MACC)</td>
<td>A graph depicting the Marginal Abatement Cost of all abatement projects to assist with decision making.</td>
</tr>
<tr>
<td>Net Present Value (NPV)</td>
<td>The total value of a project given in ‘present day’ dollar values. It is the total cost of the project over its lifetime less all anticipated savings, with a discount factor applied to allow for the diminishing value of money over time. This value can be positive (a net saving) or negative (a net cost).</td>
</tr>
<tr>
<td>Project Lifetime</td>
<td>The total lifetime of the project, often equivalent to the period for which project will continue to deliver GHG abatement.</td>
</tr>
<tr>
<td>Offset</td>
<td>Offsets are discrete greenhouse gas reductions used to compensate for (i.e. offset) greenhouse gas emissions elsewhere, for example to meet a voluntary or mandatory greenhouse gas target or cap. Carbon offsetting involves calculating a person or entity’s greenhouse gas emissions, they can then purchase credits from projects involved in emission reduction that have either prevented or removed the emission of an equivalent amount of greenhouse gas elsewhere.</td>
</tr>
<tr>
<td>Operational boundaries</td>
<td>The boundaries that determine the direct and indirect emissions associated with operations owned or controlled by the reporting entity. This assessment allows an entity to establish which operations and...</td>
</tr>
</tbody>
</table>
Guidelines for Developing a Marginal Abatement Cost Curve
August 2014

sources cause direct and indirect emissions, and to decide which indirect emissions to include that are a consequence of its operations

**Organisational boundaries**

The boundaries that determine the operations owned or controlled by the reporting entity, depending on the consolidation approach taken (equity or control approach).

**Renewable energy**

Energy taken from sources that are inexhaustible, e.g. wind, water, solar, geothermal energy, and biofuels.

**Reporting**

Presenting data to internal management and external users such as regulators, shareholders, the general public or specific stakeholder groups.

**Retired offsets**

Offsets are retired, generally on a registry, when they have been purchased and used. A retired offset prevents them from being claimed in the future.

**Scope 1 emissions**

Also known as ‘Direct emissions’. Scope 1 emissions are produced from sources within the boundary of an organisation and as a result of that organisation’s activities.

**Scope 2 emissions**

Also known as ‘Energy indirect emissions’ are emissions associated with the generation of electricity, heating/cooling, or steam purchased for own consumption.

**Scope 3 emissions**

Also known as ‘other indirect emissions’ are emissions that occur outside the boundary of a facility under the operational control of the agency (and which are not considered scope 2 emissions).

**Verification**

An independent assessment of the reliability (considering completeness and accuracy) of a greenhouse gas emissions inventory.
Useful Resources


