A GROWER'S GUIDE FOR NORTH EAST NSW

Realising the Carbon Sequestration Benefits of Planted Forests

North East NSW Forestry Hub

2rog

North East NSW Forestry Hub

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DISCLAIMER

This report was prepared according to the scope, brief and project information provided by the North East NSW Regional Forestry Hub. All findings, conclusions or recommendations in the report are based on the information provided and collected for this project, and on the personal expertise of the lead author. The report is for the use of the Hub only and 2rog Consulting accepts no liability or responsibility for its use by other parties.

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ABBREVIATIONS

Abbreviation	Description
ACCU	Australian Carbon Credit Unit
ANREU	Australian National Registry of Emissions Units
CEA	Carbon Estimation Area
CER	Clean Energy Regulator
CO_2	Carbon Dioxide
ERF	Emission Reduction Fund
FAE	Forward Abatement Estimate
FMP	Forestry Management Plan
GWP	Global Warming Potential
$t.CO_2$	Tonnes of Carbon Dioxide

OVERVIEW

North East NSW is a favourable region for establishing and growing planted forests for timber and environmental benefits. Much of the region experiences high rainfall, has productive soil and a long growing season. Tree growth rates are relatively high compared with other regions and there are a broad range of landscapes to support a diverse range of native and exotic species. On the coast and hinterland plantation species such as blackbutt (*Eucalyptus pilularis*), spotted gum (*Corymbia maculata*), and southern pines (*Pinus elliottii, Pinus caribaea* and their hybrids) all perform well. On the tablelands radiata pine (*Pinus radiata*) is a proven performer. When established on cleared land these plantations will produce sawlogs, poles, and veneer as well as fencing timber and firewood. The same plantations can be used to protect and restore soils and water catchments, enhance biodiversity, and capture and store carbon.

North East NSW has a well-established timber industry which services a growing national demand for wood. There are over fifty active wood processing facilities within the region which means that land where trees can be grown is often located close to a market.

Planted forests require a substantial up-front investment, including tree stock, site preparation and planting, and then there are ongoing maintenance costs like weed control, pruning, and thinning. Returns from timber products are often not realised for at least 20 years or longer, and long-term discount factors applied to future returns can make the initial investment unattractive.

There is now an opportunity to offset up-front and ongoing costs by generating income from carbon. This is because trees capture carbon dioxide (CO_2) from the atmosphere naturally (via photosynthesis) and covert it to carbon as they grow. This process is called carbon sequestration. The amount of carbon that is sequestered can be readily calculated. Once accounted for, the carbon can be converted into 'carbon credits' and its value realised through the Commonwealth Government's Emissions Reduction Fund.

PURPOSE OF THIS GUIDE

This Guide is for private landholders and investors seeking to generate an income from the carbon sequestered in planted forests under the Commonwealth Government's Emission Reduction Fund (ERF)[1].

The Guide is separated into four (4) sections.

Section 1 describes the carbon cycle and how woody vegetation (including planted trees) sequesters CO_2 from the atmosphere. Some examples are included of the amount of carbon that can be sequestered by planted forests in the north-east NSW region.

Section 2 steps through how to generate carbon credits (called Australian carbon credit units - ACCUs) under the ERF, including:

- An overview of how the ERF is structured
- Project due diligence

  This covers issue such as site suitability, site eligibility, financial viability, legal right, additionality, permanence and governance.
- Selecting an appropriate methodology

  There are two methodologies associated with carbon abatement from plantations (hardwood/ softwood) and two methods association with environmental plantings that are not harvested
- Registering your project

  Completed online on the Clean Energy Regulator website
- Running your project

  This section covers site delineation, establishment and maintenance, record keeping, reporting, and generating ACCUs
- Generating carbon income

  This section provides an overview of how to sell ACCUs via reverse auctions under the ERF, or via other markets.

Section 3 provides an overview of cost-sharing opportunities via co-operatives or mutuals. Aggregated projects bring together multiple landholders or investors who share in the costs of accounting, auditing and reporting.

Section 4 briefly summarises tax implications of plantation establishment, including deductions under tax law that may be associated with growing trees on farms.

[1] Also referred to as the 'Climate Solution Fund'

01 HOW DO TREES SEQUESTER CARBON?

01.1 Overview

Carbon (C) is an essential element for all forms of life on earth. It regulates the Earth's temperature, is used in food and fibre production, and is a key energy source (coal, oil, gas). Carbon is in a constant state of movement between reservoirs such as the atmosphere, oceans, plants, animals and soils. Referred to as the Carbon Cycle, carbon moves between these reservoirs via various pathways that include photosynthesis, respiration, combustion and decomposition.

Human industrial activity has seen an increase in the concentration of carbon molecules entering the atmosphere. These molecules are commonly referred to as greenhouse gases. A global increase in greenhouse gases (particularly CO_2) is causing changes to the climate which pose an increasing threat to society, the economy and the environment.

There are more than a dozen recognised greenhouse gases, each with a different global warming potential (GWP) (Table 01-1). To enable comparison, these gasses are converted to equivalent tonnes of carbon dioxide (CO_2-e) using the GWP factor.

Table 01-1. Global warming potential of greenhouse gases

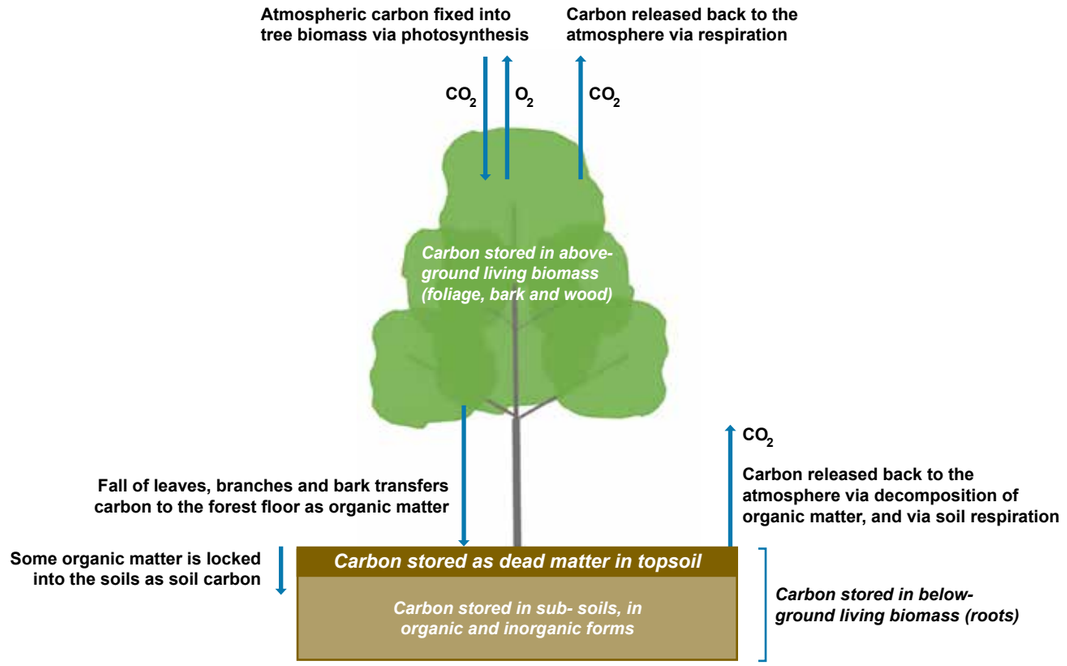
Greenhouse gas	Molecular formula	Global warming potential (GWP) (100-years)
Carbon dioxide	CO_2	1
Methane	CH_4	25
Nitrous oxide	N_2O	298
Sulphur hexafluoride	SF_6	22,800
Hydrofluorocarbon-23	CHF_3	14,800
Hydrofluorocarbon-32	CH_2F_2	675
Perfluoromethane	CF_4	7,390
Perfluoroethane	C_2F_6	12,200
Perfluoropropane	C_3F_8	8,830
Perfluorobutane	C_4F_{10}	8,860
Perfluorocyclobutane	C_4F_8	10,300
Perfluoropentane	C_5F_{12}	13,300
Perfluorohexane	C_6F_{14}	9,300

Climate change mitigation includes activities that reduce the amount of greenhouse gases being released into our atmosphere. This can be achieved by reducing emissions at the source (e.g. transition from fossil fuels to renewable energy) and by capturing carbon from the atmosphere using carbon sinks such as growing forests[2].

Living vegetation including terrestrial plants, aquatic plants and oceanic phytoplankton represent the chief carbon sinks in the global carbon cycle. Using energy from sunlight via photosynthesis, terrestrial plants capture CO_2 from the atmosphere and combine it with water (H_2O) to create sugar (CH_2O) that is synthesised into cellulose (woody biomass), and oxygen (O_2) which is released to the atmosphere.

[2] DEWNR (2017). *Guide to Carbon Planting in South Australia.* Department of Environment, Water and Natural Resources.

Wood has an elemental composition of about 50% carbon, 44% oxygen and 6% hydrogen, and trace amounts of several metal ions[3], thus 1 tonne (air-dry weight) of wood contains about 0.5 tonnes of elemental carbon. To convert carbon (C) to carbon dioxide equivalent (CO_2-e) units, simply multiple by 3.67[4].



01.2 How much carbon can plantation trees sequester?

Forests that are grown to produce lots of wood will also naturally sequester lots of carbon. This is why hardwood and softwood tree plantations have a significant role to play in carbon sequestration[5].

Using a modest growth rate of 5 tonnes per hectare per year (5 t/ha/yr) averaged over 25 years in north east NSW, a single hectare of plantation can fix about 60 tonnes of carbon into living woody matter over that time. To do this, 230 tonnes of CO_2-e is drawn from the atmosphere and sequestered into the living plant tissue. If that plantation was then harvested and regrown, a similar amount would be captured over the next 30 years while up to a third of the original carbon would be fixed in timber products. By scaling up operations over thousands of hectares, the plantation industry has a key role to play in helping Australia achieve its national emission reduction targets, with income from the sale of carbon credits helping drive this outcome.

[3] Pettersen, R.C. (1984). The Chemical Composition of Wood. In: The Chemistry of Solid Wood. Available at: https://www.fpl.fs.fed.us/documnts/pdf1984/pette84a.pdf

[4] This is because a molecule of CO_2 drawn from the atmosphere to facilitate tree growth weighs 3.67 times as much as the carbon stored in the tree, with the oxygen O_2 being released back to the atmosphere.

[5] Behera, L.K., Ray, L.I.P., Nayak, M.R, Mehta, A.A. and Pateal, S.M. (2020). Carbon sequestration potential of *Eucalyptus* spp.: a review. *e-planet.* 18: 79-84.

Indicative yields of timber within 25-year old plantations are provided in Table 01-2 for various scenarios and forest types in north-east NSW. These estimates are drawn from a range of cited publications that are listed in Annexure 1.

The indicative volume of carbon stored within the same 25-year old plantations is shown in Table 01-3. The totals range from an average 145 t.CO_2-e/ha for multiple-species environmental planting on the tablelands to 500 t.CO_2-e/ha for commercial blackbutt plantations on the coast.

Table 01-2. Indicative timber yields from tree plantations in the north east region

Plantation type	Mean annual increment (m^3/ha/yr)		Volume after 25 years (m^3)	
	Likely range	Average	Thinned/ harvested	Standing
Coastal blackbutt plantation	12 - 20	16	65 - 110	235 - 390
Coastal spotted gum plantation	9 - 15	12	55 - 100	170 - 275
Escarpment messmate plantation	10 - 18	14	60 - 105	190 - 345
Coastal southern pine	14 - 22	18	80 - 125	270 - 425
Tableland radiata pine	12 - 20	16	70 - 115	230 - 385
Mixed coastal environmental planting	8 - 12	10	0	200 - 300
Mixed tableland environmental planting	4 - 8	6	0	100 - 200

Table 01-3. Indicative stored carbon within 25-year tree plantations in the north east region

Plantation type	Standing volume after 25 years (m^3) (from Table **01-2**)	Air-dry wood density # (t/m^3)	Stored carbon in standing plantation (t.CO_2-e/ha) ##
Coastal blackbutt plantation	235 - 390	0.7	300 - 500
Coastal spotted gum plantation	170 - 275	0.8	250 - 405
Escarpment messmate plantation	190 - 345	0.75	260 - 475
Coastal southern pine	270 - 425	0.55	275 - 430
Tableland radiata pine	230 - 385	0.6	255 - 425
Mixed coastal environmental planting	200 - 300	0.7	255 - 385
Mixed tableland environmental planting	100 - 200	0.8	145 - 295

guided by air-dry density estimates in Bootle, K.R. (1983). *Wood in Australia*. McGraw-Hill.
based on mean standing volume after 25 years, and assuming a carbon biomass factor of 0.5

01.3 What is the value of carbon sequestered in a plantation?

Under the ERF Australian Carbon Credit Units (ACCUs) have averaged $15/tonne, however the price has been rising. In early 2022 a spot price of $55/tonne was achieved and ACCUs are currently trading at about $30/unit - see market price here.

It follows that a fast-growing commercial plantation established on a favourable site on the NSW north coast could theoretically generate over $15,000 per hectare of carbon income over 25 years at a spot price of $30/ACCU if successfully established and managed, in addition to revenue from the sale of commercial timber products including thinnings and small sawlogs.

However, there are some things to consider when forecasting revenue from your growing carbon stocks. For example, the saleable amount of captured CO_2 will be less if you opt for a 25-year permanence period (1F; Section 02.3.1), and the saleable amount will also be moderated by the risk of reversal buffer that applies to all sequestration projects and reduces the carbon abatement issued during a reporting period by 5 per cent. There are also risks associated with disturbance events that may transpire as your project matures, as well as fluctuations in the ACCU price.

Using a conservative spot price of $15/ACCU and accounting for discounts associated with 25-year permanence and risk of reversal buffer, commercial plantations can be expected to generate $3,420 to $5,700 per hectare of ACCU income over 25 years.

02 GUIDE TO GENERATING CARBON CREDITS

02.1 Overview

The Emission Reduction Fund or ERF is administered by the Clean Energy Regulator, which is an independent statutory authority responsible for measuring, managing, reducing and offsetting Australia's carbon emissions.

The ERF is a voluntary scheme that aims to provide incentives to organisations and individuals to adopt new practices and technologies to reduce carbon emissions. Various activities are eligible under the scheme including forest planting.

By participating in the scheme, forest growers can earn Australian carbon credit units (ACCUs) that are valued on the open market. One ACCU is earned for each tonne of carbon dioxide equivalent (tCO_2-e) captured and stored by a forestry project. An ACCU is also financial product that can be retained or sold.

ACCUs can be sold to generate income, either via an auction to the Australian Government, or to businesses or private buyers in a secondary (non-government) market. Earning and selling ACCUs is the most common way of converting sequestered carbon into income.

The price paid for an ACCU varies. At the time of writing, the value of 1 ACCU was $30 per $t.CO_2$, however, in early 2022 it peaked at $55 per $t.CO_2$, rising from a long-term base of $15 per $t.CO_2$.

02.2 How does the ERF work?

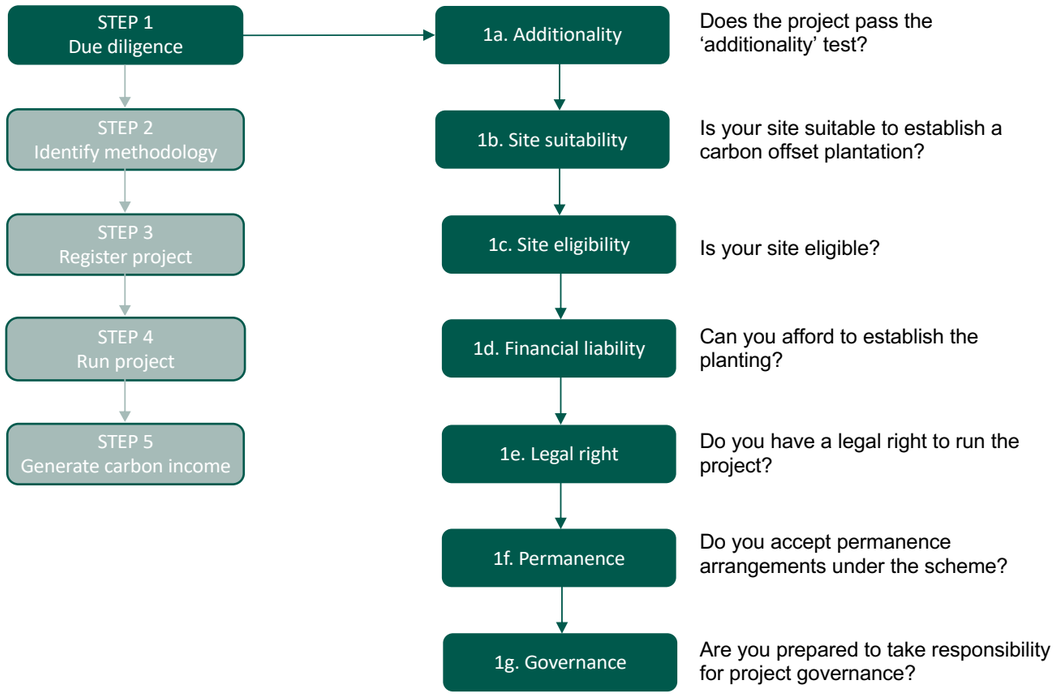
There are five (5) main steps in taking part in the ERF:

STEP 1 Due diligence	Undertake a 'due diligence' assessment to ensure you project is feasible.
STEP 2 Identify methodology	Find a project method that works for you, and ensure you meet general eligibility requirements as well as the specific project requirements.
STEP 3 Register project	Register your project by setting up client portal account. You will need to provide a forward abatement estimate for your project to be approved (this is the number of ACCUs likely to be generated by your project). You will also need to disclose who the project proponent will be.
STEP 4 Run project	Run the project and claim your ACCUs once you complete specific tasks for your project that include reporting, monitoring, record keeping and auditing.
STEP 5 Generate carbon income	Once you have your ACCUs, auction them via a carbon abatement contract, or sell them to a private buyer through a commercial arrangement. Private buyers are normally large business who emit carbon and wish to buy your ACCUs to help offset those emissions.

02.3 A step-by-step guide to undertaking an ERF project

02.3.1 STEP 1 – Due diligence

Before committing to your project there are seven key factors you should consider.



1a. Additionality

A key requirement of the project will be to demonstrate additionality at both the ERF scheme level and the methodology level. At the scheme level there are three additionality tests: newness; regulatory; and Government Programs.

The newness test establishes that credits issued for emission reduction from the project are new or 'additional' to emission reductions that would have occurred in the absence of the project (i.e. under normal business conditions). As an example, a reforestation project established under the *20 Million Trees Program* (a Government grants project) would not demonstrate additionality because the carbon abatement would have already been taken into account. The regulatory additionality test ensures that an activity associated with a project cannot receive ACCUs if the activity is already required by law. For example, a regeneration planting that is required to be established as an offset under a development approval would not be able to demonstrate regulatory additionality. The Government Programs test requires you to state that the project is not being carried out under another Commonwealth, State or Territory government program or scheme.

At the methodology level, the Forestry Plantation methodology includes two new activities: continuing plantation activities (Schedule 3); and transitioning a plantation to a permanent planting (Schedule 4). For these activities projects can only be considered additional if there is strong evidence that the plantation would likely convert to non-forest land under business-as-usual. The additionality framework for assessing the additionality of Schedule 3 and 4 projects under the Forestry Plantation methodology has three extra requirements that all need to be met for projects to be eligible. These are:

- Transformation statement - articulates and provides evidence of how the project activity is different to business-as-usual
- Independent financial assessment - financial assessment by a qualified independent personal that demonstrates that the plantation forest is likely to convert to a feasible and financially attractive alternative land use relative to continuing plantation forestry in the absence of the scheme
- Evidence of business-as-usual scenario - evidence of what the business-as-usual scenario would have been to demonstrate that the stated intent for the alternative land use is a feasible and financially attractive alternative, relative to continuing plantation forestry.

The Clean Energy Regulator website provides more information about the newness test and the regulatory additionality and government programs tests, while additionality information for activities under Schedules 3 and 4 of the Plantation Forestry methodology are provided on the Plantation Forestry method web page.

1b. Site suitability

Environmental plantings can be established in many situations (including on poorer soils or flood-prone lands). However, commercial timber plantations may not be suited to some sites (for example, the land must be accessible for future timber harvesting and haulage vehicles).

You'll need to investigate whether your site is suitable for growing commercial trees, which species to select, how to prepare and manage the site, and whether the site is close to a timber processing facility to minimise transport costs. It may also be prudent to gauge the likely growth rates that might be achieved at your site, as this could influence the methodology you select.

The NE NSW Regional Forestry Hub can provide general guidance on the land within the region which is best suited to commercial hardwood and softwood plantations. As three of four schedules in the Forestry Plantation methodology concern the ongoing management of *existing* plantations, site suitability considerations are not relevant for these schedules.

1c. Site eligibility

There are various eligibility requirements under the 2022 plantation forestry method and other similar methods. The main eligibility criteria associated with establishing new plantations forests are as follows:

- Plantation forestry projects cannot occur on high value agricultural lands for which the Minister for Agriculture would determine that the project would have an undesirable impact on agricultural production. If you are using the *New Farm Forestry Plantation Methodology* or *Plantation Forestry Methodology*, you may need to lodge a ***Plantation Notification*** to the Commonwealth Minister for Agriculture prior to commencement to ensure your proposal has no adverse impact on local agriculture. An adverse impact finding is where the Agriculture Minister forms the opinion that the proposed project would result in an undesirable impact on agricultural production in the region, including but not limited to agricultural businesses and facilities (e.g. agricultural product processors). Large scale projects (thousands of hectares) and projects that target crop or horticultural lands are more likely to be rejected than smaller scale projects, and those that target lands used for grazing.
- The project must not materially impact water availability to other users (it must pass 'the water rule') – however, as the North East NSW Forestry Hub region is within a 'specified region' that receives at least 600 mm annual rainfall, all projects will be compliant with the water rule.
- There must not have been a plantation or native forest or wetland on the site in the previous seven (7) years (or five (5) years if the property has changed hands since the clearing/draining event)
- There are restrictions on the tree species that can be grown. All candidate species are listed in Schedule 6 of the Methodology and include the following species for north-east NSW:

Araucaria cunninghamii (hoop pine)	*Eucalyptus aggregata* (black gum)
Corymbia maculata (spotted gum)	*E. cloeziena* (Gympie messmate)
Pinus caribaea x P. elliottii (southern pine hybrids)	*E. dunnii* (Dunn's white gum) *E. grandis* (flooded gum)
P. elliottii (slash pine)	*E. laevopinea* (silvertop stringybark)
P. pinaster (maritime pine)	*E. pilularis* (blackbutt)
P. radiata (radiata pine)	*E. saligna* (Sydney blue gum)
P. taeda (loblolly pine)	

1d. Financial viability

Establishing a plantation involves up-front costs that include site preparation, tube-stock, planting, fertilising and possibly fencing. On-going maintenance includes weed control, track and fence maintenance, and possibly tree thinning and pruning, and maintenance of bushfire offsets. It is prudent to understand these costs prior to project kick-off.

The cost per hectare of planting generally decreases with increasing scale of operation, and there are substantial cost-savings by working on a single project as a co-operative with other landholders. Under the ERF this is called an Aggregated Project (refer to Section 3).

Table 02-1 provides some indicative average costings for hardwood and softwood plantations grown for sawlogs[6] and Figure 02-1 shows the potential variation in cumulative costs per hectare. In practice, establishment and maintenance costs will vary between regions and site by site and will also be subject to stochastic events.

Table 02-1. Indicative establishment and maintenance costs for different plantation types

Type	Cost ($/ha)		
	Establishment	Maintenance (Year 1)	Annual maintenance (Year 2+)
Radiata Pine	1,500 – 3,000	300 – 500	100 – 200
Southern Pine	1,500 – 3,000	300 – 650	100 – 200
Hardwood	2,000 – 3,500	300 – 500	200 – 300
Environmental planting	1,000 – 10,000	50 – 250	20 – 50

[6] Based on cost estimates in Whittle, L., Lock, P. and Hug, B. (2019*). Economic potential for new plantation establishment in Australia. Outlook to 2050. Research Report 19.4.* Department of Agriculture and Water Resources.

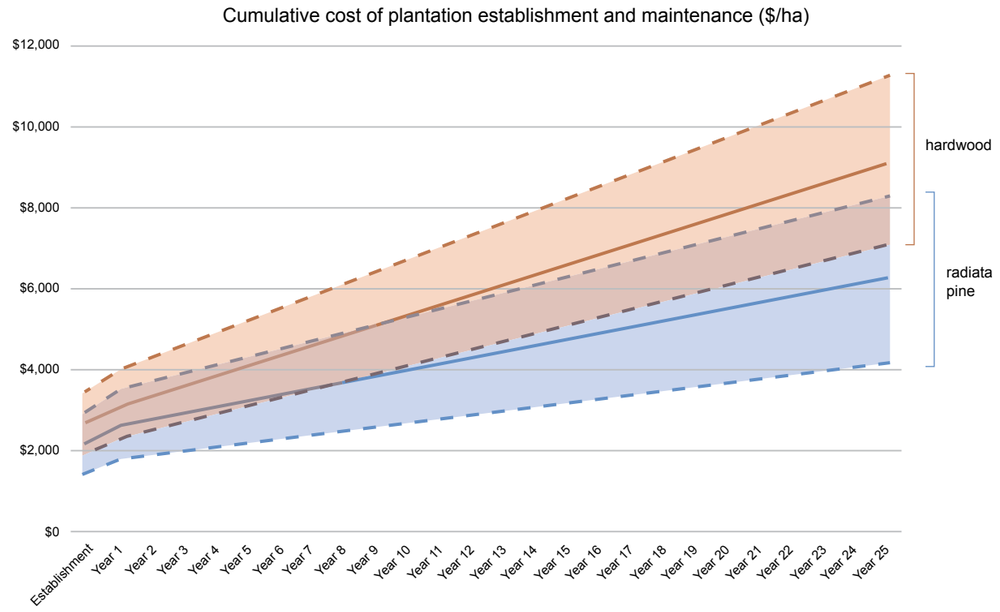


Figure 02-1. Cumulative cost range ($/ha) associated with eucalypt and pine plantations

The likely return from timber products and ACCUs generated by a new of continuing project is also the focus of the financial viability assessment. There are many factors at play in relation to future revenues available from timber products, including:

- tree growth rates (mean annual increment)
- future prices for biomass residue (including thinnings and possibly prunings),
- future prices for poles and sawlogs
- access to markets
- harvesting and on-site processing costs
- haulage costs
- unplanned disturbance events.

It follows that there can be considerable uncertainty around future revenue streams for a particular forest plantation site. However, given that forestry plantations on the NSW North Coast can demonstrate financial viability from sale of timber products alone, the introduction of an additional revenue stream from ACCUs is likely to make more projects viable.

The cumulative ACCUs generated over the first 25 years of a project is shown in Figure 02-2 for pine plantations and Figure 02-3 for hardwood plantations and environmental plantings. These charts assume an ACCU price of $18/unit, a permanence period of 25 years[7], the risk of reversal buffer[8], and the indicative metrics listed in Table 02-2 (shown as above-ground biomass charts in Annexure 2). There is some variation in mean annual increment (i.e. growth rates) within species and this variation is evident in potential revenue flow from ACCUs.

[7] Permanence period of 25 years requires the application of a 0.8 adjustment factor
[8] Risk of reversal buffer = 0.95 adjustment factors

Assuming an ACCU price of $18, radiata and southern pine plantations could generate up to $5,900/ha from ACCUs over 25 years under optimal growth rates (Figure 02-2). However, under relatively low growth, revenue flow from ACCUs could be less than $3,500/ha which means the revenue flow from ACCUs alone will cover the costs of establishment but not all the ongoing maintenance.

ACCU revenue flow from a eucalypt plantation (assuming $18/unit) is likely to vary between $4,100/ha and $6,800/ha over 25 years (Figure 02-3), which will also cover the costs of plantation establishment but perhaps not all the ongoing maintenance costs (Figure 02-1). Supplementary income can however be generated from cattle grazing once the trees are well established.

Environmental plantings would generate $1,900/ha to $5,700/ha over 25 years, which may cover the costs of establishment and maintenance in some cases, although closely spaced multiple-species plantings associated with site ecological restoration could cost up to $10,000/ha during establishment.

Table 02-2. Data used to estimate revenue from ACCUs during a plantation project

Metric	Plantation type			
	Radiata Pine (Tablelands)	Southern Pine (Coast)	Hardwood (Coast)	Environmental planting
Mean annual increment (m^3/ha/yr)	12 - 20	14 - 22	12 - 20	4 - 12
Mean annual increment distribution	10% (year 5); 20% (year 10); 30% (year 15); 25% (year 20); 15% (year 25)			
Air-dry wood density (t/m^3)	0.6	0.55	0.7	0.7
Non-commercial thinning (years)	5	5	5	na
Biomass from non-commercial thinning (% biomass)	15	15	15	na
Commercial thinning (years)	15	15	15	na
Biomass from commercial thinning (% biomass)	30	30	30	na

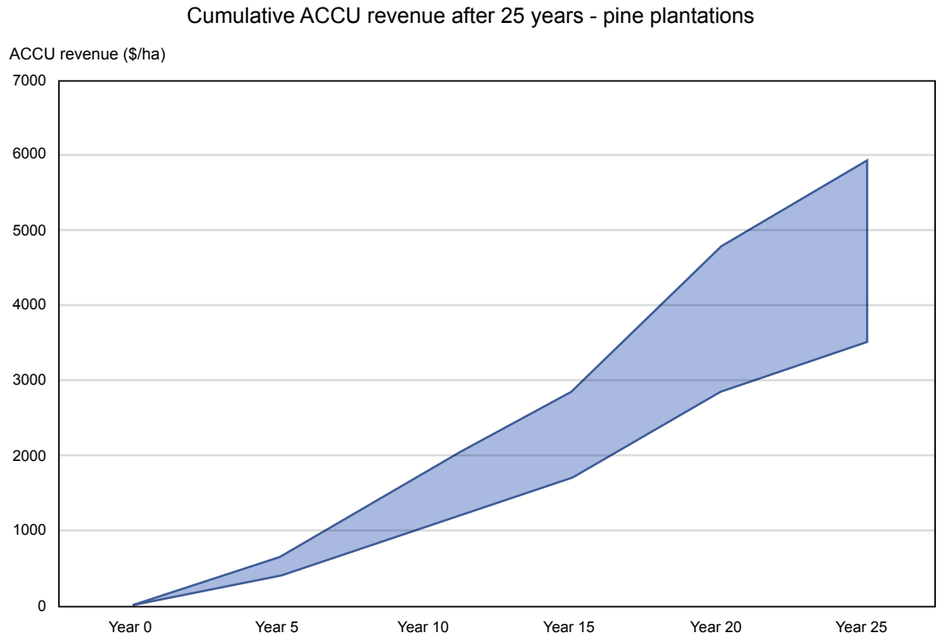


Figure 02-2. ACCU accumulation at $18/unit – radiata and southern pines

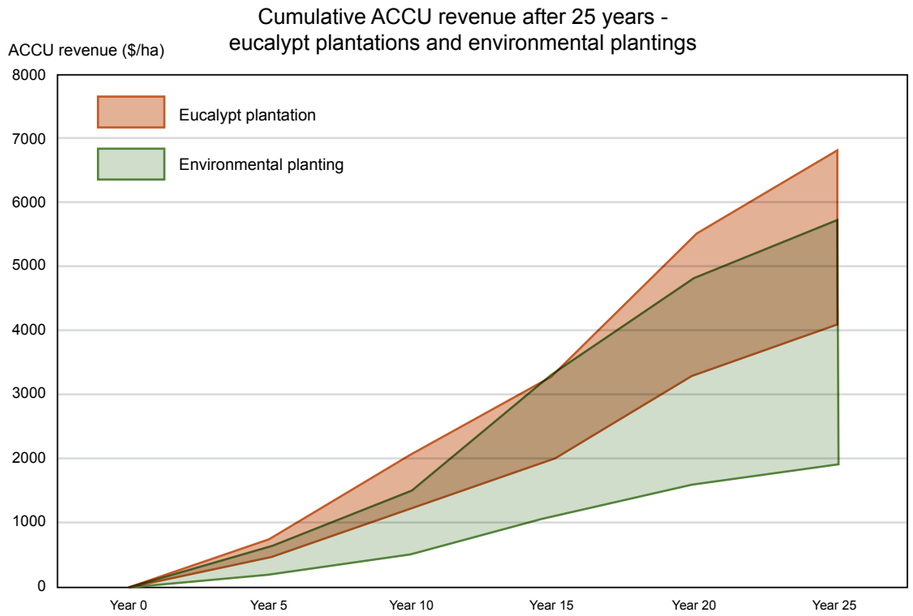


Figure 02-3 ACCU accumulation a $18/unit – hardwood plantations and environmental plantings

1e. Legal right

You must have the legal right to run an ERF project. If you are the landholder or leaseholder, you will generally have the legal right to conduct a project on your land. If you are not, you will need a signed agreement with other landholders to run a project on their land. This can be established under the NSW *Conveyancing Act 1919*, where the owner of land can create a forestry right for carbon sequestration and/or a timber extraction and these can be transferred to a third party. For more details on forestry rights refer to the Land Registry Services website.

You will also require regulatory approvals and consent from third parties with an interest in the land (e.g. banks). As the project proponent is in control of the project, the Clean Energy Regulator's legal relationship is with the project proponent.

The existence of native title determinations and claims may affect legal right considerations when carrying out a project. Advice from the National Native Title Tribunal is that native title claimants are not permitted to include land and waters covered by previous exclusive possession acts in their applications, therefore they would normally exclude freehold areas[9]. More information about legal right (including a link to native title) can be found at the Clean Energy Regulator website.

In addition to the above, you will also need approval from NSW Department of Primary Industries (DPI) to establish a commercial plantation. The *Plantations and Reafforestation Act 1999* (PR Act) provides a streamlined approval process for plantations whilst providing certainty for harvest on timber plantations. The Plantations and Reafforestation Code under the PR Act has environmental standards to prevent soil erosion and land degradation and protect biodiversity and cultural values. The Code provides requirements for:

- the level of permissible clearing
- protection of rivers and other drainage features
- protection of cultural sites
- roading and harvesting operations
- fire prevention/safety provisions.

Obtaining authorisation to establish and manage a plantation from DPI provides the landholder with the right to harvest the timber they have grown. To find out more about seeking a planation authorisation, refer the DPI guidelines for plantation applicants.

1f. Permanence

Carbon sequestration in plantings can generate ACCUs only if the stored carbon meets the scheme's permanence rules. The permanence obligation ensures that credits are associated with a genuine form of carbon sequestration. If carbon stores are not maintained, or the vegetation is cleared, CO_2 is released again into the atmosphere and the project would have had no long-term carbon sequestration benefits.

The permanence period is the number of years in which carbon sequestered from the atmosphere should be 'permanently' stored by your project. You can nominate a 25- or 100-year permanence period for your project. Projects with **a 25-year permanence period will be subject to a 20% discount on the number of credits (ACCUs) that would otherwise be issued for the project**. This is demonstrated in Figure 02-4.

As part of the project, you will need to demonstrate permanence of your project (i.e. demonstrate how carbon will continue to accumulate within your project). This may include:

- An explanation of management activities that maintain the plantation or permanent planting for 25 or 100 years (e.g. maintaining fire breaks, controlled burning, fertilisation and weed control)
- An explanation of how you will respond to potential risks that could reduce the carbon stored by the plantation or permanent planting (e.g. fire management plan).

[9] Further reading: http://www.nntt.gov.au/nativetitleclaims/Pages/Native-title-claims-and-freehold-land.aspx

If a fire or other disturbance affects your project, causing a decline in the amount of carbon stored, the plantation must be managed or replanted to enable the carbon stock to return to previously reported values. Alternatively, ACCUs equivalent to the loss of carbon caused by the disturbance can be returned, or relinquished, to the Clean Energy Regulator.

If you wish to sell your property, you are obliged to ensure that any agent or prospective buyer is informed about the project and its permanence obligation.

More information about permanence can be found at the following Clean Energy Regulator website.

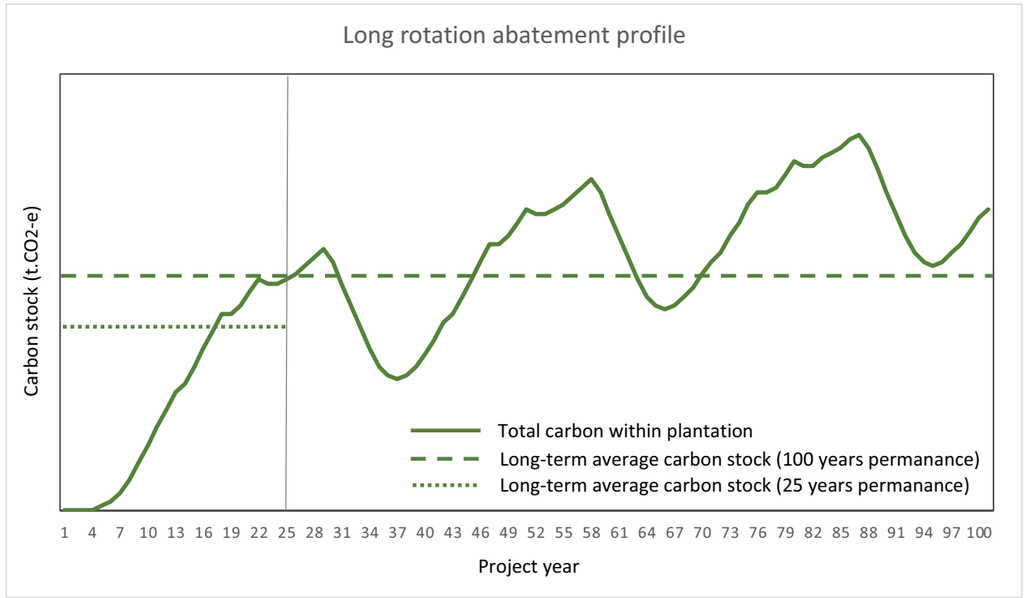


Figure 02-4. Example of actual and average carbon abatement across 25-year and 100-year permanence periods

In the above figure abatement is calculated by subtracting any project emissions from the project carbon stock in each reporting period, with a cap on maximum abatement represented by the long-term average project carbon stock (dashed line). Credits are issued based on the abatement achieved in each reporting period. In this example of a new long-rotation plantation, the long-term average carbon stock is reached in project year 18 for a nominated permanence period of 25 years, and in project year 25 for a nominated permanence period of 100 years. No additional credits can be issued during the life of the project over and above the long-term average stock.

For the 25-year permanence period, all plantation timber could be harvested at any point after this period without consideration of ongoing carbon sequestration. To meet the 100-year permanence requirement, a plantation managed on a 33 year rotation needs to be grown and harvested times to maintain the long-term average carbon stock over 100 years.

1g. Governance obligations

Participants in the ERF are required to comply with all requirements of the method which applies to their project. This includes, but is not limited to:

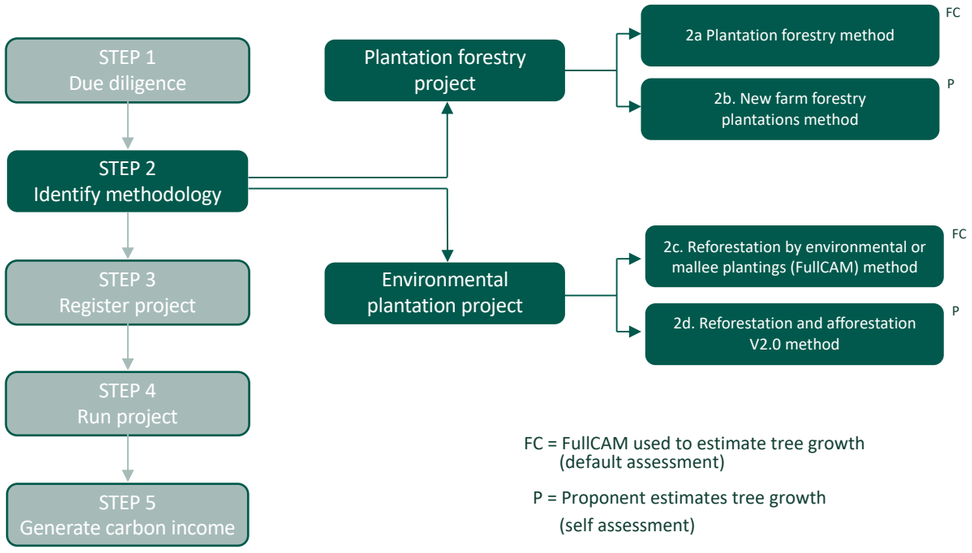
- record keeping, reporting and audit requirements
- maintenance of Fit and Proper Person status
- maintenance of the legal right to undertake the project
- notification requirements, including the need to notify the Clean Energy Regulator of any changes to their project and/or project participants
- maintenance of carbon stores throughout the permanence period (for sequestration projects)
- compliance with work, health and safety obligations

More information about project feasibility can be found at the following Clean Energy Regulator website.

02.3.2 STEP 2 – Which method is best for you?

There are two (2) main forestry methods available to you under the ERF. There are also two (2) environmental planting methodologies available for those wishing to establish plantings that are not harvested. Which method is most suitable depends on:

- whether your proposed (or existing) plantation is for commercial timber production or environmental purposes
- whether you are prepared to undertake tree measurements yourself to estimate tree growth or have them estimated using Government's full carbon accounting model (FullCAM).



The use of FullCAM as the default Government program to estimate carbon growth is convenient and less costly than in-field forest inventory. However, growth estimates provided by FullCAM are generally conservative, thus for high-quality sites in which tree growth is likely to be relatively high, on-ground measurement might be warranted to generate additional ACCUs. The cost of tree measurement should be factored into this decision. Running an aggregated project (Section 3) provides more scope for on-ground assessment as field costs can be shared across the group of participants. STEP 4 below provides more information on carbon accounting.

Selection of the appropriate forestry methodology also depends on your key objective for establishing trees. These are summarised below for each methodology:

2022 Plantation Forestry Methodology

- Establishing a new forestry plantation
- Conversion of an existing forestry plantation from short rotation to long rotation
- Continuing plantation forestry activities where land is otherwise likely to convert to non-forest
- Transition of an existing plantation to a permanent forest where land is otherwise likely to convert to non-forest.

2014 New Farm Forestry Plantations Methodology

- Establishing a new forestry plantation
- Establishing and maintaining a permanent planting

2013 Reforestation by Environmental of Mallee Plantings Methodology

- Sequestering carbon by establishing and maintaining a permanent mixed native species planting where it has the potential to attain a height of at least 2 metres, and a crown cover of at least 20%

2015 Reforestation and Afforestation Methodology

- Sequestering carbon by establishing and maintaining a mixed permanent native species planting where it has the potential to attain a height of at least 2 metres, and a crown cover of at least 20%

The *2022 Plantation Forestry Methodology* is the default methodology adopted within the forestry plantation sector as it avoids collection of detailed inventory data and provides the capacity to change rotation strategies. Additional detail is provided below with respect to the four main activities available under this methodology.

Schedule 1 - Establishing a new plantation

Schedule 1 permits you to establish a new plantation forest on land that has had no plantation forest for seven years. This plantation will have a rotation that is no longer than 60 years.

Schedule 2 – Conversion of short-rotation to long-rotation plantations

Schedule 2 permits you to convert a short-rotation plantation to a long-rotation plantation, where the conversion might occur either part-way through the short-rotation plantation cycle or following harvest of a short-rotation plantation. The rotation length must be extended by at least 10 years longer. This approach will enable you to increase the number of ACCUs delivered by your project, as shown in Figure 02-5.

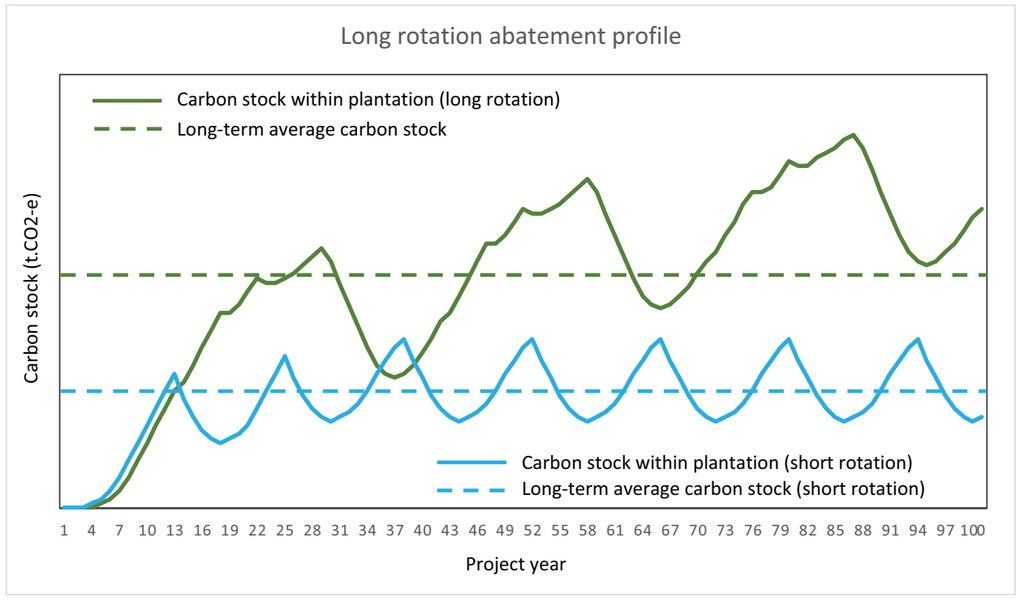


Figure 02-5. Example of change in carbon stocks when converting from short to long rotation plantation

Schedule 3 – Continuing plantation forestry where the land would have otherwise converted to non-forested land

Schedule 3 permits continuation of an existing long-rotation forestry operation, where the plantation would otherwise have been cleared by the former owner. This approach will enable you to increase the number of ACCUs delivered by your project, as shown in Figure 02-6. This provision may be particularly useful for plantations that were established on less favourable land and would not have been economically viable without the introduction of revenue from ACCUs.

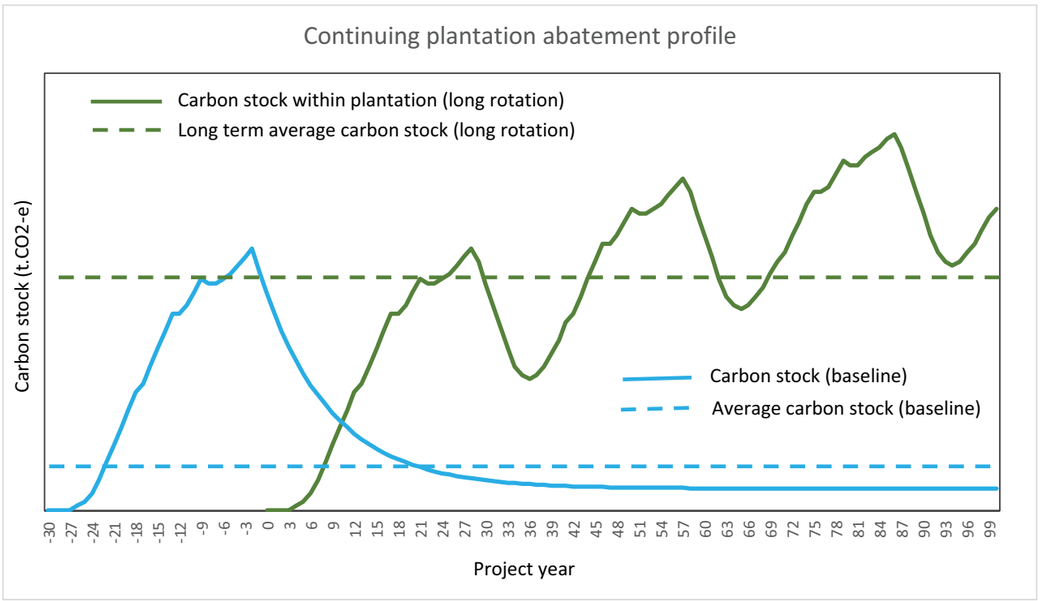
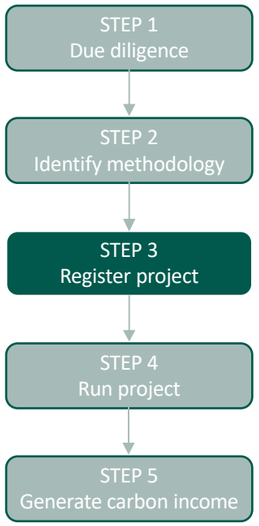


Figure 02-6. Example of change in carbon stocks when opting to continue a plantation

Schedule 4 – Transitioning a plantation forestry to a permanent forest where the land would have otherwise converted to non-forested land

Schedule 4 permits you to transition an existing long-rotation forestry operation into a permanent forest, where the plantation would otherwise have been cleared by the former owner. This approach will enable you to increase the number of ACCUs delivered by your project, but there would be no timber benefits as the plantation would not be harvested in future.

02.3.3 STEP 3 – Registering your project



Once you have identified an appropriate method and you are confident that your proposal is eligible under the ERF, you can go ahead and register the project. Participation is open to individuals, sole traders, companies, local, state and territory government bodies and trusts.

You will register your project online at the following Clean Energy Regulator site.

Your application will require the following:

- Information about you, so that the Clean Energy Regulator can be sure of your identity and assess you against the Fit and Proper Person test requirements
- Verification of your legal right to conduct the project
- A forward estimate of 25 year carbon abatement likely to be generated by your project. This is the 'Forward Abatement Estimate' (FAE) (refer to Box 1)
- Signed 'eligible interest holder consent forms' from all persons or organisations that have a specific legal interest in the land on which your project will run

Information you provide about your project, including the project area, will be included on the public register. However you can apply for publication of project area information to be suppressed if you can demonstrate that it could substantially prejudice your commercial interests, and that this outweighs the public interest in publishing the information.

You will also be required to open an ANREU account[10] to receive any ACCUs generated by your project although this account does not need to be opened on registration. It needs to be open prior to lodgement of your first project report.

Box 1. Forest Abatement Estimate

A useful tool for establishing your Forward Abatement Estimate (FAE) is the LOOC-C tool developed by CSIRO. LOOC-C stands for 'landscape options and opportunities for carbon abatement – calculator'. All you need to do is:

- Access the website at https://looc-c.farm
- Use the on-screen map and polygon tool to delineate your site
- Answer a few questions about exclusion areas and site history

The program will then run FullCAM behind the scenes and provide you with a summary report that includes site area (ha), average sequestration rate (t.CO_2 per hectare per year), and final FAE (t.CO_2 generated in 25 years).

If your project area comprises multiple sites, you can use the LOOC-C tool for each site and add all the individual FAE outputs to obtain a project FAE.

LOOC-C outputs assume you will employ the 'Reforestation by environmental or mallee plantings - FullCAM' method, so it does not assume any timber harvesting. But LOOC-C is likely to be useful for timber harvest projects as well because:

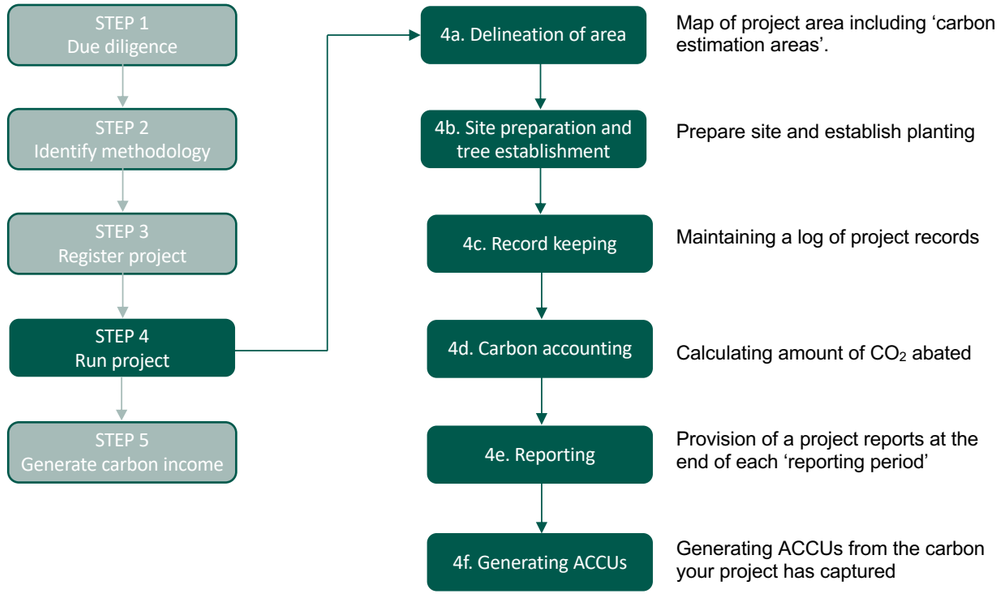
- Your project may not involve any harvesting in the first 25 years.
- If your project does include at least 1 harvest, you can apply a multiplier (e.g. if half the biomass is likely to be removed, you can multiply the LOOC-C output by a multiplier of 0.5)

[10] ANREU = Australian National Registry of Emissions Units

02.3.4 STEP 4 – Running your project

Once your project has been accepted and registered, you can set it up and begin to run it. This will start with site delineation, site preparation, tree establishment, and move into monitoring and maintenance.

There will be monitoring, reporting and audit obligations in running your project. You will need to report on your project at least once every five years. You will receive ACCUs each time you report an increase in carbon stored by your plantation over the crediting period.



4a. Delineation of project area

You will be required to provide a map of your Project Area that shows all areas in which trees will be established and grown. To calculate carbon abatement, you may also need to sub-divide your project area into broad strata or sub-units called 'carbon estimation areas' (CEAs). These are the areas of your project in which you will carry out the project management activities, where carbon will be stored and from which ACCUs will be generated.

Delineation of your plantable area into CEAs can improve the precision of forest and forest-carbon measurements. However, it should only be undertaken when you recognise that tree growth will vary across the project area. For example, tree growth may be more favourable on fertile valley flats than on shallow, exposed ridges. The following criteria can be used to stratify the project area into broad strata – broad soil type, landscape position, southerly v northerly aspects, land-use history.

Excluded area (e.g. rivers, sheds, roads, powerlines, steep slopes and firebreaks) will need to be excised from the map. The geographic boundaries of each CEA must be defined in accordance with the *Carbon Farming Initiative Mapping Guidelines* which outline the steps in mapping out various zones in your Project Area. An example of an area delineated into CEAs and exclusion zones is shown in Figure 02-7.

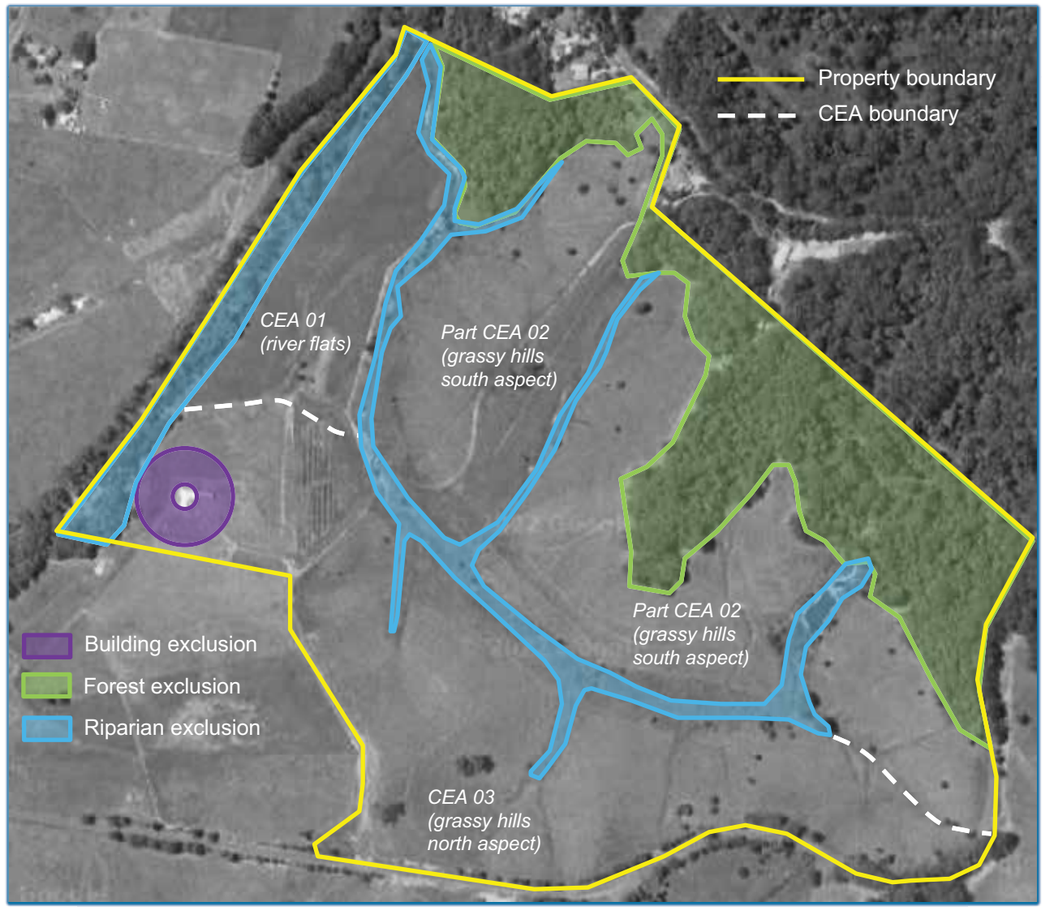


Figure 02-7. Example of CEAs and exclusion zones for a project on the mid north coast

4b. Site preparation and tree establishment

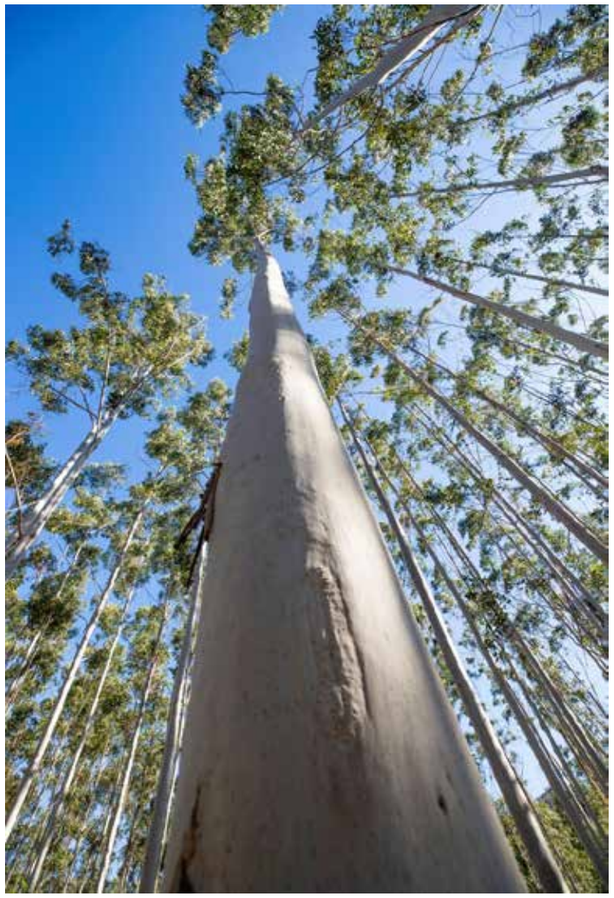
There are several factors to consider in successfully establishing your plantation forest. First you will need to consider:

- species selection (which is the right species/mix of species for your project)
- season (when is the best time to prepare the ground and plant)
- spacing or density (trees/hectare)

Once you have decided on species, timing and stocking density, the next important consideration is site preparation, including:

- weed control
- ripping
- planting
- fertiliser application (optional)
- fencing (optional)

Giving planted seedlings the best opportunity to grow into young healthy trees over the first three (3) years of the project is extremely important. Deep ripping is generally required, with alignment of rip lines along the contour recommended on sloping ground. Weed suppression and control of browsing/ grazing animals is usually required during this period.



Planting when there is soil moisture is also important to avoid water stress. Having to water trees at and following planting is high cost and best avoided. The creation of fire breaks should also be part of the overall planting plan. The Forestry Hub can provide guidance on where to seek professional help in planning and establishment of plantations (e.g. from a Registered Forestry Professional).

4c. Record keeping

You will need to ensure that you are familiar with the record keeping requirements of the method you adopt. When you set up your project, there will be various documents you will need to develop and records you need to keep. Main record keeping requirements for each method are summarised in Table **02-3**.

Importantly a forestry management plan (FMP) is required under the 2022 plantation forestry methodology. This is a document which sets out the management framework as well as disturbance events and other relevant information for the project. The management framework includes:

- management actions which are the actions listed in the FullCAM guidelines and will have a specific impact on project carbon stocks

- management activities that are only required to be detailed for specific project activities such as monitoring and controlling pests and disease, and are not modelled in FullCAM
- a management regime which include the species grown and the set of actions that have been or will be applied to a single rotation
- a management record which is a compendium of records, detailing each management action and disturbance event in the CEA since the forest start date.

In short, the FMP sets out how the project has been and will be run and provides other information about how project risks will be managed.

The FMP needs to be reviewed and signed-off by a Registered Forestry Professional under Forestry Australia's registered forestry professional accreditation scheme.

More information about FMPs is provided within the Clean Energy Regulator website. The website also outlines specific requirements of FMPs in relation to Schedules 2, 3 and 4 of the Plantation Forestry methodology.

4d. Carbon accounting

The Plantation Forestry methodology requires abatement to be calculated using the Full Carbon Accounting Model (FullCAM), which is the model used to construct Australia's National Greenhouse Gas Inventory for the land sector. FullCAM guidelines can be found here, and are summarised below.

- FullCAM is used to model three scenarios:
  - Baseline scenario (level of abatement in the absence of the project)
  - Project scenario (abatement up to the end of the reporting period)
  - Long-term project scenario (abatement over the long-term modelling period)
- Modelling is undertaken separately for each CEA
- Modelling considers carbon stock changes in trees, debris, and harvested forest products, and accounts for:
  - forest growth
  - natural disturbance (including fire)
  - harvesting
  - other silvicultural activities such as thinning, pruning and fertilising
  - fossil fuel emissions due to plantation management, including forest product harvesting
- Modelling requires you to specify the types of forest products and the proportions going to end uses such as paper, packaging, building and construction.

FullCAM is also used in the 'Reforestation by environmental or mallee plantings' method, however if you opt to use either the 'New farm forestry plantations' method or the 'Reforestation and afforestation V2.0' method, you will be required to conduct your own measurements to estimate carbon stocks.

4e. Reporting

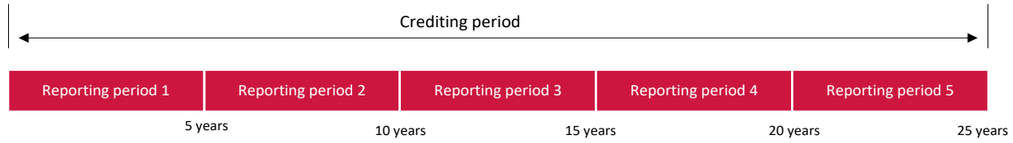
The first thing you need to know is that your crediting period is 25 years which is standard for all sequestration projects. The crediting period starts from the date of your project registration and is the period in which ACCUs can be claimed.

There will be a series of reporting periods within the crediting period in which you report the quantity of carbon abated via your plantation to the Clean Energy Regulator. This project or offset report will include:

- information and calculations on carbon abatement achieved (your method will contain specific instructions that should be used to calculate abatement)
- other relevant information (your method will specify what other information is required).

The first reporting period will begin at the start of the crediting period, and each subsequent reporting period will begin immediately after the previous reporting period. The minimum number of reporting periods is five (each being of five years duration).

A project report needs to be submitted within 6 months of the end of each reporting period, regardless of whether it is accompanied by an application for ACCUs. You can opt to choose shorter reporting periods if the net abatement from your project for the shortened reporting period is likely to be 2,000 t.CO_2 or more.



Reports are submitted on the Clean Energy Regulator Client Portal using the Emissions Reduction Fund Project Report and Crediting Form. Broad reporting requirements for each method are summarised in Table **02-4**. More details can be found in the method determinations.

4f. Generating ACCUs

Establishment and management of tree plantations is a type of carbon farming that permits the landowner to generate and own Australian Carbon Credit Units (ACCUs). ACCUs are issued by the Clean Energy Regulator in return for activities completed by the landowner under the ERF. They have no expiry date and can be kept or sold on voluntary carbon markets, or to the Commonwealth through the ERF.

Applying for ACCUs involves applying for a certificate of entitlement along with a project offsets report and an audit report.

The project offsets report is required every reporting period and must include the following information:

- net abatement amount
- carbon stock changes
- emissions due to biomass burning
- fuel use emissions
- initial and final carbon stocks
- forest management information
- project area information
- FullCAM outputs.

Audits are required where indicated in your project's audit schedule, which the Clean Energy Regulator will provide following registration of your project. The results of the audit are provided in an audit report that must be completed by a registered national greenhouse and energy auditor. This reporting is done online via the client portal.

Applications for ACCUs can be made at the same time as you submit your offset and audit reports using the certificate of entitlement form available on the Clean Energy Regulator website. The Clean Energy Regulator will not issue ACCUs automatically on receipt of a project report. Instead the regulator will assess offsets and audit reports to ensure that the abatement can be verified and that the unit entitlement figure is correct. Successful applicants will then be issued with a certificate of entitlement that advises of the number and type of ACCUs that the project is entitled to receive for the reporting period.

Applications to claim ACCUs can be made at the same time as a report is provided. Once issued, your ACCUs will be registered under your Australian National Registry of Emissions (ANREU) account which you set up in the project registration step. Once ACCUs are in this account, you can choose to hold or sell your ACCUs.

Given good site selection and preparation, tree growth within established plantations can be favourable in the north-east region of NSW. This means that income from carbon can be achieved from the end of the first reporting period, helping with cash-flow. As the plantation matures over the crediting period, its growth (measured in tonnes per hectare per year) is likely to accelerate up until at least year 20, meaning that proportionally more ACCUs will be generated as the project matures.

For most methodologies ACCUs are issued every 5 years. However, under Schedules 2 and 3 of the Plantation Forestry methodology, in which a short-rotation plantation is converted to a long-rotation plantation (Schedule 2 - Figure 02-5) or an existing long-rotation forestry operation is continued where it would otherwise have been cleared (Schedule 3 - Figure 02-6), abatement is calculated differently.

Under these scenarios, abatement is calculated by subtracting the long-term average baseline carbon stock (and any project emissions) from the long-term average project carbon stock, then splitting this difference into even apportionments which are linearly apportioned over the first 15 years of the crediting period of the project. For example, if the total additional ACCUs delivered by converting a plantation from short- to long-rotation under Schedule 2 of the methodology was 15,000 units, these would be delivered as 15 annual credit issuances (one issuance of 1,000 units each year over the first 15 years).

Table 02-3. Summary of record-keeping requirements for each sequestration method

Record keeping requirements (for each carbon estimation area and/or the project area)	ERF method (Section **02.3.2**)			
	Plantation forestry	New farm forestry plantations	Reforestation by environmental or mallee plantings – FullCAM	Reforestation and afforestation V2.0
Forestry management plan	✓			
Geospatial maps the identify the project area, carbon estimation areas, exclusion areas, and model points [A]	✓	✓	✓	✓
Sampling plans and project operation records	✓	✓		✓
Project tree measurements including species and allometric functions		✓		✓
Carbon stock calculations	✓	✓		✓
FullCAM information	✓		✓	
Fuel use associated with project activities [B]	✓	✓	✓	✓
Records associated with salvage harvesting	✓			
Records associated with monitoring and management activities	✓	✓	✓	✓
Records associated with disturbance events	✓	✓	✓	
Records associated with grazing (timing and intensity)			✓	
Quality assurance and control	✓	✓	✓	✓

A. if areas are not clearly visible, a list of names or other identifiers is required

B. More information about fuel use at: http://www.cleanenergyregulator.gov.au/ERF/Pages/Forms%20and%20resources/Regulatory%20Guidance/Sequestration%20guidance/Recording-fuel-use-for-sequestration-projects.aspx

Table 02-4. Summary of reporting requirements for each sequestration method

Reporting requirements (for each project area of a project)	ERF method			
	Plantation forestry	New farm forestry plantations	Reforestation by environmental or mallee plantings – FullCAM	Reforestation and afforestation V2.0
Initial project site information (geospatial maps of project area, carbon estimation areas, exclusion areas, and model points) [A]	✓	✓	✓	✓
Description of site strata (including location and area)	✓	✓	✓	✓
Sampling strategy	✓	✓	✓	✓
Carbon stocks (plots and strata)	✓	✓	✓	✓
FullCAM outputs	✓		✓	
Disturbance events	✓	✓	✓	✓
Fuel use	✓	✓	✓	✓
Quality assurance and control	✓	✓	✓	✓

A. if areas are not clearly visible, a list of names or other identifiers is required

02.3.5 STEP 5 – Generating carbon income

Overview

Income from the carbon sequestered by planted forests is generated via the sale of ACCUs allocated by the Clean Energy Regulator. The spot price of ACCUs is therefore of relevance to the income that may be generated from a project. The price is determined by supply and demand, and the way in which supply and demand develops hinges on government policy, both in Australian and internationally. Governments are setting stronger targets for emission reduction following deepening concern about climate-related impacts here and overseas. It is highly likely therefore that demand for ACCUs will increase as more and more businesses within the domestic economy seek to offset their carbon emissions.

The rate at which planted forests grow determines the number of ACCUs that they can generate. Planted forests within the region will achieve growth rates ranging from 4 – 22 m^3/ha/yr over 25 years, depending on species mix, site quality and planting type.

For commercial plantations, between 190 and 380 ACCUs per hectare may be generated over the crediting period after accounting for discounts associated with 25-year permanence[11] and risk of reversal buffer.

Commercial timber plantation typically sequester carbon at a faster rate than environmental plantings, however, over the longer-term commercial plantation may be credited with fewer ACCUs after ERF accounting rules are applied. At current ACCU prices the value of the discounts applied to harvested forests are much less that the value of that plantation's timber products.

Using a conservative spot price of $15/ACCU, a commercial hardwood or pine plantation could therefore be expected to generate between $2,880 and $5,700 per hectare of ACCU income over 25 years in addition to the revenue received from timber sales. At an average ACCU price of $25 the income range increases to between $4,800 and $9,500 per hectare (refer to Table 02-5).

Table 02-5. Data used to estimate revenue from ACCUs during a plantation project

Metric	Plantation type			
	Radiata Pine (Tablelands)	Southern Pine (Coast)	Hardwood (Coast)	Environmental planting
Standing biomass (t/ha) at after 25 years (using data in **Table 02-2**)[A]	138 – 231	149 – 234	165 – 273	80 – 210
Number of ACCUs generated (ACCUs/ha)[B]	192 – 322	208 – 326	230 – 380	112 – 293
Revenue from ACCUs ($000/ha)				
Price = $15/ACCU	2.9 – 4.8	3.1 – 4.9	3.5 – 5.7	1.7 – 4.4
Price = $20/ACCU	3.8 – 6.4	4.2 – 6.5	4.6 – 7.6	2.2 – 5.9
Price = $25/ACCU	4.8 – 8.0	5.3 – 8.1	5.7 – 9.5	2.7 – 7.4

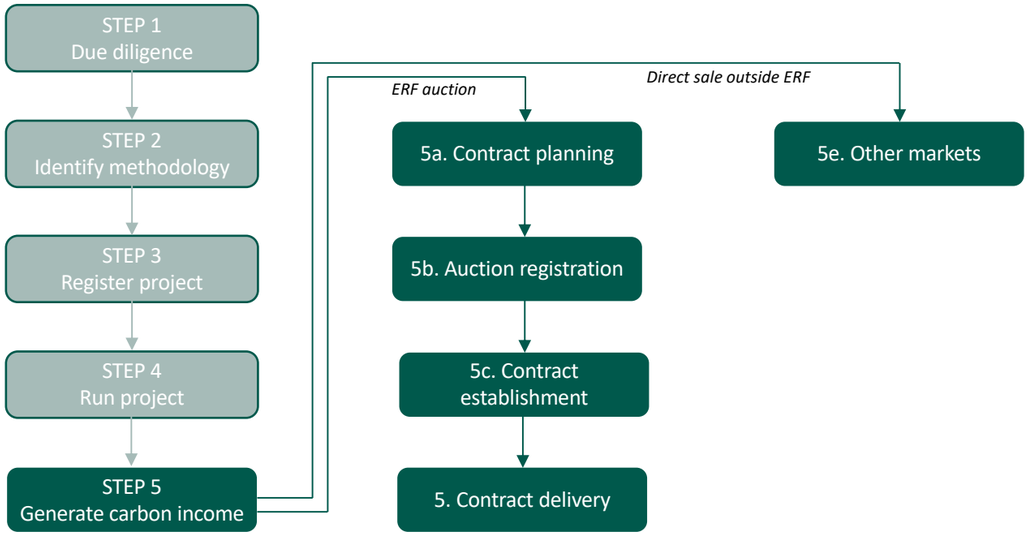
A. Accounts for biomass removed associated with thinning operations
B. Assumes a permanence period of 25 years and application of the 'risk of reversal buffer'

[11] harvesting is treated as an emission event

Generating income via the ERF

Generating income via the sale of ACCUs can be undertaken via either:

- an auction arrangement and carbon abatement contract under the ERF
- a secondary market under a private commercial agreement which is not regulated or controlled by the government.



5a. Contract application

Once you have secured your ACCUs, you can submit them to a competitive auction run by the Clean Energy Regulator. To do this, you apply to the Clean Energy Regulator to participate in an auction, via the client portal. This application also acts as an offer to enter a carbon abatement contract with the Clean Energy Regulator, who will assess your auction qualification by determining your ability to deliver the proposed quantity of ACCUs from the project, and if relevant your past performance with both contracted and non-contracted projects.

5b. Auction registration

Once you have qualified to participate you can register your project for auction which is the next step in the auction and contract establishment process. Auction registration commits you to the delivery terms of the carbon abatement contract which provides information about the number of ACCUs you will deliver and when you will deliver them. Most project proponents will have estimated the number and timing of ACCUs as part of their decision to join the ERF.

The auction format used by the Clean Energy Regulator is a reverse auction in which each participant puts forward a single, confidential bid during the auction window. The lowest priced bids have the best chance of being successful at auction and represent the best value for money for the Government.

If you have successfully registered to participate in an auction you will be provided with a unique code and information on how to submit your bid using the online auction bidding platform AusTender. This information will include a pre-filled auction bid form. The bid price is the amount that you would be willing to accept per ACCU for the duration of the contract.

Figure 02-8 shows the average bid price accepted by the Clean Energy Regulator for the 14 auctions convened to date, and the quantity of abatement purchased. At the most recent auction in April 2022, a total 7.6 million tonnes of abatement was purchased at an average price of $17.35/ACCU.

It should be noted that under the ERF, the regulator may specify a minimum bid size for auctions. This may be several thousand ACCUs. The minimum bid size may provide strong incentives for running aggregated projects (Section 3) or may encourage sale via other markets (see point '5e' below).

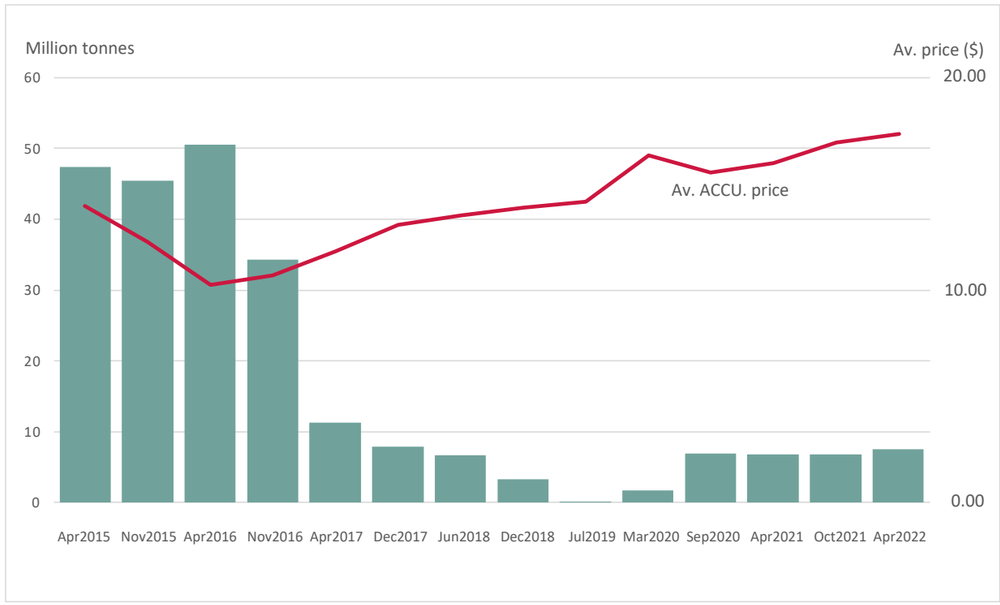


Figure 02-8. Number of tonnes sold and average ACCU price for ERF auctions held to date

5c. Contract establishment

The Clean Energy Regulator selects projects to contract based on the price bid at the auction. If your bid is successful, you will automatically enter a carbon abatement contract with the Clean Energy Regulator which will cover the project(s) relating to the bid. The contracts will guarantee payment of future delivery of emissions reductions at the auction bid price. They provide commercial terms and conditions and will provide for payment to be made on the delivery of emissions reductions.

5d. Contract delivery

Once you have a contract with the regulator, you will deliver emissions reductions according to the schedule in that contract, transferring required ACCUs from your ANREU account to the government to meet contract conditions. You will then be paid at the ACCU price set out in the contract.

5e. Generating income via other markets

In addition to auctioning ACCUs via the Clean Energy Regulator, there is also an option for you to seek emerging secondary carbon markets into which you can sell your ACCUs, and this may be suitable for landholder that hold smaller tranches of ACCUs. Selling via secondary carbon markets generally involves establishment of a direct commercial relationship with a buyer, which may be facilitated by an intermediary such as a bank, broker or other financial institution. When dealing with any of these service providers, ideally you should make sure that you have a contract with an Australian Financial Services licence.

In voluntary markets, the demand for abatement is determined by individual or corporate choices to offset emissions and expectation of future regulation. The price you obtain for your ACCUs may be higher than that sold at a Government reverse auction.

To sell your ACCUs into a secondary market, there are currently two options:

1. Contact a carbon broker

   There are several brokers and financial institutions that are set up to facilitate sale of your ACCUs to third parties. We provide no advice on which to use but suggest that you ensure they are legitimate organisations by seeking their licence details, and/or validating their authenticity via legal advice.

2. Do you own marketing

   You can approach a large emitter (e.g. mining company) directly or with a group of like-minded growers to negotiate to sell ACCUs via a private contract. There may be an opportunity to deliver positive media reports around regional development and environmental restoration associated with plantations, that could leverage outcomes.

But there will be an attractive third option available soon, with establishment of one of more carbon trading exchanges that will enable buyers and sellers of ACCUs to trade online. The Clean Energy Regulator has gone to market seeking development of the Australian Carbon Exchange[12] which is intended to operate in a similar way to an online stock exchange. The platform would enable purchase, clearing and settlement of ACCUs (and possibly other forms of carbon credits) by both individuals and businesses. The Clean Energy Regulator anticipates that the platform could be launched in 2023.

[12] More reading at the CER website: http://www.cleanenergyregulator.gov.au/Infohub/Markets/australian-carbon-exchange

03 COSTS AND COST SHARING OPPORTUNITIES

03.1 Overview

A key element in determining the viability of an ERF project is overall cost. In addition to establishment and maintenance costs of the forest (including purchase of seeds/seedlings, site preparation, planting, thinning, pruning, weed control, fuel reduction, harvesting), there are numerous project operating expenses that need to be accounted for which are summarised in Table 03-1.

Table 03-1. Summary of main project costs

Cost item	Description	Indicative cost #
FMP review and signoff (more information here)	Under the Forestry Plantation method, an FMP needs to be developed, then reviewed and signed off by a qualified independent person (e.g. registered forestry professional). The FMP will set out how the project has been/will be run including management activities.	$5,000 - $20,000
Offset reports	At least five offset or project reports will be required over the 25-year crediting period. Reports are submitted on the Clean Energy Regulator Client Portal using the Emissions Reduction Fund Project Report and Crediting Form.	$1,000 - $5,000 each
Audit reports	At least 3 audit reports will be required over the 25-year crediting period, including an initial audit submitted at the time of the first report, and at least two subsequent audits submitted at times of peak abatement. The audits will need to establish reasonable assurance that the abatement achieved and associated reporting is accurate, so it needs to be undertaken (or signed off) by a category 2 auditor registered under the National Greenhouse and Energy Reporting Regulations 2008.	$5,000 - $20,000 each
Independent financial assessment (more information here)	This is required for Schedules 3 and 4 of the Plantation Forestry method to demonstrate that the plantation would have been converted to a feasible and financially attractive non-forested land use in the absence of the ERF. It requires a qualified independent person to prepare or review the financial assessment and land valuation. This can be a qualified auditor, accountant or valuer or a registered forestry professional.	$5,000 - $15,000

depends on the complexity of the project

How much you pay will depend upon how much you outsource. If you nominate yourself as the project proponent and you are willing to learn and take on reporting and record keeping, you are likely to save a considerable amount compared to entrusting an agent to undertake these tasks. We estimate that costs and fees associated with running your project will be between $30,000 and $120,000, depending on the nature of your projects and how much you are able to do yourself. You may also need to pay a commission equal to a nominated proportion of all ACCUs received (e.g. 5% - 30%). When considered in combination with site preparation and plantation establishment and maintenance costs, and the opportunity cost of not undertaking a different land use (e.g. cattle), careful consideration needs to be given to overall costs in the due diligence stage of project planning.

For smaller holdings, costs may outweigh the benefits received from generation and sale of ACCUs, so identification of cost efficiencies and cost savings are important. There are two potential approaches in which the administration, auditing and reporting costs can be shared across participants, reducing the overall cost for each landholder:

- using a carbon 'aggregator'
- establishing a landholder co-operative.

03.2 Carbon aggregators

Aggregation is the process of bringing multiple sources of carbon abatement together. This can introduce economies of scale, reduce transaction and other business costs and help manage performance risk. An aggregator is an organisation that acts on behalf of multiple forest growers to run an aggregated project.

Under the ERF there are two broad categories of aggregation:

- Project aggregation, where activities that use the same method to bring about carbon abatement are grouped into a single registered project
- Contract aggregation, where projects are grouped or 'bundled' into a single bid made by the aggregator at an auction for a single Carbon Abatement Contract

Under an aggregated project the Clean Energy Regulator will contract with the aggregator who is responsibility for executing the project and for delivering the contracted ACCUs. Other parties involved in the project will need commercial arrangements defined as to how the financial costs and benefits, including performance risk, are allocated amongst the parties.

An aggregator may either purchase or rent land from landholders and generate the carbon benefits themselves or manage the land on behalf of the landholders for an agreed fee, who maintain the rights to carbon credits. Like any other participant, an aggregator must substantiate their legal right to undertake the project and be responsible for the project.

A directory of carbon aggregators (also called carbon service providers) may be found here.

There are some inherent risks associated with aggregated projects which relate to their complexity and duration. Any long-term venture involving multiple parties can be expected to see changes in individual ownership and management and experience internal grievances. How these issues are managed over the project's operating life will have a bearing on its overall success and durability.

The ERF website has more information about aggregated projects.

03.3 Landholder co-operatives

A co-operative is a user-owned and user-controlled organisation that aims to benefit its members via sharing of costs and risks. They help individual farmers resist market pressures and give them an opportunity to cut on transaction costs by jointly performing activities related to processing and/or marketing of their produce. Good examples of cooperatives can be found in the dairy industry. For example, the Dairy Farmers Milk Cooperative[13] was established in 1900 and currently has about 250 members and 200 farms in NSW, Queensland, Victoria and South Australia.

Co-operatives in the environmental market (including carbon) are emerging in recognition of the considerable upside in future environmental markets and the substantial cost savings compared with going with a carbon broker. An example is the recently established Regen Farmers Mutual[14] which is a farmer-owned broker that is enabling farmers to aggregate their market power to sell environmental services.

[13] Available at: https://dfmc.org.au/about-us/
[14] Available at: https://regenfarmersmutual.com

04 TAX TREATMENT OF CARBON CREDITS

It is likely that a project proponent (e.g. landholder) who undertakes an approved ERF project will be carrying on a business and will therefore be subject to income tax. In this respect the receipts of the business (e.g. ACCUs) may be assessable income while the outgoings of the business (e.g. site preparation, planting, audit fees) will be allowable deductions under the *Income Tax Assessment Act 1997.*

A project participant that is registered for GST should be able to claim input tax credits for GST paid on acquisitions associated with an ERF project. In contrast, the supply of ACCUs is GST-free (i.e. no GST is payable on the supply of ACCUs).

You should obtain your own professional advice about the tax treatment of ACCUs having regard to your own situation. As a guide the following is taken from the CER website in relation to tax and ACCUs:

Detailed information about the tax treatment of ACCUs is available on the ATO's website. Generally, the following applies to ACCUs:

- the cost of acquiring an ACCU is tax deductible, with the deduction effectively being deferred through the rolling balance method until the year in which the ACCU is sold or surrendered
- however, where an ACCU is issued to you in accordance with the CFI Act 2011, the availability (if any) of a deduction for the expenses you incur in undertaking activities under the CFI is generally determined under the normal income tax provisions rather than under the more specific provisions that apply to other ACCUs. The one exception is costs incurred in preparing and lodging an application for a certificate of entitlement or an offsets report. These are deductible under the specific provisions. The market value of this type of ACCU is included under the rolling balance account method. This has the effect of temporarily offsetting the economic benefit of the deductions until the ACCU is sold or surrendered.
- the proceeds of selling an ACCU are assessable income on revenue account in the income year the ACCU is sold,
- supplies of Kyoto ACCUs and non-Kyoto ACCUs are GST-free, and
- sellers of ACCUs are deemed to have received market value for an ACCU in certain circumstances (for example, transactions between related entities).

ANNEXURE 01

Estimates in Table 01-2 are drawn from various cited publications including:

Bi, H., Long, Y., Turner, J., Lei, Y., Snowdon, P., Li, Y., Harper, R., Zerihun, A. and Ximenes, F. (2010). Additive prediction of aboveground biomass for Pinus radiata (D. Don) plantations. *Forest Ecology and Management.* 2259: 2310-2314.

DPI (2003). *Agriculture Notes – Radiata Pine for Farm Forestry*. Victorian Department of Primary Industries. AG810.

FWPA (2014). *Analysis of long term productivity and productive capacity of a radiata pine plantation on infertile fine textured soils.* Forest and Wood Products Australia. Project No. PNC216-1011.

Johnson, I.G., Ades, P.K. and Eldridge, K.G. (1997). Growth of natural Californian provenances of *Pinus radiata* in New South Wales, Australia. *New Zealand Journal of Forest Science*. 27: 23-38.

Kanowski, J. and Catterall, C.P. (2010). Carbon stocks in above-ground biomass of monoculture plantations, mixed species plantations and environmental restoration plantings in north-east Australia. *Ecological Management and Restoration.* 11: 119-126.

NWFIG (2002). Economic Aspects of Growing Hardwood Plantations on Farms in the New England Region. New England – North West Forestry Investment Group. April 2002.

Qiao, X., Bi, H., Li, Y., Ximenes, F., Weston, C.J., Volkova, L. and Ghaffariyan, M.R. (2021). Additive predictions of aboveground stand biomass in commercial logs and harvest residues for rotation age Pinus radiata plantations in New South Wales, Australia. *Journal of Forestry Research*. 32: 2265-2289.

Sheppard, K.R. and Forrest, W.G. (1973). Growth of radiata pine following thinning. *Commonwealth Forestry Review.* 52: 133-142.

Smith, R.G.B. and Brennan, P. (2006). First thinning in sub-tropical eucalypt plantations grown for high-value solid-wood products: a review. *Australian Forestry.* 69: 305-312.

Snowdon, P. (2003). Growth of *Pinus elliottii*, *P. pinaster* and *P. radiata* on coastal dune soils near Jervis Bay, Australian Capital Territory. *Australian Forestry.* 66: 161-169.

Specht, A. and West, P.W. (2003). Estimation of biomass and sequestered carbon on farm forest plantations in northern New South Wales, Australia. *Biomass and Bioenergy.* 25: 363-379.

Thomas, D., Henson, M., Joe, B., Boyton, S. and Dickson, R. (2009). Review of growth and wood quality of plantation-*grown Eucalyptus dunnii* Maiden. *Australian Forestry.* 72: 3-11.

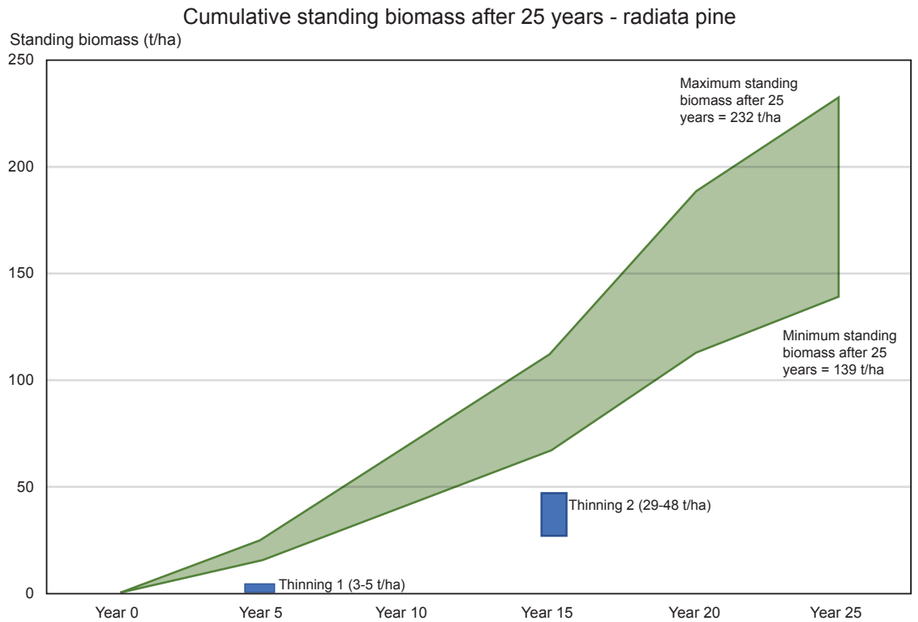
Turner, J., Lambert, M.J., Hopmans, P. and McGrath, J. (2001). Site variation in *Pinus radiata* plantations and implications for site specific management. New Forests. 21: 249-282.

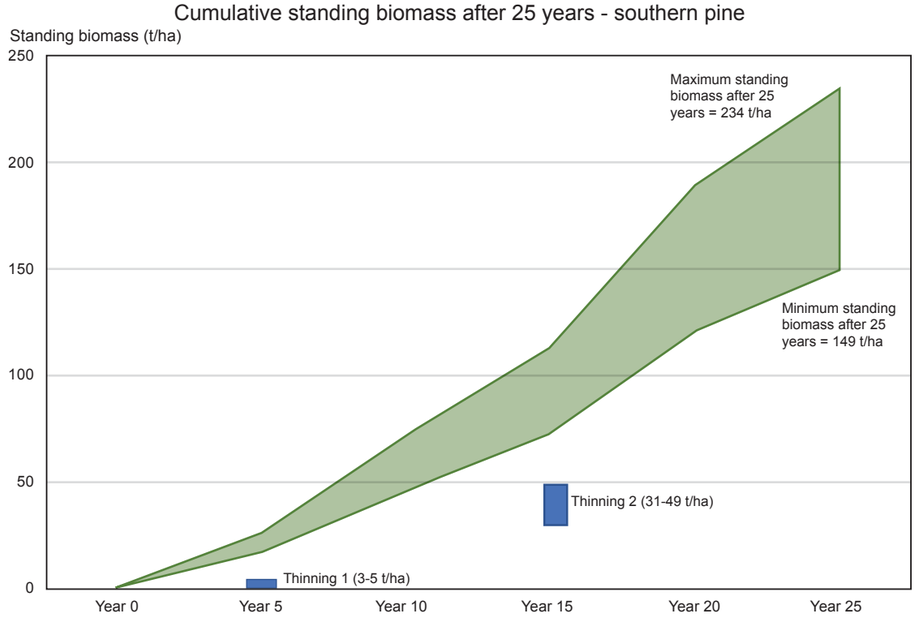
Walsh, P.G., Barton, C.V.M. and Haywood, A. (2008). Growth and carbon sequestration rates at age ten years of some eucalypt species in the low- to medium-rainfall areas of New South Wales, Australia. *Australian Forestry.* 71: 70-77.

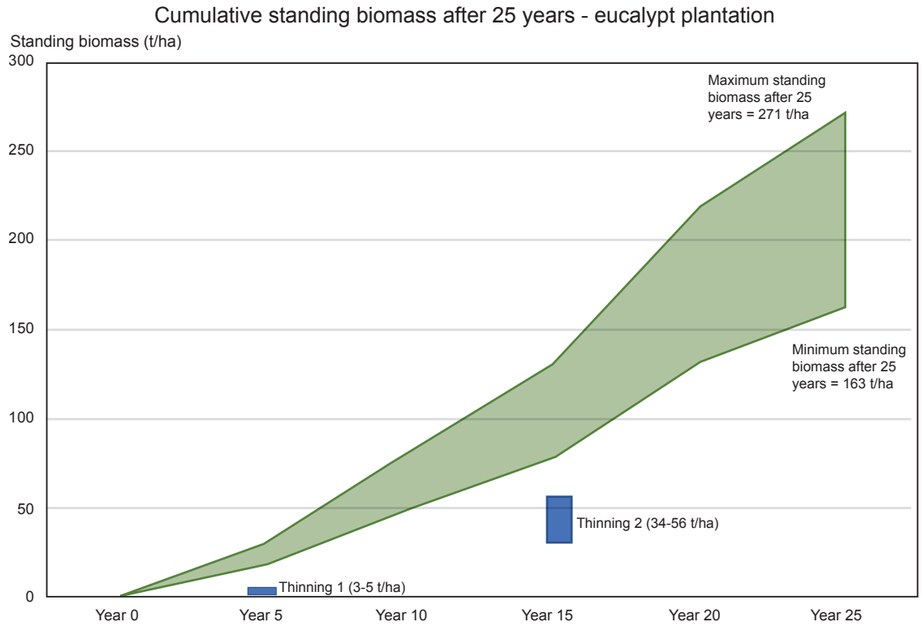
Wang, X., Bi, H., Ximenes, F., Ramos, J. and Li, Y. (2017). Product and residue biomass equations for individual trees in rotation age *Pinus radiata* stands under three thinning regimes in New South Wales, *Australia. Forests.* 8: 439; doi:10.3390/f8110439.

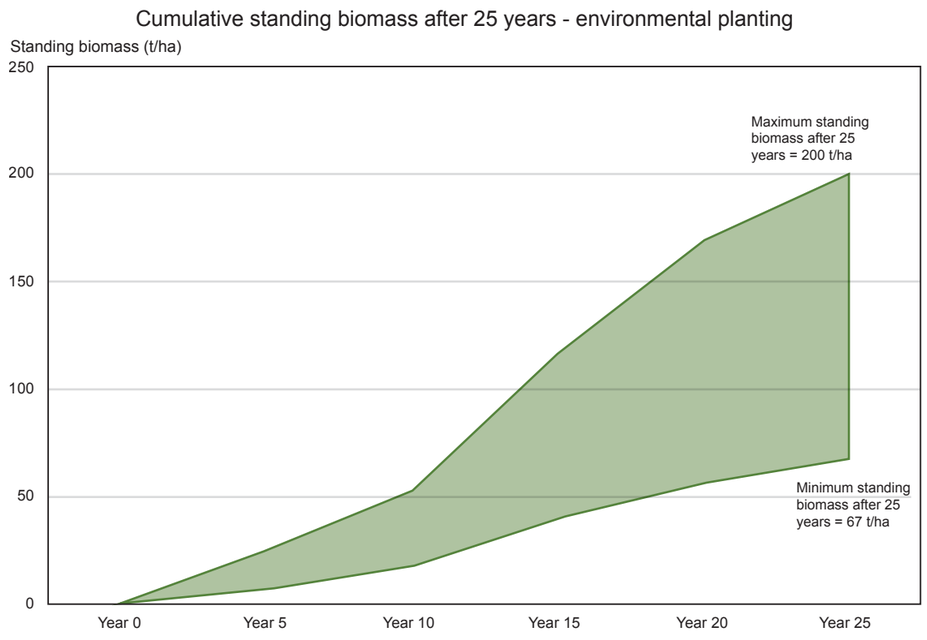
Waterworth, R.M., Richards, G.P., Brack, C.L. and Evans, D.M.W. (2007). A generalised hybrid process-empirical model for predicting plantation forest growth. *Forest Ecology and Management.* 238: 231-243.

ANNEXURE 02






Cumulative standing biomass after 25 years - eucalypt plantation
Standing biomass (t/ha)
300
250
200
150
100
50
0
Maximum standing biomass after 25 years = 271 t/ha
Minimum standing biomass after 25 years = 163 t/ha
Thinning 2 (34-56 t/ha)
Thinning 1 (3-5 t/ha)
Year 0
Year 5
Year 10
Year 15
Year 20
Year 25


Cumulative standing biomass after 25 years - environmental planting
Standing biomass (t/ha)
250
200
150
100
50
0
Maximum standing biomass after 25 years = 200 t/ha
Minimum standing biomass after 25 years = 67 t/ha
Year 0
Year 5
Year 10
Year 15
Year 20
Year 25

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