Australian Government
Department of Climate Change, Energy, the Environment and Water

EMISSIONS REDUCTION ASSURANCE COMMITTEE

ACCU SCHEME
Expression of interest (EOI) template

Comprehensive Carbon Accounting (CCA) method

Isabelle Grant

July 2024

Using this template

Please use this template if you wish to submit an expression of interest (EOI) for a method or method variation proposal under the Australian Carbon Credit Unit (ACCU) Scheme. Your method proposal will be assessed by the Emissions Reduction Assurance Committee (ERAC). The ERAC is an independent statutory committee who assess the compliance of methods against the legislated Offsets Integrity Standards.[1] Its assessment will inform prioritisation by the Australian Government of EOIs that should be developed into a method. You should refer to the *Guide for submitting an expression of interest* (EOI Guide), available on the Department's website when filling out this template.

Please complete all sections of this template to the best of your ability. Please acknowledge any unresolved issues in your submission as this will assist the ERAC to understand outstanding work required to further develop your proposal, and any challenges you anticipate in developing the proposed method.

A completed EOI template should not exceed 20 pages. This excludes the cover page, introduction page and the appendices and declaration page. The page limit does not include any attachments that you submit. In the interest of accessibility please do not change the font or formatting beyond expanding the answer boxes as needed.

Method EOIs are to be submitted via the Have Your Say page website.

Supporting information

Supporting information is requested throughout the EOI. If you are referencing publications, please provide a reference list. Any reference style can be used.

Documents may be attached where appropriate and additional space can be created in the answer boxes if required. Additional information included in a separate document should be labelled with the item number it relates to.

You are encouraged to include the names and affiliations of technical experts consulted in the development of the EOI. You must have permission from the individual or organisation to include their names prior to submitting the EOI.

Please be aware that your submission is likely to be published on the ERAC Secretariat's webpage. Please DO NOT include any confidential material in your submission. If you have confidential information that you believe is essential to your submission, please contact the ERAC Secretariat on methodproposal@dcceew.gov.au to discuss how this can be managed. Where possible, information should be made publicly available.

Section 1: Method developer contact details

1.1 Method developer contact details

[1] Section 133 of the *Carbon Credits (Carbon Farming Initiative) Act 2011*.

Title of proposed method/variation, 10 words:	Comprehensive Carbon Accounting
Contact name:	Isabelle Grant
Email:	isabelle.grant@superpowerinstitute.com.au
Phone:	0452205004
Position:	Land Carbon Lead
Organisation name:	Full name of the legal entity you are submitting the idea on behalf of (or specify that you are representing no company or organisation). Please include your ABN, ACN, or equivalent (if applicable for your organisation).
Organisation type:	What type of entity are you? ● Research/University ● Aboriginal or Torres Strait Islander group or company ● Carbon Service Provider ● Environmental group ● Other NGO ● Peak body ● Private Industry ● Other
Public facing name and contact details:	Isabelle Grant isabelle.grant@superpowerinstitute.com.au 0452205004

Section 2: Eligibility

2.1 Registering your idea with the ERAC Secretariat

Have you registered your method idea on the Method Development Tracker?

☐ Yes – please provide details below.

Date of registration:

Registration ID:

X No – You are encouraged to submit an idea before an EOI. Please visit the department's website or email methodproposal@dcceew.gov.au to find out how to register your idea.

2.2 Eligibility of proposed carbon abatement

Appendix A to the EOI Guide lists the categories for which greenhouse gas emissions and removals are included in Australia's National greenhouse gas inventory. Following consultation with the Secretariat, indicate which of the below is correct. If you have not consulted with the Secretariat, please mark as unconfirmed.

Is the abatement described in your method proposal eligible carbon abatement under the ACCU Scheme? Which categories will your proposal impact? Please refer to Section 2 of the EOI Guide.

Please note that if it becomes clear proposed abatement is not eligible abatement, the Secretariat may not assess the remainder of your proposal.

☐ Yes – the EOI Guide (Appendix A) and the ERAC Secretariat indicate the activity covered under the proposed method is likely to result in eligible carbon abatement.

X Unconfirmed – feedback from the secretariat indicates further consideration is required.

Section 3: Experience and consultation

3.1 Your skills and expertise

Provide a description of your skills, expertise and experience and their relevance to the method proposal. Please list any organisations involved in/collaborating on development of the proposed method.

Professor Peter Rayner, Chief Scientist, The Superpower Institute.

Honorary Professor of Atmospheric Science, University of Melbourne

Expertise in Atmospheric Science, Carbon Cycle Modelling, Atmospheric Inverse Problems

Professor Ross Garnaut, Director, The Superpower Institute.

Professor Emeritus of Business and Economics, University of Melbourne.

Author of the Garnaut Climate Change Review (2008 & 2011).

Expertise in macro-economics, global trade, climate and economic policy.

Isabelle Grant, Land Carbon Lead, The Superpower Institute.

Author Land Carbon Chapter Superpower Transformation, Making Australia's Zero Carbon Future.
Expertise in terrestrial carbon accounting, bio-based value chains, renewable energy regional development.

3.2 Expert consultation

Provide names and organisations of experts consulted in developing this EOI. You must have consent from them to include their names prior to submitting this proposal.

Name	Organisation	Will you continue to engage with this expert if your proposal is progressed to be developed into a method?

3.3 Community, organisations, and individuals

Please provide the names, communities, and organisations you have included, or engaged with on the development of this EOI including Aboriginal and Torres Strait Islander peoples and communities. You must have permission from the individual or organisation to include their names prior to submitting this proposal.

Name	Organisation	Will you continue to engage with this person or organisation if your proposal is progressed? If yes, what role will they play in the method development process?
	Yambangku Aboriginal Cultural Heritage and Tourism Development	YES

Aboriginal Corporation
(YACHATDAC)

3.3.1 First Nations opportunities

Does the proposed method idea apply to areas with a recognised Aboriginal or Torres Strait Islander peoples' rights or interests including Native Title interests or claims? What opportunities have you identified for Aboriginal or Torres Strait Islander participation? This includes during the method development process (such as recognition of Traditional ecological knowledge), at the project-level (through First Nations-led projects), or benefit sharing.

TSI has engaged with YACHATDAC on the importance of measurement technology to capture indigenous land management techniques that are not currently permitted under the Emission Reduction Fund methodologies. Of particular importance are those related to ongoing management of important cultural native plants, spring rehabilitation and cool burning techniques. TSI will continue to build this strong partnership with YACHATDAC at the project level, during the method development and in traditional ecological knowledge exchange between YACHATDAC, TSI and any future partners of the method.

Section 4: Similarity to existing or other proposed methods

EOIs should be drafted to be broadly applicable. EOIs that are substantially similar may be referred back to proponents, with a recommendation that a joint proposal be submitted instead. Registering your idea on the method development tracker will enable you to identify other, similar proposals under development, and help you to collaborate with proponents with similar ideas.

4.1 Similar methods under development

Are you aware of another method under development or method proposal which is similar to your proposal?

☐ There are no comparable methods under development.

X There are comparable methods under development – please list them below and explain why you are submitting a separate EOI.

Similar method under development	Difference in new methodology
Integrated Farm and Land Management (IFLM) methodology	Comprehensive Carbon Accounting differs from the IFLM method because of its measurement approach. The measurement approach allows carbon stocks to be measured at different intervals, through remote sensing technology and ground measurements, to inform a land surface vegetation model. The model is informed by large data sets including soil moisture, vegetation optical depth, direct biomass measurements, soil temperature (IST), among others. These measurements improve and validate the land surface vegetation model

	and the carbon stock is able to be measured from this model. This model incorporates climate change impacts to carbon stocks in its forecasts.

There are many methods which have activities suitable to the Comprehensive Carbon Accounting method. CCA can measure all changes in carbon stock through known relationships between landscape characteristics and carbon storage. Project boundaries extend beyond conventional examples; we can measure the interactions between carbon pools and aggregate multiple pools and emissions to work out net abatement. Therefore, there would be opportunity to add these "modules" in relatively short timescales (12-18 months).

4.2 Existing methods

Is this EOI adapting an existing ACCU method or method from another offsets scheme?

X No, this is a new method.

☐ Yes – please provide below:

1. The name of the scheme in which the method exists
2. Title/name of existing method
3. A reference/source for the existing method
4. Description of any major differences between this method proposal and the existing method.

Section 5: Activities and eligibility

5.1 Project activity

Describe the processes that would be involved in implementing the project activity/activities so it is possible to understand what would be required to conduct the applicable projects. Please identify whether projects using the proposed method would remove and/or avoid emissions. Provide supporting evidence when possible. (Note that details on how the baseline and project emissions are calculated are requested in Section 6.)

Comprehensive Carbon Accounting (CCA) method is a framework for modeling, measuring, monitoring and verifying changes in terrestrial carbon stocks. CCA is a framework to award all increases in carbon, no matter the method. Current remote sensing measurement technology, can effectively and reliably model and measure the following activities in a model-measurement hybrid approach. Other activities will be included over the coming years.

All activities are based on removal of emissions or carbon drawdown (inexhaustive list)

- Tree planting/seeding.
- Natural regeneration of forests and woodlands through suppression of grazing animals.
- Natural regeneration of forests and woodlands through fencing.
- Indigenous wildfire management through early burning and cool burning.
- Cover crops for soil carbon sequestration.
- Water management for soil carbon sequestration.

- Removal/harvesting of biomass for commercial purposes (e.g. biochar or advanced fuels) or weed management purposes

5.2 Project eligibility requirements

Clearly set out the requirements for projects to be eligible. The proposed eligibility criteria must describe the circumstances and conditions in which a project would be allowed to occur. Requirements may relate to ensuring newness, baseline setting and project boundaries.

Eligibility criteria[2]

- Newness test: the project must be new.
- The project must be above business-as-usual.
- The project must not be required by law.
- The project proponent must have the legal right to conduct the activities.

Beyond these core eligibility criteria there are no strict management or land type based criteria beyond the following principles:

- The projects must contribute to increases in carbon storage above a baseline. The activity must demonstrate changes in landscape characteristics, e.g. vegetation cover or change in plant species.
- The activity must be measurable, e.g. the activity conducted must have a recognisable effect on the carbon stock so that the model can measure the effect.

The model can measure outside of the current boundaries, e.g. combining the soil carbon pool, above and below-ground biomass, dead wood and leaf litter, however the project must fall within physical boundaries limited to the soil and aboveground carbon pools (see Figure 1 below). This means any removal of the biomass and carbon off the site is removed also from the carbon stock and is not accounted for outside of the physical project boundary. The only exception to this as previously mentioned is fuel use from machinery, fertiliser use and other on-farm emissions.

[2] General eligibility criteria as in all other Australian carbon credit methods. https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/eligibility-accu-scheme

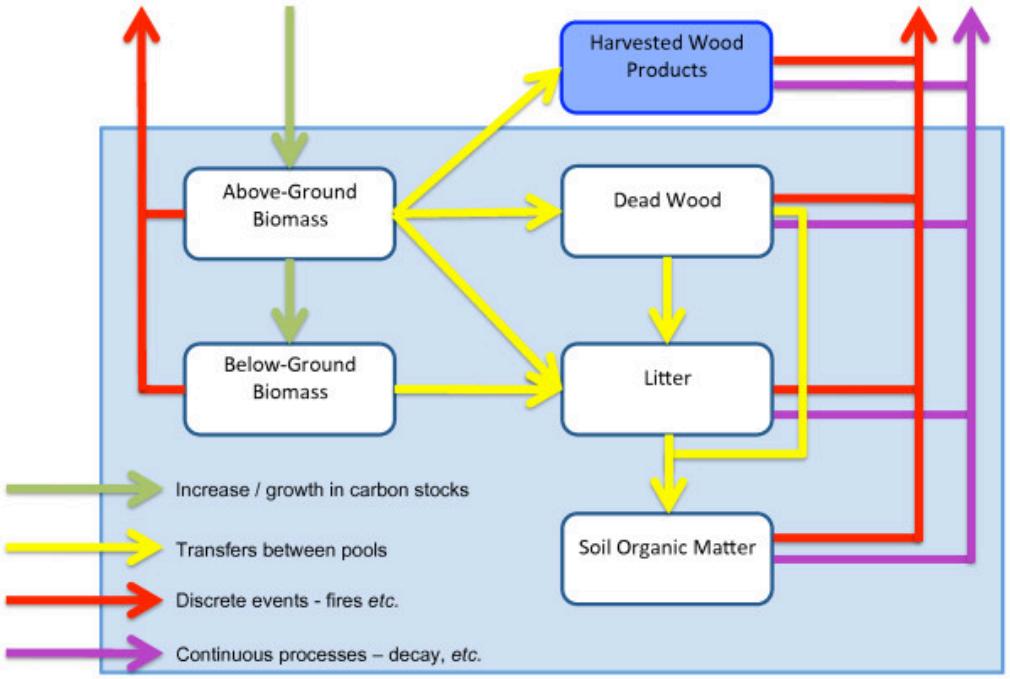

Figure 1. Terrestrial carbon pools and flows. CCA model and measurement boundaries are shown within the blue boundary lines and within the blue box. Taken from Maniatis & Mollicone (2010)[3].

Eligible projects will conduct activities which correspond to legitimate activities which increase the carbon stock. Comprehensive Carbon Accounting is not specific about management activities, therefore any activities that increase carbon via management of vegetation (some examples given above) should be awarded credits. Because we are measuring carbon stock we are measuring the outcome, which is not prescriptive. There are acceptable management practises which change this carbon stock, and any of these are eligible under Comprehensive Carbon Accounting. Outcomes that cannot be explicitly measured include changes in NOx emissions or methane emissions, though on-farm emissions such as NOx and methane emissions from fuel use must be recorded and kept a log book of. The addition of these non-CO2 GHG emissions would be an important next step in completing the Comprehensive Carbon accounting framework.

5.3 Potential for double counting

Is there a risk of double counting associated with the proposed method? Are relevant emissions counted in other contexts? Please describe how you propose to account for any potential for double counting in the method.

The risk of double counting may occur if projects are registered under the voluntary market as well as the compliance market. This may occur for scenarios such as biochar production and biomass that is used for low carbon liquid fuels such as sustainable aviation fuel. Double counting could occur if biomass is removed from the project boundaries and not accounted for. This model will account for the biomass that is removed by measuring the carbon stock and adjusting the

[3] Maniatis, Danae & Mollicone, Danilo. (2010). Options for sampling and stratification for national forest inventories to implement REDD+ under the UNFCCC. Carbon balance and management. 5. 9. 10.1186/1750-0680-5-9.

carbon stock based on these numbers. Therefore, the removal of the biomass will be accounted for in the updated carbon stock.

Because there is a measurement taken at the baseline, anything above the baseline, regardless of the activities conducted, will have credits awarded for every tonne of CO2e sequestered. Any reductions in this store of carbon will require credits returned to the administrator.

Double counting could occur if multiple activities are stacked. For example the interactions between different methods that impact the below-ground biomass pool and the soil carbon pool have their own emissions and carbon sequestration, however these will be integrated in the carbon cycle model that accommodates these interactions. The aim of the method is for this to be the only method (once all emissions are included), therefore there would be no risk of double counting with other methodologies as this method would be comprehensive. The voluntary market is not a compliance market and does not currently count towards national targets, and cannot be used to offset emissions under the safeguard mechanism, therefore the risk of double counting is reduced.

Section 6: Calculating net abatement

6.1 Baseline scenario

Identify and describe the baseline scenario or scenarios for the proposed method.

Provide a description and evidence of current industry practice and how baseline emissions can be quantified and calculated. Provide supporting evidence.

OLCAM model

CCA will measure changes in carbon stock through adapting the DARLEC and BETHY land surface vegetation models (Knorr et al, in review) to Australian vegetation types and requirements under the Open Land Carbon Assimilation Model (hereinafter referred to as OLCAM). The approach is known as Carbon Cycle Data Assimilation (CCDAS) in which a physical model including all relevant processes is continually adjusted to fit all available observations. The paradigm is weather forecasting where the model trajectory is "nudged" by observations. Although less discussed than its predictive aspect, weather forecast models provide continuous and complete estimates of all atmospheric variables as consistent as possible with our physical understanding and all previous observations. CCDAS provides the same outcome for the carbon cycle.

OLCAM consists of a core model with interfaces to different measurement types. These interfaces or observation operators map model variables onto measurements allowing feedback from measurements to the model behaviour. Introducing a new measurement requires writing a new interface not a complete new model.

Baseline scenario calculation

The baseline scenario is a counterfactual in which a parallel model run is performed without the landscape intervention. This is important since uptakes that would have occurred anyway should not be credited.

This counterfactual model can be calculated by running a land surface vegetation model without any planned intervention. There are common examples of this exemplified in the TRENDY Intercomparison Programme (Teckentrup et al, 2021). The TRENDY programme informs national and regional Net Biome Production data for the Global Carbon Budget annual assessment[4].

[4] https://blogs.exeter.ac.uk/trendy/

This baseline is an accurate measurement of the ongoing plant productivity, soil organic matter turnover and biomass of a given site. OLCAM baselines are never zero, they reflect the ongoing carbon cycle processes and storage of terrestrial carbon systems.

6.2 Baseline scenario over time

Please indicate whether, and to what extent, the baselines should change over time. This may help ensure the activities under the proposed method remain additional. Provide supporting evidence.

The baseline scenario will be a dynamic baseline which will change over time. This baseline will incorporate climatic conditions into the future, including the CO2 fertilisation effect on plant productivity. The baseline is a dynamic assessment of the counterfactual scenario, e.g. natural changes in landscape vegetation. The baseline is not a constant number, it is a scenario. For example, the baseline in 2050, is what you get in 2050 without an intervention.

6.3 Project activity emissions

Describe how you will calculate remaining emissions (in the project boundary) once the project has been carried out. This should include accounting for new emissions that may result from carrying out activities. Provide supporting evidence when possible.

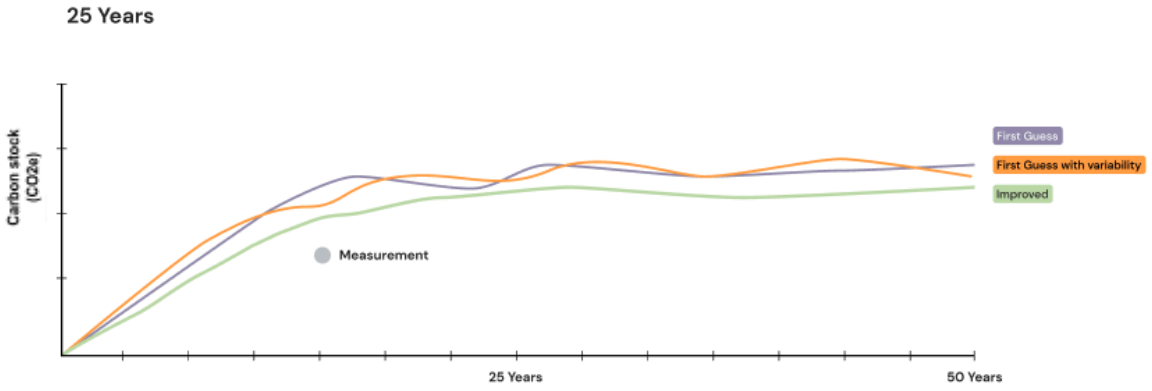

Figure 2. OLCAM carbon stock model forecast over time (First Guess), OLCAM model forecast with climate change impacts (First Guess with Variability), OLCAM model output with measurement (Improved). The graph is for illustrative purposes only.

The aforementioned OLCAM model forecasts the changes that will occur under the proposed management regime to give a First Guess (see Figure 2). This First Guess is then informed with the climate variability which helps to manage expectations of change into a warming and drying climate (some regions may see the opposite climate change). Periodic Measurement (in grey) adjusts this model trajectory to improve our estimate based on real measurements and data (these can be taken from remote sensing or direct on-ground measurements). Measurements for

given land parcels help to inform the overall trend of the carbon abatement trajectory, as well as continuing to be dynamic to more measurements.

As with FullCAM guidelines, project proponents will be required to keep a fuel log and record of all machinery, fertiliser use and other GHG emissions during the project lifetime. These emissions records will be periodically audited, in line with existing inventory requirements, such as an inventory of purchased imports. These non land-based emissions and non-CO2 emissions are included in the final carbon abatement results.

6.4 Account for periodic variation

Describe how the method proposal would account for periodic variations that may occur in the amount of carbon stored or avoided (if applicable). Provide supporting evidence when possible.

The model is anticipating these changes. because it has the climatic variability impacts - models built for that task. Periodic measurement is there to inform the model. Abnormal years in the real world, should also be abnormal years in the model. We are accounting for this.

Seasonal variation is occurring and is accounted for in the model. Random climatic variations.

6.5 Account for carbon leakage

Provide detail on whether – and to what extent – the proposed method may result in carbon leakage and how that has been or could be accounted for in the proposed method's design. Provide supporting evidence when possible.

Carbon is conserved within the model. Leakage only occurs when exogenous interventions such as harvest or herbivory are not properly tracked. That is the task of the models for the various proposed interventions.

Carbon leakage can occur when industries that would be more sustainable in Australia, for example longer rotation, Forestry Stewardship Council certified plantations, are sourced from more unsustainable options outside of Australia. To support sustainable biomass growth or woody weed removal in Australia there needs to be pathways for accreditation and methodologies. CCA would provide pathways for these plantations to achieve carbon credits for the growth of the carbon in growing biomass for reducing emissions in hard-to-tackle industries through sustainable aviation fuel and renewable shipping fuel. This will reduce carbon leakage from importing biomass from other places for the same renewable fuel production here.

6.6 Calculating net abatement

Describe how the net abatement will be calculated and how the uncertainty of the net abatement will be calculated. Provide supporting evidence.

You are encouraged to provide a diagram which clearly shows the baseline relative to the proposed abatement over the life of projects conducted under the proposed method.

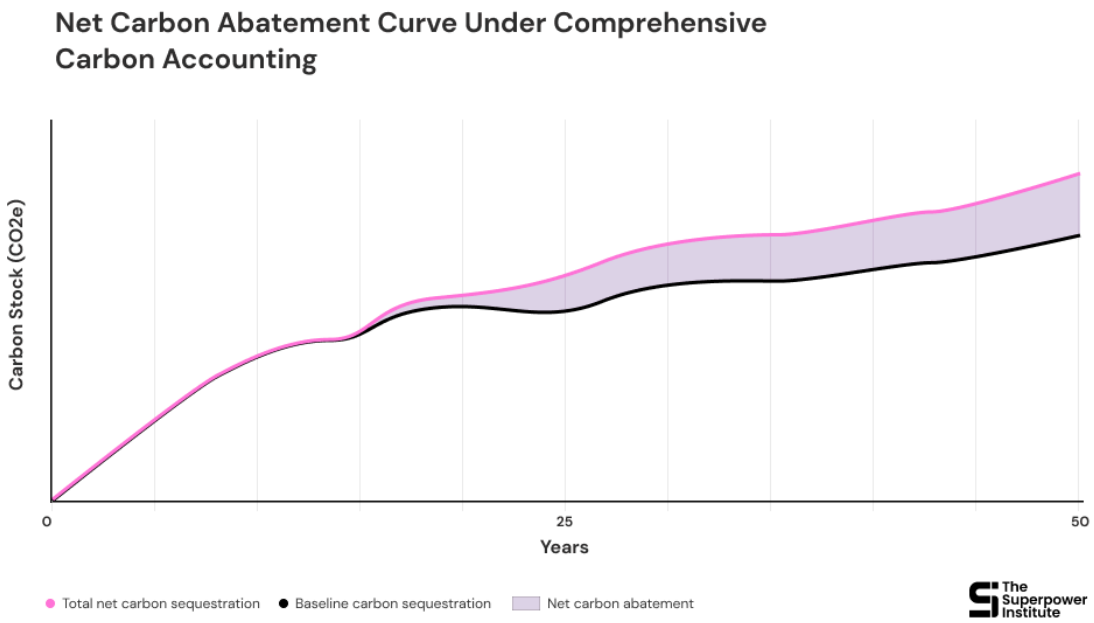

Figure 3. Net Carbon Abatement Curve under Comprehensive Carbon Accounting. This curve represents a scenario where there is continual growth of the carbon stock in the baseline and managed scenarios until an intervention, at which point the increase in carbon is recognised in the total carbon stock. This may be due to management choices that lead to above-ground carbon sequestration but is constrained by grazing, for example. A change in management to retain more carbon in plants (i.e. reduced grazing pressure or cell grazing practises) would lead to an additional sequestration benefit which would then be counted towards the net abatement. Any emissions from the management would be included in both baseline and new management scenarios. The three-step process for improving the first forecast (as seen in Figure 2), is embedded in the Total net carbon sequestration curve (pink line). The area under the curve (Net carbon abatement) represents the total net abatement over a 50 year period. The graph is for illustrative purposes only.

Managing uncertainty is inbuilt into the model. The model is designed to adjust the forecast in the case of measurement data and new model data updates. This reduces uncertainty in the baseline and in the activity emissions scenarios.

Section 7: Offsets Integrity Standards

The Offsets Integrity Standards are legislated in section 133 of the *Carbon Credits (Carbon Farming Initiative) Act 2011* that methods must meet.

7.1 How will your proposed method be additional to business-as-usual practice?

Provide supporting evidence when possible.

The baseline is a representation of the natural carbon stock baseline of the region, therefore presents an opportunity to compare business-as-usual with additional management. A baseline scenario prior to the project inception will assist in understanding any potential change in land

management that artificially reduces the carbon stock and will inform business-as-usual trajectories. This baseline will be representative of the region and will consider neighbouring properties and baseline results from those from the surrounding land parcels to ascertain the business-as-usual practises.

7.2 How will your proposed method be measurable and verifiable?

Provide supporting evidence when possible.

The work will be partially verified by an ongoing quality control process within the model itself, which updates the model with more data as it is accumulated.

Measurements that are really rare and high quality are kept back as verification. High quality measurements, such as a very representative soil carbon measurement, would be used as a validation tool in OLCAM.

7.3 What evidence will your proposed method be based on?

Provide a summary of the type of evidence your method proposal draws on and describe any uncertainties or limitations associated with it.

The method will draw upon evidence from satellite measurements that link indirect measurements such as photosynthesis from chlorophyll fluorescence, vegetation optical depth, direct biomass measurements and soil temperature measurements (LST) to carbon content and sequestration of land systems. These data sets will be accumulated with others that inform our models of land carbon stocks. Other on-ground technologies and measurements include the following (inexhaustive list); flux towers, atmospheric concentration, chamber measurements, soil carbon core sampling, vegetation activity, biomass sampling, soil moisture sensors and surface temperature measurements.

There are parametric uncertainties in every model, one of the things that reduces our uncertainties is that uncertainties are actually calculated explicitly in this model. Therefore, we can refer to uncertainties when discussing exact carbon stock figures thus reducing the unknown source of any differences in actual vs modelled carbon stocks. The uncertainties will decrease over time due to better understanding in the model of carbon stocks relative to the changing climate, the region's physical characteristics and updated carbon cycle science.

7.4 How will your proposed method be conservative?

Provide supporting evidence when possible.

OLCAM is conservative because it isn’t strongly affected by one direction or another. The model is robustly constrained. Additionally, OLCAM calculates uncertainties explicitly therefore it can weight final carbon stocks by their uncertainties.

As per the ACCU Method Development Guidelines document, there is a 5% risk of reversal adjustment made to all carbon credits and a 20% reduction in total carbon credits with shorter, 25-year projects. The focus of CCA is that we are aiming to better understand and measure total carbon stocks. The risk of reversal will be better accounted for in the model as climate change impacts, including increased wildfires are inbuilt in the forecasts.

Section 8: Method proposal triage criteria

In addition to considering whether a method proposal has the potential to meet the legislated Offsets Integrity Standards, the ERAC assesses method proposals against the triaging criteria.

8.1 Total abatement potential, including likely uptake

Describe the possible total abatement potential of the proposed method, including:

- Likely uptake, including justification and evidence for your estimate and factors likely to influence the uptake.
- Possible locations of projects (i.e. particular regions/jurisdictions).
- Accessibility of the proposed method to all stakeholders.
- Given the above, the likely abatement in the short and longer-term from the method.

Provide supporting evidence when possible.

As suggested in Fitch et al, (2022) there is a role for extending fire management credits into semi-arid and arid landscapes, including outside of the Northern Territory into Queensland. Using the technical potential estimate provided in this study, and **expansion into 55.8 million hectares of new area** that could be included in cool burning or fire management techniques, the potential abatement of wildfires can help contribute to 3.5 million tonnes of CO2 emission avoidance every year. This would result in 87.7 million tonnes over a 25 year period through early burning and reducing the intensity and area covered by wildfires. Because of the huge success of the current savanna burning, the likelihood of success in this new management option is high.

The OLCAM would be created as an open source platform to be used by many different user groups to help understand the potential of their land for many carbon farming opportunities. Highly accessible tool and there has been considerable time and effort placed on how best to interact with all stakeholders to provide the best outcomes.

Potential abatement has been estimated for a number of new and existing activities, such as biochar production and use of biomass for sustainable aviation fuel in the Superpower Transformation, Land Carbon chapter (Garnaut, 2022)

- Maximising current forest and woodland reforestation methods through CCA could result in 116 million tonnes of CO2e sequestration per annum.
- 10% increase in mallee planting in annual crops and highly modified pastures could result in 18 million tonnes of CO2e per annum.
- One million hectares of agave, strategically located as fire breaks could sequester 4.6 Mt CO2e if sustainably harvested and converted into biochar and 6.6 Mt CO2e in bio-oil as a fuel source.
- Use of cellulosic waste residues including forestry and agricultural waste to produce sustainable aviation fuels could avoid around 38 million tonnes of CO2e a year.

There have been announcements in support of SAF and low carbon liquid fuels from the federal government, this plan can be supported by better quality measurement technologies and tools to measures the biomass stage of this industry.

8.2 Proposal complexity

Describe the complexity of the method proposal, including how difficult it may be, and how much time it may take, to develop, maintain, and regulate.

Project development for a proponent will be easy, developing the model will take time. We estimate 18-24 months until the model is fit-for-purpose, including validating the tool under different Australian landscapes and case studies. The tool will need maintenance, however the aim will be to create an open source platform which will be maintained for a large set of end-users. Work in dealing with complexity of the carbon cycle and the physical model assumptions and parameters has been ongoing for more than 20 years in the research community, therefore much of the complexity has been worked through and is now ready to be applied to a market setting.

8.3 Broader positive outcomes

Describe any positive environmental, economic, social and/or cultural outcomes and benefits, including for Aboriginal and Torres Strait Islander peoples, that might occur from the uptake of the proposed method. Provide a clear rationale for each proposed outcome, with supporting evidence where possible.

Environmental

Greater measurement potential of carbon stocks will allow more “restoration” opportunities to happen such as spring rehabilitation, deep soil carbon sequestration through erosion mitigation and rehydration management which encourages better environmental land management across Australia.

Economic

New avenues for crediting activities will improve the livelihoods of many landholders across Australia. Such credits can diversify existing land management, such as managing drought tolerant crops such as Agave for fire breaks on pasture land. Regions that sustainably grow biomass in innovative planting formations and long rotation cycles can support new industries such as sustainable aviation fuel. These industries have long value chains that can provide numerous long term job opportunities in technical and management fields as well as temporary jobs in construction and waste or weed management or plantation harvesting.

Social

These new industries can form the economic backbone of regions that are transitioning out of fossil fuel production and for regions that are suffering from decreasing populations due to urbanisation trends. The flow-on benefits to local communities present new commercial opportunities but also recreational, tourism and community development.

Cultural, including indigenous

Cultural benefits include greater ownership and engagement of indigenous peoples with a wider range of carbon projects. Potential for recognition of the resilience of indigenous managed land systems; greater permanence and high value credits.

8.4 Innovation

Briefly describe how the method proposal could foster innovation in the relevant sectors.

This tool could enable a vast set of new methods, so-called “modules” under OLCAM, to be developed to demonstrate many ways of increasing and maintaining carbon in the landscape. Additionally, due to flexibility of data and the use of multiple data sources, this method could take advantage of many new technologies in the field of remote sensing such as LiDAR, Radar and drone-technology, as well as satellite programmes to take advantage of latest science in identifying changes in plant productivity from space, such as chlorophyll fluorescence. These new technologies could easily be added to the OLCAM, or used as measurements to improve estimates of carbon stocks.

We think there can be added benefits, outside of carbon, for co-benefit measurement, monitoring and verification through this powerful measurement tool. Additions to measurement technology, such as acoustic sensors on eddy covariance towers can foster innovation in non-carbon benefits from land restoration and tree planting activities. Additionally, quantification of plant and landscape heterogeneity, resulting from indigenous land management practises, can foster new methods in indigenous carbon management such as return of invertebrate species, habitat provisioning and the benefits of cool burning techniques, for improved carbon sequestration outcomes and avoided emissions from wildfires.

8.5 Preliminary risk assessment and any potential adverse impacts

Please indicate what, if any potential adverse or negative environmental, economic, social and/or cultural impacts could result from the method. Consider the circumstances under which the risks or outcomes might arise and any method requirements that could avoid or minimise the risks.

The risk of reversal and reduction in carbon credits may occur from improved measurement technologies, making some carbon projects uneconomic. However, only carbon projects that are economically viable should be awarded carbon credits under a functioning carbon market. Improvements to the measurement help to award only good quality sequestration opportunities.

A situation may arise where OLCAM presents different forecast carbon sequestration outcomes than the existing measurement technologies. In this case, to minimise the impact to existing projects, there must be safeguards in place to ensure returns on investment.

Section 9: Method tools

9.1 Method tools (optional)

If applicable, describe any tools that would be used as part of the method, for example to model or calculate abatement under the method. Please provide information outlined in the EOI Guide.

The OLCAM tool has been explained in Section 7.

Section 10: Method Development Project Plan

10.1 Project plan for method development

Provide a high-level project plan for developing your proposal. The plan can take any form and be submitted as an attachment. Please provide the information outlined in the EOI Guide.

Project Plan

The time needed to undertake further method development work

- 12-18 months for demonstration sites and validation. Timeline below:

Month 0: start project

Month 3: OLCAM implemented over Australia

Month 6: OLCAM interfaced with key satellite data sets over Australia

Month 12: OLCAM calibrated and validated against existing in situ data sets such as flux towers, biomass and soil carbon measurements

Month 15: Modules for implementing planting and HIR methods interfaced to OLCAM

Month 18: OLCAM interfaced with climate scenarios for risk projections,

Month 18: Submission for acceptance as approved method

If relevant, indicative timelines for any further research needed

- Further research will be needed to make the tool fit-for-purpose for Australian conditions, as the tool has been developed in climatic zones in Europe.

When your method could be ready for each step in the method development process

- The method development process and the method would run parallel to one another and would be ready at the same time - around 12-18 months

The resources available to you to develop the method and whether they are sufficient

- Resource needs include post-doctoral researchers and site managers.

Key stakeholders you plan to engage with on further development of the method, and timelines for engagement (in addition to the mandatory public consultation period for all methods)

- Terrestrial Ecosystem Research Network (TERN). Additionally co-funded demonstration sites across key regions such as semi-arid rangelands in Queensland and WA (YACHATDAC and Barcaldine Regional Council), temperate forests in Victoria (other partners), among others.

Project risks and other matters that may affect delivery of the method

- Coordination of complex projects, project management issues.

Section 11: References

11.1 References

Provide a full citation for all reports, papers and journal articles cited in the method proposal.

Fitch P, Battaglia M, Lenton A, Feron P, Gao L, Mei Y, Hortle A, Macdonald L, Pearce M, Occhipinti S, Roxburgh S, Steven A, Australia's sequestration potential (2022) CSIRO.

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Maniatis, Danae & Mollicone, Danilo. (2010). Options for sampling and stratification for national forest inventories to implement REDD+ under the UNFCCC. Carbon balance and management. 5. 9. 10.1186/1750-0680-5-9.

Teckentrup, Lina & De Kauwe, Martin & Pitman, Andrew & Goll, Daniel & Haverd, Vanessa & Jain, Atul & Joetzjer, Emilie & Kato, Etsushi & Lienert, Sebastian & Lombardozzi, Danica & McGuire, Patrick & Melton, Joe & Nabel, Julia & Pongratz, Julia & Sitch, Stephen & Walker, Anthony & Zaehle, Sönke. (2021). Assessing the representation of the Australian carbon cycle in global vegetation models.

https://blogs.exeter.ac.uk/trendy/

Section 12: Appendices

12.1 Appendices

List and attach all relevant documentation to support an assessment of the proposal including cited reports, papers and journal articles that are not publicly available.

Section 13: Declaration

This application must be signed by a duly authorised representative of the proponent. The person signing should read the following declaration and sign below.

Division 137 of the Criminal Code makes it an offence for a person to give information to a Commonwealth entity if the person providing the information knows that the information is false or misleading. The maximum penalty for such an offence is imprisonment up to 12 months.

By signing below, the signatory acknowledges that he or she is an authorised representative of the proponent, and that all of the information contained in this application is true and correct. The signatory warrants that they own or have a licence to use all of the relevant intellectual property rights in the application submitted. The signatory also warrants that they have read, and agreed to all information on the submission portal for this EOI, including the important information, privacy notice, public disclosure statement, intellectual property agreement, and declaration.

Full name of the person signing as representative of the proponent	
Position	

Signature _____ Date _____