



USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE
AVOIDED CONVERSION OF GRASSLANDS AND
SHRUBLANDS TO CROP PRODUCTION

March 2020



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ABOUT AMERICAN CARBON REGISTRY® (ACR)

A leading carbon offset program founded in 1996 as the first private voluntary GHG registry in the world, ACR operates in the voluntary and regulated carbon markets. ACR has unparalleled experience in the development of environmentally rigorous, science-based offset methodologies as well as operational experience in the oversight of offset project verification, registration, offset issuance and retirement reporting through its online registry system.

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ABOUT THIS MANUAL

This is a user's manual for project developers, project participants and those otherwise interested in the conduct of the **Avoided Conversion of Grasslands and Shrublands to Crop Production** carbon offset project type with the American Carbon Registry. It is based on v.2.0 of the methodology (October 2019) and the accompanying Errata and Clarification (March 2020).

Documents referenced within:

- [Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Avoided Conversion of Grasslands and Shrublands to Crop Production v.2.0](#) ("the Methodology")
- [The American Carbon Registry Standard – Latest version](#)
- [The American Carbon Registry Validation and Verification Standard – Latest version](#)
- Project Planning Tool (Excel, available from ACR upon request)
- [Risk Tool and Buffer Pool Contributions](#)

This document supports and simplifies information in the methodology but **does not replace requirements listed in the methodology or the ACR Standard**. Corresponding sections of the methodology are listed. This document is intended to facilitate and catalyze the early stages of project planning especially for developers new to the project type.

Definitions of terms used in this document can be found in the Methodology (**Methodology, Section 8**) and in the ACR Standard. An abridged list of acronyms is included below for easy reference.

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ACR	American Carbon Registry
COI	Conflict of Interest
ERTS	Emissions Reductions Tonnes
GHG	Greenhouse Gas
LCA	Land Conservation Agreement
LCC	Land Capability Class
MRV	Monitoring, Reporting and Verification
PDA	Programmatic Development Approach
SOC	Soil Organic Carbon
SSR	Sources, Sinks and Reservoirs
VVB	Validation and Verification Body



PROJECT DEFINITION AND ELIGIBILITY

PROJECT ACTIVITY

The recording of a conservation easement (land conservation agreement, LCA) on a property that includes land parcels of grassland or shrubland that would otherwise be converted for agriculture. (**Methodology, Section 1.1**)

The methodology estimates the GHG emissions avoided by preventing the conversion of grasslands and shrublands to annual crop production. The greatest net GHG benefit from the project activity is anticipated to be the avoided release of soil organic carbon (SOC). This methodology conservatively assumes that avoided conversion results in the maintenance (without increase) of carbon stocks in the pools of soil organic carbon, and above-ground and below-ground biomass remain at steady state throughout the project scenario.

PROJECT ELIGIBILITY

In addition to meeting all requirements in the latest version of the ACR Standard, each field in the project must meet the criteria below. (**Methodology, Section 1.2**)

Table 1: Eligibility Criteria

CRITERIA	CHECK (✓) IF YES
1. All fields to be enrolled avoid the complete conversion to annual Cropland. Avoided conversion to land uses other than Cropland (e.g. development) is not an allowed activity.	<input type="checkbox"/>
2. All fields to be enrolled in the GHG project are in the United States.	
3. All fields to be enrolled in the GHG project are currently grassland or shrubland; fields have been grassland or shrubland ¹ for at least 10 years; cropland is the most likely next land use for the fields.	<input type="checkbox"/>
4. No legal prohibition exists to prevent conversion to cropland of all fields to be enrolled in the GHG project.	<input type="checkbox"/>
5. All fields to be enrolled in the GHG project are covered by a qualified Land Conservation Agreement (LCA), e.g. a conservation easement for 40 years (minimum project term).	<input type="checkbox"/>
6. The LCA includes a “sodbuster clause”, explicitly prohibiting grassland conversion to another land use	<input type="checkbox"/>
7. The LCA is recorded on the deed for the property	<input type="checkbox"/>
8. Fields are located entirely within counties shown and listed in Figure 3 and Table 3 of Appendix B (this User’s Manual) and Figure 2 and Appendix B of the Methodology (Methodology, Section 3.1.1.2 and Appendix B) for unidentified agents of conversion OR written offers to buy or lease the fields specify cropland as highest and best use and reference water rights and infrastructure for irrigation (if required) (Methodology, Section 3.1.1.2) for identified agents.	<input type="checkbox"/>
9. At least 50% of the GHG project area is in Land Capability Class (LCC) I-IV and no more than 25% is in Land Capability Class VII and VIII, according to the SSURGO non-irrigated lands database ² .	<input type="checkbox"/>
10. Landowner holds title to carbon and submits to ACR an Statement of Intent to conduct a carbon project in conjunction with the LCA; Statement of Intent is submitted to ACR within ±12 months of the LCA recording date.	<input type="checkbox"/>

¹ As defined in the American Carbon Registry Standard (<https://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard>)

² <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

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CRITERIA	CHECK (✓) IF YES
11. Project developer holds title to carbon rights and submits to ACR a copy of the agreement transferring carbon rights ownership from the landowner to the project developer; Agreement is dated and submitted to ACR within ±12 months of the LCA recording date.	<input type="checkbox"/>
12. No fields to be enrolled in the GHG project include organic soils, peatlands, or wetlands and these areas are present, they have been excluded from the project per the Methodology, Section 2.1.2 .	<input type="checkbox"/>
13. Justification for an irrigated cropland scenario is provided (where needed) and includes demonstration of water access, legal and physical, and discussion of irrigation practices on neighboring or similar properties within the county.	<input type="checkbox"/>
14. IF livestock are present in the project scenario, manure is not managed, stored or dispersed in liquid form.	<input type="checkbox"/>
15. IF livestock are present in the project scenario, they are primarily forage fed and not confined.	<input type="checkbox"/>



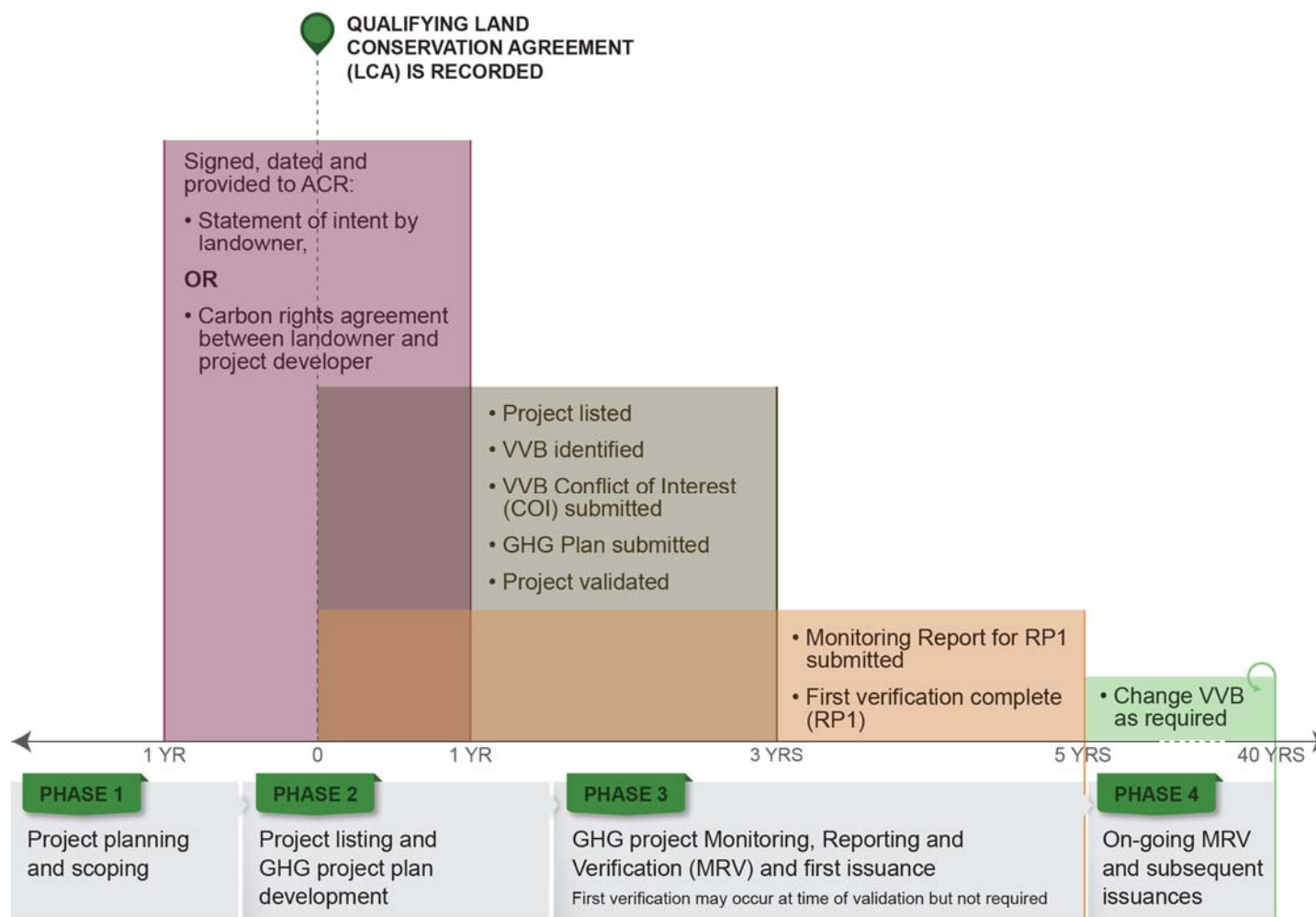
TIMELINE

The basic project timeline for a single property or aggregated project is shown below. The **recording of a conservation easement** is the defining action in the project timeline. Critical project milestones are shown in relation to this date.

- Phase 1 – Project planning and scoping
- Phase 2 – Project listing and GHG project plan development
- Phase 3 – GHG project Monitoring, Reporting and Verification (MRV) and first issuance
- Phase 4 – On-going MRV and subsequent issuances

The key **activities, questions to be answered** and important **documents to be gathered and/or submitted** are listed below for each Phase. The scenario below assumes that the DAYCENT model is used for quantification of the soil organic carbon (SOC) pool, although other methods are allowed as shown in Table 2 (this User's Manual).

Figure 1: Project Timeline



Notes: The exact timing for the beginning of phases 1, 2 and 3 can vary. Validation and Verification for RP1 may (but not required to) occur simultaneously for RP1, i.e. Phase 2 and 3 may fully overlap. Steps in Phase 2 are only required once per crediting period.



PHASE 1: PROJECT PLANNING AND SCOPING

PHASE 1 ACTIONS

- Assess the feasibility of the project
- Understand the project timeline and deadlines
- Review the ACR Standard and the project specific eligibility criteria
- Establish an ACR account
- Connect with a DAYCENT modeling practitioner (if using DAYCENT for SOC pool)
- Engagement with landowners, conservation easement stakeholders, buyers

PHASE 1 PROJECT TRAJECTORY CHECKS

- What properties will be included and what are the dates of easement recording for each (**Methodology, Section 2.3** and if PDA, **ACR Standard, Chapter 6F**)?
- Based on the easement date, what are the dates of other key milestones (**Methodology, Section 8** and **ACR Standard, Chapter 3**)?
- What are the monitoring requirements under the easement (**Methodology, Section 8**)?
- Do all properties meet all eligibility criteria in the methodology (**Methodology, Section 1.2**)?
- Is the project in compliance with the ACR Standard?
- Who will hold title to the carbon offsets (**Methodology, Section 1.2**)?
- Is the project property (ies) located in counties listed in Appendix B of the methodology (**Methodology, Section 3.1.1**)?

- If no, is there evidence to support an unidentified agent of conversion (**Methodology, Section 3.1.1**)?
- What is the baseline cropland management scenario (**Methodology, Section 3.1.2**)?
- Will the project include any optional pools (**Methodology, Section 2.2**)?
- Will DAYCENT be used to quantify the soil carbon pool (**Methodology, Sections 6.1.3 and 6.2.3**)? If no, see Table 2 below (this User's Manual) for quantification options by pool.
- Who will set up the DAYCENT model for the project? What data do they need and what are their costs (**Methodology, Sections 5 and 6**)?
- What are the soil types in the project area (**Methodology, Sections 6.1.3 and 6.2.3**)?
- Does grazing occur in the baseline scenario, project scenario or both (**Methodology, Section 6.1.5 and 6.2.5**)?
- What are the estimated VVB costs, Registry fees, other costs and the timing of costs?
- What is the estimated Risk Deduction and estimated contribution to the buffer pool (**Methodology, Section 6.6.3**)?

PHASE 1 DOCUMENTS/FILES/DATA

- Shape files of the LCA boundary, GHG boundary that excludes roads, buildings, wetlands etc. (**Methodology, Section 2.1**)?
- Datasets defining the baseline scenario (**Methodology, Section 3.1.2**)?
- ACR Avoided Conversions of Grasslands and Shrublands Planning Tool (request acr@winrock.org)
- Listing form

Table 2: Quantification Options by Pool

	BASELINE SCENARIO		PROJECT SCENARIO	
<p>ABOVE GROUND BIOMASS</p> <p>(Optional Pool)</p>	$C_{AGB,grass,BL_{p,y}}$	<p>Equation 4 (Based on $C_{AGB,PR_{p,y}}$)</p> <p>See Project Scenario)</p>	$C_{AGB,PR_{p,y}}$	<p>1. Approved models</p>
	<p>Non-crop, above-ground biomass (grass and shrubs)</p> <p>(6.1.1.1)</p>	<p>→</p>	<p>Non-crop, above-ground biomass (grass and shrubs)</p> <p>(6.2.1)</p>	<p>2. Direct field measurements of $C_{AGBb,y=0}$ or $DM_{b,y=0}$ and CF_b (Equation 21) for each biomass type, b, in a year where growing season precipitation is within 30% of average annual growing season precipitation or averaged over three years</p> <p>3. Remote sensing of $C_{AGBb,y=0}$ or $DM_{b,y=0}$ and CF_b (Equation 21) for each biomass type, b, in a year where growing season precipitation is within 30% of average annual growing season precipitation or averaged over three years. Remote sensing data should be calibrated to the Project Area with field samples</p> <p>4. Data as available from government agency or University extension office for $DM_{b,y=0}$ and CF_b</p>

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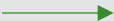


	BASELINE SCENARIO	PROJECT SCENARIO
	<p>$C_{AGB,crop,BL_{p,y}}$</p> <p>Crop, above-ground biomass</p> <p>(6.1.1.2)</p>	<p>Crop, above-ground biomass</p>
	<ol style="list-style-type: none"> 1. Approved models 2. Field measurements for crop or forage productivity and in the Project Region published in peer re-viewed literature 3. Agricultural statistics for crop or forage productivity and Project Region, including State Agri-cultural Extension Offices 4. Equation 6. Values for the annualized average dry matter ($DM_{BL,p,y}$) and carbon fraction (CF_b) for each crop type Values for $DM_{BL,p,y}$ can be obtained from fixed ratio of crop yield to plant biomass, the Harvest Index ratio, available from peer reviewed literature, or government or University extension for crop and region of interest. <p>DEFAULT VALUES AVAILABLE FOR ($DM_{BL,p,y}$) AND (CF_b).</p>	<p>Not present in the project scenario</p>

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	BASELINE SCENARIO		PROJECT SCENARIO	
BELOW GROUND BIOMASS (Optional Pool)	$C_{BGB,grass,BL_{p,y}}$ Non-crop, below ground biomass (6.1.2.1)	Equation 8 (Based on $C_{BGB,PR_{p,y}}$) See Project Scenario 	$C_{BGB,PR_{p,y}}$ Non-crop, below-ground biomass (6.2.2)	1. Approved models 2. Equation 22. $C_{AGB,b,y=0}$ and approved root to shoot ratios (R_b). DEFAULT VALUES AVAILABLE FOR (R_b).
	$C_{BGB,crop,BL_{p,y}}$ Crop, below-ground biomass (6.1.2.2)	1. Approved models 2. Field measurements for crop or forage productivity and Project Region published in peer re-viewed literature 3. Agricultural statistics for crop or forage productivity and Project Region, including State Agri-cultural Extension Offices 4. Equation 9. $C_{AGB,crop,BL_{p,y}}$ and suitable root-to-shoot ratio for crop and region. Defaults available for (R_b)±.	Crop, below-ground biomass	Not present in the project scenario

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	BASELINE SCENARIO		PROJECT SCENARIO	
SOIL CARBON STOCKS (Required)	$C_{SOC,BLp,y}$	<p>1. Approved models. This method assumes emissions from SOC following conversion proceed according to the best fit decay curve to the model SOC and for the time up until when SOC levels in the model are changing by no more than +/-3%, not to exceed 40 years.</p> <p>2. Direct measurement of SOC according to requirements in ISO 10381-2:2003 Soil quality – sampling – Part 2: Guidance on sampling techniques.³¹ This method assumes the emissions from SOC following conversion proceed linearly for 20 years (i.e., $D = 20$), at which point a new equilibrium level of SOC is reached in the converted state. A linear EF function may be used per the IPCC GL AFOLU 2006 (adapted from Eq. 2.25, Ch2, p 2.30).</p>	$C_{SOC,y=0}$	<p>No year-to-year loss of soil carbon in project scenario. Soil carbon in steady state at $y=0$.</p> <p>$C_{SOC,y=0}$ can be determined by same methods as baseline scenario.</p> <p>←</p>
	<p>Baseline carbon stocks in soil</p> <p>(6.1.3)</p>		<p>Project carbon stocks in soil</p> <p>(6.2.3)</p>	

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	BASELINE SCENARIO		PROJECT SCENARIO	
		<p>Requires determination of $EF_{t,y}$ (Equation 11).</p> <p>3. Direct measurement of SOC according to requirements in ACR Tool for Estimation of Stocks in Carbon Pools and Emissions from Emission Sources.³⁴ This method assumes the emissions from SOC following conversion proceed linearly for 20 years (i.e., $D = 20$), at which point a new equilibrium level of SOC is reached in the converted state. A linear EF function may be used per the IPCC GL AFOLU 2006 (adapted from Eq. 2.25, Ch2, p 2.30). Requires determination of $EF_{t,y}$ (Equation 11).</p>		
FERTILIZER APPLICATION (Required)	$E_{Fert,BL_{p,y2}}$ Direct emissions of N_2O from fertilizer application in the	<p>1. Approved models</p> <p>2. Equations 12, 13 and 14 and known masses of fertilizer application and nitrogen content as defined in the baseline cropland management scenario</p>	$E_{PR,N_2O_{p,y}}$ Direct emissions of N_2O from fertilizer	<p>1. Approved models</p> <p>2. Equations 23, 24 and 25 and known masses of fertilizer application and nitrogen content from activity data in the project scenario. DEFAULT</p>

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	BASELINE SCENARIO		PROJECT SCENARIO	
	counter factual baseline cropland management scenario (6.1.4)	(Methodology, Section 3.1.2). DEFAULT VALUES AVAILABLE FOR (Frac_{SN}) (Frac_{ON}) (EF_N).	application in project scenario (6.2.4)	VALUES AVAILABLE FOR (Frac_{SN}) (Frac_{ON}) (EF_N).
GRAZING LIVE- STOCK (Required)	$E_{BL,Livestock_{p,y}}$ Emissions from enteric fermentation (ONLY when winter or stover grazing can legitimately be part of the counterfactual baseline cropland management scenario) AND unmanaged manure on grazing lands (ONLY when winter or stover grazing can legitimately	1. Equations 15, 16 and 29. DEFAULT VALUES AVAILABLE FOR (EF_{CH4,l}), (EF_{N2O,l}), (N_{rate,l}) AND (Y_m).	$E_{PR,Livestock_{p,y}}$ Emissions from enteric fermentation (ONLY when grazing is present in the project scenario) AND unmanaged manure on grazing lands (ONLY when grazing is present in the project scenario) (6.2.5)	1. Equations 27, 28 and 29. DEFAULT VALUES AVAILABLE FOR (EF_{CH4,l}), (EF_{N2O,l}), (N_{rate,l}) AND (Y_m).

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	BASELINE SCENARIO		PROJECT SCENARIO	
	be part of the counterfactual baseline cropland management scenario) (6.1.5)			
FOSSIL FUEL (Optional)	$E_{FF,BL_{p,y}}$ Emissions from fossil fuel combustion by fuel and vehicle type based on the counterfactual baseline cropland management scenario (6.1.6)	1. Equation 17. DEFAULT VALUES AVAILABLE FOR (E_{ff}).	$E_{FF,PR_{p,y}}$ Emissions from fossil fuel combustion by fuel and vehicle type from activity data (6.2.6)	1. Equation 30. DEFAULT VALUES AVAILABLE FOR (E_{ff}).
LEAKAGE			LE_y	1. Equation 33. DEFAULT VALUES AVAILABLE FOR ($LE_{M,y}$)

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	BASELINE SCENARIO		PROJECT SCENARIO	
			Market and activity shifting leakage (6.3.2)	
NON-PERMANENCE			NP_y Risk of reversal of the carbon sequestration in biomass pools (6.6)	1. Equation 35. (BF_y) from ACR Risk Assessment Tool.



PHASE 2: PROJECT LISTING AND GHG PROJECT PLAN DEVELOPMENT

PHASE 2 ACTIONS

- Create the GHG Plan and Ex-Ante Offset Projection ([templates](#) available)
- ACR completes review of the GHG Plan and project is listed
- Record the easement and begin monitoring requirements under the easement
- Engage a Validation and Verification Body (VVB)
- Submit COI for VVB
- Submit Statement of Intent or carbon rights agreement between landowner and project developer

PHASE 2 PROJECT TRAJECTORY CHECKS

- What is the last date that a Statement of Intent or Carbon Rights agreement can be submitted?
- What is the date by which the project must be validated?
- Are values available for all parameters available at validation (Table A.2)?
- Will validation be conducted simultaneously with the first verification? (if yes, see Phase 3)
- Does the verifier require a site visit (**Methodology, Section 8**)?
- Does the project require stratification (**Methodology, Section 4**)?

PHASE 2 DOCUMENTS/FILES/DATA

- Statement of Intent or Carbon Rights Agreement
- VVB COI
- GHG Project Plan (including supporting data files; submitted once per Crediting Period and upon first verification)
- GHG Ex-Ante Offset Projection
- Recorded Easement
- Phase 3 documents – IF verification for Reporting Period 1 will occur together with validation



PHASE 3: GHG PROJECT MRV AND FIRST ISSUANCE

PHASE 3 ACTIONS

- Complete DAYCENT modeling for the SOC pool³ on project parcels for the first 5 years of the project. Baseline management scenario must be updated at 5-year intervals where needed. Contact ACR for specific DAYCENT modeling guidance.
- Complete quantification of ERTs for project parcels for each year in the reporting period (Figure 2, this User's Manual)
- Complete Verification (and Validation if not already conducted). Validation must be within 36 months of project start date (easement recording) and verification (if separate from validation) must be completed within 60 months of project start date (easement recording).
- Credits are issued by ACR and can be transacted

PHASE 3 PROJECT TRAJECTORY CHECKS

- How many years are included in the first reporting period?
- Have there been any easement violations during the reporting period?
- Has the deadline to complete verification 1 before end of year 5 been met?
- Have all necessary documents been submitted to ACR and retained by VVB and Project Developer?

³ DAYCENT is one of several allowed quantification approaches for several pools (see Table 2). This Manual describes the scenario where optional pools are excluded and DAYCENT is used to quantify the SOC pool.

- Are there any changes to the GHG Project Plan or lessons learned that need to be incorporated for verification 2?
- Has a buyer been identified for the first issuance of ERTs?

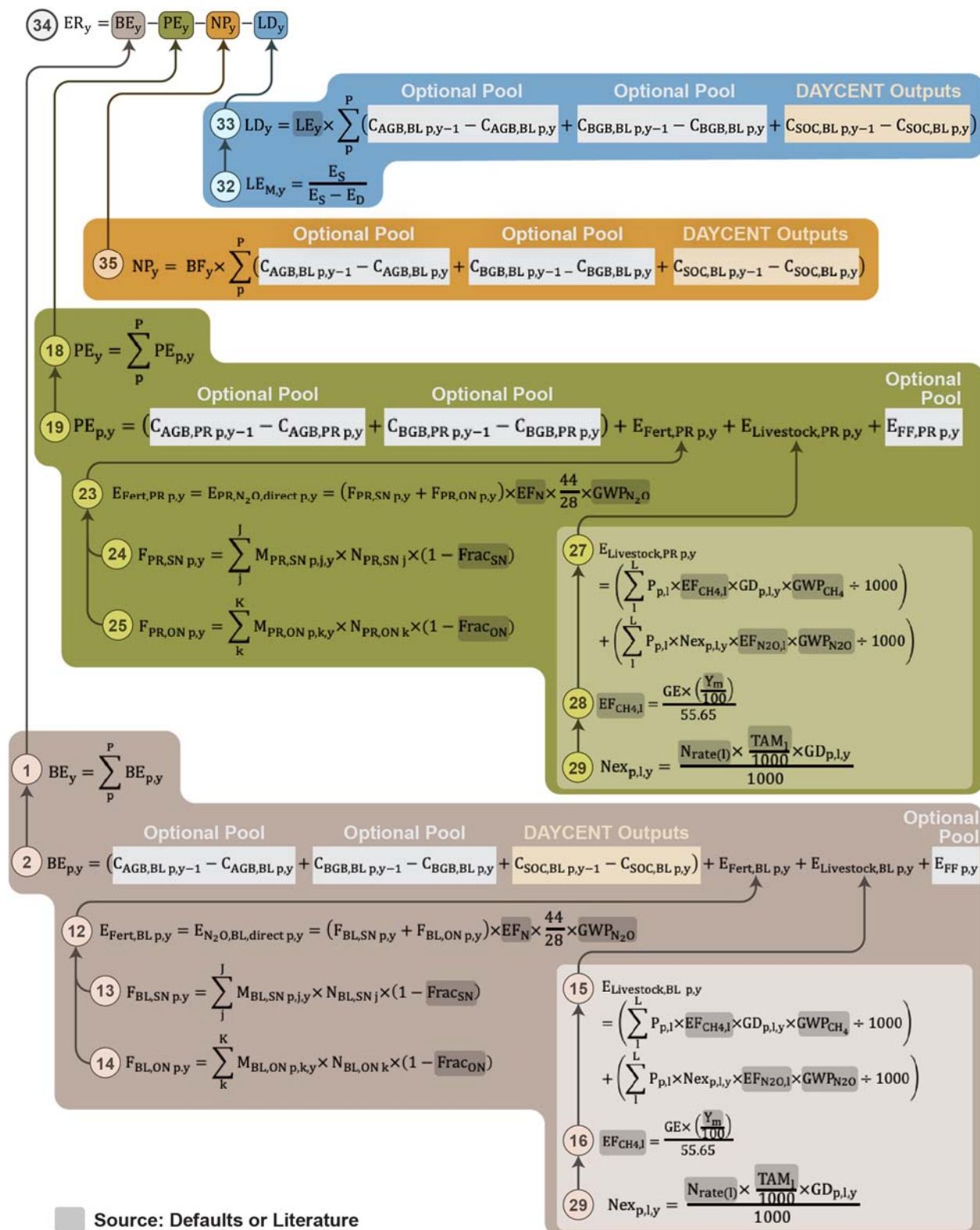
PHASE 3 DOCUMENTS/FILES/DATA

- GHG Monitoring Report for Reporting Period 1 and supporting documentation
- Validation Report (once per Crediting Period)
- Validation Statement
- Verification Report for Reporting Period 1
- Verification Statement for Reporting Period 1

Figure 2 on the following page maps all equations (for non-optional pools) listed in **Section 6** of the **Methodology**. Figure 2 starts with equation 34 which ultimately calculates annual ERTs from the sum of the GHG emissions/reductions in the Baseline (BE_y) and Project (PR_y) scenarios, and from Leakage (LE_y) and Non-Permanence (NP_y). Circled numbers (Ⓢ) correspond to equation numbers in **Section 6** of the **Methodology**. All terms are defined in Appendix A of the Methodology and included here for easy reference (Appendix A, this User's Manual)⁴. Figure 2 assumes that the DAYCENT model is used to quantify SOC (other approaches are allowed per the **Methodology**, **Sections 6.1.3** and **6.2.3**) and non-optional pools are excluded. Gray squares highlight where default values are available/allowed.

⁴ Please note that Appendix A of this User's Manual reflects changes described in the Errata and Clarifications issued in March 2020 and shown in the accompanying redline of v.2.0 of the methodology.

Figure 2: Equation Map





PHASE 4: ON-GOING MRV AND SUBSEQUENT ISSUANCES

PHASE 4 ACTIONS

- After year 5, update DAYCENT model to reflect any changes to the baseline cropland management scenario and update evidence substantiating the scenario
- Ensure that annual easement monitoring is being conducted and collect reports
- Report reversals or massive events such as fires, droughts or floods or change in ownership
- Submit for verification at least once every 5 years
- Change VVBs at least once every 5 years or 5 verifications; re-submit COI

PHASE 4 PROJECT TRAJECTORY CHECKS

- How frequently will the project be verified?
- Does verification need to be coordinated with other projects?
- Is easement monitoring occurring as prescribed?
- When will ERTs be transacted and what are the costs?
- Has the sale of ERTS in issuances 2,3,4...n been contracted?

PHASE 4 DOCUMENTS/FILES/DATA

- GHG Monitoring Report for Reporting Period 2,3,4 n and supporting documentation

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- Verification Report for Reporting Period 2,3,4 n
- Verification Statement for Reporting Period 2,3,4 n
- Annual Easement monitoring reports
- Data substantiating the hypothetical baseline scenario for the current 5-year period
- VVB COI



OTHER INFORMATION

AGGREGATION AND PROGRAMMATIC DEVELOPMENT APPROACH (PDA) PROJECTS

To achieve scale and consequent economic viability, carbon offset projects of this type will often necessarily be composed of numerous properties under their own LCAs, grouped into a single project with ACR. ACR allows for multiple fields, facilities or parcels (sites) to be grouped into single projects via two approaches: 1) Aggregation and 2) Programmatic Development Approach (PDA). Aggregated projects shall include ALL sites in the initial GHG Project Plan. No new sites can be added after validation. The PDA allows for a “rolling enrollment” style system where additional sites can be added over time, with some restrictions. Specific requirements for Aggregated and PDA projects are listed in Chapter 6 of the ACR Standard.

USE OF THE DAYCENT MODEL

The DAYCENT model is one of several available options for quantification of the AGB, BGB and SOC pools (**Methodology, Sections 6.1.1, 6.1.2, 6.1.3 and 6.2.1, 6.2.2, 6.2.3.**). DAYCENT is the daily time-step version of the CENTURY biogeochemical model (Parton et al., 1994). DAYCENT simulates fluxes of C and N among the atmosphere, vegetation, and soil (Del Grosso et al., 2001a; Parton et al., 1998). Model inputs are: daily maximum/minimum air temperature and precipitation; surface soil texture class; and land cover/use data (e.g., vegetation type, cultivation/planting schedules, amount and timing of nutrient amendments).

Model outputs include: daily N-gas flux (N_2O , NO_x , N_2); CO_2 flux from heterotrophic soil respiration; soil organic C and N; NPP; H_2O and NO_3 leaching; and other ecosystem parameters. The ability of DAYCENT to simulate NPP, soil organic carbon, N_2O emissions, and NO_3 leaching has been tested with data from various native and managed systems (Del Grosso

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et al., 2001b; 2002; 2005).⁵ DAYCENT model experts are available for hire for a fee. ACR can connect interested project developers with a DAYCENT modeling expert. Post-processing instructions for DAYCENT model outputs are available from ACR for registered projects.

⁵ <https://www2.nrel.colostate.edu/projects/daycent/>

APPENDIX A: PARAMETERS

A.1 PARAMETERS DEFINED BY METHODOLOGY EQUATIONS

All parameters in A.1 can also be obtained as outputs from approved biogeochemical models.

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
BE_y	MTCO ₂ e	Baseline emissions in year y , all field. $y=0$ at project start date		1
$BE_{p,y}$	MTCO ₂ e	Baseline emissions from participant field p , in year y		1,2
$C_{AGB,BL,p,y}$	MTCO ₂ e	Carbon stock of above-ground biomass for Participant Field p in the baseline scenario in year y		2,3
$C_{AGB,b,y=0}$	MTCO ₂ e	Initial (year $y=0$) carbon stock of above-ground biomass for biomass type b		20, 21, 22
$C_{AGB,PR,p,y}$	MTCO ₂ e	Carbon stock of above-ground biomass for Participant Field p in the project scenario in year y		4, 19, 20

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$C_{AGB_{grass},BL_{p,y}}$	MTCO ₂ e	Carbon stock of above ground biomass for Participant Field p in year y in the baseline scenario, as calculated from Section 6.2.1		3,4
$C_{AGB_{crop},BL_{p,y}}$	MTCO ₂ e	Carbon stock of aboveground crop biomass in Participant Field p in year y in the baseline scenario		3, 5
$C_{AGB_{crop},BL_{b,y}}$	MTCO ₂ e	Carbon stock of aboveground crop biomass in Participant Field p , for crop type b , in year y in the baseline scenario		5, 6, 9
$C_{BGB,BL_{p,y}}$	MTCO ₂ e	Carbon stock of belowground biomass in Participant Field p in year y in the baseline scenario		2,7
$C_{BGB_{crop},BL_{p,y}}$	MTCO ₂ e	Carbon stock of belowground crop biomass in Participant Field p in year y in the baseline scenario		7, 9
$C_{BGB_{grass},BL_{p,y}}$	MTCO ₂ e	Carbon stock of belowground biomass from Participant Field p in year y in the baseline scenario		7, 8
$C_{BGB,PR_{p,y}}$	MTCO ₂ e	Carbon stock of below-ground biomass for Participant Field p in the project scenario in year y		8, 19, 22
$C_{SOC,BL_{p,y}}$	MTCO ₂ e	Carbon stock of soil organic carbon for Participant Field p in the baseline scenario in year y		2,10

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$F_{BL/PR,ONp,y}$	MT-N	Mass of organic N amendments applied to Participant Field p in the baseline/project scenario in year y adjusted for volatilization as NH_3 and NO_x		12, 14, 23, 25
$F_{BL/PR,SNp,y}$	MT-N	Mass of synthetic fertilizer nitrogen applied to Participant Field p in the baseline/project scenario in year y adjusted for volatilization as NH_3 and NO_x		12, 13, 23, 24
$E_{Fert,BL/PRp,y} = E_{BL/PR,N_2Odirectp,y}$	MTCO ₂ e	Total N ₂ O emissions due to application of synthetic and organic fertilizer from Participant Field p in the baseline/project scenario in year y .		2, 12, 19, 23
$E_{(BL/PR),FFp,y}$	MTCO ₂ e	Emissions due to the use of fossil fuels in agricultural management in the baseline/project scenario on Participant Field p in year y		2, 17, 19, 30
$EF_{t,y}$	d.u.	Emission factor for the fraction of soil organic carbon pool remaining t years since conversion to Cropland in year y		10, 11
$Nex_{l,p,y}$	kg N (animal) ⁻¹ (yr.) ⁻¹	Annual average N excretion per head of livestock type l , Participant Field p in year y		15, 27, 29

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$E_{\text{Livestock,BL/PR}_{p,y}}$	MTCO ₂ e	CH ₄ emission from livestock enteric fermentation and N ₂ O emissions from deposited, un-managed livestock waste on Participant Field p in year y		2, 15, 19, 27
PE_y	MTCO ₂ e	Total project emissions in year y		18
$PE_{p,y}$	MTCO ₂ e	Total project emissions from participant field p in year y		18, 19
LE_y	(0.0 -0.1)	Leakage factor in year y		31
LD_y	MTCO ₂ e	Leakage deduction in year y		33

A.2 PARAMETERS AVAILABLE AT VALIDATION

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
A_b	ha	Area of biomass/crop type b	Project Proponent	6, 21
$A_{p,i}$	ha	Area of Participant Field in soil strata i	Project Proponent	10

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$C_{AGB_{b,y=0}}$	MTCO ₂ e	Initial (year $y=0$) carbon stock of aboveground biomass for Participant Field p	Approved models, direct measurements, remote sensing, data published in scientific literature	20, 21, 22
$C_{SOC_{i,y=0}}$	MTCO ₂ e (ha) ⁻¹	Total initial (year $y=0$) soil organic carbon stock in soil strata i , fixed for project duration	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU GL, Table 2.3.	10
CF_b	MT C (MT dry matter) ⁻¹	Carbon fraction of dry matter for biomass type b	Data published in scientific literature Default values from IPCC 2006 AFOLU GL, Table 11.2.	6, 21
D	years	Transition period for soil organic carbon, time period for transition between equilibrium SOC values, default value of 20	Approved models, direct measurements, data published in scientific literature. Default value of 20 years (IPCC 2006 AFOLU GL, Ch. 2.3.2.2).	11
$DM_{b,y=0}$	MT/ha	Average, annual, dry matter for biomass type b at project initiation (year $y=0$)	Approved models, direct measurements, published data.	21
$e^{(-0.77 \times (y-t))}$	d.u.	The decay function for aboveground biomass following conversion	Kochsiek et al. 2009	4

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$e^{(-1.41 \times (y-t))}$	d.u.	The decay function for below-ground biomass following conversion	Silver and Miya 2001	8
EF_f	MTCO ₂ e (liter of fuel) ⁻¹	Emission factor for the type of fossil fuel combusted in vehicle or equipment	For gasoline EF CO ₂ e = 8.89 kg CO ₂ e/gal-lon. For diesel EF CO ₂ e = 10.16 kg CO ₂ e/gallon. Source: EIA ⁶	17, 30
$EF_{CH_4,l}$	kg-CH ₄ head ⁻¹ grazing day ⁻¹	Enteric CH ₄ emission factor for livestock type l	Default values from IPCC 2006 AFOLU GL, Table 10.11 (Cattle, N. America, values are annualized)	15, 16, 27, 28
EF_N	MT-N ₂ O-N (MT-N input) ⁻¹	Emission Factor for emission from N inputs	0.0254 (2.54%) of applied synthetic fertilizer N and 0.02 (2%) of applied organic fertilizer N (Davidson, 2009)	12, 23
$EF_{N_2O,l}$	MT-N ₂ O-N (MT-N input) ⁻¹	Emission Factor for emission from manure inputs	Data published in scientific literature. Default values from IPCC 2006 AFOLU GL, Table 11.1.	15, 27
$FC_{p,y}$	d.u.	Proportion of Participant Field p that has been converted to Cropland in the	Project Proponent	10

⁶ https://www.eia.gov/environment/emissions/co2_vol_mass.php

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
		baseline scenario for year y , d.u.		
$FC_{p,t,y}$	d.u.	The cumulative proportion of Participant Field p that has been converted to Cropland in year t , time of conversion, as of year y in the baseline scenario, determined based on rates and extents of conversion	Project Proponent	4, 8
$Frac_{ON}$	kg N volatilized (kg of N applied or deposited) ⁻¹	Fraction of organic N applied to soils that volatilizes as NH_3 and NO_x	Default value of 0.20. IPCC 2006 AFOLU GL, Table 11.3.	14, 25
$Frac_{SN}$	kg N volatilized (kg of N applied or deposited) ⁻¹	Fraction of synthetic N applied to soils that volatilizes as NH_3 and NO_x	Default value of 0.10. IPCC 2006 AFOLU GL, Table 11.3.	13, 24
GWP_{CH_4}	MTCO ₂ e	Global warming potential for CH_4	See ACR Standard	15, 27
GWP_{N_2O}	MTCO ₂ e	Global warming potential for N_2O	See ACR Standard	12, 15, 23, 27

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
Y_m	d.u.	Methane conversion factor, per cent of gross energy in feed converted to methane	Default values: 6.5% (Cattle or Buffalo grazing); 4.5% (Lambs < 1 year); 6.5% (Mature Sheep). IPCC 2006 AFOLU GL, Tables 10.2 and 10.3.	16, 28
P	d.u.	Total number of participant fields, p	Project Proponent	
t	years	Time since conversion of Grassland to Cropland in the baseline scenario	Project Proponent	
R_b	d.u.	Root carbon-to-shoot carbon ratio of (crop) biomass type b ; default value 4.2 for temperate grassland, 4.5 for cool temperate grassland and 1.8 for shrubland	Data published in scientific literature (grass and crops) including Craine et al. 2005, Mokany et al 2006. Default values from IPCC 2006 AFOLU GL, Table 6.1.	9, 22
$\frac{44}{12}$		Ratio of molar mass of CO_2 to C	NA	6, 21
$\frac{44}{28}$		Ratio of molar mass of N_2O to N	NA	12, 23
$LE_{M,y}$	(0.0 - 1.0)	Market leakage in year y ; (0-1.0)	Default value 0.2 or calculated according to Equation 32. See section 6.3.1.	31, 32

A.3 PARAMETERS MONITORED

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
B		Total number of crop/bio-mass types b		
$DM_{BL,b,y}$	MT dry matter (ha) ⁻¹	Annualized average dry matter in the baseline for crop type b in year y	Data published in scientific literature. Harvest Index applied to crop yield guides for the Project Region where the Harvest Index is ratio of economic product dry mass to plant aboveground dry mass. Default value of 0.5 MT C (ha) ⁻¹ for annual crops following one year after conversion, Source: IPCC AFOLU GL, Table 5.9.	6
$FSOC_{LU}$	d.u.	Fraction of soil organic carbon pool remaining after transition period, accounting for land use factors	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU, GL Table 5.5.	11
$FSOC_{MG}$	d.u.	Fraction of soil organic carbon pool remaining after transition period, accounting for management factors	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU, GL Table 5.5.	11
$FSOC_{IN}$	d.u.	Fraction of soil organic carbon pool remaining after	Approved models, direct measurements, data published in scientific literature. Default	11

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
		transition period, accounting for input of organic matter	values from IPCC 2006 AFOLU, GL Table 5.5.	
$FF_{BL/PR_{p,v,j,y}}$	liters	Volume of fossil fuel consumed in the baseline/project scenario on Participant Field p in vehicle/equipment type v with fuel type j during year y	Expert opinion or extension/agency report (baseline) or producer report (project) that contains vehicle/equipment hours and fuel needed per unit of use.	17, 30
$GD_{p,l,y}$	days	Grazing days per livestock type l on Participant Field p in year y	University extension, producer, or other production report containing average grazing days per livestock type l in the project region.	15, 27, 29
GE	MJ head ⁻¹ day ⁻¹	Gross energy intake	Data published in scientific literature, government reports, or expert opinion.	16, 28
$M_{BL/PR,SN_{p,j,y}}$	MT	Mass of synthetic fertilizer type j applied to Participant Field p in year y	County-level producer surveys conducted by a government agricultural agency(ies) or university extension offices, or the expert opinion of an university extension personnel working in the region and systems of interest, personnel of a governmental agriculture agency field office (e.g., USDA's RMA, FSA,	13, 24

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
			NRCS) with jurisdiction in the Project Region, or Cropland management plans approved by a lending agency.	
$M_{BL/PR,ONp,k,y}$	MT	Mass of organic N amendment type k applied to Participant Field p in year y	County-level producer surveys conducted by a government agricultural agency(ies) or university extension offices, or the expert opinion of an university extension personnel working in the region and systems of interest, personnel of a governmental agriculture agency field office (e.g., USDA's RMA, FSA, NRCS) with jurisdiction in the Project Region, or Cropland management plans approved by a lending agency.	14, 25
$N_{BL/PR,ONk}$	MT-N (MT input) ⁻¹	Nitrogen content of organic N amendment type k	Product label or product specifications if commercially produced. Data published in scientific literature. Defaults available from IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Chapter 4, Background Paper, N ₂ O: Direct Emissions from Agricultural Soils ⁷ .	14, 25

⁷ https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/4_5_N2O_Agricultural_Soils.pdf

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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$N_{BL/PR,SN_j}$	MT-N (MT input) ⁻¹	Nitrogen content of synthetic fertilizer type j	Product label or product manufacturer specifications	13, 24
N_{rate_l}	kg N (1,000 kg animal mass) ⁻¹ day ⁻¹	N excretion rate	Default values from IPCC 2006 AFOLU, GL Table 10.19.	29
$P_{p,l}$	number of head	Population of livestock type l	Where the Project Proponent can demonstrate that any positive change in enteric methane would be de minimus then it is not required that livestock populations must be monitored at the level of the Participant Field. This could be done by identifying the maximum stocking rate observed in the Project Region and calculating the difference in enteric methane emission between the baseline and maximum stocking rate.	15, 27
TAM_l	kg animal ⁻¹	Typical animal mass for livestock category l	Literature, government reports, or expert opinion.	29
L		Total number of livestock types in project scenario	Project Proponent	15, 27
J		Total number of synthetic N inputs, j	Project Proponent	13, 24

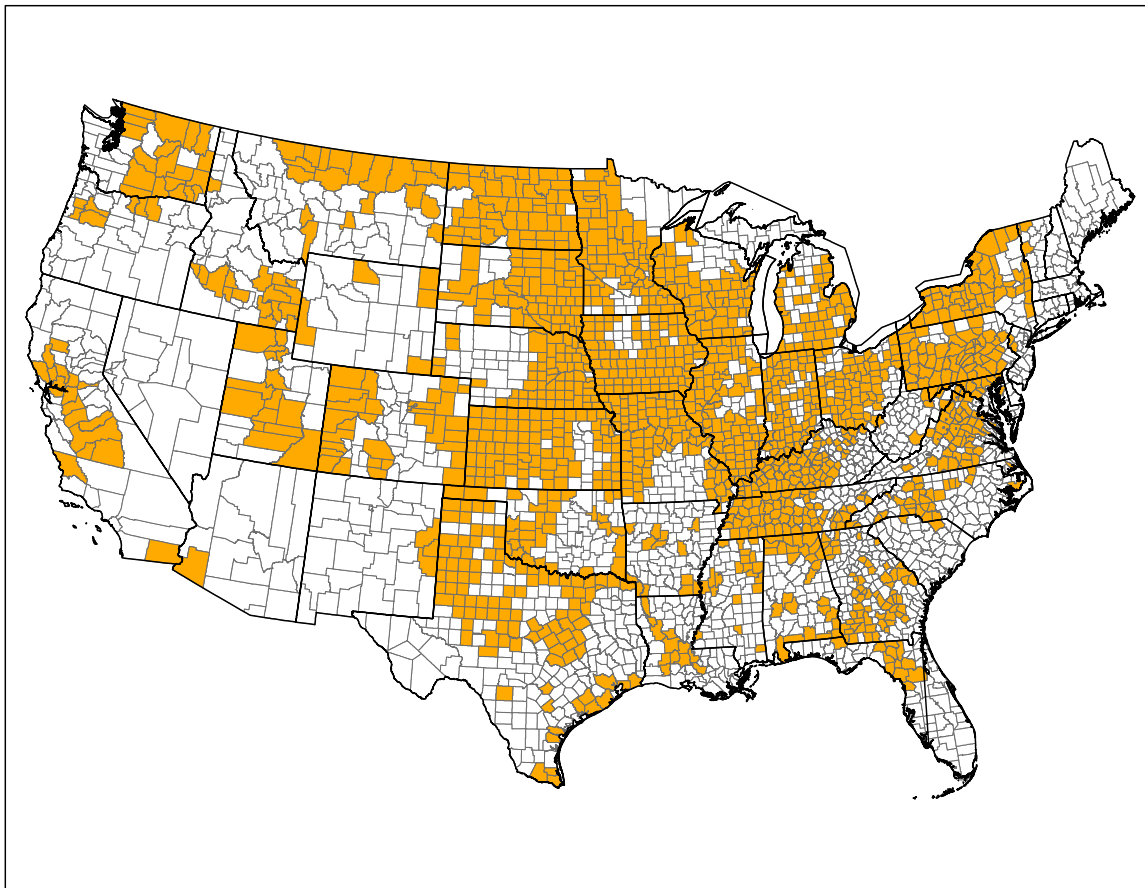
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PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
K		Total number of organic N amendments, k	Project Proponent	14, 25
V		Total number of vehicles, v	Project Proponent	17, 30
F		Total number of fossil fuels, f	Project Proponent	17, 30

APPENDIX B: COUNTIES FOR UNIDENTIFIED AGENTS OF CONVERSION



**Figure 3: County Map for
Unidentified Agents of Conversion**

Project fields/parcels located in the counties highlighted in orange have a baseline scenario of cropland for unidentified agents of conversion and surpass the practice-based performance standard for demonstrating additionality. Project fields/parcels in white counties must determine the baseline land-use scenario and demonstrate additionality according to **Sections 3.1.1.2** and **3.2.2.2** of the **Methodology**, respectively.

Table 3: County List for Unidentified Agents of Conversion

STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
AL	Baldwin County		Miller County		Kit Carson County
	Barbour County		Perry County		La Plata County
	Bullock County		Pope County		Lincoln County
	Calhoun County		Yell County		Logan County
	Cherokee County				Mesa County
	Colbert County	AZ	Yuma County		Moffat County
	Covington County				Montezuma County
	Cullman County	CA	Amador County		Montrose County
	Dallas County		Contra Costa County		Morgan County
	DeKalb County		Fresno County		Phillips County
	Escambia County		Glenn County		Pitkin County
	Etowah County		Imperial County		Prowers County
	Franklin County		Kings County		Rio Blanco County
	Geneva County		Lake County		Rio Grande County
	Henry County		Madera County		Routt County
	Houston County		Merced County		Saguache County
	Jackson County		Napa County		San Miguel County
	Lauderdale County		Sacramento County		Washington County
	Lawrence County		San Joaquin County		
	Limestone County		San Luis Obispo County		
	Macon County		Solano County	FL	Alachua County
	Madison County		Sonoma County		Citrus County
	Marengo County		Stanislaus County		Columbia County
	Marshall County		Tulare County		Dixie County
	Morgan County		Yolo County		Gilchrist County
	Perry County				Hamilton County
	Talladega County				Jackson County
AR	Ashley County	CO	Adams County		Lafayette County
	Chicot County		Alamosa County		Levy County
	Conway County		Arapahoe County		Madison County
	Crawford County		Baca County		Marion County
	Drew County		Cheyenne County		Suwannee County
	Jackson County		Conejos County		
	Lafayette County		Delta County	GA	Appling County
	Little River County		Denver County		Atkinson County
	Lonoke County		Dolores County		Bacon County
			Eagle County		Baker County
			Elbert County		Bartow County
			Garfield County		Berrien County
			Kiowa County		

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Bleckley County		Seminole County		Des Moines County
	Brooks County		Spalding County		Dickinson County
	Burke County		Sumter County		Dubuque County
	Calhoun County		Taylor County		Emmet County
	Chattooga County		Telfair County		Fayette County
	Coffee County		Terrell County		Floyd County
	Colquitt County		Thomas County		Franklin County
	Crawford County		Toombs County		Fremont County
	Crisp County		Treutlen County		Greene County
	Decatur County		Walker County		Grundy County
	Dodge County		Walton County		Guthrie County
	Dougherty County		Warren County		Hancock County
	Early County		Washington County		Hardin County
	Floyd County		Wheeler County		Harrison County
	Gordon County		White County		Henry County
	Hart County		Worth County		Howard County
	Houston County				Ida County
	Irwin County	IA	Adair County		Iowa County
	Jeff Davis County		Adams County		Jackson County
	Jefferson County		Allamakee County		Jasper County
	Jenkins County		Appanoose County		Jefferson County
	Johnson County		Audubon County		Johnson County
	Lamar County		Benton County		Jones County
	Lanier County		Black Hawk County		Keokuk County
	Lee County		Butler County		Lee County
	Macon County		Carroll County		Linn County
	Miller County		Cass County		Louisa County
	Mitchell County		Cedar County		Lucas County
	Monroe County		Cherokee County		Lyon County
	Montgomery County		Chickasaw County		Madison County
	Morgan County		Clarke County		Mahaska County
	Murray County		Clay County		Marion County
	Peach County		Clayton County		Marshall County
	Pierce County		Clinton County		Mills County
	Polk County		Crawford County		Mitchell County
	Putnam County		Dallas County		Monona County
	Richmond County		Davis County		Monroe County
	Screven County		Decatur County		Montgomery County
			Delaware County		

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Muscatine County O'Brien County Osceola County Page County Plymouth County Polk County Pottawattamie County Poweshiek County Ringgold County Sac County Shelby County Sioux County Story County Tama County Taylor County Union County Van Buren County Wapello County Warren County Washington County Wayne County Winnebago County Winneshiek County Woodbury County Wright County		Lincoln County Madison County Oneida County Power County		Jersey County Jo Daviess County Johnson County Kane County Kankakee County Kendall County Knox County Lawrence County Lee County Livingston County Macoupin County Madison County Marion County Marshall County Mason County Massac County McDonough County McHenry County McLean County Menard County Mercer County Monroe County Montgomery County Morgan County Ogle County Peoria County Perry County Pike County Pope County Pulaski County Putnam County Randolph County Richland County Rock Island County Saint Clair County Saline County Schuyler County Scott County
		IL	Adams County Alexander County Bond County Boone County Brown County Bureau County Calhoun County Carroll County Cass County Christian County Clay County Clinton County Coles County Crawford County Cumberland County DeKalb County Douglas County Edgar County Edwards County Effingham County Fayette County Ford County Franklin County Fulton County Gallatin County Greene County Hamilton County Hancock County Hardin County Henderson County Henry County Jackson County Jasper County Jefferson County		
ID	Ada County Bannock County Bear Lake County Bingham County Bonneville County Butte County Camas County Canyon County Caribou County Elmore County Gooding County Jefferson County Latah County				

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Shelby County Stark County Stephenson County Tazewell County Union County Vermilion County Wabash County Warren County Washington County Wayne County White County Whiteside County Will County Williamson County Winnebago County		Greene County Hamilton County Harrison County Hendricks County Henry County Huntington County Jackson County Jasper County Jay County Jefferson County Jennings County Knox County Kosciusko County LaGrange County LaPorte County Lawrence County Madison County Marshall County Martin County Miami County Monroe County Montgomery County Morgan County Newton County Noble County Orange County Owen County Perry County Pike County Porter County Pulaski County Putnam County Randolph County Ripley County Rush County Saint Joseph County Scott County Spencer County		Starke County Steuben County Tippecanoe County Union County Vermillion County Vigo County Warren County Warrick County Washington County Wayne County White County Whitley County
IN	Adams County Allen County Benton County Blackford County Boone County Brown County Carroll County Cass County Clark County Clay County Crawford County Daviess County Decatur County DeKalb County Delaware County Dubois County Elkhart County Fayette County Floyd County Fountain County Franklin County Fulton County Gibson County			KS	Allen County Atchison County Barton County Bourbon County Brown County Butler County Cherokee County Cheyenne County Clay County Cloud County Comanche County Crawford County Decatur County Dickinson County Doniphan County Douglas County Edwards County Ellis County Finney County Ford County Franklin County Gove County Graham County Grant County Gray County Greeley County

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Hamilton County		Republic County		Christian County
	Harper County		Rice County		Clark County
	Harvey County		Rooks County		Clinton County
	Haskell County		Rush County		Crittenden County
	Hodgeman County		Russell County		Cumberland County
	Jackson County		Saline County		Daviess County
	Jefferson County		Scott County		Edmonson County
	Jewell County		Sedgwick County		Estill County
	Johnson County		Seward County		Fleming County
	Kearny County		Shawnee County		Franklin County
	Kingman County		Sheridan County		Fulton County
	Kiowa County		Sherman County		Graves County
	Labette County		Smith County		Grayson County
	Lane County		Stafford County		Green County
	Leavenworth County		Stanton County		Greenup County
	Lincoln County		Stevens County		Hancock County
	Linn County		Sumner County		Hardin County
	Logan County		Thomas County		Hart County
	Marion County		Trego County		Henderson County
	Marshall County		Wallace County		Henry County
	McPherson County	Washington County	Hickman County		
	Meade County	Wichita County	Hopkins County		
	Miami County	Wilson County	Larue County		
	Mitchell County	KY	Lewis County		
	Montgomery County		Adair County	Lincoln County	
	Morton County		Allen County	Livingston County	
	Nemaha County		Ballard County	Logan County	
	Neosho County		Barren County	Lyon County	
	Ness County		Bath County	Marion County	
	Norton County		Bourbon County	Marshall County	
	Osage County		Boyle County	Mason County	
	Osborne County		Breckinridge County	McCracken County	
Ottawa County	Bullitt County		McLean County		
Pawnee County	Butler County		Meade County		
Phillips County	Caldwell County		Mercer County		
Pratt County	Calloway County	Metcalfe County			
Rawlins County	Carlisle County	Monroe County			
Reno County	Carroll County	Muhlenberg County			
	Casey County				

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Nelson County Ohio County Powell County Pulaski County Rockcastle County Rowan County Russell County Scott County Shelby County Simpson County Spencer County Taylor County Todd County Trigg County Trimble County Union County Warren County Washington County Wayne County Webster County		Garrett County Harford County Howard County Montgomery County Queen Anne's County Washington County		Oceana County Ogemaw County Oscoda County Ottawa County Saginaw County Saint Clair County Saint Joseph County Sanilac County Shiawassee County Tuscola County Washtenaw County Wayne County
		MI	Alcona County Allegan County Alpena County Arenac County Barry County Bay County Berrien County Branch County Calhoun County Cass County Clinton County Eaton County Genesee County Gladwin County Grand Traverse County Hillsdale County Huron County Ingham County Ionia County Iosco County Isabella County Jackson County Lapeer County Leelanau County Lenawee County Livingston County Macomb County Manistee County Mason County Mecosta County Missaukee County Muskegon County	MN	Aitkin County Anoka County Becker County Beltrami County Benton County Big Stone County Carver County Cass County Chippewa County Chisago County Clay County Clearwater County Cottonwood County Crow Wing County Dakota County Dodge County Douglas County Fillmore County Freeborn County Goodhue County Grant County Hennepin County Houston County Hubbard County Isanti County Jackson County
LA	Allen Parish Avoyelles Parish Bossier Parish Evangeline Parish Grant Parish Iberville Parish Jefferson Davis Parish Natchitoches Parish Pointe Coupee Parish Rapides Parish Red River Parish Saint Landry Parish				
MD	Allegany County Baltimore County Carroll County Cecil County Frederick County				

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STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Kanabec County		Washington County		Harrison County
	Kandiyohi County		Wilkin County		Henry County
	Lac qui Parle County		Winona County		Hickory County
	Lake of the Woods County		Wright County		Holt County
	Le Sueur County		Yellow Medicine County		Howard County
	Lincoln County				Jackson County
	Lyon County	MO	Adair County		Jasper County
	Mahnomen County		Andrew County		Johnson County
	Marshall County		Atchison County		Knox County
	McLeod County		Audrain County		Lafayette County
	Meeker County		Barry County		Lawrence County
	Mille Lacs County		Barton County		Lewis County
	Morrison County		Bates County		Lincoln County
	Mower County		Benton County		Linn County
	Murray County		Bollinger County		Livingston County
	Norman County		Boone County		Macon County
	Olmsted County		Buchanan County		Madison County
	Otter Tail County		Butler County		Marion County
	Pennington County		Caldwell County		Mercer County
	Pine County		Callaway County		Moniteau County
	Pipestone County		Cape Girardeau County		Monroe County
	Polk County		Carroll County		Montgomery County
	Pope County		Cass County		Morgan County
	Red Lake County		Cedar County		New Madrid County
	Redwood County		Chariton County		Newton County
	Rice County		Clark County		Nodaway County
	Roseau County		Clay County		Perry County
	Scott County		Clinton County		Pettis County
	Sherburne County		Cole County		Pike County
	Sibley County		Cooper County		Platte County
	Stearns County		Dade County		Polk County
	Steele County		Daviess County		Putnam County
	Stevens County		DeKalb County		Ralls County
	Swift County		Dunklin County		Randolph County
	Todd County		Franklin County		Ray County
	Traverse County		Gasconade County		Saint Charles County
	Wabasha County		Gentry County		Saint Clair County
	Wadena County		Greene County		Saint Francois County
			Grundy County		

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Saint Louis County Sainte Genevieve County Saline County Schuyler County Scotland County Scott County Shelby County Stoddard County Sullivan County Vernon County Warren County Wayne County Worth County		Dawson County Fallon County Gallatin County Glacier County Golden Valley County Hill County Liberty County McCone County Petroleum County Phillips County Pondera County Roosevelt County Sheridan County Teton County Toole County Valley County		Rowan County Stanly County Surry County Transylvania County Union County Warren County Wilkes County Yadkin County
MS	Adams County Alcorn County Benton County Calhoun County Chickasaw County Clay County Covington County DeSoto County George County Humphreys County Leake County Lee County Leflore County Lowndes County Monroe County Noxubee County Pontotoc County Sunflower County Union County Washington County	NC	Alamance County Anson County Burke County Cabarrus County Catawba County Cherokee County Clay County Cleveland County Davidson County Davie County Durham County Franklin County Gaston County Henderson County Hyde County Iredell County Lincoln County Mecklenburg County Mitchell County Orange County Pasquotank County Randolph County	ND	Adams County Barnes County Benson County Billings County Bottineau County Bowman County Burke County Burleigh County Cass County Cavalier County Dickey County Divide County Dunn County Eddy County Emmons County Foster County Grand Forks County Grant County Griggs County Hettinger County Kidder County LaMoure County Logan County McHenry County McIntosh County McLean County Mercer County Morton County Mountrail County Nelson County
MT	Blaine County Broadwater County Chouteau County Daniels County				

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Oliver County Pembina County Pierce County Ramsey County Ransom County Renville County Richland County Rolette County Sargent County Sheridan County Slope County Stark County Steele County Stutsman County Towner County Walsh County Ward County Wells County Williams County		Franklin County Furnas County Gage County Gosper County Greeley County Hall County Hamilton County Harlan County Holt County Howard County Jefferson County Johnson County Kearney County Kimball County Knox County Lancaster County Madison County Merrick County Nance County Nemaha County Nuckolls County Otoe County Pawnee County Perkins County Phelps County Pierce County Platte County Polk County Red Willow County Richardson County Saline County Sarpy County Saunders County Seward County Sherman County Stanton County Thayer County Thurston County		Valley County Washington County Wayne County Webster County Wheeler County York County
				NJ	Hunterdon County Warren County
				NM	Curry County Quay County Roosevelt County
				NY	Albany County Allegany County Broome County Cattaraugus County Cayuga County Chautauqua County Chemung County Chenango County Clinton County Columbia County Cortland County Dutchess County Erie County Franklin County Genesee County Herkimer County Jefferson County Lewis County Livingston County Madison County Monroe County Montgomery County Niagara County Oneida County Onondaga County Ontario County
NE	Adams County Antelope County Banner County Boone County Box Butte County Boyd County Buffalo County Burt County Butler County Cass County Cedar County Clay County Colfax County Cuming County Dakota County Dawes County Dixon County Dodge County Fillmore County				

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Orleans County Oswego County Otsego County Rensselaer County Saint Lawrence County Saratoga County Schoharie County Schuyler County Seneca County Steuben County Tioga County Tompkins County Washington County Wayne County Wyoming County Yates County		Gallia County Greene County Hardin County Highland County Hocking County Holmes County Huron County Jackson County Knox County Licking County Logan County Lorain County Madison County Mahoning County Marion County Medina County Mercer County Montgomery County Morgan County Morrow County Muskingum County Perry County Pickaway County Pike County Portage County Preble County Richland County Ross County Sandusky County Scioto County Seneca County Shelby County Stark County Trumbull County Tuscarawas County Union County Warren County Wayne County		Williams County Wyandot County
OH	Adams County Allen County Ashland County Ashtabula County Athens County Auglaize County Brown County Butler County Champaign County Clark County Clermont County Clinton County Columbiana County Coshocton County Crawford County Darke County Defiance County Delaware County Fairfield County Fayette County Franklin County Fulton County			OK	Alfalfa County Beckham County Blaine County Bryan County Caddo County Canadian County Cimarron County Cotton County Craig County Custer County Garfield County Grant County Greer County Harmon County Harper County Jackson County Jefferson County Kay County Kingfisher County Kiowa County Le Flore County Major County McCurtain County Muskogee County Ottawa County Roger Mills County Sequoyah County Texas County Tillman County Tulsa County Wagoner County Washita County
				OR	Benton County Gilliam County Linn County

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Marion County Morrow County Polk County Sherman County		Lycoming County Mercer County Mifflin County Monroe County Montour County Northumberland County Perry County Potter County Schuylkill County Snyder County Somerset County Sullivan County Union County Venango County Warren County Washington County Westmoreland County York County		Edmunds County Faulk County Grant County Gregory County Haakon County Hamlin County Hand County Hanson County Hughes County Hutchinson County Hyde County Jackson County Jerauld County Jones County Kingsbury County Lake County Lincoln County Lyman County Marshall County McCook County McPherson County Meade County Miner County Minnehaha County Moody County Pennington County Perkins County Potter County Roberts County Sanborn County Spink County Stanley County Sully County Tripp County Turner County Union County Walworth County Yankton County
PA	Adams County Allegheny County Armstrong County Beaver County Bedford County Berks County Blair County Bradford County Butler County Cambria County Carbon County Centre County Chester County Clarion County Clearfield County Clinton County Columbia County Crawford County Cumberland County Dauphin County Erie County Fayette County Franklin County Fulton County Greene County Huntingdon County Indiana County Jefferson County Juniata County Lancaster County Lawrence County Lebanon County Lehigh County Luzerne County	SC	Cherokee County Chesterfield County		
		SD	Aurora County Beadle County Bennett County Bon Homme County Brookings County Brown County Brule County Buffalo County Campbell County Charles Mix County Clark County Clay County Codington County Davison County Day County Deuel County Douglas County		

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
TN	Bedford County		Loudon County		Castro County
	Benton County		Macon County		Chambers County
	Bledsoe County		Madison County		Childress County
	Blount County		Marion County		Clay County
	Bradley County		Marshall County		Cochran County
	Cannon County		Maury County		Coleman County
	Carroll County		McMinn County		Collin County
	Cheatham County		McNairy County		Collingsworth County
	Chester County		Meigs County		Comanche County
	Clay County		Monroe County		Concho County
	Cocke County		Montgomery County		Cooke County
	Coffee County		Obion County		Coryell County
	Crockett County		Perry County		Cottle County
	Davidson County		Polk County		Crosby County
	Decatur County		Robertson County		Dallam County
	DeKalb County		Rutherford County		Dallas County
	Dickson County		Sequatchie County		Dawson County
	Dyer County		Smith County		Deaf Smith County
	Fayette County		Stewart County		Delta County
	Franklin County		Sumner County		Denton County
	Gibson County		Tipton County		Ellis County
	Giles County		Trousdale County		Falls County
	Grundy County		Warren County		Fannin County
	Hamblen County		Wayne County		Fisher County
	Hardeman County		Weakley County		Floyd County
	Hardin County		White County		Gaines County
	Haywood County		Williamson County		Glasscock County
	Henderson County	TX	Archer County		Gray County
	Henry County		Armstrong County		Grayson County
	Hickman County		Bailey County		Guadalupe County
	Houston County		Bell County		Hale County
	Humphreys County		Borden County		Hall County
	Jackson County		Bosque County		Hamilton County
	Jefferson County		Bowie County		Hansford County
	Lauderdale County		Brazoria County		Hardeman County
	Lawrence County		Callahan County		Harris County
	Lewis County		Cameron County		Hartley County
	Lincoln County		Carson County		Haskell County

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Hidalgo County		Scurry County		Campbell County
	Hill County		Sherman County		Caroline County
	Hockley County		Swisher County		Charlotte County
	Howard County		Taylor County		Clarke County
	Hunt County		Terry County		Culpeper County
	Jackson County		Throckmorton County		Cumberland County
	Jefferson County		Tom Green County		Dinwiddie County
	Johnson County		Uvalde County		Fauquier County
	Jones County		Wharton County		Fluvanna County
	Karnes County		Wheeler County		Franklin County
	Kaufman County		Wichita County		Frederick County
	Lamar County		Wilbarger County		Goochland County
	Lamb County		Willacy County		Greene County
	Limestone County		Williamson County		Halifax County
	Lubbock County		Yoakum County		Hanover County
	Lynn County				King George County
	Martin County				King William County
	Matagorda County				Loudoun County
	McCulloch County				Louisa County
	McLennan County				Lunenburg County
	Milam County				Madison County
	Mills County				Mecklenburg County
	Mitchell County				Nelson County
	Montague County				Nottoway County
	Moore County				Orange County
	Navarro County				Page County
	Nolan County				Pittsylvania County
	Nueces County				Powhatan County
	Ochiltree County				Rappahannock County
	Parmer County				Richmond County
	Randall County				Rockbridge County
	Reagan County				Rockingham County
	Red River County				Shenandoah County
	Robertson County				Spotsylvania County
	Rockwall County				Stafford County
	Runnels County				Wythe County
	San Patricio County				
	Schleicher County				
		UT	Box Elder County		
			Cache County		
			Davis County		
			Emery County		
			Garfield County		
			Juab County		
			Millard County		
			Morgan County		
			Piute County		
			San Juan County		
			Sanpete County		
			Sevier County		
			Utah County		
			Wayne County		
			Weber County		
		VA	Albemarle County		
			Amelia County		
			Appomattox County		
			Augusta County		
			Bath County		
			Brunswick County		
			Buckingham County		
				VT	Addison County
					Franklin County

USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION



STATE	COUNTY	STATE	COUNTY	STATE	COUNTY
	Grand Isle County		Columbia County		Rock County
WA	Adams County		Crawford County		Rusk County
	Benton County		Dane County		Saint Croix County
	Columbia County		Dodge County		Sauk County
	Douglas County		Door County		Shawano County
	Ferry County		Dunn County		Sheboygan County
	Franklin County		Eau Claire County		Trempealeau County
	Garfield County		Fond du Lac County		Vernon County
	Grant County		Grant County		Walworth County
	Kittitas County		Green County		Washburn County
	Klickitat County		Green Lake County		Washington County
	Okanogan County		Iowa County		Waupaca County
	Skagit County		Jackson County		Waushara County
	Snohomish County		Jefferson County		Winnebago County
	Spokane County		Juneau County		Wood County
	Stevens County		Kenosha County		
	Walla Walla County		Kewaunee County	WV	Berkeley County
	Whatcom County		La Crosse County		Greenbrier County
	Whitman County		Lafayette County		Hardy County
	Yakima County		Manitowoc County		Jefferson County
			Marquette County		Mason County
WI	Adams County		Monroe County		Mineral County
	Ashland County		Oconto County		Preston County
	Barron County		Outagamie County		Tucker County
	Bayfield County		Ozaukee County		
	Brown County		Pepin County	WY	Big Horn County
	Buffalo County		Pierce County		Crook County
	Burnett County		Polk County		Laramie County
	Calumet County		Portage County		Lincoln County
	Chippewa County		Racine County		Weston County
	Clark County		Richland County		