PANDA STANDARD SECTORAL SPECIFICATION FOR AGRICULTURE, FORESTRY AND OTHER LAND USE (PS-AFOLU)

founders and co-founders:

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Section 1: Introduction

The Panda Standard is a domestic voluntary greenhouse gas (GHG) offset standard that aims to provide transparency and credibility in the nascent Chinese voluntary carbon market by establishing the first standard for domestic carbon projects. The Panda Standard Association's foremost aim is to foster methodological innovation and technologies that specifically suit the environmental, legal, economic and social situation of the People's Republic of China (PRC).[1]

The "domestic" focus of the Panda Standard means that all projects will be implemented within the PRC. PS Credit purchasers and investors can be both Chinese or internationally based companies, organizations and individuals.

1.1. Panda Standard Objectives

The Panda Standard effort will support reducing the GHG emissions intensity of the PRC's economy, help develop capacity in domestic voluntary carbon markets, and promote agriculture, forestry and other land use (AFOLU) offset projects with poverty alleviation benefit.

The Panda Standard will support activities that:

- Complement areas where there has been significant activity in China under the Clean Development Mechanism (CDM);
- Once demonstrated at a small scale, have significant scaling-up potential;
- In addition to delivering GHG reductions, have net positive environmental and community impacts;
- Where feasible and relevant, deliver measurable poverty alleviation impacts;
- Are particularly suited to China's AFOLU sector (e.g. activities to improve management of existing forests, address degradation of rangelands, reduce GHG emissions from agriculture while maintaining or increasing yield, and many others).

1.2. Panda Standard Founders and Co-Founders

The Panda Standard effort was launched in 2009 by:

- *China Beijing Environment Exchange (CBEEX)*, was founded on Aug 5th, 2008, established with the approval of Beijing municipal government, which is a professional market platform for trading various environment equities;

[1] See *Panda Standard v1.0* at http://www.pandastandard.org/.

- *BlueNext SA*, a leading environmental trading exchange founded in 2007 by NYSE Euronext and Caisse des Depots, which has partnered with CBEEX to set up an international platform to promote investment in CDM projects in China and to found the Panda Standard;

- *China Forestry Exchange (CFEX)*, established with the approval of the State Council, the State Forestry Administration and Beijing Municipal Government. CFEX is a professional market platform for nationwide forestry equity and forest-related trading business, as well as international;

- *Winrock International*, a U.S. non-profit organization that has been a leader in developing science-based carbon measurement and monitoring standards for AFOLU and operates the *American Carbon Registry (ACR),* the first voluntary GHG offset registry in the United States.

And,

- *Asian Development Bank (ADB),* also give a part of financial supports of this document, through its technical assistance to the government of the PRC: *Facility for Policy Reform and Capacity Building* *III.*

Section 2: Scope

The Panda Standard aims to allow project activities to develop across sectors where opportunities exist within the PRC to reduce emissions at sources, or enhance removals by sequestration while at the same time providing net positive impacts on the environment and communities. The scope of project activities allowed under the Panda Standard will therefore be enlarged over time to concentrate efforts on addressing needs within the PRC.

This Panda Standard AFOLU Sectoral Specification (PS-AFOLU) describes Panda Standard requirements for all land-use activities eligible for registration on the PS Registry.

The sectoral scope of the Panda Standard can only be enlarged by the PS Secretariat. The process for scope enlargement through development and approval of new PS Sectoral Specifications is outlined in the *Panda Standard v1.0*. Note that PS-AFOLU is only the first sectoral specification; other sectoral specifications, for activities not covered in PS-AFOLU, will follow as opportunities are identified and the Panda Standard scope continues to expand.

Project Proponents developing a PS-AFOLU Project Activity must comply with all requirements in this PS-AFOLU specification and the *Panda Standard v1.0*, and must apply an approved PS-AFOLU Methodology (a methodology approved by the Panda Standard Technical Committee through the process detailed in the *Panda Standard v1.0*) that is applicable to the Project Activity. One PS-AFOLU Project can encompass more than one Project Activity and employ more than one PS-AFOLU Methodology.

The following components must be followed for compliance under the Panda Standard:

- The entirety of the Project and all Project-related activities must take place within the borders of the PRC. Leakage, where required to be quantified and deducted, need only be considered within the borders of the PRC; there is no requirement to address international Leakage.
- The PS-AFOLU Project Activity "shall generate net positive impacts on the environment as well as on the social and economic wellbeing of communities, and shall mitigate potential on-site and off-site negative effects caused by the Project Activity".[2] Therefore, impacts on the environment and local communities, both on-site and offsite, must be assessed and monitored.
- All activities implemented by the Project must comply with any and all applicable regulations or laws.
- Accounting measures must be provided for the following Kyoto Protocol greenhouses gases: CO_2, CH_4, and N_2O.
- Project-based emission reductions or enhanced removals must be additional to any that would have occurred in the business-as-usual scenario and without carbon market incentives.

[2] See *Panda Standard v1.0.*

Section 3: Eligibility

3.1. Project Types

PS-AFOLU allows for a comparison of GHG emissions and removals between what would have occurred in the absence of the PS-AFOLU Project (i.e. the Baseline) and those taking place as a result of the PS-AFOLU Project Activity. All Project Activities must be categorized under one of the PS-AFOLU Project Types listed below. It is allowable for one PS-AFOLU Methodology to be applicable to more than one PS-AFOLU Project Type. Examples of potential project activities under each Project Type are provided (Table 1). Additional activities are allowable if they result in the same with-Project land cover type. Project activities on crop and grazing lands that generate the majority of potential credits from changes in live biomass carbon stocks shall be classified as "Forestation and Vegetation Increase" Projects.

Forest Management (FM)

This category includes activities to change forest management. Under this category, all lands within the Project Type Area should meet the CDM PRC Forest[3] definition at the Project Start Date and are expected to continue to meet the same definition under the Project Activity. The Baseline Activity land use type may either be forest or result in deforestation or degradation below the forest definition.

Forestation and Vegetation Increase (F-V)

Under this category, the aboveground biomass pool must increase as a result of the Project Activity. Such an increase can take place through direct planting of seeds or seedlings or human-assisted natural regeneration. This may result in the CDM PRC definition of a Forest, or vegetation structure below this definition. Under this category, all lands within the Project Type Area should not meet the Forest definition at the Project Start Date. The Baseline Activity land use type may vary.

Cropland Management (CM)

Under this category, land within the Project Type Area should be classified as Cropland under the Project Activity. The land use type may vary at the Project Start Date and under the Baseline Activity. Cropland includes cropped land, including rice fields, lands under a crop-fallow rotation that are in fallow state at Project Start Date, and agro-forestry systems where the vegetation structure falls below the thresholds used in the CDM PRC Forest definition under the Baseline and Project Activity .

Grassland Management (GM)

Under this category, land within the Project Type Area should be classified as rangeland, pastureland, or grassland under the Project Activity. The land use type may vary at the Project Start Date and under the Baseline Activity.

[3] See http://cdm.unfccc.int/DNA/ARDNA.html?CID=46.

Table 1 Potential Project Activities by PS-AFOLU Project Types

PS AFOLU Project Type	Example Project Activities
Forest Management (FM)	• *Extending Forest rotations of managed Forests:* Carbon stocks in managed Forests may be enhanced by increasing the age at which trees are cut. Lengthening the rotation time will allow Forest stands increased growing time (i.e. additional growing seasons) and therefore promote greater carbon storage over that stand, enhancing average carbon stocks. • *Reduced Impact Logging:* Carbon emission may be reduced by improving logging practices (e.g. through reduced impact logging, reducing or avoiding slash burning and soil disturbance such as overall plough before replanting). This can also be combined with improved replanting practices. Improvements in harvesting practices may be made through such things as: reducing incidental damage (branches and neighboring trees damaged due to timber treefall), alterations in logging infrastructure (roads, skid trails, and logging decks to pile harvested timber), and/or reducing carbon stocks of harvested tree(s) left in the forest as dead wood through improved harvesting practices (e.g. increasing timber minimum diameter, reducing timber remaining due to poor shape of log, cracking of log, reduction in felled logs that are unreachable, etc). • *Decreasing timber harvest volume:* Carbon emissions may be reduced by simply decreasing the amount of timber harvested within a given area of forest. This can include reducing the number of trees logged per unit area per year or per rotation. • *Restructuring even-aged plantations to mixed species and multi-aged forests:* Long term average live biomass carbon stocks can be increased by interplanting with additional species and shifting timber harvesting practices either to selective logging or ceasing logging activities • *Improving management of even-aged mono-plantations:* Often after successive rotations of mono-species, even-aged plantations growth rates decline, resulting in decreased average carbon stocks. This can be increased by altering management techniques, including replanting and interplanting with additional species. • *Enhancing change in Forest carbon stocks:* Increasing the rate of carbon stock accumulation in areas currently meeting Forest definition may result in the long term increase of Forest carbon stocks. This can include activities such as: enrichment planting, fertilization, thinning of slow-growing tree species, mitigation of disturbance events (e.g. mudslides), and/or other Forest management activities. • *Increasing productivity by excluding animal grazing or harvest of understory and Forest floor:* Domestic animals cause significant impact in Forest regeneration by trampling seedlings, eating seedling trees, and compacting soil. Avoidance of animal grazing within areas classified as a Forest will promote greater regeneration and improve recruitment of new cohorts of trees. Understory and Forest floor harvest follows the same principle, where removal of these Forest components will result in reduced live and dead biomass carbon stocks.

- *Increasing proportion of wood moving to long-term wood products:* Carbon emissions may be reduced by increasing the proportion of the timber removed destined to become long-term wood products. This could include improving milling efficiencies and altering the type of wood product produced (e.g. shifting more production from paper to lumber).
- *Decreasing harvest of fuel wood:* Reducing quantities of fuel wood removed within a given area per year will result in greater standing live biomass carbon stocks in the forest.
- *Reducing Emissions from Planned Deforestation:* Stopping legally authorized and documented deforestation in a known area and location will reduce carbon emissions. Sufficient documentation must be presented demonstrating known deforestation threat.
- *Reducing Emissions from Unplanned Deforestation:* The conversion of land from Forest to a non-Forest category can also take place without advanced or deliberate planning. The rate of such conversion may be informed by historic deforestation in the region. This deforestation could be the result of Forest conversion to Cropland, or successive selective cutting resulting in the Grassland category. The prevention of such cutting activities can result in a reduction in emissions.

Forestation and Vegetation Increase (F-V)

- *Increase in trees and woody vegetation through planting of seeds or seedlings.* Sample activities include:
  - Timber or tree crop plantations/orchards
  - Afforestation with native species
  - Afforestation/Reforestation of sloped and mountainous land resulting in watershed protection
  - Creation of Riparian Buffers, Shelter Belts, Windbreaks
  - Afforestation of abandoned minelands, marginal cropland or grazing land, or following natural disturbances
  - Aerial planting of seeds or seedlings
  - Afforestation with bamboo
- *Human-assisted Natural Regeneration of trees and other woody vegetation*

Sample activities include:

  - Removal of grazing animals
  - Ceasing of cropland production
  - Prevention or reduction in fire frequency or intensity
  - Reduction or ceasing of firewood collection in areas below the Forest definition
- *Planting of high-biomass non-woody or woody crops (that do not meet threshold criteria for Forest):* Planting of high-biomass crops can increase long-term average carbon stocks. If the land within the Project Boundary will meet the threshold Forest definition threshold under the Project Activity, this activity is considered Forestation but remains in the overall F-V category.
- *Alteration in fallow management or length:* Alteration in the management of the fallow period can result in an increase in long term carbon stocks of soil and vegetation carbon stocks. This can include such things as: planting of fallow cover, addition/alteration of residual waste, and/or increasing the length of the fallow period.

- *Increase of woody, bamboo, and/or non-woody vegetation through planting, sowing, or human assisted natural regeneration:* Establishment of greater woody vegetation can increase long-term average above and below-ground live biomass and soil carbon stocks. This can include activities such as direct planting, or removal of degradation agents such as grazing animals.
- *Alteration in management during Settlement creation:* Altering the techniques used to create Settlements can result in a greater carbon stock than in Baseline conditions. This could include such things as reducing the number of trees or other vegetation cut during conversion.
- *Alteration in management resulting in planting of Settlements with vegetation:* Increasing the biomass of trees and woody vegetation through additional plantings or altered management will increase average carbon stocks.

Cropland Management (CM)

- *Increasing soil carbon stocks through changes in tillage practices:* Tillage of soil leads to increased decomposition therefore increasing carbon emissions. Changes in tillage regime may result in an increase in soil carbon stocks until a new equilibrium is reached. Tillage may be eliminated (no-till) or simply reduced (ridge-till, strip-till etc.)
- *Increasing soil carbon stocks through conversion of land to cropland:* Conversion of land, such as marginal or degraded land, to cropland may lead to an increase in soil carbon
- *Increasing soil carbon stocks through changes in cover crop practices:* Cover crops may lead to additional carbon in the soil through improved nitrogen fixation and deeper root systems.
- *Increasing soil carbon stocks through addition of exogenous carbon:* (e.g. manure, agricultural residues, compost, biochar, etc). Adding additional organic material may increase soil carbon stocks until a new equilibrium soil stock is reached.
- *Fertilizer management to decrease nitrous oxide emissions:* Effective application of nitrogen may result in altered usage of applied fertilizer and/or manure and reduced emissions of nitrous oxide (N_2O). This can include such things as the quantity of application (rate), type of fertilizer (source), the timing of application, the placement of fertilizer, and use improved fertilizer types such as timed-release fertilizer or fertilizers with nitrification inhibitors.
- *Planting of inoculated legumes:* By incorporating the planting of inoculated legumes in crop rotations, or increasing the frequency or other management of inoculated legumes, the quantity of soil nitrogen may increase, thus potentially reducing the need to apply fertilizers.
- *Changes in irrigation practices:* The type of alteration will be dependent on Baseline practices but could include both an increase use of irrigation to increase live biomass stocks and/or to reduce nitrous oxide emissions.
- *Changes in management practices to decrease fossil fuel consumption:* Reduction of usage of fossil fuel-powered machines will result in reduced fossil fuel emissions.

- *Changes in management of rice paddies to decrease non-CO_2 gas emissions:* Alteration in rice production, such as draining flooded rice paddies when rice plants are absent, mid-season drainage or alternate wetting and drying, can lead to a reduction in methane (CH_4) emissions as well as possible reductions in emissions from fossil fuel combustion used for water pumping.

Grassland Management (GM)

- *Fertility improvements:* Altering the quantity and type of fertilizer and/or liming of acid soils may lead to an increase in Grassland biomass production, and therefore average carbon stocks. However, this may also result in an increase in nitrous oxide emissions.
- *Changes in species composition:* Planting of altered species can lead to increases in long-term average carbon stocks. This may include inter-planting with leguminous species or woody species. In addition, some grass species are deeper-rooted and therefore result in increased long term soil carbon stocks. Altering management or species planted may also impact non-CO_2 emissions from enteric fermentation from on-site grazing livestock.
- *Alteration in management to reduce emissions from burning non-woody vegetation:* Burning Grasslands will result in direct emissions of CO_2 and non- CO_2 greenhouse gases. By altering management that prescribes burning, these emissions may be avoided.
- *Alteration in livestock management:* Emissions can be reduced through reduction in stocking rates, destocking during unfavorable conditions, and adjusting the timing and frequency of grazing.
- *Institution of rotational grazing:* Rotational grazing, improves the efficiency of forage use and allows time for species to regrow while livestock are elsewhere, therefore increasing average carbon stocks. This may also impact non-CO_2 emissions from enteric fermentation.
- *Reducing emissions from Grassland Degradation:* Emissions can be reduced through reduction in the volume, frequency, or type of biomass cutting taking place. This may include both woody and non-woody vegetation. This activity will both allow for carbon stock maintenance and regrowth.
- *Grassland protected from conversion to Cropland or other land use with lower carbon stock:* Reductions in biomass and soil carbon stocks can be stopped through the prevention of Grassland conversion. This will result in net emission reductions if the Baseline Activity would have resulted in lower carbon stocks. Sufficient documentation must be presented demonstrating known conversion threat.
- *Establishment of Grassland and increase of woody vegetation through planting, sowing, or human assisted natural regeneration (vegetation that does not meet threshold criteria for Forest):* Establishment of greater woody vegetation can increase long-term average carbon stocks. This can include activities such as direct planting or ceasing cropping practices. If the land within the Project Boundary will meet the Forest definition threshold under the Project Activity, this activity should take place under the F-V category.

- *Establishment of Grassland and increase of non-woody vegetation:* Establishment of grassy plants in degraded or non-vegetated areas (e.g. sand dunes), especially those with deeper root systems will result in greater allocation of atmospheric carbon to the belowground roots and improve fixation of carbon into the soil as these deep rots die off and decompose deep into the soil matrix. In addition, the long term average biomass carbon stocks may be higher.
- *Establishment of Grassland from Cropland, reducing fertilizer inputs:* Change in heavily fertilized Croplands to perennial Grasslands may lead to reduction in fertilizer application and therefore avoiding emission resulting from fertilizers applied in excess. This will be in addition to the increase in long term average biomass carbon stocks and potential soil carbon stock increases.

The following activities are outside the scope of this version of the PS-AFOLU specification. However, these activities may be eligible and addressed in other Panda Standard sectoral specifications or in a future version of PS-AFOLU:

- Any activities on land areas classified as water bodies, including lakes, rivers and other water bodies. This would equate to the IPCC definition of "Wetlands"[4] .
- Non-land based activities only targeting emission reductions from altering livestock feeding management and manure management using biogas digesters. These activities will be eligible Panda Standard activities but will be addressed in other PS sectoral specifications and methodologies.
- Other non-land based activities such as use of more efficient cookstoves, solar water heaters, etc. These activities are likely important in rural China and may have significant emission reduction potential when aggregated. They will be addressed in other PS sectoral specifications and methodologies.
- Activities taking place on peat soils. Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm.[5] It is expected that a future version of PS-AFOLU will include activities taking place on peat soils.

3.2. Historic Land Use

The Project Proponent must provide documented evidence in the Project Form of the historic land use within the Project geographic boundaries over the 10 years prior to the Start Date. If land use management within the Project geographic boundary has changed within the last 10 years, documentation must be included to demonstrate that the motivation of such land management change

[4] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_03_Ch3_Representation.pdf
[5] Rieley, J.O. and S.E Page. 2005. Wise Use of Tropical Peatland: Focus on Southeast Asia. Alterra, Wageningen, The Netherlands. 237 p. ISBN 90327-0347-1.

was not the pursuit of emission credit creation. The PS-AFOLU Methodology must delineate the steps to demonstrate the historic land use management and demonstrate that land management changes were not the in the pursuit of emission credit creation.

3.3. Offset Title and PS Credit ownership

The Project Proponent shall be responsible for identifying PS Credit ownership in the PS Project Form. The Project Proponent is not required to hold land title or lease, but must document clear offsets title per the following paragraph.

The Project Proponent must have legal control of the GHG emissions and removals taking place over the life of the Project within all areas inside the Project Boundary. Legal control may be documented through contracts/agreements with, or signed attestations from, the entity (national/provincial/local government, private company etc.) controlling the lands, GHG sources and sinks from which GHG emissions and removals derive. The Project Proponent must be able to demonstrate undisputed title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past. Title to offsets shall be clear, unique, and uncontested. The Project Proponent shall include, in an annual signed attestation, a statement that legal control of GHG emissions and removals remains uncontested or, in the event legal control becomes contested, what measures are being taken to secure control. The PS Secretariat may decline to issue PS Credits until legal control is clarified.

Documentation in the form of an Offset Title must be presented to show that potential PS credit ownership is recognized for all areas within the Project Boundary at the time of Project Validation and Verification.

3.4. Baseline Net Emissions

The Project Proponent must apply approved PS-AFOLU Methodology(ies) or Tool(s) to estimate the net GHG emissions resulting from the Baseline within the Project Boundary. How the Methodology or Tool was applied to create this Baseline shall be described in the Project Form, validated prior to registration, and verified at the time of credit Verification.

3.5. Leakage

The Project Proponent must assess, quantify, and mitigate Leakage. The Project Form must choose and implement an applicable PS-AFOLU Methodology(ies) or tool(s) to monitor and quantify all potential Leakage as a result of the Project.

3.6. Ancillary Benefits

The implemented PS-AFOLU Project must evaluate ancillary benefits, as required and defined by the Panda Standard[6]. The Project Form must describe with proper documentation how these ancillary benefits were evaluated and the stakeholder consultation process that occurred. Where required, the Project Form must delineate a mitigation plan of assessed on-site and off-site negative effects caused by the Project Activity.

In addition to addressing impacts on the environment and local communities, the Project Proponent *may* assess the poverty reduction impact of the Project through application of the PS Poverty Alleviation Criteria Tool[7]. Assessment of poverty impacts using the PS Poverty Alleviation Criteria Tool is recommended but not required. Projects that apply the PS Poverty Alleviation Criteria Tool and demonstrate positive poverty reduction impacts, validated and verified by approved Third Party Auditors, shall be awarded PS Credits with a special designation indicating the optional added certification of poverty impacts.

Application of the PS Poverty Alleviation Criteria Tool is particularly recommended for Project Activities implemented in the Nationally Defined Key Poverty Counties (NDKPCs).[8]

[6] See Panda Standard for requirements, http://www.pandastandard.org/
[7] Currently under development
[8] As designated, and periodically updated, in China's national poverty alleviation program.

Section 4: Project Definition

4.1. Activity and Methodology Definition

A PS-AFOLU Project may include multiple eligible Project Types and Project Activities. The Project Proponent must explicitly list all Project Types and all Project Activities to be included in the Project and state the PS-AFOLU Methodology that will be applied to each Project Activity.

4.2. Temporal Definition

4.2.1. Project Start Date

The Project Proponent must list an explicit Project Start Date within the Project Form. The Project Start Date is the date by which the Project Proponent began the Project Activity on Project lands. PS-AFOLU Methodologies may include a more specific Project Start Date definition: e.g., for Forestation the Project Start Date shall be the date of planting or of site preparation. Documentation justifying the chosen Start Date must be included.

All projects with a Start Date greater than one year prior to the submission of the Project Form must document GHG mitigation as an original objective by presenting verifiable evidence based on (preferably official, legal and/or other corporate) documentation that was available to third parties at, or prior to, the Project Start Date.

Per the *Panda Standard v1.0*, eligible Projects will generally have a Project Start Date no earlier than January 1, 2005. However, AFOLU Projects will be evaluated on a case-by-case basis and may be accepted with a Start Date earlier than January 1, 2005, provided the Project Proponent can demonstrate that GHG mitigation was an objective of the activity from its inception.

4.2.2. Crediting Period

The Project Proponent must include explicit dates that define the Crediting Period within the Project Form. The Crediting Period is the finite length of time for which a Project can generate PS credits for registration under a given Baseline. A new Crediting Period can be initiated following a new Baseline Validation.

4.2.3. Crediting Period Start Date

The Crediting Period Start Date must be explicitly listed in the Project Form. The Crediting Period Start Date of the first Crediting Period shall equate to the date on which the new land management regime was instituted. Documentation justifying the chosen Crediting Period Start Date must be included. For Project Activities expected to generate net carbon sequestration, the Crediting Period Start Date is the date on which land management changed from the Baseline Scenario to the Project Activity, such as when land preparations began for planting in the Project Boundary. For Project Activities reducing terrestrial Carbon Pool emissions, the Crediting Period Start Date is the date Project Activities aimed at

altering land management began. Often the initial Crediting Period Start Date will equate to the Project Start Date.

4.2.4. Project Term

The Project Term must be explicitly listed in the Project Form and included in the analysis of Additionality. For Projects where multiple activities are taking place, the minimum Project Term for the whole Project shall equate to the minimum length required by the Project Activity with the longest minimum Project Term.

Project Activities generating **net carbon sequestration (or GHG removals),** the minimum Project Term must be longer than the length of one rotation, for projects where harvesting will take place, or 30 years, whichever is longer.

For Project Activities generating **net emission reductions** through alteration in the emissions of terrestrial Carbon Pools, the minimum Project Term is 20 years.

For Projects *only* producing PS Credits through activities that can be shown to produce **irreversible net GHG emission reductions** (e.g. altering fertilizer management) the minimum Project Term is 5 years.

4.3. Boundary

The PS-AFOLU Project Form must include explicit documentation on the boundaries of each Project Activity; this shall equate to the geographic boundaries of each Project Activity.

A PS-AFOLU Project may contain more than one discrete parcel of land. For each discrete parcel a unique geographic identifier must exist. The Project Form must describe the Project Activity to take place, the and Methodology applied in each parcel, and must include documentation that each parcel meets the eligibility and applicability conditions required by the PS-AFOLU Methodology applied to that Project Activity. Only one PS-AFOLU Methodology can be applied to any given discrete parcel of land. The sum of all discrete parcels using one Methodology shall equate to the Project Activity Area and the sum of all Project Activity Areas shall equal the Project Boundary.

As stated in Section 3.3, to be eligible for offset Verification, the Project Proponent must have legal control of the GHG emissions and removals taking place over the life of the Project within all areas inside the Project Boundary. All areas inside the Project Boundary must be Validated with respect to Eligibility, Additionality, Baseline, and Ancillary Benefits. Additional areas may be added to the Project Boundary after initial Project Validation, but no offsets may be issued from these areas prior to the Validation of additional areas to the Project Boundary (which may occur simultaneous to Verification).

4.4. GHG Sources

The PS-AFOLU recognizes the following GHG Sources (not directly calculable from changes in carbon stocks) for Project accounting:

- Fossil fuel combustion

- Nitrous oxide emission resulting from fertilizer application
- Nitrous oxide and methane gases derived from biomass burning
- Methane emissions from areas inundated by water for significant proportion of the year
- Nitrous oxide and methane emissions from livestock and manure

A PS-AFOLU Methodology must include procedures for accounting for each GHG source, except when:

- Accounting for a GHG source is considered *a priori* optional for the Project Type by the PS-AFOLU (Table 2)

  However, a Project Proponent may elect to account for any and all GHG sources for a given Project Activity. Wherever a GHG Source is included, it must be accounted in both the Baseline and Project scenarios for that Project Activity.

- The GHG source is demonstrated to be *de minimis* through application of a significance tool approved for use within the PS-AFOLU Methodology

  For GHG Sources that cannot *a priori* be optional for a PS-AFOLU Project Type, a PS-AFOLU Methodology may allow the use of a significance tool[9] to demonstrate that the change meets the *de minimis* criteria and therefore can be omitted from accounting. If a GHG Source is not considered as *de minimis* during Project Validation but found to be *de minimis* through monitoring, the GHG Source may be omitted from subsequent monitoring and verification if the Project Proponent presents evidence that the *de minimis* criteria shall also be met during future monitoring intervals.

- The Project Proponent presents evidence that exclusion of the GHG source is conservative, i.e. exclusion will underestimate rather than overestimate Net Emission Reductions.

  In addition, a PS-AFOLU Methodology may include applicability conditions excluding Baseline or Project Activities where specific GHG sources exist and thus the Methodology does not need to account for a given GHG source. An example of a Methodology applicability condition could be: “Methodology is not applicable to locations where livestock exist within the Project Type Area at the Project Start Date, in the Baseline Activity, or in the Project Activity”. Such a methodology would then not be required to account for nitrous oxide and methane emissions from livestock.

[9] E.g. the CDM “Tool for Testing Significance of GHG Emissions in A/R CDM Project Activities,” at http://cdm.unfccc.int/EB/031/eb31_repa_n16.pdf.

Table 2 Greenhouse Gas Sources that are *a priori* optional for various Project types in the PS-AFOLU

PS-AFOLU Project Type		Greenhouse Gas Sources				
		Fossil Fuel Combustion	Fertilizer Emissions	Biomass Burning	Water Inundation	Livestock
Forest Management	(FF)	Optional	Optional		Optional	Optional
Forestation and Vegetation Increase	(F-V)	Optional			Optional	Optional
Cropland Management	(CM)					
Grassland Management	(GM)				Optional	

4.5. GHG Pools

The PS-AFOLU recognizes the Carbon Pools delineated in the 2006 IPCC Guidelines for National GHG Inventories[10], with the addition that Non-tree Biomass (above and below ground) is considered a separate pool from Live Biomass and Harvested Wood Products is considered a separate pool from Deadwood.

The included pools are:

- Aboveground live tree biomass
- Belowground live tree biomass
- Aboveground live non-tree biomass
- Belowground live non-tree biomass
- Dead wood
- Forest floor (litter)
- Soil organic carbon
- Harvested Wood Products

For Dead Wood that does not represent a long term increase in stocks, PS-AFOLU Methodology accounting must use the simplifying assumption that emission occurs in the year of generation. For Harvested Wood Products, PS-AFOLU Methodology accounting should assume the permanent sequestration to be equal to the proportion still in use or in landfill 100 years after initial generation. The

[10] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

remaining proportion is considered to be emitted in the year of generation. However, alternative accounting procedures within a PS-AFOLU Methodology may be considered.

A PS-AFOLU Methodology must include procedures for accounting for each GHG pool, except when:

- Accounting for a GHG pool is considered *a priori* optional for the Project Type by the PS-AFOLU (Table 3)

  However, a Project Proponent may elect to account for any and all GHG pools for a given Project Activity. Wherever a Carbon Pools is included, it must be accounted in both the Baseline and Project scenarios for that Project Activity.

- The GHG pool is demonstrated to be *de minimis* through application of a significance tool approved for use within the PS-AFOLU Methodology

  For Carbon Pools that cannot *a priori* be optional for a PS-AFOLU Project Type, a PS-AFOLU Methodology may allow the use of a significance tool[11] to demonstrate that the change meets the *de minimis* criteria and therefore can be omitted from accounting. If the Carbon Pool is not considered as *de minimis* during Project Validation but found to be *de minimis* through monitoring, the Carbon Pool may be omitted from subsequent monitoring and verification if the Project Proponent presents evidence that the *de minimis* criteria shall also be met during future monitoring intervals.

- The Project Proponent presents evidence that exclusion of the GHG pool is conservative, i.e. exclusion will underestimate rather than overestimate Net Emission Reductions.

  Alternatively, a PS-AFOLU Methodology may include applicability conditions excluding Baseline or Project Activities where specific GHG pool changes would take place. An example of a Methodology applicability condition could be: “Methodology is not applicable to locations where any live tree biomass will exist at the Project Start Date, in the Baseline Activity, or in the Project Activity”.

[11] E.g. the CDM “Tool for Testing Significance of GHG Emissions in A/R CDM Project Activities,” at http://cdm.unfccc.int/EB/031/eb31_repan16.pdf.

Table 3 Carbon Pools that are *a priori* optional for various Project Types in the PS-AFOLU

PS-AFOLU Project Type	Carbon Pool							
	AG Tree Biomass	BG Tree Biomass	AG Non-Tree Biomass	BG Non-tree Biomass	Deadwood	Litter	Soil Organic carbon	Harvested Wood Products
Forest Management (FF)		Optional	Optional	Optional	Optional	Optional	Optional	
Forestation and Vegetation Increase (F-V)		Optional			Optional	Optional		
Cropland Management (CM)					Optional	Optional		Optional
Grassland Management (GM)					Optional	Optional		Optional

Section 5: Additionality

GHG reductions and removals must be additional to any that would have occurred in the business-as-usual scenario and without carbon market incentives. To demonstrate this is the case, PS-AFOLU provides two options:

1. **Three-prong approach:** Project Proponents may demonstrate (and a PS-AFOLU Methodology may require) that the Project Activity pass a "three-prong test" to show that it meets all of the following conditions:
    a. Complies with regulatory requirements
    b. Exceeds common practice
    c. Faces investment, technological or institutional barriers
2. **Performance standard approach:** Project Proponents may demonstrate that the Project Activity exceeds regulatory requirements and exceeds a performance standard as defined in a PS-AFOLU Methodology.

PS-AFOLU Methodologies should incorporate the simplest and most standardized approach that still constitutes a rigorous demonstration of additionality. Thus where feasible for the Project Type, the second option above – using standardized approaches such as performance standards and simplified tools – is preferred. Standardized approaches may be considered rigorous where sufficient reliable data exists to develop performance benchmarks and default factors, and where application of the performance standard is not likely to result in significant crediting of business-as-usual activities. With many AFOLU Project Types data is insufficient, and/or in a voluntary market context the risk of over-crediting cannot be eliminated (see below), so rather than making these Project Types ineligible, the option of project-specific additionality determinations is retained.

Performance standards under a voluntary program have the inherent danger of over-crediting, since Project Proponents whose business-as-usual GHG emissions are less than (or sequestration is greater than) the benchmark will use the performance standard and claim credit for activities without atmospheric benefit, while Project Proponents whose business-as-usual GHG emissions are greater than (or sequestration is less than) the benchmark will not enroll in the voluntary program.

Thus PS-AFOLU recommends standardized approaches for activities where sufficient reliable data exists to develop a performance standard, and over-crediting can be minimized.

PS-AFOLU recommends the "three-prong" or project-specific approach to additionality for activities where sufficient data is not yet available, or potential for over-crediting is great.

The two options to demonstrate additionality ("three-prong" test and performance standard) are mutually exclusive; Project Proponents need only apply one of the two. The PS-AFOLU Methodology must specify which approach is being taken.

5.1. Three-Prong Test

For Project Activities and Methodologies using the three-prong test, proof of Additionality must be based on a Project-specific assessment that addresses each requirement.

5.1.1. Regulatory Conformity

Project Proponent must demonstrate that all Project Activities taking place within the Project Boundary do not lead to the violation of any existing laws, regulations, statutes, legal rulings, or other regulatory frameworks. This review should include laws and regulations at the national (PRC Government) level but also applicable provincial and local regulations. Voluntary guidelines, proposed laws or regulations need not be considered.

5.1.2. Common practice

Project Proponents must demonstrate that the Project Activity exceeds common practice. The PS-AFOLU Methodology must delineate steps that the Project Proponent shall use to evaluate whether the predominant practices undertaken are similar to those being implemented by the Project Activity., and thus considered common practice. Similar activities include those implemented by a comparable entity (e.g. large company, small company, national government program, local government) and with comparable geographic size, geographic location, environmental condition, socioeconomic condition, regulatory framework, and/or investment climate.

If no similar activities, as defined above, are being implemented, the Project Activity is considered to exceed common practice.

Projects that are deemed to go beyond common practice are considered beyond common practice for the duration of their Crediting Period. If common practice adoption rates of a particular practice change during the Crediting Period, this may make the Project non-additional and thus ineligible for renewal of the Crediting Period, but does not affect its additionality during the current Crediting Period.

5.1.3. Implementation barriers

Project Proponent shall apply the implementation barriers test. An implementation barrier represents any factor or consideration that would prevent the adoption of the proposed Project Activity for the Project Term. Project Proponents shall choose at least one of three barrier assessments: i) financial, ii) technological, and iii) institutional. Project Proponents may demonstrate that the Project faces more than one barrier, but are only required to demonstrate one.

- *Financial barriers* can include high costs, limited access to capital, or an internal rate of return in the absence of revenues from Panda Standard Credits that is lower than the Proponent's established minimum acceptable rate. If electing the financial implementation barrier test, Project Proponents shall provide solid quantitative evidence over the life of the Project term such as net present value (NPV) and internal rate of return (IRR) calculations, documentation such as appraisal documents, etc.

- *Technological barriers* can include R&D deployment risk, uncorrected market failures, lack of trained personnel and supporting infrastructure for technology implementation, and lack of knowledge on practice/activity.
- *Institutional barriers* can include institutional opposition to technology implementation, limited capacity for technology implementation, lack of management consensus, aversion to upfront costs, and lack of awareness of benefits.

Existing additionality tools provide guidance on the application of barriers analysis, investment analysis, and common practice analysis to demonstrate additionality of Project activities.[12] Application of existing tools is recommended. New additionality tools may also be proposed for approval by the PS Technical Committee through the process outlined in the *Panda Standard v1.0*.

5.2. Performance Standard approach

For PS-AFOLU Methodologies using the Performance Standard approach for a Baseline, Projects that exceed pre-defined sectoral or sub-sectoral performance standard benchmarks will be considered Additional, provided they also exceed all applicable enforced regulatory/legal requirements.

The Project Proponent must first evaluate existing laws, regulations, statutes, legal rulings, or other regulatory frameworks that directly or indirectly affect GHG emissions associated with a Project action or its Baseline candidates, and which require technical, performance, or management actions. This review should include laws and regulations at the national (PRC Government) level but also applicable provincial and local regulations. Voluntary guidelines, proposed laws or regulations need not be considered. Project activities only pass the regulatory surplus test if the activity itself is not required by applicable regulatory framework, or if its resulting GHG emission reductions or removals go beyond those that would have occurred from compliance with the regulatory framework in place or from common practice in case this regulatory framework is shown as systematically not enforced.

Second, the Project Proponent must apply a PS-AFOLU Methodology to demonstrate that the Project Activity exceeds a performance threshold. Under this approach Projects are required to achieve a level of performance that, with respect to emission reductions or removals, or technologies or practices, is significantly better than average compared with similar recently undertaken practices or activities in a relevant geographic area.[13] The performance threshold may be:

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[12] See, for example, the CDM Additionality Tools at http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html and http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html; ACR baseline and additionality tool at http://www.americancarbonregistry.org/carbon-accounting/tools-templates.

[13] This section adapted from the U.S. Environmental Protection Agency Climate Leaders offset module overview, and various offset methodologies, at http://www.epa.gov/stateply/resources/optional-module.html.

- *Practice-based*: Developed by evaluating the adoption rates or penetration levels of a particular practice within a relevant industry, sector or sub-sector. If an approved Methodology demonstrates these levels are below 10%, it is determined the Project Activity is not common practice, then the Project Activity is considered additional.
- *Technology standard*: If an approved Methodology demonstrates a particular GHG-reducing technology is installed in less than 10% of relevant cases, then simply installing the technology is considered additional.
- *Emissions rate or benchmark* (e.g. tonnes of CO_2 emission per unit of output): If an approved Methodology examines sufficient data to assign an emission rate that characterizes the industry, sector, subsector, or typical land management regime, the net GHG emissions/removals associated with the Project Activity, in excess of this benchmark, may be considered additional and credited. In order to incentivize reductions and minimize over-crediting, benchmarks established in approved Methodologies should generally be based on the average emissions rate of the cleanest 20% participants in the relevant industry, sector, subsector or land management regime.

PS-AFOLU Methodologies using the performance standard approach need not apply additionality tools or conduct barrier analysis as described in Section 5.1. Such methodologies need only require the Project Proponent to demonstrate that the Project Activity is surplus to applicable enforced regulations and exceeds the performance threshold, as defined in the PS-AFOLU Methodology.

Section 6: Net Emission Reductions/Removals

6.1. General Accounting Principles

All approved PS-AFOLU methodologies must provide steps, equations, and requirements for estimating the net anthropogenic GHG emission reductions/removals resulting from all required GHG pools and sources from a Project Activity in comparison to a Baseline scenario using best practice accounting methods. The PS-AFOLU accounting requirements are to be based on the ISO 14064-2:2006 Standard, Clause 3[14] and the IPCC Guidelines 2006 for AFOLU.[15] Full GHG accounting must take place, including annual estimates of the Baseline and Project case GHG impacts expressed in metric tons of CO_2-equivalents.

The maximum amount of cumulative PS Credits that can be generated up to any given Verification event cannot exceed the projected total Net Emission Reductions/Removals that will be generated over the Crediting Period. This will require net *ex ante* estimations to be calculated for the Crediting Period within the Project Form and evaluated during Validation. Verifiers must ensure that emission reductions/removals at Verification events and future *ex ante* estimations result in a realistic estimation of total Crediting Period Net Emission Reductions/removals.

PS-AFOLU methodologies must describe methods that can be used to create realistic *ex ante* estimation of net emissions in the Baseline and Project scenario and robust and credible monitoring protocols.

To create *ex ante* estimates of the Project scenario it is allowable to use existing databases, models, and default tables. However, justification of the relevance of estimates used must be included in the Project Form.

Measurements of carbon stocks, emissions, or sequestration should be based on randomized sampling techniques, scientifically valid methods[16], and with sufficient sampling intensity to meet precision requirements. Peer-reviewed models may be used to estimate emission or sequestration provided the models are validated with field data and allow an estimate of uncertainty to be produced. Where models are used for pools or sources that can be directly measured (e.g. soil carbon), the applicability of the model to Project Boundary must be demonstrated through limited field measurements during the first Validation or Verification where the model is used. The results of limited field measurement sampling must produce an 80% confidence interval that includes the model prediction or that over-estimates emissions or under-estimates sequestration.

The final net emission reduction/removal can be reported as the mean if precision is calculated to be within ±10% of the mean at 90% confidence across the entire Project Boundary and only not within a

[14] International Standards Organization (ISO) 14064-2:2006(E) - Greenhouse gases — Part 2: Specification with guidance at the Project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.
[15] See http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html, Volume 4.
[16] E.g. conforming with IPCC Good Practice Guidance and CDM guidelines.

Carbon Pool, stratum, or Project Activity. If the 90% confidence interval is greater than 10% of the mean the reportable amount must include an Uncertainty Deduction. The Uncertainty Deduction shall be equal to the calculated % of the mean represented by the confidence interval minus the allowable 10%. This allows the Project Proponent to determine whether the added measurement costs associated with achieving a precision target justify the potential additional revenues resulting from avoiding an Uncertainty Deduction.

6.2. Baseline

Determine the Baseline Scenario(s)

The Baseline Scenario is the long-term projection of the land management activities that would have occurred within the Project boundaries in the absence of the proposed Project Activity and the net GHG emissions resulting from such land management activities. It is possible that the Project Boundary may contain different land areas that are under different Baseline Scenarios. However, a specific and singular Baseline Scenario must be determined for each geographically identified parcel.

All PS-AFOLU methodologies must include explicit steps that Project Proponent can follow to identify and demonstrate what land management activity is the most likely to occur on all geographically identified parcels. This is known as the Baseline Scenario for that parcel. The Project Proponent must provide verifiable evidence to demonstrate that the selected Baseline Scenario would have taken place within the geographic parcel or group of parcels. All PS-AFOLU methodologies should also include steps to identify the entity or type of entity that would have had the responsibility to determine the land management practices implemented within that area of the Project Boundary. This is known as the Baseline Agent.

Determine net Baseline Scenario GHG emission reductions(removals)/ha/year/strata

For each Baseline Scenario Type, the net GHG emission reductions/removals that would have taken place must be estimated over the Crediting Period. At the conclusion of a Crediting Period, the Baseline Scenario Type must be reassessed.

For Project-specific Baselines, the Project Proponent must define the most credible land management practices that would have taken place in the Project Boundary over the Crediting Period given the Baseline Scenario Type. The PS-AFOLU Methodology must provide the steps necessary to calculate the net GHG emission reductions/removals from a given Baseline Scenario Type. For Baseline Activities where carbon pools undergo cyclical changes (forest rotations, crop-fallow systems), the net GHG reductions/removals for a given pool should be set to the long-term average of that pool.

Where the Baseline Agent is a specific known entity responsible for the Baseline Scenario, the Baseline land management practices can be based on:

- Historic land management practices conducted by that Baseline Agent if known and appropriate

- Regionally appropriate common practice (must provide justification) where the Baseline Agent has no appropriate historic practices
- Credible and documented plan of future land management practices by Baseline Agent

Where the Baseline Agent is a type or class of entity responsible for the Baseline Scenario , the Baseline land management practices can be based on:

- Regionally appropriate common practice (must provide justification)[17]
- Modelled projection, most likely based on historic or planned activities of the rate, location, and change in GHG emissions resulting from Baseline type

Baseline Length and Baseline Renewal

Baselines shall be valid for a fixed amount of time that shall be determined in the PS-AFOLU Methodology. This period shall not be less than 5 years nor longer than 30 years. Under the PS-AFOLU, the Baseline validity equates to the Crediting Period.

In order to renew the Crediting Period, the Baseline Scenario must be re-evaluated and re-validated.

6.3. Project

Determine the Project Activity Scenario

The Project Activity Scenario(s) is the long-term projection of the land management activities that will occur within the Project boundaries as a result of the Project Activity and the net GHG emissions resulting from such land management activities. It is possible that the Project Boundary contain different land areas that are under different Project Activity Scenarios. However, a specific and singular Project Activity Scenario must be determined for each geographically identified parcel at Verification.

Determine net Project Activity Scenario GHG emission reductions(removals)/ha/year/strata

For all areas within the Project Boundary, the net GHG emission reductions/removals must be accounted over the Crediting Period. PS-AFOLU Methodologies must provide explicit steps to create *ex-ante* estimates of net emissions taking place within the Project Boundary and steps to measure and monitor *ex-post* net emissions within the Project Boundary over the crediting period. This should include methods for net emissions from all required GHG sources and pools. For Project Activities where carbon pools undergo cyclical changes, the net GHG reductions/removals for a given pool over the Crediting Period cannot exceed the long-term average of that pool.

[17] Not allowable for Baseline Activities where the exact location of the baseline land cover change is unknown within the Project Boundary. This would include activities such as deforestation or devegetation caused by small-holder farmers.

6.4. Leakage

Emissions outside the Project Boundary may take place as a result of the PS-AFOLU Project. Such emissions outside the Project Boundary are considered Leakage. The quantity of GHG emissions resulting from Leakage must be subtracted from the total estimated net GHG emission reductions and removals resulting from the Project, unless Leakage can be demonstrated to meet one or more of the conditions below. This shall take place prior to the application of any non-permanence buffer deduction.

The Project Proponent must apply a PS-AFOLU Methodology that appropriately accounts for all relevant and significant potential types of Leakage that could take place as a result of the PS-AFOLU Project. The Project Form must supply a plan for accounting for Leakage. Any Leakage identified must be quantified and subtracted from the net emission reduction/removal benefits estimated by the Project Proponent, unless Leakage can be demonstrated to meet one or more of the conditions below.

It is allowable for PS-AFOLU Methodologies to account for Leakage using models, default tables, or explicit steps that must be followed by the Project Proponent.

Under the PS-AFOLU, accounting for potential Leakage is *a priori* not required for the following:

- Creation of poles and fencing to implement Project Activities
- Fossil fuel combustion resulting from ground transportation

Under the PS-AFOLU, accounting for potential Leakage is not required for a Project Activity if verifiable documentation can be presented in the Project Form during Validation and Verification to show:

- Displacement of Baseline Activities occurs on less than an average of 5% of the land area for a given Project Activity during the Crediting Period
- Total quantity of a given good/commodity (e.g. lumber, crop, fuelwood, grazing animal) supplied to market in the with-Project Scenario for a given Project Activity is reduced by less than 20% of in comparison to the Baseline during the Crediting Period
- All Leakage emissions are estimated to be below the *de minimis* threshold[18] on average during the Crediting Period.

Where applicable, all PS-AFOLU Methodologies must include monitoring steps to document the Project's conformity to these requirements.

It is highly recommended that the Project Proponent design and implement activities to reduce the occurrence and extent of Leakage. Examples of activities to reduce Leakage emissions include agricultural intensification, agroforestry, crop diversification, fallow lengthening, woodlots, and sustainable production of non-timber forest products. However, the implementation of such activities may itself cause Leakage (see Section 6.4.3) and this must be accounted for in Project accounting.

[18] As defined in the Annex, the *de minimis* threshold is thus 3% of the *ex ante* calculation of net emission reductions/removal enhancements for each Project Activity over the Project Crediting Period.

Although some Project Activities and Leakage activities may result in net emission reductions outside the Project area, the PS-AFOLU does not recognize such 'positive Leakage'.

6.4.1. Activity Shifting

Activity shifting refers to GHG emissions resulting from activities that would have taken place within the Project Boundaries in the Baseline that, as a result of the Project, occur outside the Project Boundary.

Examples of activities causing Activity Shifting Leakage include, but are not limited to the shifting of: grazing animals, crop production, forage production, households or villages, fuel wood collection, machinery use, and wood harvesting or harvesting rates.

If a model or default tables are not used by the PS-AFOLU Methodology to estimate Leakage then the Methodology must create explicit steps to monitor the potential shifting of Baseline activities. The Project Proponent may present documented justification for monitoring the Baseline activities within a restricted geographic area. This would generally equate to the area in which the activity can be reasonably expected to have been displaced.

6.4.2. Market Effects

The reduction of a commodity due to Project activities in comparison to the baseline may cause Market Effects Leakage.

Accounting for potential market effects leakage is not required for a Project Activity if verifiable documentation can be presented in the Project Form during Validation and Verification to show either:

- As stated above: total quantity of a given good/commodity (e.g. lumber, crop, fuelwood, grazing animal) supplied to market in the with-Project Scenario for a given Project Activity is reduced by less than 20% in comparison to the Baseline
- Average quantity of a given good/commodity in the Baseline per year supplied to market is less than 5% of total commodity produced per year within the PRC Prefecture (s) where the Project is taking place.

Where applicable, all PS-AFOLU Methodologies must include monitoring steps to document the Project's conformity to these requirements. It is highly recommended that PS-AFOLU Methodologies develop default tables that can be used to account for Market Effects Leakage. However, Project Proponents may estimate the market effect of the Project through the documentation of existing Leakage analyses or create new Leakage analyses.

6.4.3. GHG emissions resulting from Project Activities and Leakage prevention measures

Project Activities, including Leakage prevention measures, can cause emissions outside of the Project Boundary. If this is likely to occur the Project Proponent must apply a PS-AFOLU Methodology that appropriately includes steps for accounting for such emissions. This would include activities such as, but not limited to: agricultural intensification, altered fertilizer use, fodder production, and site preparation.

Section 7: Permanence and Risk Mitigation

7.1. Purpose

Some AFOLU activities have an inherent risk of reversal of sequestered carbon. Prior sequestration, which may already have been verified, credited and sold as PS Credits, may be reversed through unintentional occurrences (e.g. fire, flood, insect infestation, etc.) or intentional factors (e.g. Project Proponents choosing to discontinue the Project Activity). In the latter case, Project Proponents may be discontinuing the activity because they intend to begin a land-use activity that releases stored carbon or is inconsistent with maintaining stored carbon (e.g. harvest greater number of trees than stated in the Project Form), in which case there is an actual reversal of sequestration that must be mitigated. Alternately Project Proponents may intend to maintain stocks, but not to continue reporting, monitoring and verifying for the Project Term originally agreed to, in which case even if sequestration is not fully reversed it is conservative to assume a reversal.

The goal of the PS-AFOLU permanence and risk mitigation requirements is to make all offset activities fully comparable and fungible, with each other and with emission reductions that occur at emitting facilities or in other sectors. Only if PS Credits from AFOLU activities offer equal GHG mitigation value to emission-reduction Projects that have no reversal risk will these types of credits be equally attractive to buyers. For this to be the case, the inherent reversal risk of AFOLU Projects must be mitigated, without resort to temporary crediting, discounting, or buyer liability.

7.2. Assessment of Reversal Risk

To assess reversal risks, the Project Proponent shall conduct a Risk Assessment addressing both general and Project-specific risk factors. General risk factors include risks such as financial failure, technical failure, management failure, rising land opportunity costs, regulatory and social instability, and natural disturbances. Project-specific risk factors vary by Project type.

Project Proponents shall conduct the risk assessment using the Panda Standard Risk Analysis Tool[19].

The result of the Risk Assessment is an overall risk category for the Project, translating into a percentage (in Option 1 below) or number (in Option 2) of PS Credits that must be deposited into the Panda Buffer Pool.

The risk assessment must be included in the Project Form and evaluated by the Validator and Verifier.

7.3. Options for Mitigation of Risk

The output of the risk assessment is a percentage of net GHG reductions. Project Proponents then have two options for mitigating risk:

[19] In development

Option 1: Project Proponents may set aside, at each Verification and issuance of new PS Credits, this percentage of offsets *from the Project itself* for deposit to the Panda Buffer Pool. In this case PS Credits issued to the Proponent's account will be:

$$PSC_t = \left(C_{t_2} - C_{t_1}\right) * \left(1 - BUF\right)$$, where

PSC_t	Number of PS Credits at time $t = t_2 - t_1$
C_{t2}	Cumulative total net GHG emissions reductions up to time t_2, *including all required deductions for Leakage and uncertainty*
C_{t1}	Cumulative total net GHG emissions reductions up to time t_1, *including all required deductions for Leakage and uncertainty*
BUF	Percentage of Project credits contributed to the Panda Buffer Pool

Option 2: Project Proponents may set aside, at each Verification and issuance of new PS Credits, the number of PS credits *of any type and vintage* that equates to the percentage drawn from the risk assessment. These are deposited to the Panda Buffer Pool. In this case no deduction is made from the Project itself (*BUF* = 0), but an equal number of PS Credits are set aside to mitigate reversals.

This option is intended to provide flexibility for Project Proponents preferring to market all PS Credits from the AFOLU Project Activity itself. Through adherence to Panda Standard requirements and approved methodologies, all PS Credits are viewed as equal and fungible, i.e. one metric tonne GHG reduction from any Project is of equal benefit to the atmosphere as any other Project; thus reversals may be mitigated through retirement of any type and vintage of PS Credit.

Note that while any past vintages of PS Credits may be used for the buffer contribution under this option, only unretired PS Credits may be used, and no future vintages may be used (since these will not exist; the PS Registry will only issue PS Credits for *ex-post* verified reductions).

7.4. Management of the Panda Buffer Pool

In the case of a reversal, whether unintentional or intentional, the magnitude of the reversal must be quantified at the Project Proponent's expense. A corresponding number of PS Credits will be retired by the PS Secretariat from the Panda Buffer Pool. Following the reversal, Project risk must be reassessed.

In the case of unintentional reversals, PS Credits are retired on a 1:1 basis. If reversals exceed the Project Proponent's buffer contributions to date, net of refunds and earlier retirements, the difference is made up through the pooled contributions of other Projects.

In the case of intentional reversals, the Project Proponent must replace all PS Credits issued up to the time of the intentional reversal for the portion of the Project that intentionally reverses. This replacement is also on a 1:1 basis. The PS Credits surrendered to replace intentional reversals are

credited to the Panda Buffer Pool, in replacement of the retired credits corresponding to these reversals.

Over time as a Project continues, and is monitored and verified at regular intervals, in the event of no reversals the PS Secretariat will refund earlier buffer contributions at the rate of 10% for each five-year interval with no reversal. This is a refund of cumulative buffer contributions, net of any buffer retirements or prior refunds.

At the end of the Crediting Period, if the Project Proponent elects not to continue monitoring and verifying and not to renew for another Crediting Period, the PS Secretariat will assume the Project Activity has ended and will retain in the Panda Buffer Pool any remaining buffer contributions that have not already been retired or refunded.

Annex: Definitions

Additional

GHG reductions and removals are additional if they exceed those that would have occurred in the business-as-usual scenario and without carbon market incentives, as demonstrated either through application of a "three-prong test" (activity complies with applicable regulations, exceeds common practice, and faces implementation barrier(s)); or alternately, by showing the activity complies with applicable regulations and exceeds a performance standard as defined in a PS-AFOLU Methodology.

Agriculture, Forestry and Other Land Use (AFOLU)

A broad category of Panda Standard-eligible Project Activities that reduce GHG emissions and/or enhance GHG removals through changes in agriculture, forestry and land-use practices. AFOLU activities may reduce GHG emissions, enhance GHG removals, or both.

Assurance

Assurance refers to the degree of confidence a Verifier provides that the GHG emission reductions and removal enhancements claimed in a GHG assertion are materially correct. The Panda Standard Secretariat requires the Verifier to provide a reasonable (as opposed to absolute or limited) level of assurance that the GHG assertion is free of material misstatement and provides a true and fair representation of the Project's net GHG emission reductions/removal enhancements.[20]

Baseline Scenario

The scenario that reasonably represents GHG emissions and removals that would occur in the absence of the proposed Project Activity. It is the long-term projection of the land management activities that would have occurred within the Project boundaries in the absence of the proposed Project Activity and the net GHG emissions resulting from such land management activities.

Baseline Agent

The specific and known entity or type/class of entity responsible for determining and implementing land management practices within the Project Boundary in the Baseline scenario.

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[20] See ISO 14064 Part 3 (International Standards Organization (ISO) 14064-3:2006(E) - Greenhouse gases — Part 3: Specification with guidance for the Validation and Verification of greenhouse gas assertions.)

Carbon Pool

A reservoir of carbon that has the potential to accumulate or lose carbon over time.

Carbon Stocks

The measured, estimated or modeled quantity of carbon held in a particular Carbon Pool. Quantifying GHG emissions and removals for terrestrial carbon offset Projects involves estimating, for the Baseline and Project scenarios, changes over time in carbon stocks in relevant pools.

Conservative

An assumption, approach, parameter, or selection/exclusion of a particular Carbon Pool or emission source is conservative if this choice would tend to underestimate the final calculation of Net Emission Reductions.

Crediting Period

The period for which reductions by sources or net anthropogenic GHG removals by sinks are verified by an independent third party for the purpose of issuance of Panda Standard Credits. A crediting period shall not extend beyond the operational lifetime of the Panda Standard Project Activity. Under the PS-AFOLU Sectoral Specification the Crediting Period may not exceed the period of Baseline validity. Crediting Period can be renewed with a full Validation each time.

Crediting Period Start Date

The day that the new land management regime was instituted. When a Project's Crediting Period is renewed, the start of the new Crediting Period is the date on which the previous Crediting Period ended.

De minimis

Following ISO 14064 Part 2,[21] Project Proponents shall include in Baseline and Project accounting all significant GHG sources and sinks, i.e. all those that exceed an appropriate *de minimis* threshold. Project Proponents may omit any Carbon Pool or emission source whose exclusion is conservative, i.e. the exclusion of which will tend to underestimate emission reductions/removal enhancements. If exclusion of a pool or source is not conservative, the pool or source may be excluded only if it is determined to be

[21] International Standards Organization (ISO) 14064-2:2006(E) - Greenhouse gases — Part 2: Specification with guidance at the Project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

insignificant using appropriate approved tools for significance testing[22] AND all combined pools and sources thus excluded represent less than 3% of the *ex ante* calculation of emission reductions/removal enhancements for a given Project Activity. The Panda Standard *de minimis* threshold is thus 3% of the *ex ante* calculation of net emission reductions/removal enhancements for each Project Activity over the Project Crediting Period.

Greenhouse Gas (GHG)

Any gaseous compound that absorbs infrared radiation in the atmosphere and contributes to the warming of the atmosphere. The primary GHGs regulated under the Kyoto Protocol are carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The Intergovernmental Panel on Climate Change (IPCC) lists, and periodically updates, GHGs in its assessment reports. See for example the IPCC *Fourth Assessment Report* (AR4), Working Group 1, Chapter 2, Table 2.14.[23]

Global Warming Potential (GWP)

A relative scale translating the global warming impact of any GHG into its CO_2 equivalent over the same timeframe. The Intergovernmental Panel on Climate Change periodically updates its GWP factors for GHGs based on the most recent science. The Panda Standard Secretariat requires Project Proponents to calculate GHG reductions and removals based on the 2nd Assessment Report (SAR-100) GWPs included in the IPCC *Fourth Assessment Report* (AR4), Working Group 1, Chapter 2, Table 2.14.[24]

Leakage

A net change in anthropogenic emissions by sources of GHGs which occurs outside the Project Boundary, and which is measurable and attributable to the Panda Standard Project Activity.

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[22] E.g. the CDM "Tool for Testing Significance of GHG Emissions in A/R CDM Project Activities," at http://cdm.unfccc.int/EB/031/eb31_repan16.pdf.

[23] See http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf, page 212.

[24] See page 212. The SAR 100-year values are in the fourth column from the right. Although the IPCC provides a new set of 100-year values in the second column from the right, and may again update GWP values in forthcoming assessment reports, for reasons of fungibility the SAR-100 values are generally used.

Materiality / Material Misstatement

The concept of materiality is used with regard to Verification of GHG assertions. A material misstatement is an inaccurate assertion of an offset Project's GHG emission reductions/removals, which may reasonably be expected to influence decisions or actions taken by the users of GHG Project information. Errors, omissions, and misstatements are considered material if they exceed a defined threshold. The Panda Standard materiality threshold is ±5%, applied to the final estimate of GHG emission reductions and removal enhancements. Individual or aggregation of errors or omissions greater than this threshold require re-stating before the Panda Standard Secretariat will accept a Verification Statement and issue Panda Standard Credits.

Measurable

GHG emissions reduced at a source or removed by sequestration must be quantifiable against an identifiable Baseline.

Net Emission Reductions/Removals

The total GHG emission reductions and removals created by a Project Activity (Project net of Baseline) minus required deductions for Leakage and uncertainty. Panda Standard Credits are equal to verified *ex post* Net Emission Reductions, with a further deduction for the Project's contribution to the Panda Buffer Pool based on assessed risk of reversals.

Offset Title

A legal term representing rights and interests in an offset, a future stream of offsets, or a Project delivering offsets. While ownership or lease arrangements on the lands on which a PS-AFOLU Project Activity takes place may vary, the Project Proponent must be able to demonstrate undisputed Title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past. Title to offsets shall be clear, unique, and uncontested.

Panda Buffer Pool

Reserve mechanism allowing for the issuance of permanent credits to Projects subject to the risk of reversal. The Panda Buffer Pool consists of a reserve of credits set aside after a risk assessment, which shall be retired in case of reversal in order to ensure the permanence of the credits generated by Projects.

Panda Standard Credit

Carbon credit generated by a Project over the period of time it is registered under the Panda Standard. One Panda Standard Credit represents one metric tonne of CO_2e. The Panda Standard Secretariat will only issue Panda Standard Credits for verified *ex post* GHG emission reductions and removals, with deductions as required for uncertainty, Leakage, and reversal risk mitigation.

PS-AFOLU Project

One or more PS-AFOLU Project Activities generating Panda Standard Credits and accounted for under one Project Form.

PS-AFOLU Project Activity

A defined action, or set of actions, to reduce GHG emissions and/or enhance GHG removals within a defined Project, for the purpose of Validating, Registering, and Verifying the resulting GHG emission reductions and/or removal enhancements on the Panda Standard Registry.

PS-AFOLU Methodology

A methodology approved by the Panda Standard Technical Committee through the process detailed in the *Panda Standard v1.0*. A PS-AFOLU Methodology is a systematic explanation of how a Project Proponent established the Project Baseline scenario(s), and estimates and monitors emissions reductions or removals resulting from a Project Activity by following scientific good practice.

PS-AFOLU Tool

A tool approved by the Panda Standard Technical Committee through the process detailed in the *Panda Standard v1.0*. An approved component of a Methodology (i.e., a stand-alone methodological module to perform a specific task) or a calculation tool (i.e., spreadsheets or software that perform calculation tasks) that a Project Proponent uses to quantify net GHG reductions/removals or meet other Panda Standard requirements.

Performance Standard

Approach to additionality and Baseline-setting that requires Projects to achieve a level of performance that, with respect to emission reductions or removals, or technologies or practices, is significantly better than average compared with similar recently undertaken practices or activities in a relevant geographic

area.[25] Performance standards take various forms, including practice-based, technology tests, and emission rate benchmarks.

Permanent

GHG emission reductions and removals are permanent if they have no risk of future reversal. A PS-AFOLU Project Activity must create permanent GHG reductions through emissions reduced at sources or removed by sequestration. Reversal risks inherent in certain Project activities must be identified, assessed, and mitigated such that these reductions are made effectively permanent and fungible with Project activities that have no reversal risk and with emission reductions that occur at emitting facilities or in other sectors.

Project Form (PF)

A document that describes the Project Activity, satisfies Panda Standard eligibility requirements, identifies sources and sinks of GHG emissions, establishes Project Boundaries, describes the Baseline scenario, applies a PS-AFOLU Methodology approved by the Panda Standard Technical Committee to quantify the Baseline and with-Project scenarios, and provides details on the Project's monitoring, reporting and Verification procedures.

Project Proponent

The entity that undertakes, develops, and/or owns a Project. The Project Proponent holds the Offset Title to all potential future credits produced by the Project, and holds all Verified PS Credits until the credit title is transferred to a buyer. The Project Proponent is responsible for the Project continuance, monitoring and Verification over the Project Crediting Period. More than one entity can be included as the Project Proponent.

Project Start Date

The date by which the Project Proponent began the Project Activity on Project lands.

[25] Definition based on U.S. Environmental Protection Agency Climate Leaders program http://www.epa.gov/stateply/resources/optional-module.html.

Project Term/Lifetime

The finite length of time for which a Project can generate PS credits for registration. The Project Term initiates at the first Crediting Period Start date. More than one crediting period can take place within a Project Term.

Real

Project Activities must lead to quantifiable and verifiable GHG emissions reductions or removals. These shall only generate Panda Standard Credits after they have occurred (*ex post* as opposed to *ex ante*).

Reduction

A verified decrease in GHG emissions caused by Project Activities, as measured against an appropriate forward-looking estimate of Baseline emissions for the Project.

Removal

A verified increase in carbon stocks caused by Project Activities, as measured against an appropriate forward-looking estimate of Baseline carbon stocks for the Project.

Registration

The formal acceptance by the Panda Standard Secretariat of a validated Project Activity as a Panda Standard Project Activity. Registration is the prerequisite for the Verification, certification and issuance of Panda Standard Credits related to that Project Activity.

Third Party Auditor

Third Party Auditors are domestic or international legal entities approved by the Panda Standard Secretariat to perform Validation and/or Verification. Third Party Auditors accredited as “Designated Operational Entities” by the Clean Development Mechanism Executive Board are presumptively approved to perform both Validation and Verification, which may occur at the same time. Third Party Auditors accredited and designated as “Local Verifiers” by the Panda Standard Secretariat are only allowed to perform Verification operations.

Uncertainty Deduction

The deduction from calculated Net Emission Reductions required if precision of ±10% of the mean at 90% confidence is not achieved in the final net emission reduction/removal estimates. Precision is calculated across the entire Project and not within a Carbon Pool, stratum, or Project Activity.

Unique

The emissions reduced or removed by the Project Activities must not be double-counted. To prevent double-counting, serialized Panda Standard Credits will be issued by the Panda Standard Registry. In addition, if the Project is enrolled in another GHG program, emissions reductions/removals verified under the Panda Standard must not be used to generate other types of carbon credits.

Validation

The process of independent evaluation of a Project Activity by a UNFCCC Designated Operational Entity against the requirements of the Panda Standard.

Validator

A Third Party Auditor approved by the Panda Standard Secretariat to perform Validation. Currently only CDM Designated Operational Entities are approved to perform Validation. All PS approved Verifiers can only perform Verifications if they have been accredited in this Sectoral Scope.

Verification

The periodic independent review and *ex post* determination by a UNFCCC Designated Operational Entity or Local Verifier of GHG anthropogenic emissions reductions or removals that have occurred as a result of a registered Panda Standard Project Activity during the Verification period.

Verifier

A Third Party Auditor approved by the Panda Standard Secretariat to perform Verification. CDM Designated Operational Entities are presumptively approved, and additional "Local Verifiers" accredited by the Panda Standard Secretariat are also approved, to perform Verification. All PS approved Verifiers can only perform Verifications if they have been accredited in this Sectoral Scope.