

AN OVERVIEW OF THE URBAN FORESTRY CARBON MARKETPLACE

Table of Contents

INTRODUCTION	2
SECTION 1: PROTOCOL REQUIREMENTS.....	2
SECTION 2: COMPARISON BETWEEN PROTOCOLS	5
SECTION 3: DECISION KEY FOR CARBON PROJECT DEVELOPERS AND CARBON CREDIT BUYERS.....	9

INTRODUCTION

This report provides an overview of carbon offset protocols that focus on urban forestry, specifically the CAR urban tree planting protocol, Forterra Evergreen Carbon Capture Program, City Forest Credits Protocol and the Duke Carbon Offset Initiative (DCOI) Urban Forestry Protocol. Urban tree planting projects are gaining popularity in voluntary carbon markets due to high project visibility and multiple environmental benefits brought about by urban trees. Tools, such as i-Tree, help quantify carbon sequestration to be sold as carbon offset credits. Purchasing carbon offset credits allows companies to demonstrate their commitment to reduce net carbon emissions as part of their corporate social responsibility (CSR) mission.

Each of the existing urban forestry protocols has different requirements, limitations and compatibility, and this report aims to provide carbon project developers and carbon buyers a clear comparison between different protocols. Depending on your objectives, you might find certain protocols more suitable for your needs as a project developer, or certain types of carbon credits may appeal more to you as a carbon credit buyer.

Section 1 below provides general introduction and requirements of each urban forestry protocol, which is followed by direct comparison between four protocols in Section 2. Finally, Section 3 provides a decision key for carbon project developers and carbon credit buyers to select urban forestry protocols or carbon credits that best align with their needs.

Section 1: Protocol Requirements

The four protocols discussed in this review are similar in that they require fulfillment of PAVER (Permanence, Additional, Verified, Enforceable and Real) criteria. Specific details are provided in each subsection:

(a) CAR Urban Tree Planting Protocol

Introduction: CAR provides two urban tree-related protocols, namely CAR Urban Tree Planting Protocol and Urban Forest Management protocol. The Urban Tree Planting Protocol was first launched on Aug 12, 2008 and the latest version was released on June 25, 2014 alongside the pilot version of Urban Forest Management Protocol which tracks canopy cover changes. Both protocols provide guidance for quantifying and verifying greenhouse gas (GHG) reductions from urban tree planting.

Eligibility criteria: The project has to fall within an urban area with no timber commercial harvesting in the past 10 years, meet additionality criteria, demonstrate social and environmental co-benefits and commit to monitoring, reporting and verification activities for 100 years following last credit issued to project. The project also has to be submitted to CAR within six months after project commencement.

¹ <http://www.climateactionreserve.org/how/protocols/urban-forest/>

² <http://www.climateactionreserve.org/wp->

Quantification method: The CAR Urban Tree Planting protocol requires projects to estimate the baseline for onsite carbon stocks and determine the project's actual onsite carbon stocks annually. The project's primary effect is calculated by taking the difference between actual onsite carbon stock for the current and previous year, following subtraction of the difference between baseline for current and previous year. More detailed descriptions can be found in the CAR Urban Tree Planting Quantification Guidance document.

(b) Forterra Evergreen Carbon Capture Program

Introduction: Forterra launched Evergreen Carbon Capture Program in 2012 to help companies, organizations and individuals address threats of climate change by planting trees in the Puget Sound region in Washington state. Provided the field partner and planting location fulfill eligibility requirements, the program will supply free tree seedlings to field partners for planting. The species Forterra provided in 2018 included Douglas fir, grand fir, western redcedar and western hemlock.

Eligibility criteria: The field partner has to be a nonprofit organization that plants trees on private or public land and has volunteer stewards as well as city, county and state land managers. If the field partner is not the landowner, they have to obtain permission from the landowner to conduct tree plantings on site. The restoration site needs to be protected in perpetuity, have a vegetation or restoration management plan, be enrolled in active management, restoration and monitoring efforts, and have less than 40% slope.

Quantification method: The protocol provides 1 tree for every 5 tons of carbon to be sequestered. It uses the Center for Urban Forest Research (CUFR) Tree Carbon Calculator to quantify carbon, and the program assumes 50% survival rate of tree seedlings planted plus a 30% contingency rate to account for variations among planting sites.

(c) City Forest Credits (CFC) Protocol

Introduction: City Forest Credit is a non-profit based in Seattle with the mission of bringing the wide range of environmental benefits of trees to the cities and towns of America. CFC released their first urban tree planting protocol in April 2018 but is currently undergoing review to release a more updated tree planting protocol as of December 2018. Each CFC Carbon+ credit includes 1 ton of sequestered carbon and some rainfall interception, air quality benefits and energy savings.

Eligibility criteria: The project has to be located in an urban area, and the project operator needs to own the land, hold an easement or obtain agreement from the landowner to own

content/uploads/2014/07/Urban_Tree_Planting_Project_Protocol_V2.0.pdf

³ <https://forterra.org/service/evergreen-carbon-capture>

⁴ https://forterra.org/wp-content/uploads/2018/08/Field-Partner-Request-for-Trees_2018_Final.pdf

⁵ <https://forterra.org/subpage/ecc-carbon-science>

⁶ <https://www.cityforestcredits.org/who-we-are/>

⁷ <https://www.cityforestcredits.org/protocols/>

⁸ <https://www.cityforestcredits.org/carbon-credits>

carbon credits and associated environmental benefits on the land. The project operator also has to sign a Project Implementation Agreement (PIA) with the CFC registry.

Quantification method: The protocol allows project operators to choose from a single tree method or canopy method to quantify carbon dioxide stored in project trees. The single tree method tracks and samples individual trees, while the canopy method tracks changes in project overall tree canopy area using data and the i-Tree tool. A more detailed description can be found on City Forest Credits Protocol Appendix B: Quantification Methods for Tree Planting Projects.

(d) Duke Carbon Offset Initiative (DCOI) Urban Forestry Protocol

Introduction: DCOI is delegated by Duke University to assist the university in achieving carbon neutrality by 2024. DCOI has participated in multiple types of carbon offset projects since 2007, and in 2015, DCOI developed their own urban forestry protocol and founded a peer verification network, which allows universities to peer verify each other's carbon offset projects to reduce up to 30% of Scope 3 emissions. The DCOI Urban Forestry Protocol is the only protocol in this overview to allow both third party verification and peer verification. Credits generated from peer verification are nonmarketable; they are only eligible for internal consumption (retiring or banking) and no reselling of credits is allowed. If third-party verification is conducted, the credits will be marketable.

Eligibility criteria: The project has to fall within an urban area, meet additionality criteria and reduce or remove greenhouse gas above legal requirements. The project also has to commit to at least 20 years and be approved by DCOI within six months after project commencement.

Quantification method: The protocol recommends i-Tree to quantify urban tree carbon benefits. If the proposed planting scheme resembles forest stand plantation, the protocol recommends using US Forest Service Forest Vegetation Simulator (FVS) to estimate stand carbon. The protocol reserves 16% buffer to account for tree mortality and other risks.

⁹ <https://www.cityforestcredits.org/s/App-B-Quantification-Methods-for-Planting-Projs-0417.pdf>

¹⁰ https://sustainability.duke.edu/sites/default/files/UrbanForestryProtocol_v2.2.pdf

¹¹ <https://secondnature.org/webinars/peer-reviewed-innovative-carbon-offsets/>

Section 2: Comparison between Protocols

The table below summarizes major differences between current urban forestry protocols:

	CAR Urban Tree Planting Protocol v2.0	Forterra Evergreen Carbon Capture Program	City Forest Credits Tree Planting Protocol v5 (Apr 2018)	Duke Carbon Offset Initiative (DCOI) Urban Forestry Protocol v2.2
Issuance of Carbon Credits	Yes	No, certifications and acknowledgements are provided instead	Yes	Yes
Usage of issued carbon credits	To be listed on CAR registry; Marketable	N/A, the program provides trees for planting to offset organization's carbon footprint. Quantity of trees depends on organization's climate mitigation goals.	To be listed on CFC registry; Marketable	If third party verification is used: Credits are marketable If peer verification is used: For institution's internal consumption or credit banking only; Nonmarketable. Typically listed on Offset Network registry.
Targeted project developers	Any organizations that meet protocol requirements	Any organization that has access to land for tree planting and meets protocol requirements	Any organizations that meet protocol requirements	Typically educational institutions, but other entities could be considered if the project reinforces an academic mission and community benefits.

Targeted credit buyers	Any entity that desires to offset carbon footprint	Any entity that has access to land for tree planting and	Any entity that desires to offset carbon footprint	If third party verification is used: Any entity that
		desires to offset carbon footprint		desires to offset carbon footprint. If peer verification is used: Typically educational institutions that desires to offset Scope 3 emissions, but other entities can be allowed
Emission Scope addressed	Scope 1, 2 and 3	N. A.	Scope 1, 2 and 3	If third party verification is used: Scope 1, 2 and 3 If peer verification is used: up to 30% of Scope 3

Verification requirement	Verifier must be accredited by ISO 14065 and understand ISO 140643:2006 standards. Verifiers must also be approved by CAR to carry out urban forestry verification	Not applicable. Instead, the program will ensure that tree survivorship meets 50% in the first three years of the program	CFC will conduct verification adhering to ISO 14064-3:2006 standards.	If third-party verifier is used: Verifiers must be accredited to ISO 14065 and understand ISO 14064-3 standards. If peer verification is used: Verifiers will be conducted by offset network peer verifiers, and the verification report will be reviewed by the Offset Network
Pros	- Rigorous procedures provide very thorough accounting for	- Relative ease of applying and minimum monitoring effort needed	- Relative ease of applying - CFC will guarantee any credit	- Relative ease of applying - Allows flexibility of verification methods

	PAVER* requirements - Credits can be traded or retired as needed	- Conservative quantification method that provides ample buffer and prevents overestimating carbon benefits	performance up until 2020 - Credits are bundled with other environmental benefits and can be traded or retired as needed	- Peer verification option significantly reduces verification cost for project developers
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<p>Cons</p>	<ul style="list-style-type: none"> - Challenges in calculating carbon baseline for a project site (see Comments) - High commitment needed for monitoring and long-term implementation 	<ul style="list-style-type: none"> - Organizations who wish to obtain Forterra certificates must be able to secure land and take part in tree plantings - Not suitable for organizations that specifically seek credits (see Comments) 	<ul style="list-style-type: none"> - Allow issuance of forward credit, which may result in the sold environmental benefits exceeding actual environmental benefits. - Potential verification issues (see Comments) - Uncertainty of future registry effort in securing credit performance (see Comments) 	<ul style="list-style-type: none"> - Allow issuance of forward credit, which may result in the sold environmental benefits exceeding actual environmental benefits. - Limited usage of peer-verified credits - Potential verification issues (see Comments)
<p>Other Comments</p>	<p>CAR quantification method is relatively complex and inventory data can be difficult to obtain for the whole city for baseline calculation. The technical barrier can be a deterring factor for project developers to adopt CAR protocol.</p>	<p>Simple and straightforward project with conservative carbon quantification. But as the program does not issue credits, it could impose challenges for corporate carbon accounting, such as uncertainty in scope of emissions addressed by tree planting.</p>	<p>The organization is still very new, and many project details are not yet revealed (e.g. mechanisms to protect credit reversal beyond 2020, exact breakdown of Carbon+ credit accompanying environmental benefits, etc). It is also unusual that CFC is verifying the project by itself (Note how CAR, as a non-</p>	<p>As the peer verification network is in its early stages, there could be logistical challenges such as finding peer verifier volunteers and ensuring the peer verifiers understand the framework and conduct verification in a proficient manner.</p>

			<p>profit, does not carry out verification on its own). Although CFC is a nonprofit, given the marketability of the credits, it is more prudent to engage external verifiers instead of employing their own verification officials to prevent potential conflict of interests. There is also no mention on whether the registry was accredited by ISO 14065, the ISO standards specifying requirements for entities conducting verification.</p>	
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*PAVER: PAVER stands for “Permanence, Additional, Verified, Enforceable, Real” and these are the basic requirements for carbon offset projects

Section 3: Decision Key for Carbon Project Developers and Carbon Credit Buyers

Carbon Credit Buyer

As a carbon credit buyer, you can follow the questions below to find out what type of credits will suit your needs.

1. Is it acceptable for you to receive a certificate with no carbon credits issued?
 - a. Yes – to 2
 - b. No – to 3
2. Would you be willing to plant your own trees? If yes, do you have land which will be preserved in perpetuity and allows tree planting? If the land is not yours, did you receive landowner’s permission to plant trees?
 - a. Yes to all three questions – Forterra Evergreen Carbon Capture Program

- b. No to any of the questions – to 3
- 3. Do you require the credits to be verified by ISO-accredited bodies?
 - a. Yes – CAR Urban Forestry Protocol, DCOI Urban Forestry Protocol (Thirdparty verification)
 - b. No – CFC Protocol*, DCOI Urban Forestry Protocol (Peer verification)**

* This result is based on current knowledge that it is unknown whether CFC Protocol is accredited by ISO 14065

** If peer verification was conducted, the credits purchased can only offset up to 30% of Scope 3 emissions.

Carbon Project Developer

As a carbon project developer, you can follow the questions below to find out what type of urban forestry project will suit your project needs. Do note that as the structure of the project changes, the chain of custody and owner of carbon credits might become more complex and require consultation with the protocol developers and registries.

1. Is it acceptable for you to receive a certificate with no carbon credits issued?
 - a. Yes – to 2
 - b. No – to 3
2. Would you be willing to plant your own trees? If yes, do you own land which will be preserved in perpetuity and allows tree planting? If the land is not yours, did you receive landowner’s permission to plant trees and own the carbon associated with trees?
 - a. Yes to all three questions – Forterra Evergreen Carbon Capture Program
 - b. No to any of the questions – to 3
3. Do you intend to implement rigorous project methods, such as calculating project baseline based on taking inventory and tracking primary effects, and follow through 100 years of monitoring effort?
 - a. Yes – CAR Urban Forestry Protocol
 - b. No – to 4
4. Do you intend to carry out peer verification with other academic institutions?
 - a. Yes – DCOI Urban Forestry Protocol (Peer Verification)
 - b. No – CFC Protocol, DCOI Urban Forestry Protocol (Third-party verification)