December 2012

FINANCING RESIDENTIAL ENERGY EFFICIENCY WITH CARBON OFFSETS

Guidance for Project Developers & Investors

PURPOSE AND USERS

Financing Residential Energy Efficiency with Carbon Offsets was created to help weatherization programs evaluate whether and how they can benefit from selling independently verified Residential Offsets. Residential Offsets is a term used by this Guide to describe the carbon credits that result from emission reductions certified under the Verified Carbon Standard (VCS) methodology VM0008.* Weatherization programs are often operated by utilities, housing finance authorities, housing owners and associations, community-based non-profit organizations, and government agencies.

In addition to weatherization programs, policymakers may also find this Guide useful to understand Residential Offset projects. Policymakers commonly include advocacy groups, regulators, government agencies, and others concerned with the operation of carbon offset protocols and emission reduction programs.

Due to the complexity of Residential Offset projects as well as periodic changes to VCS rules, this guide cannot provide a complete breakdown of the project development process. Users should consult **www.v-c-s.org**, the Verified Carbon Standard website, for relevant and up-to-date methodologies, standards, and guidance. A financial calculator to help understand revenues and costs of a Residential Offset project is available at **www.mainehousing.org/carbon.** Expert advice should be solicited before making any decisions relating to Residential Offsets.

DOCUMENT LAYOUT

This guide is organized into 5 sections to enhance usability:

- Executive Summary (pp 8–12)
- Book 1 – Carbon Market Background (pp 13–18)
- Book 2 – Carbon Accounting Theory (pp 19–25)
- Book 3 – Residential Offset Guide (pp 26–47)
- References (pp 48–51)

**Residential offsets is not a term officially accepted by the VCS.*

AUTHORS

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DISCLAIMER

Financing Residential Energy Efficiency with Carbon Offsets and related materials reflect the views and experience of the contributing authors only. The information provided does not constitute or substitute for financial, technical, legal, or any other type of advice, and neither the Maine State Housing Authority nor any of the contributing authors can be held liable for any mistakes or inaccuracies contained herein. Expert advice should be sought prior to any energy efficiency or carbon offset activities.

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ABOUT THIS DOCUMENT

MaineHousing operates a number of weatherization programs that improve energy efficiency in existing residential buildings. These weatherization programs are important to help Maine families keep their homes safe and warm through the winter.

Unfortunately, the needs of many Maine families go unmet due to low weatherization program funding levels. In response, MaineHousing launched the Carbon Quantification Project (CQP) in 2008. The CQP was a pilot project to supplement weatherization funding with carbon financing. MaineHousing, which was the first to attempt a project of this kind, found support for its pilot project from a number of funders and partners as shown in Figure 1.

In March 2012, MaineHousing reached a significant milestone in the pilot project when it sold carbon offsets to Chevrolet. While it took MaineHousing almost five years to secure carbon financing, the CQP created two tools that may enable other weatherization programs to access carbon financing in roughly one year.

The first tool, constructed from January 2008 through December 2010, is a methodology to create Residential Offsets that are independently verified to an internationally-recognized Standard. The methodology, *Weatherization of Single Family and Multi-Family Dwellings*, is available for download from the Verified Carbon Standard website (**www.v-c-s.org**) and is applicable to a wide variety of residential energy efficiency programs.

The second tool, published in December 2012, is *Financing Residential Energy Efficiency with Carbon Offsets* and the complementary financial calculator. This Guide has been produced to help weatherization programs evaluate whether and how they can benefit from selling Residential Offsets. It provides information to help weatherization programs access carbon financing in a shorter timeframe and at a lower cost than heretofore possible. It does not address weatherization management, database systems, or other core operations; instead, it speaks only to those incremental activities required to access carbon finance.

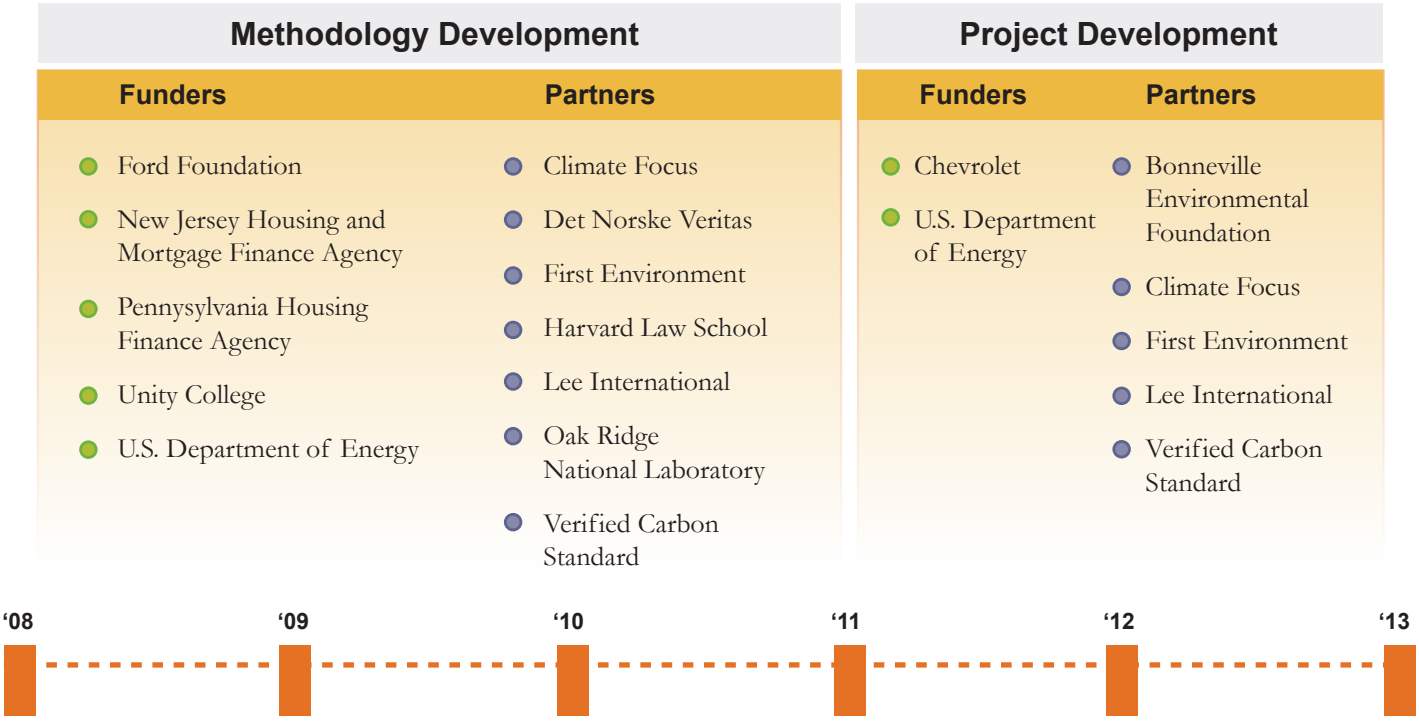

Figure 1: Carbon Quantification Project Timeline

It took MaineHousing almost five years to access carbon finance, although two tools created by the agency and its supporters may allow other weatherization programs to access carbon finance in roughly one year.

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INTRODUCTION

Residential energy usage makes up 32% of total energy consumption in the United States, accounting for 1.27 billion metric tons of Carbon Dioxide equivalent emissions annually. Studies suggest that cost-effective energy efficiency programs could unlock savings of around 27% of U.S. residential energy consumption by 2020[1]. This represents an enormous opportunity for weatherization activities to improve energy affordability, stimulate economic activity, and mitigate climate change.

One of the barriers limiting investment in energy efficiency upgrades is the large amount of required upfront capital and prolonged returns on investment. Utilities, housing finance authorities, housing owners and associations, community-based nonprofit organizations, and government agencies have helped overcome barriers by creating weatherization programs that offer financing and other related assistance. While weatherization programs have proved to be successful in many regions across the country, innovations are still needed to fully realize cost-effective savings. This document, *Financing Residential Energy Efficiency with Carbon Offsets*, explains how carbon finance can be used to complement weatherization program financing. Essentially, carbon finance relies on the generation and sale of carbon offsets that result from energy efficiency upgrades, as shown in Figure 2.

CARBON FINANCE

The World Bank describes carbon finance as financial resources leveraged to purchase carbon offsets[2]. Carbon offsets are 'created' when activities reduce the amount of Carbon Dioxide and other greenhouse gas (GHG) emissions that would have normally been released into the atmosphere. The reductions can, with proper rules and oversight, be counted and sold as carbon offsets on carbon markets, providing an additional revenue stream for GHG reducing activities. In this Guide, carbon offsets created from residential energy efficiency activities are called Residential Offsets.

In 2012, MaineHousing sold over 7,000 Residential Offsets to Chevrolet, the U.S. auto company, which was making investments in domestic carbon offset projects. This unprecedented transaction proved that carbon financing could be used to supplement weatherization capital investment.

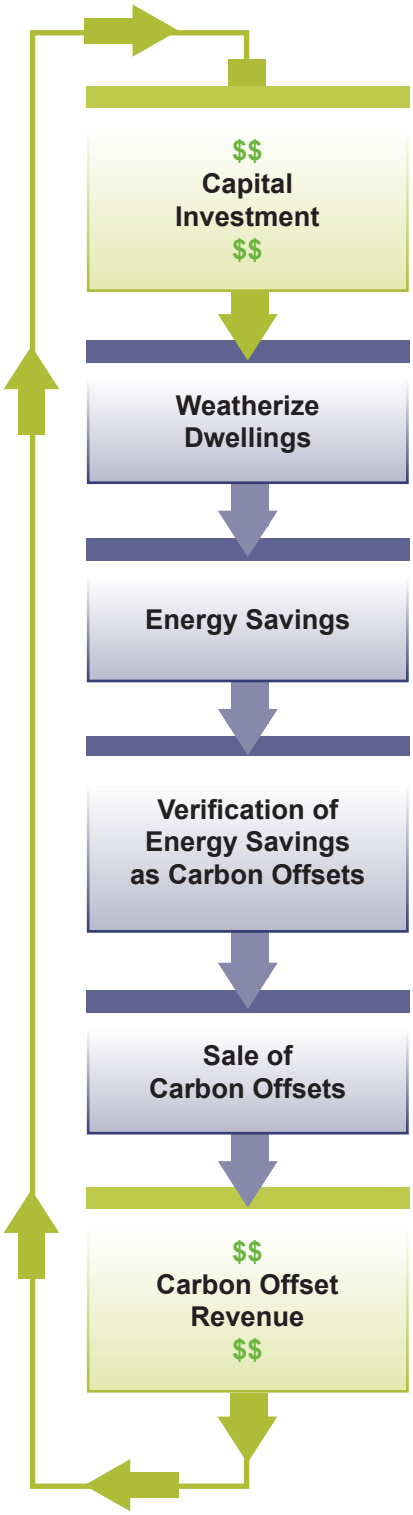

Figure 2: Residential Offset Financing Model

[1] *McKinsey & Company (2009). Unlocking Energy Efficiency in the U.S. Economy.*
[2] *World Bank (2012). State and Trends of the Carbon Market Report 2012.*

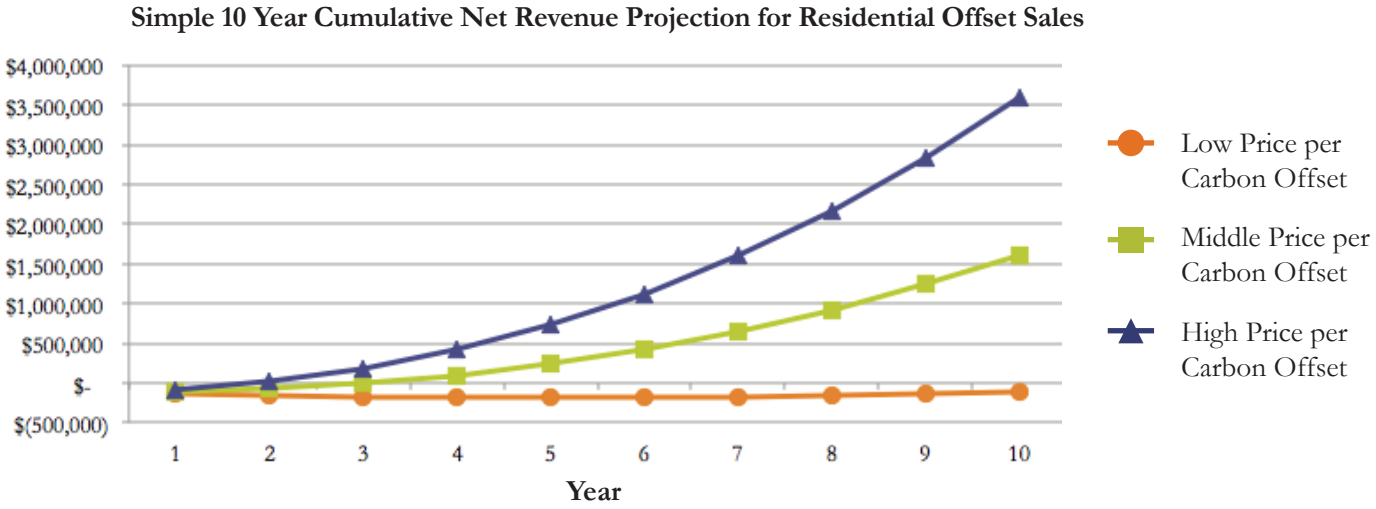

Figure 3: Simple 10 Year Net Revenue Projection for Residential Offset Sales

The net revenue curve was created using the financial calculator which complements this Guide. Projections are based on an example case, although actual costs and will vary. The following assumptions were made in this example:

Cost assumptions: *year one upfront costs of $120,000, annual recurring costs of $25,000, and no project partners (the project is implemented unilaterally and there is no cost-sharing).*

Revenue assumptions: *weatherization of 1,000 dwellings per year, with each dwelling generating two metric tons Carbon Dioxide equivalent (mtCO2e) emission reductions annually, equal to two Residential Offsets. The low, middle, and high carbon prices per Residential Offset are assumed to be $2, $15, and $30, respectively. The reduction of 2 mtCO2e roughly equals savings from the reduction of 300 – 400 therms of natural gas or 2,000-4,000 kWh of non-renewable electricity.*

Discounting assumptions: *because this is a 'simple' 10 year projection, there is no discount rate and no rate of change for carbon offset prices.*

BENEFITS OF CARBON FINANCING FOR WEATHERIZATION PROGRAMS

A weatherization program might seek to utilize carbon finance for the following reasons:

Generation of Carbon Financing Revenue

Once weatherized, a dwelling may generate Residential Offsets for the effective lifetime of the energy efficiency improvements installed. Therefore, annual revenues will typically increase as a program continues to weatherize additional dwellings over time. See Figure 3 above for a projection of potential costs and revenue benefits.

Proof of Positive Program Impacts

Certification of Residential Offsets requires third-party verification of weatherization program energy savings. Verification reports provide credible, independent assurance of program savings to program funders and can be used to highlight other weatherization benefits such as job creation, cost savings, and occupant comfort.

Improvement in Program Management

In order to verify that Residential Offset savings have occurred, a weatherization program must comprehensively and transparently track the weatherization process and its outcomes. For organizations with room to improve information management systems or weatherization procedures, Residential Offsets may offer a robust framework and financial incentive to enhance program management oversight.

Organizational Capabilities and Branding

By developing Residential Offsets, weatherization programs demonstrate: the ability to attract non-traditional long-term funding sources; the capacity to plan and execute advanced projects; and organizational support of energy efficiency, climate change mitigation, job creation, and local economic growth. Weatherization programs that develop Residential Offsets may be able to leverage their unique brand and capabilities to attract non-carbon financing from internal or external sources.

Table 1: Weatherization Program Eligibility

	Generally Eligible	Generally Not Eligible
Types of energy savings	■ Electricity savings* ■ Fuel savings	
Types of buildings	■ Existing single family buildings ■ Existing multi-family buildings ■ Existing mobile homes buildings	■ New construction ■ Commercial buildings ■ Industrial buildings ■ Industrial processes
Income level of owners / occupants	■ Low-income ■ Non-low-income	
Geographic location of projects	■ Communities, regions, and states in the U.S. and internationally	
Types of weatherization measures	■ Lighting and appliances (e.g. lighting or refrigerator replacement) ■ Heating and cooling system efficiencies ■ Building envelope upgrades (e.g. insulation, air sealing)	■ Fuel switching (e.g. oil to natural gas conversion) ■ Renewable energy (e.g. solar, geothermal, biomass)

**Electricity savings may be subject to ownership issues, particularly in jurisdictions subject to cap and trade regulations*

WEATHERIZATION PROGRAM ELIGIBILITY

In order to generate tradable Residential Offsets registered by the Verified Carbon Standard (VCS), weatherization programs must conform to the methodology created by MaineHousing and publicly available from VCS. The methodology was designed for maximum flexibility so that it could be used by a diverse array of energy efficiency retrofit programs. The methodology is potentially applicable across all residential building types (single family, multifamily, and mobile home); all income classes (low income and non-low income); and all geographic locations around the world. The methodology is generally not applicable to savings from commercial or institutional buildings, fuel switching, or renewable energy projects.

Table 1, shown above, identifies some of the characteristics that suggest whether a weatherization program is eligible to sell Residential Offsets.

DEVELOPING A RESIDENTIAL OFFSET PROJECT

While the potential benefits of Residential Offset project development are large, not all weatherization programs will choose to pursue carbon financing. The two primary factors that will drive an organization's decision to invest in a Residential Offset project are, first, whether the project is eligible to create Residential Offsets according to the VCS methodology[3], and second, whether project returns would be sufficient to generate a positive financial outcome for a weatherization program.

The most likely factor to influence a weatherization program's decision to invest in a Residential Offset project is the number of expected dwelling upgrades. The weatherization of one housing unit can generate hundreds of dollars of carbon financing over the lifetime of a project; however, the process to measure and sell Residential Offsets costs tens or even hundreds of thousands of dollars. Therefore, the only financially

[3] *There are other standards that govern methodologies used for carbon offsets creation (e.g. the Clean Development Mechanism and the Gold Standard), but the VCS methodology created by MaineHousing is the first proven in practice to successfully accommodate a wide range of weatherization program activities in the U.S.*

attractive model is to aggregate carbon offsets from many different weatherization activities and to sell them under one administrative body. As a general rule of thumb, an organization independently developing a Residential Offset project would need to weatherize the equivalent of at least 1,000-2,000 units annually for a project to make financial sense. Programs that weatherize a small volume of units may find economies of scale by partnering with other weatherization programs.

The remainder of this document and the financial calculator available at **www.mainehousing.org/carbon** provide guidance to help evaluate potential Residential Offset project eligibility and financial feasibility. For organizations that choose to pursue carbon finance, additional information on the Residential Offset project development process is provided in Book 3 of this Guide.

Book 1:
Carbon Market Overview

OVERVIEW

Book 1 provides general, non-technical background on carbon offsets and carbon markets. Readers who are familiar with carbon markets may want to skip to *Book 2 – Carbon Accounting Theory* for basic technical concepts relating to carbon offsets, or *Book 3 – Residential Offset Model* for details about Residential Offset project development.

BOOK 1 CONTENTS

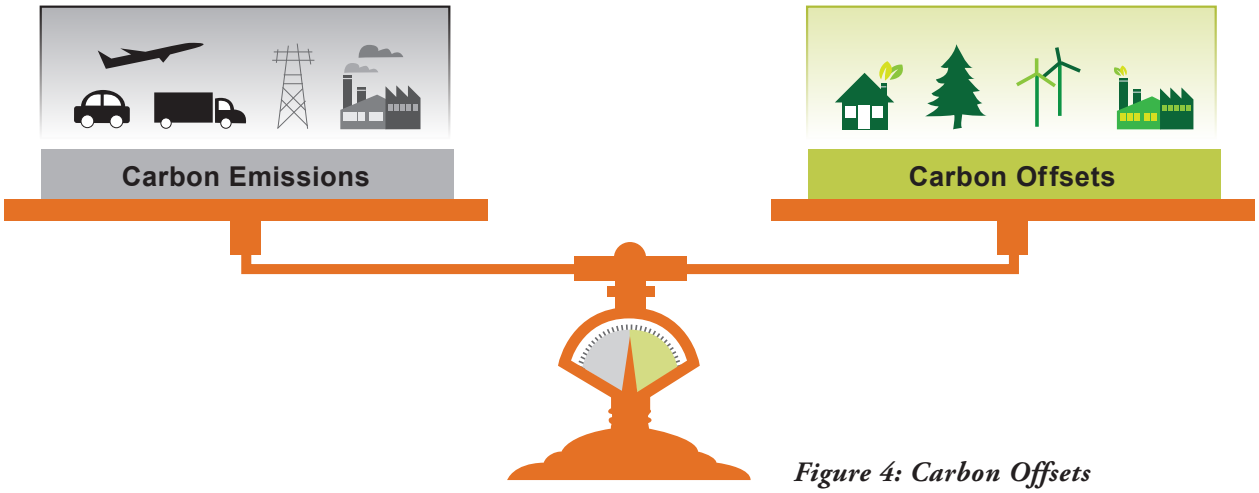

Figure 4: Carbon Offsets

CARBON OFFSETS DEFINED

Carbon offsets are generated by projects that reduce, remove, and/or destroy greenhouse gas (GHG) emissions beyond the baseline scenario – also known as the business-as-usual (BAU) scenario. Carbon offsets are measured by comparing the actual emissions of a project to the 'baseline' estimate of the emissions that would have occurred had the carbon offset project not been implemented. Each carbon offset represents one metric ton of emission reductions or removals. As shown in Figure 4 above, carbon offsets are used to counterbalance, or 'offset' the emissions of Carbon Dioxide and other GHGs from activities such as manufacturing or transportation.

In general, there are two different types of projects that can create carbon offsets: 1) GHG emission reduction projects and 2) GHG emission removal projects. Figure 5 below demonstrates how projects may be classified as either an 'emission reduction' or an 'emission removal' project. For example, a wind turbine project is classified as an emission reduction project because wind turbines generate fewer GHG emissions than other types of power plants, like coal and natural gas, that are used to generate electricity. Therefore, wind turbines avoid the burning of additional coal and natural gas that might have occurred in the BAU scenario and therefore help avoid GHG emissions. Alternatively, planting trees helps to increase the absorption of GHG emissions, which helps to remove emissions from the atmosphere relative to the BAU scenario where there were fewer trees. Both emission reduction and emission removal projects are important sources of carbon offsets.

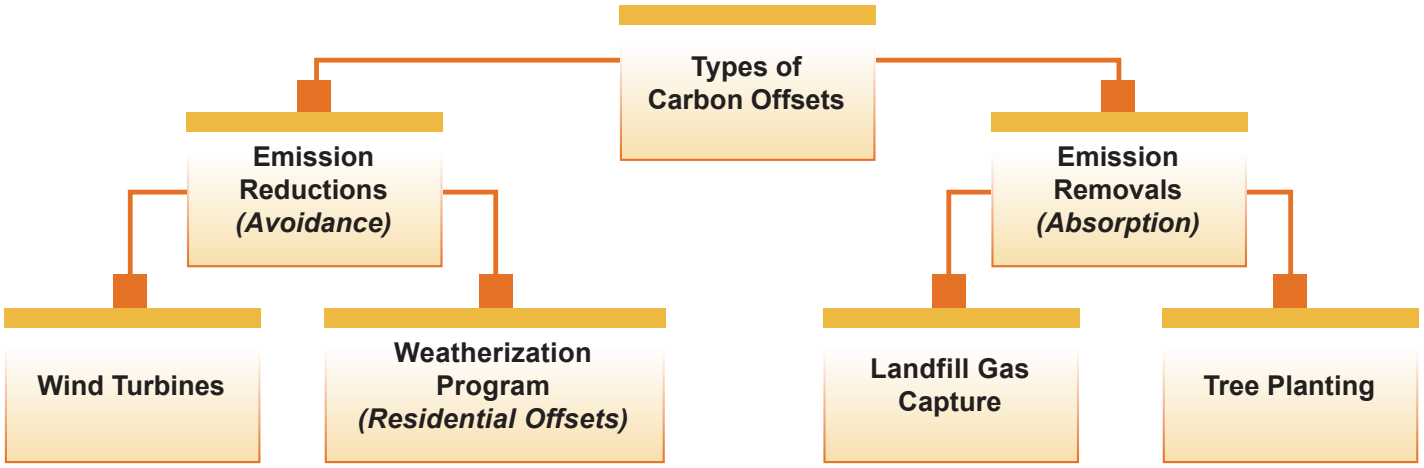

Figure 5: Examples of Carbon Offset Project Types

CARBON MARKETS

Carbon offsets are transacted in a number of ways. For example, they can be purchased directly from the organization that measures and sells carbon offsets, through a direct business-to-business transaction. In addition, carbon offsets can be acquired from resellers, brokers, and exchanges. The sum of these formal and informal transactions is referred to as the 'carbon markets.'

During the last twenty years, carbon markets have moved from the exception to the mainstream as a mechanism to help stimulate economic activity and mitigate climate change. Today, according to 2012 World Bank report 'States and Trends of the Carbon Markets,' the global carbon market is valued at US $176 billion—more than double the amount in 2007. While it is impossible to predict the future of any market, trends suggest that the demand for carbon offsets will only increase, providing a potentially important funding source for developers of carbon offset projects.

REGULATED AND VOLUNTARY MARKETS

The carbon market has two sectors: regulatory and voluntary. Regulatory or 'compliance' markets are currently much larger as measured by transacted volume and value when compared to voluntary markets. Regulatory markets are created and regulated by regional, national, and international GHG reduction regimes. In the United States, there are two such regimes: The Regional Greenhouse Gas Initiative comprised of nine northeastern states, and AB32, California's cap and trade program.

Voluntary carbon markets, the focus of this Guide, function largely outside of regulated markets and enable individuals, businesses, and organizations to create, sell, and buy carbon offsets on a voluntary basis.

Although similar in type, carbon offsets that are generated for use in regulatory or voluntary markets may differ. Differences may include:

Purpose

- Regulated carbon markets are driven by legislation and regulations, which are required to meet environmental goals within a jurisdiction (a region, a province, a country, or multiple countries).

- Voluntary carbon markets are primarily focused on supporting companies with social responsibility and public relations goals that can be at least in part achieved by supporting emission reductions on a voluntary basis. Companies are increasingly seeking to differentiate themselves as more sustainable and supportive of community development, which is helping to drive growth in the voluntary carbon market space.

Standards

Standards provide agreed upon, repeatable, and verifiable frameworks guiding carbon offset project development. Standards help reduce transaction costs and increase credibility, transparency, and rigor in the marketplace.

- Regulatory carbon markets typically define proprietary standards specific to their regulations and geographic region.

- Voluntary carbon offsets can be generated under a wide range of standards such as the Verified Carbon Standard (VCS). Different carbon offset project types, whether technology or land based, are suited to different standards. Carbon offsets that are created under a credible standard like the VCS have a stamp of approval that enhances—or creates—their value in the carbon market.

Market Value

- Regulatory carbon offset buyers primarily value the GHG emission benefits of their purchase. In some cases, regulatory markets may have significantly higher prices because of the regulatory driven demand, but may also support very low prices as economic, regulatory, and political drivers shift.

- Voluntary carbon offset buyers, on the other hand, are often more focused on the 'story' associated with carbon offset creation. Buyers value 'co-benefits' such as community involvement and economic impact because they can point to these improvements as more tangible results of their carbon offset investments. In other words, buyers of voluntary offsets are often valuing the project co-benefits

as much as the GHG emission benefit, especially when the project is local. Projects with strong co-benefits often sell each carbon offset at a higher price relative to projects without a strong story. Due to the differentiated nature of the carbon offset products sold, voluntary markets are often more illiquid than regulated markets, which can result in comparatively higher administrative costs.

CARBON OFFSETS: BENEFITS AND RISKS

By placing a dollar value on GHG emissions reductions and removals, carbon markets provide an additional source of financing for GHG projects.

However, the process to access the carbon finance is often cumbersome: carbon finance may not be suitable for the project type or the project type may be too risky for an organization. There is also the widespread misperception that carbon offsets can generate returns that exceed the cost of undertaking the project. Typically, carbon finance revenues are only a small part of a much larger picture. For example, the energy cost savings arising from a home energy efficiency project will still be the largest source of cost savings from implementing a project, as the incremental revenues from developing carbon offsets typically amount to a small percentage of overall project cost savings and revenues.

Risks aside, there are numerous environmental and social benefits that are typically overlooked and not measured, often due to their perceived intangibility. Table 2 summarizes a number of benefits and risks that may be associated with carbon offest projects.

CARBON MARKET PARTICIPANTS

The magnitude and evolution of carbon markets continues to attract numerous intermediaries, such as brokers, exchanges, aggregators, and financiers, as well as other participants such as validators/verifiers and legal and consulting service providers. Table 3 briefly describes the roles of major 'participants' in the carbon markets.

Table 2: Benefits and Risks of Carbon Offsets

Benefits	Risks
■ Competitive / reputational benefit (leadership role)	■ Project does not pass a validation or verification
■ Reduce upfront and ongoing project costs	■ Reputational / media risk (e.g. project is not viewed as being additional)
■ New sources of revenues from project activities and/or cost savings	■ Lack of expertise, coordination, or institutional support
■ Diversification of economic activities	■ Project administrator turnover
■ Direct employment benefits	■ High administrative costs
■ Flexible market-based response to climate change	■ Technology failure / inappropriate deployment of technology
■ Health and community benefits	■ Weak implementation partners and ill-defined roles
■ Infrastructure improvements	■ Delays in project completion due to lack of expertise
■ Increased environmental quality	■ Poor perception of compliance and voluntary markets
■ Increased social equity	■ Carbon market price collapses (e.g. oversupply or financial crisis)

Table 3: Carbon Market Participants

Name	Role
Project Proponents	Develop and maintain carbon offset project documentation, monitoring, and reporting. Project proponents may or may not own the assets associated with carbon project development activities.
Accreditation Providers	Create an infrastructure and rules to be followed in order to obtain certification for carbon offsets (e.g. ISO 14065). More well-known accreditation providers include the American National Standards Institute (ANSI) and the Canadian Standards Association (CSA).
Carbon Offset Registries	Maintain internet based trading platforms where carbon offsets are registered for sale. Along with emissions reporting and tracking services, registries provide a service that transparently assigns serial numbers to every carbon offset, which assures buyers they are acquiring a unique carbon offset.
GHG Program Authorities	Administer GHG standards and programs as needed by market participants. For example, the Verified Carbon Standard Association (VCSA) administers the Verified Carbon Standard (VCS). GHG program authorities are financed through the assessment of small fees on each carbon offset issued or sold under the particular GHG standard.
Retailers	Aggregate carbon offsets from a number of carbon offset projects with the intent of reselling them in smaller volumes to individuals, companies, and institutions.
Brokers	Facilitate transactions between sellers and buyers. Similar role to stock market brokers.
Buyers	Purchase carbon offsets for use, such as corporations seeking to achieve climate neutrality.
Validators and Verifiers	Audit carbon offset projects. Independent third party organizations that audit the project and provide a statement of assurance that the project meets the eligibility criteria of the GHG standard and program. In the context of the VCS, validators and verifiers are known as 'Validation/Verification Bodies' or 'VVBs.'
Legal and Technical Consultants	Assist Project Proponents and/or carbon offset buyers in understanding how to develop carbon offset projects and transact carbon offsets.
Donors	Provide project development related funding, often for reasons other than the carbon offset value produced.
Investors	Seek financial returns for provisioning capital for carbon offset project development. In return for assuming more of the project risk, an investor may desire some control over project activities.
Environmental Nongovernmental Organizations (ENGOs)	Function as watchdogs, critics, and experts providing input for the development of best practices and GHG accounting standards.

RESOURCES

Ecosystem Marketplace and Bloomberg New Energy Finance collaborate to publish an annual report on the state of the voluntary carbon market, which can be found at **www.ecosystemmarketplace.com**.

The World Bank produces a report each year on the state and trends of the global carbon market, which can be found at **www.worldbank.org**.

The Verified Carbon Standard website provides background information on voluntary carbon offsets at **www.v-c-s.org**.

Book 2:
Carbon Accounting Theory

OVERVIEW

Book 2 provides background on basic carbon accounting theory. Carbon accounting is an agreed upon process designed to assure buyers and other users that carbon offsets are of high quality. Readers who are generally familiar with carbon accounting may skip to *Book 3 – Residential Offset Model* for details about Residential Offset project development. The term 'Carbon Accounting' is not officially accepted by the VCS.

BOOK 2 CONTENTS

VERIFIED CARBON STANDARD (VCS)

Book 2 examines general principles of carbon accounting as they relate to the Verified Carbon Standard (VCS). The VCS is a private, not-for-profit, non-governmental organization founded to set a robust international greenhouse gas (GHG) accounting standard. The VCS was founded by The Climate Group, the International Emissions Trading Association, and the World Economic Forum in 2005.

The overarching goals of carbon accounting under the VCS are relevance, completeness, accuracy, conservativeness, consistency, and transparency. These principles are critical to ensuring that buyers have faith in carbon offset quality, which in turn increases the value of the carbon offsets and strengthens the overall carbon market.

In addition to setting a GHG accounting standard, the VCS serves other important roles such as setting guidance on eligible carbon offset project types and overseeing carbon offset registries.

VCS Methodologies

One of the key functions of the VCS is to establish a process to ensure the creation of rigorous methodologies. A methodology outlines a specific set of carbon accounting procedures that must be followed for a particular type of carbon offset project activity. For example, Book 3 of this Guide focuses on providing guidance on how to use the VCS methodolgy ID VM0008, also known by its full title, *Methodology for the Weatherization of Single Family and Multi-Family Buildings*. VM0008 sets rules specifically relating to carbon accounting for home energy efficiency projects. Standardized carbon accounting procedures for different offset types help reduce the cost and risk associated with project development.

Carbon offsets generated through VCS methodologies are called Verified Carbon Units (VCUs). A VCU is a quality, independently verified, and tradeable carbon offset that has passed the VCS carbon accounting process and is ready for sale. Each VCU is assigned a specific serial number and is traceable.

GENERAL CARBON ACCOUNTING TOPICS

The following general carbon accounting topics apply to project proponents (PPs), the entities responsible for developing and maintaining carbon offset project documentation, monitoring, and reporting.

Baselines

The baseline of a carbon offset project is the most likely scenario that would have occurred prior to implementation, i.e. had the project not been implemented, the baseline activity is what would have occurred as a normal course of business. In the context of a weatherization program, the baseline would be the energy use of a dwelling that does not undertake weatherization activities. Establishment of a conservative baseline is vital to any carbon offset project as it becomes the basis to which the emission reductions or removals will be measured over time.

Additionality

For a project to be 'additional,' the emission reductions or removals must be different than a 'business as usual' (BAU) scenario while still producing the same product or service (this is referred to as functional equivalence). For instance, a tree planting project would not be considered additional if law required that a particular forest be replanted.

There are a number of different methods to test and prove for additionality. Two of the most common groups of methods are project-by-project approaches and standardized methods.

Project-by-project approaches typically demonstrate additionality by proving that a project would not have been viable without carbon finance.

Standardized methods typically demonstrate additionality using pre-defined, quantitative methods that are considered to be more objective than project-by-project approaches. Performance methods, one type of standardized methods, can help reduce the cost of additionality tests and greatly streamline the project development process. Performance metrics set pre-defined performance benchmarks that project activities must meet, along with other criteria, to be categorized as additional.

Sources, Sinks, and Reservoirs (SSRs)

Sources, sinks, and reservoirs (SSRs) refers to a framework used to categorize all the GHG emissions associated with a BAU scenario. SSR classification determines if emissions should be included or excluded from carbon offset quantification. A 'source' is something that releases GHG emissions into the atmosphere, such as a diesel generator. A 'sink' is a process or item that removes GHGs from the atmosphere, such as tree sequestering or storing carbon. Finally, a 'reservoir' is a process or item with the capability to store or accumulate GHGs removed from the atmosphere by a sink, such as the process of storing carbon dioxide in underground cavities.

SSRs are extremely important in the development or modification of a methodology, because they allow for the assessment and fair comparison of emissions between a project and baseline scenario. When SSRs are identified during the methodology development process, a project life cycle approach is undertaken to identify, select, and exclude SSRs that may or may not be attributable to the baseline and project scenario. The procedure will identify all aspects of the project and baseline scenario (e.g. manufacture, transportation, maintenance, disposal) in order to compare each SSR and assess their relative contribution to the project.

The outcome of the process is the identification and establishment of SSRs and associated GHGs that should and should not be included in a project. A methodology generally prescribes specific guidance regarding which SSRs to include and exclude.

Uncertainty and Risk

Every carbon offset project is subject to some level of uncertainty and risk, whether it is statistical uncertainty in the quantification of the emission reductions or the risk that the carbon project may not operate as intended.

Three types of uncertainty typically exist in carbon accounting: scientific uncertainty, model uncertainty, and parameter uncertainty.

Scientific uncertainty relates to the accuracy of basic assumptions about, for example, the global warming potential (GWP) of different GHGs. Typically, this uncertainty is addressed in the methodology and as such a PP is not responsible for this aspect of carbon accounting.

Model uncertainty is associated with quantification methods used to devise the GHG emissions. Similar to scientific uncertainty, PPs are typically not responsible for managing this type of uncertainty. However, in some circumstances PPs may use models and calculations not approved in a methodology, and may be required to address model uncertainty in these cases.

Parameter uncertainty is associated with the quality of data used to calculate the carbon offsets created by a project. This is the main type of uncertainty that PPs must seek to mitigate. Guidance on assessing risk and uncertainty are typically included in a methodology and associated GHG Standard.

There are a number of different types of risk present in carbon offset accounting: baseline risk, quantification risk, regulatory risk, and performance risk.

Baseline risk is the risk that the project technology is taken up rapidly and thus quickly becomes considered to be common practice.

Quantification risk is the risk that the data to support the baseline or project becomes unavailable, that measurement technologies improve, or that the quantification methodology changes with time.

Regulatory risk is the risk that there is a change in the regulatory environment that affects the project emission reductions (e.g. legal requirement for all homes to exceed the performance benchmark).

Performance risk is the risk that the infrastructure, program uptake, or data systems do not perform according to that which was assumed during the feasibility analysis.

Ownership

Ownership relates to whether or not a PP can produce written proof identifying legal claims to the GHG emission reductions that occur as part of a carbon project. In cases where there are numerous potential claimants of ownership, it is sensible to gain written assurances transferring ownership from all parties to the PP. Examples of potential claimants include utilities and fuel providers, weatherization program funders, weatherization programs, building owners, government agencies, and project proponents.

Validation/Verification Bodies (VVBs)

Validators and verifiers are accredited independent third party organizations that audit carbon offset projects. Their purpose is to assure the quality and integrity of carbon accounting, which takes the form of a statement of assurance that the project meets the claims it makes relative to the GHG program under which it operates. In the VCS Program, validators and verifiers are referred to collectively as Validation/Verification Bodies (VVBs).

VVBs gather various types of evidence to audit carbon offset projects. When preparing data evidence for validation and verification, a PP should be aware of the three different classifications of evidence: physical evidence, documentary evidence, and testimonial evidence. This will allow the PP to establish a transparent and comprehensive audit trail.

Physical evidence is gathered by direct observation of equipment or processes. Physical evidence refers to something that can be seen or touched and verified as correct, such as the installation of weatherization measures in a building.

Documentary evidence refers to something that is recorded on paper or electronically. Documentary evidence can include operating and control procedures, log books, inspection sheets, invoices, or analytical results. See tables 5-7 in Book 3 for more information on documentary evidence data requirements.

Testimonial evidence refers to evidence gathered from interviews with technical, operating, administrative, or managerial personnel. Testimonial evidence provides a context for understanding physical and documentary information but its reliability depends on the knowledge and objectivity of the interviewees.

Validation

Validation is a systematic, independent, and documented process for the evaluation of a project's GHG assertions in a project description (PD) against criteria established by a methodology and the VCS Program.

Validation is a forward-looking process in which a VVB assesses whether predicted emission reductions or removals are valid, reasonable, and in compliance with VCS and methodology rules. Unlike verification, which looks back in time at a project, validation occurs before a project registers in a GHG program.

Validation focuses on examining the PD, a document prepared by a PP that describes the project and how the carbon offsets will be quantified. The PD highlights aspects such as project eligibility, quantification methodologies, and monitoring protocols. Once validation is complete, the PD is generally considered eligible for a ten-year crediting period.

The length of time required to prepare a PD and complete validation is correlated to type, complexity, size, and location of the project. It can take 6 months to a year or more to write a PD and to complete the validation process. There are four common issues that can result in prolonged validations, higher costs and ineligible projects:

1. **Uncertainty related to measurement and quantification:** A VVB must take time to assess whether the quantification and measurement methodologies are appropriate and will result in a conservative GHG estimate. Incomplete justification for quantification methods, lack of reference to sources, or incomplete inclusion of SSRs–among other data quality issues–may lengthen the validation timeline, resulting in increased costs and a delayed project.

2. **Additionality:** Additionality must be documented carefully and in full accordance with the methodology requirements. Poor quality or insufficient data can result in an ineligible project and sunk costs.
3. **Functional equivalence:** Functional equivalence is fundamental to determining whether the project scenario is providing the same service as that of the baseline scenario. Justifying functional equivalence requires PPs to demonstrate that the baseline and project remain comparable throughout the life cycle of the project, that all material emissions and removals have been captured, that SSRs included are conservative, and that any 'leakage' has been captured in the calculations. Lack of supporting evidence for functional equivalence is a common sticking point and may result in delays, increased costs, or an ineligible project.
4. **Data collection and monitoring plans:** To successfully pass validation, the PD must identify: the sources of data; the frequency of measurement; the process for obtaining, manipulating, and storing the data; and controls to limit errors and omissions. Poor data collection procedures are a common issue in the validation process.

Verification

Following a successful validation, a carbon offset project can be registered with a GHG program, such as the VCS, and verification can occur. Verification is a systematic, independent and documented process for the evaluation of a project's GHG assertion in a monitoring report against criteria established in the PD, methodology, and GHG program guidance.

Verification is a backward-looking process in which a VVB assesses whether the GHG reductions or removals did occur and whether they are accurate, conservative, and in compliance with specified criteria.

Verification focuses on examining the monitoring report, a document prepared by a PP that measures and calculates carbon offsets using data from the carbon offset project. The monitoring report contains summaries of data and calculations specific to a carbon offset project. Once verification is complete, carbon offsets can be issued, registered, and sold.

The length of time required to prepare a monitoring report and complete verification is correlated to type, complexity, size, and location of the project. It can take around 6 months to a year or more to compose a monitoring report and to complete the verification process.

Monitoring Report

In order for verification to occur, a PP must complete a monitoring report. A monitoring report documents the activities implemented and quantifies the emission reductions. Complete and documented monitoring results form the basis of evidence that is subject to verification, and therefore the basis of proving GHG reductions or removals. PPs must ensure that they are utilizing best practices to ensure that the GHG emission reductions or removals are reasonable and defensible with documented evidence (e.g. invoices and usage data). It is important that PPs establish a systematic and transparent method of collecting, maintaining, and storing this information. These systems and processes will be used to establish the data trail to which both the validator and verifier will test. An incomplete and poorly designed data trail will result in an ineligible project. The data management system must be capable of operating without significant error, fault, or failure.

Figure 6: Selection of Documents Required for VCU Issuance

Verified Carbon Unit (VCU Issuance)

Verified Carbon Units (VCUs) are serialized and traceable carbon offsets that have been assured of being high quality. To issue VCUs a PP will create an account with a registry and submit the required documentation. Figure 6 above summarizes some but not all of the carbon accounting documents required to arrive at VCU issuance. These documents include the PD, validation report, monitoring report, and verification report. PPs can register their projects at the time of validation but will not be able to generate and sell VCUs until successful verification occurs.

GROUPED PROJECTS

Carbon offset projects can be referred to either as a 'project' or a 'grouped project' under the VCS.

- An example of a project is the installation of 100 wind turbines at one point in time. All 100 'project activity instances' or 'instances' of the project are identified at the time of validation.
- An example of a grouped project is the upgrading of an unknown number of residential buildings. The number of 'instances' in the grouped project may not be known at validation.

The main benefit of grouped projects is that they allow for instances to be included after validation is complete. This is helpful to a PP who installs many different instances over time, because it allows them to apply the same carbon accounting procedures over a long time period, often 10 years. It would likely be repetitive and cost prohibitive for a PP operating a grouped project to complete a validation for each new set of instances.

As shown in Figure 7 on the following page, knowledge of four key terms is needed to understand how grouped projects work in the context of VM0008:

1. **Project Proponent (PP) –** an entity that develops and maintains carbon offset project documentation, monitoring, and reporting. PPs may or may not own the assets associated with carbon project development activities.
2. **Program Administrator (PA) –** an entity that administers a program and implements instances. PAs often sets policies and procedures, collect data, and manage funding as it relates to the implementation of instances. Note, a PA can also be a PP in some cases, and vice versa.
3. **Project unit –** a set of retrofit activities defined to have the same eligibility criteria and the same method for calculating the baseline, additionality, and emission reductions. Each PA may operate more than one project unit. For example, as shown in Figure 7, if a PA operated both a single family and a multi-family weatherization program, there would be at least two potentially eligible 'project units' for that PA.
4. **Project activity instances (instances) –** the smallest collection of measures needed to comply with a methodology. For example, the weatherization of one building could represent an 'instance.'

RESOURCES

The Verified Carbon Standard provides a Validation and Verification Manual with information relating to some of the fundamentals of carbon accounting, as well as specific guidance relating to grouped project development in the VCS Standard, at **www.v-c-s.org**.

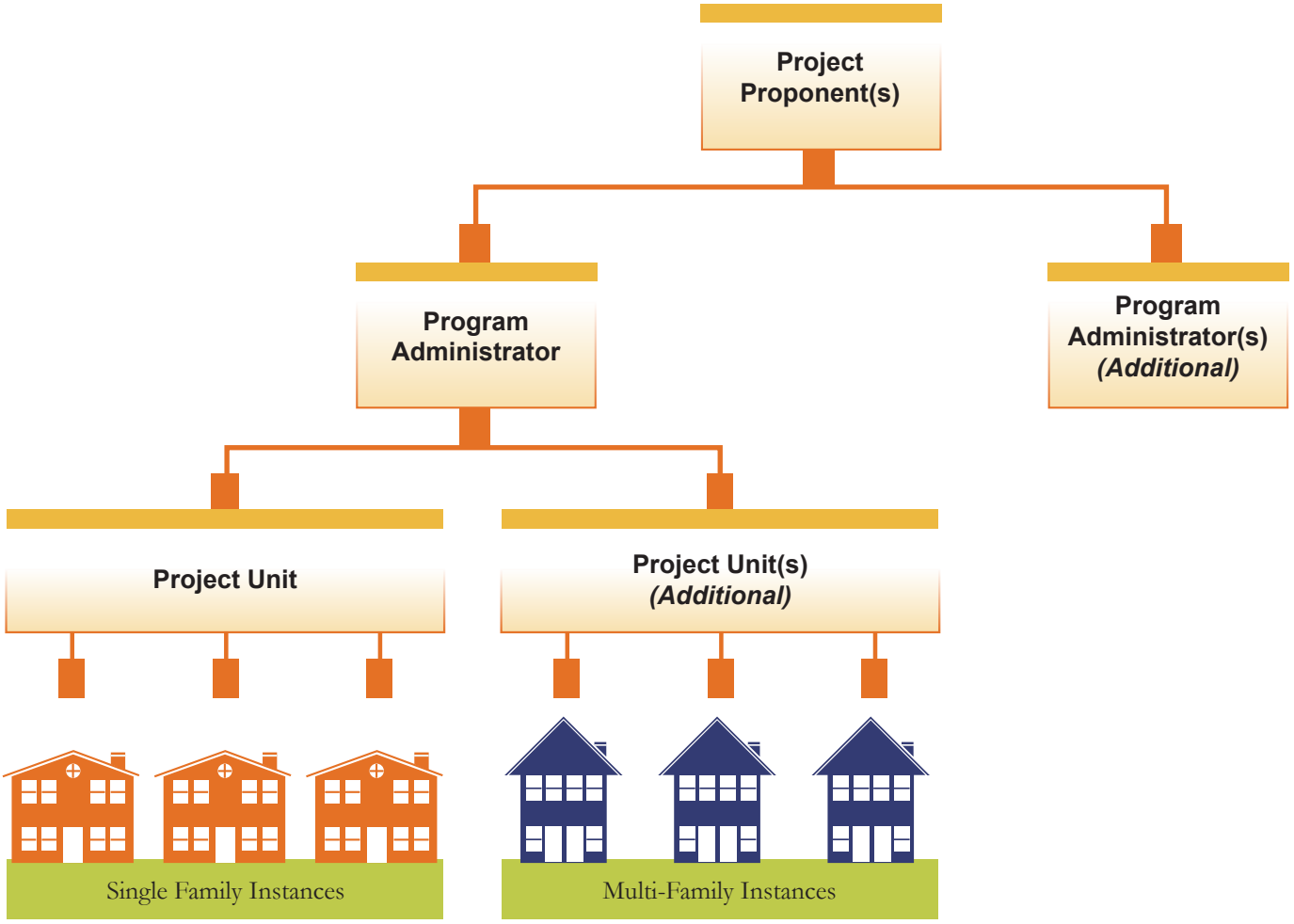

Figure 7: Grouped Project Key Terms

Book 3:
Residential Offset Guide

OVERVIEW

Book 3 – Residential Offset Guide provides information on how to quantify and sell 'Residential Offsets,' independently verified carbon offsets created using the Verified Carbon Standard (VCS) methodology VM0008. 'Residential Offsets' is used as shorthand in this guide and is not an officially accepted term by the VCS.

BOOK 3 CONTENTS

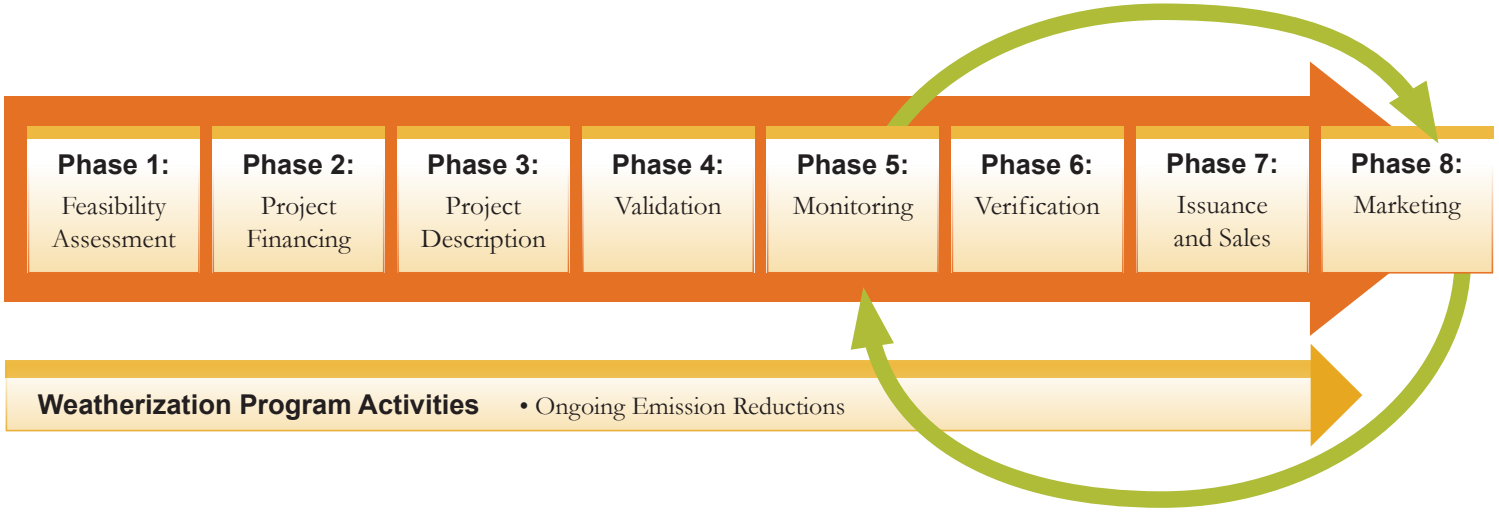

Figure 8: The Eight Phases of Residential Offset Project Development

PROJECT DEVELOPMENT OVERVIEW

Book 3 was written for two key users:

1. **Project Proponents (PPs) –** entities that develop and maintain Residential Offset project documentation, monitoring, and reporting.
2. **Program Administrators (PAs) –** entities that administer one or more weatherization programs.

If a program administrator (PA) decides to conduct the eight phases of Residential Offset project development shown in Figure 8, they are also referred to as the project proponent (PP). Sometimes, however, PAs may hire an expert PP to help develop a Residential Offset project.

Book 3 – Residential Offset Guide is organized into eight phases as shown in Figure 8 above. The steps are described in linear fashion for ease of understanding, although many of the phases could occur in parallel or in a slightly modified sequence depending on the project. Once the entire process has been completed from end to end, a PP typically restarts the process again at Phase 5.

The Guide focuses only on the incremental activities that a PP and PA must consider to successfully develop a Residential Offset project. It does not focus on the core operations of weatherization programs such as database management or weatherization program procedures and implementation. One key goal of project development is to minimize the incremental activities required to measure and sell Residential Offsets.

Due to the significant number of steps and nuances in all of the eight phases, as well as periodic changes to VCS rules, this Guide cannot provide a highly detailed breakdown of the Residential Offset project development process. Inexperienced PPs should seek professional assistance in developing a Residential Offset project.

Most importantly, this Guide is intended only as an unofficial complement to resources available from the Verified Carbon Standard (VCS). PPs may find these resources at the VCS website, **www.v-c-s.org**.

PHASE 1: FEASIBILITY ASSESSMENT

The feasibility assessment helps a PP make an initial determination of Residential Offset project development attractiveness from a financial and risk perspective.

Two tools are provided to help determine feasibility:

1. **A financial calculator** to help understand the financial implications of different project scenarios. The financial calculator is available for download at the following web link: **www.mainehousing.org/carbon**
2. **A project risk checklist** to assess high-probability issues that may arise during project development.

A feasibility assessment can take from one month to one year or more to complete. The length of the assessment depends on the required level of detail for an assessment and the inclusion of additional possible revenue scenarios. Once a feasibility assessment is completed, a PP may choose to begin planning and securing resources for a project.

Tool 1: Financial Calculator

In the context of Residential Offset project development, the financial calculator allows the PP to determine how incremental cash flows are impacted by different variables, such as the price of Residential Offsets. The financial calculator is available for download at: **www.mainehousing.org/carbon**. Instructions for use of the calculator are embedded in the file. An example screenshot of the calculator is shown in Figure 9.

This simplified calculator is not intended to prove the financial feasibility of a project. Its purpose is to help demonstrate how changes in input variables generally affect the sensitivity of outputs such as cash flows. This information can then be used to help inform strategic decisions to help improve project feasibility, such as increasing the number of partners to help aggregate Residential Offsets and share costs among a number of PAs.

The financial calculator has been populated with a number of default input variables, however each PP will likely benefit by adjusting variables to reflect locally relevant scenarios.

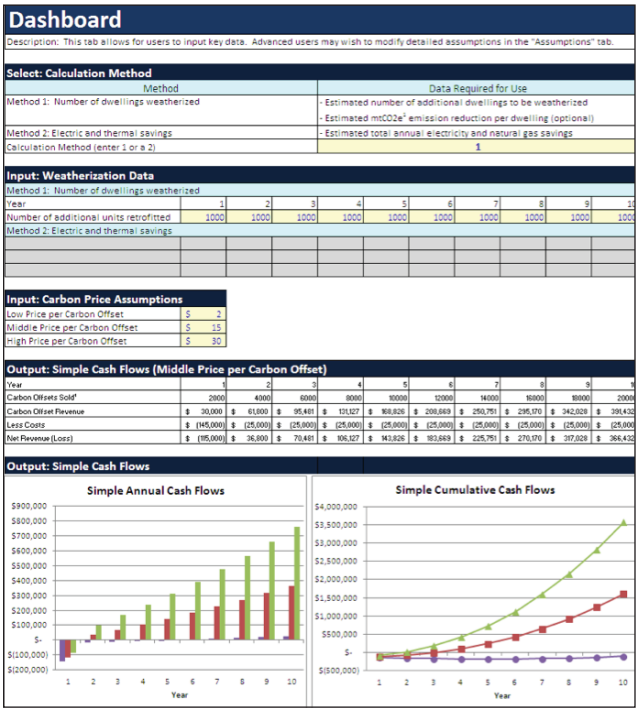

Figure 9: Financial Calculator Screenshot

In general, depending on the complexity of the project, data availability, and the experience of staff, the costs to complete the eight phases range from $50,000-$100,000 and upwards. A PP must ensure that the revenue from the project greatly exceeds project development costs. A rough rule of thumb for a Residential Offset project is that a PP should aggregate savings from programs weatherizing 1,000-2,000 dwellings or more annually to generate a positive financial return on project development investments.

Tool 2: Project Risk Checklist

The project risk checklist shown in Table 4 on the following page identifies a number of high-probability concerns that, if not thoroughly considered, can create significant risks for potential PPs later on in the Residential Offset project development process.

Table 4: Project Risk Checklist

Consideration	Description
☐ **Sufficient Data Availability**	A significant amount of data is required to quantify Residential Offsets. Organizations must assess whether or not they can actually collect the right type and quality of information.
☐ **Ability to Meet Eligibility Criteria**	Instances must fall into one or more of the 4 categories listed below: A, B, C, or D, and meet the detailed eligibility and applicability criteria outlined in VM0008. Failure to meet these criteria may result in individual instances or the entire project being excluded from the creation of Residential Offsets. • Category A – All energy retrofit (combination of Categories B and C) • Category B – Upgrade of building envelope and central heating/cooling system • Category C – Replacement of appliances • Category D – Replacement of a mobile home
☐ **Ability to Prove Additionality**	PPs using categories A, B, and C must use a performance method to prove additionality, which will require access to large databases of energy performance data. PPs using category D will require the use of a project-based test for determining additionality. All projects need to pass a regulatory additionality test.
☐ **Sufficient Upfront Capital**	A typical Residential Offset project is likely to take 12-24 months, sometimes longer, before all the legal, technical, and financial issues are sorted out and revenue can be generated. This should be accounted for when seeking finance and other forms of support. The organization should have sufficient capital availability to implement a project before any revenues are returned to the project.
☐ **Adequate Staff Capacity**	Staff or consultants with relevant technical and legal knowledge are available to manage all eight phases of Residential Offset project development.
☐ **Clear Project Unit Boundaries**	The PP should clearly understand the total number of project units to be included in a Residential Offset project. Project unit boundaries are defined by a number of factors including but not limited to geography, resident demographics, income, building regulations, and PA policies/procedures for weatherization activities.
☐ **Low Project Complexity**	PPs that group together more than one PA and/or more than one project unit increase the complexity of all aspects of implementation and risk assessment. PPs including a large number of PAs and project units need to ensure they have sufficient time, expertise, and support from PAs to develop a project.
☐ **Robust Management Processes**	PAs with robust weatherization procedures and information management systems will best be able to ensure that the data is complete, accurate, transparent, and traceable in order to calculate and prove Residential Offsets. An acute understanding of statistically sound methods will also be required.
☐ **Clear Objectives**	There tend to be a number of overlapping and sometimes conflicting objectives held by stakeholders involved that could result in a failed project. For example, a PA could have two objectives: 1) to sell Residential Offsets within six months and 2) to update their database management system. These objectives are likely to conflict, since an upgrade of a weatherization program database management system would likely delay the sale of Residential Offsets beyond six months.
☐ **Enforceable Ownership**	PPs must demonstrate rightful ownership of the emission reductions that are the basis of Residential Offsets via written contracts.

Resources

A financial calculator is available online at: **www.mainehousing.org/carbon**

A feasibility assessment should be conducted in full consideration of the most up to date rules from the Verified Carbon Standard: **www.v-c-s.org**

PHASE 2: PROJECT FINANCING

Successful Residential Offset project development requires significant upfront project financing to address an array of financial, technical, and legal issues. Project financing is often required long before carbon financing from Residential Offsets can be expected. In order to access carbon finance, a PP must complete Residential Offset activities through Phase 6: Verification, before arriving at Phase 7: VCU Issuance and Sales. Because of the long delay between initial project expenses and Residential Offset revenues, project financing should be considered one of the first activities to conduct in parallel with the feasibility assessment.

Project Financing Strategies

Due to the relatively small incremental value of carbon finance revenue streams, PPs must often find innovative ways to cover upfront capital costs. Some more commonly deployed strategies include:

1. Partner with organizations that can provide the necessary expertise in kind. Partner organizations can contribute to a particular aspect of project development (e.g. assisting with validation activities) or assist generally as a strategic advisor.
2. Seek in-kind contributions from private/public investors or grant programs. For small weatherization programs, this form of partnership may be the easiest way to get a program off the ground and to share the risks.
3. Seek grants or incentives to fund projects that lead to Residential Offset project development. To encourage this type of investment, PPs could return a share of future carbon finance revenue to organizations that provide upfront incentives. If pursuing this option it is important to ensure that Residential Offset eligibility is not compromised.
4. Utilize long-term carbon purchase agreements in order to stabilize Residential Offset prices to provide long-term predictability. This will often involve a Verified Emission Reductions Purchase Agreement (VERPA), which is the contract between the two parties governing the sale and ownership of the carbon credits.
5. Seek milestone payments set in VERPAs to reduce financial exposure during the project development phases (e.g. receive partial funds for successfully passing validation). These are often referred to as one version of forward contracts which provide access to carbon finance early on. However, the tradeoff for early access to carbon finance is often a discounting of Residential Offset value. Generally, value is based on the market price of carbon offsets and then discounted due to the potential risks involved prior to delivery.
6. Issue bonds with the capital guaranteed and paid using income generated from expected carbon revenues. This might work particularly well when scaling up programs.

Preparing a Business Case

When looking to secure external partners or internal executive support for financing, it is important that a clear business plan be developed that leverages the feasibility study completed in Phase 1: Feasibility Assessment. The feasibility study component of the business plan should include: a financial analysis, timelines, a sensitivity analysis, as well as a risk assessment that includes mitigation strategies. The business plan should also provide details of the management team, other investors (including potential), technologies deployed, technology suppliers, and other potential partners. Because any investor will assess the impact of set-up costs relative to the expected total revenues, including carbon income, it is imperative that a robust cash flow analysis be completed. Finally, when preparing the business plan, consider the following screening questions that potential executive sponsors, investors, partners, and buyers may use to evaluate a PP:

Is the PP credible? Investors and buyers typically consider investing or purchasing from those who have adequate experience in the project technology and have

a history of successful carbon offset project development. A PP who does not have in-house expertise in Residential Offset project development can add outside resources to their team in order to increase credibility.

What is the greater benefit? Investors and buyers often look for the 'feel good' stories relating to Residential Offset projects as they often form the basis of effective public relations campaigns.

Will the PP be able to transparently demonstrate the generation and sale of Residential Offsets? A PP should be able to publicize the geographic range of the project, how much each project generates in reductions, and when the Residential Offsets were created and sold.

Will a robust GHG Standard be applied? A recognized standard is more robust, and from an investment and purchase standpoint has greater value and return. VCS is recognized in the marketplace as a quality GHG standard.

Will the offsets be registered? Registries are used to both create tradable VCUs and to retire them once they have been sold. This provides for a transparent process which ensures that carbon offsets are transferred and used appropriately.

Has the PP prepared and accounted for delays? In determining the timeline, PPs must recognize that there are likely to be unforeseen delays during a number of project development activities such as contract negotiations, project description development, and data collection. Proactive PPs will have identified these risks and prepared alternative options to account for these delays.

PHASE 3: PROJECT DESCRIPTION

Should the feasibility assessment result in a positive conclusion and project financing be secured, the PP must then compile a project description (PD). The PD is a comprehensive and in-depth set of instructions on how the Residential Offset project will be developed. It outlines the rules and calculations that will be used to quantify Residential Offsets in the future. If done correctly, the information collected and prepared during a thorough feasibility assessment will inform much of the PD. The remainder of Phase 3: Project Description covers the following topics:

- PD Basics
- Defining Project Units
- Selecting Category and Approach for a Project Unit
- Setting Eligibility Criteria
- Proving Additionality
- Establishing Ownership

Project Description (PD) Basics

The PD is a complex document that depends on extensive guidance from the Verified Carbon Standard (VCS), including but not limited to VM0008, the VCS Standard, Guidance on Standardized Methods, and the Validation and Verification Manual. The PD must be completed using a template, also found on the VCS website. Materials are periodically updated and users should be sure to use the most recent versions from the VCS website.

In Phase 4: Validation, the PD will be subject to a rigorous third-party review to ensure its accuracy and conformance with applicable requirements.

Key to the success of any project is that the PD act as a stand-alone document. The level of description in the PD must be sufficient to allow an independent Validation and Verification Body (VVB) to clearly understand and assess the Residential Offset project.

The PD should, at a minimum, include:

- A description of the weatherization program and project activity boundaries;
- A description of the features that will be shared by each of the project units and the features that limit the scenario in which the activity actually happens, e.g. location, level of efficiency, and range of technologies;
- A detailed overview including baseline selection and justification, demonstration of additionality, and eligibility criteria to be used to assess new instances being added to a program;
- A detailed description of how the information will be documented, maintained, secured, and managed to reduce errors, corruption, and omissions of data;

- An estimate of annual Residential Offset volume over the crediting period (10 years);
- Disclosure of assumptions;
- A detailed monitoring plan, including sampling methodology; and
- A framework describing the duties and responsibilities of the PP and PA for each project unit, including contractors (e.g. energy auditors and construction crews).

PPs must carefully review the VCS guidance regarding grouped projects to clarify issues such as baseline selection, establishing additionality, and inclusion of new instances. Residential Offset projects are considered a grouped project, meaning the following may not be known when the PD is compiled:

- The total number of instances (dwellings) that will be included;
- The identification of some or all of the actual instances, including their specific physical location, the time of weatherization, and the type of weatherization measures installed; and
- The actual amount of GHG reductions or removals that each instance will generate under the program.

Each of the above can typically be estimated but not proven until Phase 6: Verification is completed.

Defining Project Units

The PD must identify component project unit(s) for each grouping of instances. The scope of each project unit is constrained by project unit boundaries, which can be defined by: geography, building type, income group, category (the type of technologies being installed), and monitoring and verification (M&V) approach.

The reason that the PD must describe each project unit is because once the PD is validated, similar project activity instances (instances) for each project unit will be added to the project in the future. These instances will need to be measured using similar database management systems, additionality methods, and quality assurance and quality control procedures. Consistency in quantification across each project unit ensures accurate carbon accounting for Residential Offsets.

When defining the project unit, the PP should ensure that boundaries are inclusive (to include as large a number of potential instances as possible), but not so large as to include dwellings with different types of energy use performance characteristics, which can result in an ineligible PD.

Geographic boundaries that may work well include state lines and utility service boundaries. Generally, the service areas for a given weatherization program are aligned with political and utility service boundaries and should be consistent with the establishment of a carbon offset project.

Selecting the Category and Approach for a Project Unit

VM0008 describes four different categories of eligible weatherization measures as shown in Table 5 on page 33. The selection of a category will ultimately be defined by which weatherization measures are deployed by a PA. For example, a weatherization program that installs new energy efficient appliances and adds insulation to the building envelope would fall under 'Category A – All Energy Retrofit.'

Once the category has been defined, the PP must select a M&V approach for each project unit. Table 6 demonstrates the eligible M&V approaches for each category. For every category except C, a PP can choose from several different approaches. Table 7 on page 34 shows some of the differences in data requirements, which will help to determine the appropriate approach to take.

Table 5: Eligible Emission Reduction Activities by Category

Eligible Weatherization Measures	Category A– All Energy Retrofit	Category B– Building Envelope	Category C– Appliance Replacement	Category D– Mobile Home Replacement
Efficiency Enhancements of Building Envelope	X	X		
Efficiency Enhancements of Central Heating/ Cooling Systems	X	X		
Appliance Replacement	X		X	
Mobile Home Replacement				X

Table 6: Measurement and Verification (M&V) Options by Category

Categories	Adjusted Consumption Approach	Pre - and Post - Retrofit Approach	Control Group Approach	Appliance Replacement Approach	Mobile Home Approach
Category A – All Energy Retrofit	X	X	X		
Category B – Building Envelope	X	X	X		
Category C – Appliance Replacement				X	
Category D – Mobile Home Replacement	X		X		X

Table 7: Differences between Monitoring and Verification (M&V) Approaches

M&V Approach	Data Requirements	QA/QC	Likely Application
Adjusted Consumption Approach	Energy use (e.g. utility bills) pre retrofit (sample of dwellings) and post retrofit (all dwellings)	Energy use for a sample group of dwellings not weatherized as part of the project: test to ensure weatherized dwellings demonstrate statistically significant levels of higher savings compared to non-weatherized dwellings	Programs with strong utility billing data for the majority of pre and post retrofitted homes, as well as a small sample group of non-weatherized dwellings
Pre-and-Post-Retrofit Audit Approach	Pre retrofit audit data (every dwelling) and post retrofit audit data (sample of dwellings)	Energy use for a sample group of weatherized dwellings: test to ensure energy use savings is not statistically significantly different than savings predicted by pre- and post-retrofit audit models	Programs with certified energy auditors and strong pre and post audit data
Control Group Approach	Energy use for a control group (non weatherized homes) and a sample group (weatherized homes)	n/a	Programs with access to demographic and building energy use data for both weatherized and non-weatherized homes
Appliance Replacement Approach	Electricity demand for the old and replacement appliance; annual working hours; continued rate of operation	Verifying the operation of a sample of the appliances within the first year of installation and at 3 year intervals thereafter	Appliance replacement programs
Mobile Home Replacement Approach	Cooling load and/or heat load of replaced and replacement mobile home	n/a	Mobile home replacement programs with certified energy auditors and strong pre and post audit data

Setting Additional Eligibility Criteria

Once the project unit has been generally defined in terms of its boundaries, weatherization measures, and M&V approaches, the PP must further define the eligibility criteria for each new instance. Eligibility criteria are included in the PD in order to specify the requirements each instance must meet before it can be included in Residential Offset calculations. For example, one eligibility criterion for a project unit which includes category C appliance replacement might be: 'the new appliance replaces a functioning appliance.' Instances where it cannot be sufficiently proven that eligibility criteria have been met are typically excluded from the project. There will likely be many eligibility criteria for each project unit, and therefore each qualifying instance may have to pass ten or more different criteria to be included in emission reduction calculations. Although eligibility criteria may be largely similar for each PA, the PD should define eligibility criteria for each project unit.

Proving Additionality

PPs developing Residential Offset projects in VM0008 categories A, B, and C will use a performance method for determining additionality; category D will use a project test for determining additionality. Each project unit requires a unique additionality test. For example, one statewide weatherization program may have two project units: one for single family buildings and one for multi-family buildings. In this case, each project unit would require its own additionality test.

Successful development of a performance based approach for categories A and B depends on whether the PP can gather sufficient energy performance data for residential dwellings. In particular, at least three years of energy use data is needed for dwellings in a similar project unit. This residential dwelling energy use data will be used to establish a performance benchmark, a benchmark against which the performance of individual instances is assessed for the purpose of determining additionality. The performance benchmark for these two categories is in the form of a rate of energy efficiency savings that each instance needs to pass. For example, if the performance benchmark is set at 5%, each instance will need to achieve energy savings equal to or greater than 5%.

Category C also requires the establishment of a performance benchmark, and will require access to regional or national databases on appliance energy use characteristics. The performance benchmark in category C is defined on a kWh/appliance basis.

For categories A-C, the main challenge will be compiling sufficient and relevant data to set a benchmark, and possessing the tools and expertise required to conduct statistical analyses on data to arrive at that benchmark.

For category D, a PP must complete a project-based additionality test. This typically requires that a PP identify some form of financial barrier that prevents the project activity from being deployed. A common practice test must also be undertaken. With respect to determining additionality for category D, VM0008 defers largely to the Clean Development Mechanism additionality tests. A project-based test will likely require homeowner financial data such as income levels and credit ratings.

In all cases, projects will be subject to the regulatory additionality test. Regulatory additionality ensures that instances included in a carbon offset project are not mandated by law.

Establishing Ownership

In the case of a weatherization program, ownership of the Residential Offset will pass from the original owner to the PP and finally to the buyer. With multiple parties involved in a transaction, contractual rights and establishment of ownership will need to be clearly defined through written legal documentation. In all cases, the PP must ensure that they have identified all potential claimants of Residential Offsets and have either engaged with each potential claimant and received sufficient written transfer or confirmation of right, or fully understood and acknowledged risks from not gaining sufficient written assurances from any party.

When establishing ownership, a PP should consider a number of high-probability claimants for GHG emission reductions, including but not limited to:

- Utilities and fuel providers
- Weatherization program funders
- Weatherization programs (Program Administrators)
- Building owners
- Government agencies
- Project proponents

Resources

The VCS provides a template and guidance for the compilation of a PD on its website at **www.v-c-s.org**.

MaineHousing completed a PD which may serve as a helpful example. It is accessible through the VCS project database found at **www.vcsprojectdatabase.org**.

PHASE 4: VALIDATION

Once an adequate draft of the PD has been completed, validation can begin. Validation is a systematic, independent and documented process for the evaluation of a project's GHG assertions in a PD against criteria established by a methodology and the VCS Program.

There are typically three phases to the validation:

1. Pre-engagement
2. Validation assessment
3. Review and opinion

Pre-engagement

In the pre-engagement stage, the PP issues a request for proposals from qualified Validation/Verification Bodies (VVBs) and selects a VVB. Note that a PP can solicit bids jointly for validation and verification. Selecting a VVB for both validation and verification activities can result in time and cost savings for the PP.

Vendor list – VCS maintains a list of approved VVBs for each project type on its website. The PP should review this list to determine the appropriate VVBs to send a request for proposals. If the PP wants to use the same organization for both validation and verification, it is important to check that those receiving the request are approved to do both.

Request for proposal – It is important to include enough information in the request for proposals to enable the validators to provide a detailed quote and to enable the PP to compare bids. Many validators have forms they require each PP to complete in addition to the standard request for proposal. These forms can be obtained from the validator's website or directly from the main contact at each organization. In some cases, the validator will complete the form internally but will want to discuss the project with the PP.

Ideally, the PD will be completed prior to the request for proposals being sent. In this case, the VVB may request a copy of the PD so that they can become more familiar with the project prior to issuing a bid. It is important to ensure that confidentiality agreements are in place prior to distributing copies of the PD to VVBs. This will help ensure that early versions of the PD are not in circulation later and that the project's details will remain confidential until finalized.

It is possible to issue a request for proposals without the PD being completed. If this is required it is important for the PP to communicate with the validators to explain the circumstances. Not all validators are willing to provide a proposal without a PD being completed, but most are willing to work with a project if there are extenuating circumstances. At a minimum the request for proposals should have the following information:

- Location (e.g. description of project, types of weatherization activities, and boundaries);
- Access (if any special travel arrangements are needed);
- Size of project (if known);
- Availability of the PP team and any deadlines needing to be met (e.g. long vacations planned and established sales agreements);
- Logistical support available for planning the audit, safety issues, and equipment needs;
- Overview of project activities and ownership; and
- Special circumstances or unique features of the project requiring special expertise or background.

Selecting a VVB – Once responses to the request for proposals have been received, the PP will need to evaluate them. In evaluating proposals, the PP may wish to consider:

- Cost
- Experience of audit team
- Schedule
- References

Ensuring an understanding of what is included in the cost is extremely important. PPs should review the proposal and assess if it: includes the costs of travel, allows for more than one round of clarifications and corrective actions, and provides guidance as to the process should additional work be required (e.g. hourly rates and approval process).

Experienced VVB teams may work more quickly and feel more comfortable navigating the process. Previous experience with the VM0008 methodology, while not necessary, will expedite the team's understanding of the

project's approach. Experience in the region or with the type of project activities the PP is undertaking will allow the validator to be more knowledgeable about typical baseline data sets and experiences as well as typical data challenges and opportunities.

The schedule is important and is often presented as milestones. For example, the schedule may say: 'Initial findings will be delivered 2 weeks from the day that all project documentation is received.' This allows flexibility in the schedule when steps take longer than anticipated. In general, PPs and VVBs will significantly underestimate the amount of time required to respond to findings.

One difference between VVBs is their formality: some organizations tend to be more formal, issuing questions and corrective action requests only in writing. Others tend to prefer to discuss the issues via telephone before formally issuing the findings. Both styles are acceptable and the PP should ensure that the audit style is a good fit for their team. Audit styles also vary based on the individual within a VVB firm, so it is useful to speak with references who have worked with the specific proposed auditor(s) on a VVB team.

Responses to a request for proposal may include certain terms common to carbon accounting but perhaps not be familiar to the PP. In order to properly evaluate proposals it is important to understand commonly used terms:

- **Level of Assurance –** VVBs will never be able to review every document and every piece of data. To do so would be both cost and time prohibitive. Instead they sample the evidence based on their risk analysis which guides them to the areas with the greatest potentials for mistakes or omissions. Because they only sample the evidence, the level of assurance for their resulting opinion is usually designated as 'reasonable'. This means that they are reasonably sure that the stated emissions reductions are free of material misstatements and in conformance with the standard requirements. The term reasonable may seem to indicate a less than ideal level of assurance, but this is the highest level used and the level required the VCS Validation/Verification Manual.
- **Materiality –** Material non-conformances or misstatements must be corrected prior to the validator issuing a positive validation opinion. The VCS maintains detailed guidance on the question of materiality, which are not necessarily reflected here. Materiality is defined by quantitative and qualitative thresholds. One example of quantitative materiality might be the selection of an incorrect unit conversion factor. This mistake may be material if it changes the results by more than the materiality threshold (typically 1-5%) or it may be immaterial if it does not. An example of a qualitative material discrepancy might be incorrect documentation of the project start date. While an incorrect start date may not affect the total number of credits that the project generates, it must be corrected so that the project is in conformance with the rules of the program. Sometimes, many small immaterial issues result in an overall error that is material. The level of materiality will be defined in the VVB proposal.

Contracting

Once the winning bidder has been selected, the contract negotiation process will begin. Most validation firms have their own standard agreements that have been specially designed to include the pertinent information for GHG validation and verification. As with all contracts, terms can be negotiated and this process may take some time depending on the organizations involved.

Table 8: Common Validation/Verification Body Issues and Project Proponent Strategy

VVB Issue	PP Strategy
Inadequate evidence available	All project specific methodology deviations, assumptions, and calculations must be supported by evidence. *Book 2 – Carbon Accounting Theory* explains the three types of evidence that can be provided in support of a claim.
Evidence not readily available to be provided and reviewed	Evidence should be organized and limited to relevant items only.
Incomplete monitoring plan	All relevant parameters and the means for gathering, compiling, and recording the data and calculations must be included.
VCS requirements and methodology not followed	Ensure the most recent version of the standard and methodology are being used and have been read closely. Project specific deviations—small changes to the methodology to improve accuracy or conservativeness—are allowed if properly justified.
Incomplete project documentation	Transparent and complete documentation helps the audit process move much more quickly.

Validation Assessment

Once a VVB has been selected, the validation assessment begins. The assessment will typically involve a review of:

- The project's eligibility and conformance to the VCS Standard, and applicable methodology, as a grouped project;
- The evidence supporting the baseline and project scenarios selected;
- Eligibility criteria for each project unit that will be used to include/exclude new instances;
- Program update and reasonableness of the GHG assertion; and
- Operation and management capabilities to successfully deploy the program over the validation period (e.g. data controls, monitoring, and reporting).

Often the VVB will begin by conducting a desk review of the documents provided. They will then issue any initial findings for the PP to address. Usually the VVB will hold a conference call with the PP to ensure mutual understanding of issues. While the VVB can explain the requirement and how the project failed to meet the requirement, they cannot suggest specific strategies to resolve the issue. In other words, the VVB cannot provide consulting services to a PP. Once any initial findings have been addressed, the VVB will conduct the site visit. The site visit is used to confirm the project boundaries as defined at that time, interview relevant parties, and gather additional evidence. Additional requests for information or findings may be issued following the site visit. Typically, VVBs will identify any potential issues as they are found so that there are no when the formal findings are received. Table 8 describes a number of common issues proposed in the validation assessment stage along with appropriate PP strategies for responding to each issue.

Exact language used to categorize findings varies among VVBs. In general, findings can be categorized as:

Nonconformance (Nonconformance Request, Corrective Action Request) – These findings indicate an area where the project does not conform with the requirements of the Standard or methodology. These may be errors in calculations or qualitative nonconformances. Material nonconformances must be addressed prior to the validator issuing a positive opinion.

Clarifications (New Information Requests) – As the name suggests, these are areas where the VVB would like more information regarding a topic. Depending on the nature of the request, the PP may simply provide an explanation to the VVB, submit documentation and/or add the information to the PD.

Opportunity for Improvement – During the validation process, VVBs may identify areas where the project does not have nonconformances but could be stronger. The VVB will identify these as opportunities for improvement. The PP is not required to respond to or act upon opportunities identified.

Validation Opinion

During the third stage, the VVB will provide an opinion as to whether the PD successfully passed or failed. This opinion will be offered first in a draft validation report. The PP will have the opportunity to review the report and identify any factual errors. Following review, the validation report is finalized.

Resources

As an example, the validation report for the Maine-Housing project can be viewed via the VCS project database found at **www.vcsprojectdatabase.org**.

PHASE 5: MONITORING

Monitoring involves gathering and reporting on the data, both quantitative and qualitative, required by a validated PD. The monitoring phase results in the completion of a monitoring report. The monitoring report will include a summary of data and calculations and must be completed using a template found on the VCS website. VCS materials are frequently updated and users should ensure they are using the most recent version of the methodology report template.

It is important to ensure that the monitoring report measure and report on data in a manner that is congruent with the requirements of the PD. The level of description in the monitoring report must be sufficient to allow an independent Validation and Verification Body (VVB) to clearly understand and assess the Residential Offset project. In Phase 6: Verification, the monitoring report will be subject to a rigorous third-party review to ensure its accuracy.

Weatherization programs are particularly complex and will require a considerable amount of documentation and procedures for proper maintenance. Implementing measurement procedures may require the creation or enhancement of database management systems, as well as special training for project team members, sub-contractors, or others involved. This document does not address core weatherization program operations or database management systems, and speaks only to the incremental measurement activities required for Residential Offset quantification and sale.

Project Start Date – PPs must ensure that they are properly monitoring instances for the duration of the project. Monitoring may begin on or before the project start date, the date on which emission reductions begin occurring. Depending on eligibility criteria, the project start date can occur a maximum of two years before the final validation report is delivered.

However, for most of the categories A-D and M&V approaches 1-5 described in the methodology, there are requirements for PPs to collect various data before the project start date. For example, consider a project unit defined by a number of criteria, including category A approach 1, with a start date of 1/1/2015. For a dwelling weatherized on 1/1/2015, the PP will need to collect pre-retrofit fuel use information for that dwelling at least through 1/1/2014. Therefore, monitoring activities may actually begin before the start date of a project.

Monitoring Report

At the end of each monitoring period, the PP must summarize the required data and calculations using the monitoring report template from the VCS website. The PP should always ensure that it is using the latest version of the template as updates do occur.

While it is important to adhere to the validated PD, challenges often arise during monitoring. It is very important for the PP to note any changes in a monitoring report, document why the changes were necessary, and document how the new approach is equivalent to or more accurate or conservative than the validated approach. Any deviations from the perspective of project implementation or monitoring activities as described in the PD should be addressed here. It is also important to document how changes are still in conformance with the methodology and VCS requirements.

The monitoring report should, at a minimum, include:

- Basic information about the project, including sectoral scope, boundaries, start date, monitoring period, and project location;
- A description of the qualitative progress on project implementation, including whether activities have been implemented as planned in the PD;
- A detailed description of how the data was managed to reduce errors and omissions;
- A description of the parameters monitored and the monitoring plan;
- A description of how the eligibility criteria were met for instances included in emission reduction calculations; and
- A summary of emission reduction calculations by project unit by year.

As long as there are not significant deviations from original plans, much of the information in the monitoring report can likely be copied from the PD.

Resources

The VCS provides a template and guidance for the compilation of a monitoring report on its website at **www.v-c-s.org**.

MaineHousing completed a monitoring report that may serve as a helpful example. It is accessible through the VCS project database found at **www.vcsprojectdatabase.org**.

PHASE 6: VERIFICATION

Once an adequate draft of the monitoring report has been completed, verification can begin. Verification is a systematic, independent, and documented process for the evaluation of a project's GHG assertion against criteria established in the relevant PD, methodology, and VCS guidance.

Verification follows much the same path as validation but has a different focus. In validation, the focus is on whether or not the proposed PD conforms to the VCS and methodology requirements and would lead to verifiable VCUs in the future. In verification, the focus is on whether the PD was implemented correctly and sufficient evidence exists to confirm that the GHG emissions reductions claimed by the project are correct. In essence, verification involves a third-party analysis of data resulting from the project as summarized in the monitoring report.

There are typically three stages to the verification:

1. Pre-engagement
2. Verification assessment
3. Review and opinion

Pre-engagement

The verification pre-engagement process is almost identical to the validation pre-engagement process. The largest difference is that the verification scope will examine specific data for a specific monitoring period (e.g. April 1, 2015 through March 30, 2016) that has already occurred, as opposed to general data protocols for a crediting period (e.g. April 1, 2015 through March 30, 2024) that will be examined in the future.

Some PPs may choose to conduct a validation and verification at the same time, hiring one VVB for both validation and verification. The main advantage to this approach is that it allows a PP to conduct one hiring process as opposed to two cycles of requesting and evaluating proposals. This may reduce costs by streamlining the hiring process and leveraging negotiation benefits of a larger deal focused on both validation and verification activities.

However, there is a risk to conducting validation and verification at the same time. By implementing the project prior to validation, the PP risks having implemented a monitoring plan that does not meet the requirements of VCS and the methodology. While some errors may be easy to correct, the PP runs the risk of failing to collect critical data, which would lead to the failure to create some or all projected Residential Offsets. Several tactics can help minimize this risk, such as:

- Including a project team member with previous energy efficiency and carbon accounting experience,
- Conducting the first verification events shortly after the project begins to minimize the number of credits potentially affected, and
- Conducting internal monitoring events to ensure that the monitoring plan is being followed.

Verification Assessment

The verification assessment is similar to the validation assessment. The verifier will conduct an initial desk review, issue preliminary findings, conduct the site visit, issue additional findings as needed, and close all findings as appropriate.

At the verification assessment stage, the verifier will assess the monitoring report and undertake testing at the project unit and instance levels. Testing at the project unit level may involve conducting a site assessment including interviews with PP staff, observation and review of on-site records, review of established program practices and GHG data, and the assessment of the accuracy of monitoring and reporting systems. The verifier may select a sample and test that the instances that joined the program did in fact meet the eligibility criteria. This may involve site-visits, interviews with project participants, observation and review of on-site records, review of established practices and GHG data, and the assessment of the accuracy of monitoring equipment.

Verification Opinion

Similar to validation, once the verification is complete the verifier will provide an opinion as to whether the project successfully passed or failed and draft a report for the PP to review and approve. The verification opinion and report will also document the number of Residential Offsets verified per year of the monitoring period. This assigns a vintage year to each Residential Offset.

Validation and Verification Tips

There are a number of additional steps that PPs can take to reduce costly risks and errors during the validation and verification process. It is important for PPs to ensure that they have:

- Read and met the requirements of the most recent versions of VM0008 and other VCS guidance;
- Clearly documented weatherization program activities and required data;
- Made available dedicated staff and resources during the validation and verification to attend site visits, and answer corrective action requests;
- Maintained a transparent data trail that provides sufficient evidence and documentation to support the program and the carbon offsets generated;
- Used only reliable evidence and documentation for calculations (e.g. an invoice provided by a utility is more reliable than an unsubstantiated estimate); and
- Documented and justified all risks, assumptions, and uncertainties with the program.

Resources

As an example, the verification report for the Maine-Housing project can be viewed via the VCS project database found at **www.vcsprojectdatabase.org**.

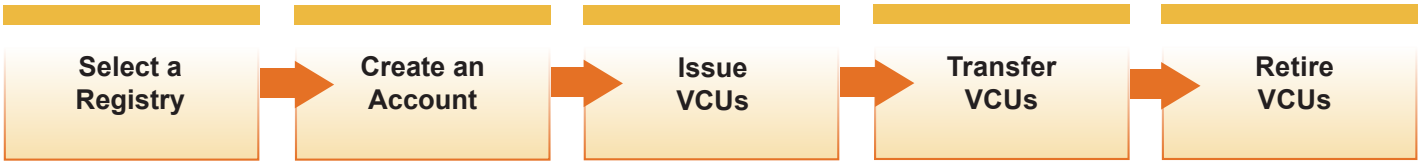

Figure 10: The VCU Issuance Process

PHASE 7: VCU ISSUANCE AND SALES

Once verification has been completed, the PP can issue Verified Carbon Units (VCUs). VCUs can then be sold to one or more buyers. PPs are advised to begin locating buyers early during the project development process as Phase 7: Issuance and Sales can take months to complete.

VCU Issuance/Registration

Once the verification body has issued a positive verification statement, the PP can register the Residential Offsets with one of the approved VCS registries listed on the VCS website. These registries serve to document all approved projects and track issued carbon offsets to improve transparency in the market. Each VCU receives a unique serial number and is placed in the account of the PP. When VCUs are bought or sold, the transactions are reflected by the transfer of the VCUs from one registry system account to another. Potential buyers can trace the history of each VCU using the serial number. Financial data like the price paid for each VCU is generally confidential and is not tracked in the database.

As shown above in Figure 10, There are a number of steps required to register VCUs and transfer them to a buyer's account. Each of these steps outlined below are generally described in documentation available from VCS or one of the approved registry operators.

1. **Select a Registry –** Each PP should contact all eligible registries listed on the VCS website for the most up-to-date pricing and service information. The VCS sets a levy on each VCU sold, but it does not have authority over setting fees that registries charge. In 2012, fees were typically about $0.17/VCU to register the VCU and transfer it to a buyer's account. Additional fees may result if the PP and buyer use different registries or for account setup. Ultimately, the choice of registry is up to the PP and should be made based on consideration of pricing and customer service provided by the registry, among other factors.
2. **Create an Account –** Once a registry is selected, an account is created. This requires the PP to provide credentials such as a username, password, organization, account holder information, and IP Address through which the online registry account will be accessed. The organization must confirm identity with verification such as a tax ID form, and the account holder must confirm identity with valid personal identification. This stage also requires the PP to submit an account registration fee to the registry provider. The process will take at least a few days to complete.
3. **Issue VCUs –** Once the account is set up the PP can then issue VCUs. In order to register VCUs, the PP must have completed the validation and verification process. The PP can then upload the required files to the online registry system and/or the contact person at the registry. The list of files and the most current templates for forms are located on the VCS website. The types of documents include, among others: project description, validation report, monitoring report, and verification report.

   The process of VCU issuance will be repeated upon the successful completion of each verification. The validation documents will likely only need to be uploaded once per ten years. It will take a few days for the registry to process and approve documentation, and to approve of the deposit of VCUs into the PP's account.

   One potential complication of VCU issuance might be overlapping boundaries of geographic

coordinates for similar carbon offsets created under VM0008 or similar methodologies. This should be anticipated during the validation and verification phase of the project to ensure there is no double counting from weatherization activities in overlapping jurisdictions.

4. **Transfer VCUs –** The process of transferring VCUs from one account to another is quite simple. One piece of information the PP should secure in advance is the account information for the party to whom they are transferring VCUs. Once the transfer is initiated from the seller to the buyer, the registry and the buyer must both approve the transfer before it is final.
5. **Retire VCUs –** Once the VCUs are in the seller's account, they are ready to be retired. To retire VCUs is to make them ineligible to be traded again. VCU retirement means that the carbon offset benefit can be claimed by the buyer. Buyers who wish to resell the VCUs will not retire them and are not able to claim the same responsibility associated with the carbon offset benefit. Unless the PP is retiring VCUs on behalf of another buyer, they will not typically be involved in the retirement of the VCU.

VCU Sales

Completing the process to this point is very exciting for all PPs. However, the project will not truly be successful until the VCUs are sold and the anticipated Residential Offset revenue is received.

In a voluntary market, buyers have very different motivations than in compliance markets. Voluntary market buyers typically want to purchase carbon offsets that align with their corporate values and reflect positively on their organization. For some buyers, this might mean that they wish to purchase carbon offsets from projects local to their facilities or customer base. Other organizations may wish to purchase carbon offsets from projects that have exceptional co-benefits such as improving the lives of low income communities. From the standpoint of potential buyers or funders, Residential Offset projects are attractive because they are:

- Developed using a rigorous VCS approved methodology;
- Validated and verified by an independent third party;
- Impacting local communities and directly passing energy and cost benefits to families and/or low-income citizens;
- Stimulating the local economy and creating local jobs.

When deciding how best to market the project, the PP should be aware of different methods available for selling Residential Offsets. The benefits and challenges relating to a number of different sales methods are outlined in Table 9 on the next page.

The VCS registries' websites include information on many carbon offset buyers, and may be a helpful tool for identifying direct buyers, brokers, and retailers. PPs should prepare a one to two page summary of the project in anticipation of buyers asking for more details on the project. A project summary or 'sales brochure' is helpful regardless of which approach the PP decides to take.

Sales Contracts

Contracts for the purchase of GHG offset projects are typically called Voluntary Emissions Reduction Purchase Agreements (VERPAs). These are very specialized contracts that cover a range of issues not normally specified in other sales agreements. There are many law firms in the United States that have experience in negotiating these types of carbon offset sale agreements. It is recommended that PPs seek the assistance of qualified counsel when negotiating contracts.

A VERPA may need to address a number of key areas including Residential Offset delivery amounts and schedule, amendments, changes to governing law, project risk, costs, monitoring and reporting, duration, exclusions, termination, liability and cost implications, and contingencies. Although typically expensive, PPs can also go through carbon offset brokers should they not have the legal expertise within reach for preparing VERPAs.

As with most transactions, the perspective of the buyer is largely different than that of the seller (the PP); however, one common goal of the buyer and the seller is to reduce risk. In Residential Offset sales, the

Table 9: Residential Offset Sale Approaches

	Description	Benefits	Challenges
Direct Sales	Some PPs sell directly to the end user of Residential Offsets. PPs typically identify end users by reaching out to local organizations who they suspect might be interested in purchasing offsets, or by responding to statements from organizations requesting information about carbon offset availability	There is no 'middleman,' meaning that the PP does not share revenue with any other intermediary company	The PP will incur costs when performing the 'leg work' associated with finding and negotiating with interested buyers
Brokered Sales	PPs use a broker to match the VCUs with interested buyers. There are several carbon brokers operating in the U.S. who offer this type of service. Brokers often have long standing relationships with buyers and a good understanding of the types of project co-benefits that mean the most to each buyer	The PP does not need to do the 'leg work'	May receive a lower price after broker fees
Retail Sales	Some organizations, called 'retailers,' purchase VCUs from projects and then bundle them for resale to customers, often in smaller volumes than in direct or brokered sales. From a PP's point of view, this approach acts very much like a brokered sale	The PP does not need to do the 'leg work'	May receive a lower price after retailer fees

assignment of risk is largely defined by the timeframe in which the sale is occurring.

If the PP is pre-selling credits to generate capital prior to the project's implementation, the buyer assumes a large amount of the risk. This is because the PP has not yet successfully demonstrated they can generate Residential Offsets in the timeframe and quantities planned. The PP may need to accept a lower price per Residential Offset in return for increased buyer risks. However, this negative pressure on price may be counterbalanced by the fact that some buyers place a premium on the first Residential Offsets created by a project. In some cases, the PP faces negative consequences if they fail to deliver the quantities of Residential Offsets specified in a contract. Therefore, the PP needs to be very careful in what it promises in the contract.

A buyer can avoid most risk by purchasing Residential Offsets after they have already been registered as VCUs with a VCS registry. Buyers may agree to purchase Residential Offsets at a higher price in exchange for immediate delivery.

PPs may also sign long-term agreements where a buyer wants to purchase a set amount of VCUs each time the project is verified.

Resources

The VCS lists approved registries at their website, **www.v-c-s.org**.

Bloomberg New Energy Finance/Ecosystem Markeplace jointly publish a freely available annual report, the State of the Voluntary Carbon Markets, that contains useful voluntary carbon market insights such as carbon offset price data. The report is available at **www.foresttrends.org**.

The World Bank produces a report, State and Trends of the Carbon Market, which provides information on regulate and voluntary carbon markets. The report is available at **www.worldbank.org**.

The International Emissions Trading Association provides an example VERPA at **www.ieta.org**.

PHASE 8: MARKETING

Marketing is the process of communicating the value of carbon offsets to customers and relevant stakeholders. Marketing is important to ensure that the maximum value is received from carbon offset transactions and to defend projects from public scrutiny. Although more commonplace today than 20 years ago, carbon offsets still receive criticism. As such, care must be taken to accurately, transparently, and effectively communicate the benefits of Residential Offset projects.

Carbon offsets can be a difficult concept for many audiences to understand. PPs will likely have more success speaking to the tangible co-benefits of a project, rather than explaining how carbon offsets work in relation to GHG emission reductions. Some of the co-benefits of Residential Offset projects include improvements in living conditions, reductions in home energy expenditures, and creation of local jobs. These types of co-benefits are easy for general audiences to understand when compared to the complicated concepts of carbon markets and carbon accounting.

Media / ENGO Risks

Accurate carbon accounting of a Residential Offset can help reduce the risk that third parties, such as environmental non-governmental organizations (ENGOs), publicly critique a Residential Offset project. Typically, outside monitors will claim that the project is weak on the basis of additionality or other complicated aspects of a project. Public criticism of a project should be expected; some organizations and individuals believe that carbon offsets are not 'true' instruments of climate change mitigation. Because climate change and carbon offsets can be contentious issues, the media may be attracted to such conflicting viewpoints. In addition to accurate carbon accounting, there are a number of strategies that can help prepare for or respond to potential media scrutiny:

Emphasize the co-benefits of the project. Even when criticism is directed at technical aspects of a project, the most easily communicated outcome of a project is the tangible co-benefits of Residential Offsets, such as increased local economic activity and overall energy cost reductions.

Speak to the overall robustness of the VCS Program. Depending on the audience, even when questions are directed at a specific aspect of a project, it may make sense to focus on the independence and strengths of the VCS Program. Any project created under VM0008 must undergo third-party certification by an accredited auditor. Furthermore, VM0008 went through a stringent approval process, and it is updated periodically to reflect changes in the rules and standards that form the basis of the VCS.

Provide additional transparency regarding weatherization program outcomes. Although the formal process to create Residential Offsets yields a number of reports regarding the weatherization program, PPs may find it beneficial to provide additional reporting. These reports may paraphrase the steps taken to ensure the accuracy of data and, where appropriate, provide relevant examples. This type of approach can make it easier for media to understand the seriousness with which a PP undertook overall Residential Offset project development and carbon accounting, which can help deflect criticism in the first place.

Engage supportive ENGOs early on in the process. The support of an ENGO can help lend additional credibility to the project beyond that provided by the VCS Program and certification by independent auditors. If utilizing this strategy, PPs need to engage the ENGO early on during the feasibility phase to ensure adequate time to establish the relationship. Should considerable criticism emerge, ENGOs can help to serve as an additional credible voice to underscore the benefits of the project.

Media Participant Risks

Due to the complexity of Residential Offset transactions, it is possible that the benefits of the Residential Offset project may be misinterpreted and misreported by media participants including the PP, buyers, and partners. Misreported claims detract from the integrity of a project and can result in negative media attention and decreased Residential Offset value.

One common issue is the confusion between validation and verification, where communication claims that the project has been verified when it has only been validated. Another example of misreporting is where a PP sells Residential Offsets from their weatherization program and then, for their internal organizational GHG inventory, claim emission reductions from the weatherization program. This would represent double counting of emission reductions, an improper method of carbon accounting that compromises the environmental integrity of a project. PPs must take note that once the Residential Offsets are sold, the environmental benefit (GHG reductions) and the ability to communicate those benefits are transferred to the buyer. Once sold, the PP must ensure that they are not making any claim to these transferred rights, since this too may result in media and legal issues.

One effective way to mitigate media participant risks is to actively engage and educate all participants early on by jointly preparing a detailed and agreed upon communication plan. The communication plan may describe the planned and periodic communications between all media participants, provide guidance on responding to unsolicited requests for information, and identify the participant(s) responsible for providing public information. In short, the communication plan should:

- Describe the purpose and intent of the Residential Offset project;
- Describe the benefit of the project in terms of carbon reductions and co-benefits;
- Establish communication tactics and objectives (e.g. clear messages and talking points tailored to target audiences);
- Identify and define roles and responsibilities of a designated spokesperson to speak to all matters regarding the program;
- Identify target audiences (e.g. media, shareholders, and management) and the purpose of communicating with each audience; and
- Define the types of communications that will be deployed such as advertising, promotions, presentations, and social media.

Key to any communication plan is ensuring that all parties have the most up-to-date, accurate, and complete information at all times. Although the intent of the communication plan is to establish a process so that all parties work together before releasing media material, it is extremely important that participants have experienced staff available to work to help prepare and approve public material. This will avoid unnecessary embarrassment and retraction of communications around what would have otherwise been a generally positive project.

Resources

Examples of carbon offset marketing materials may be found by searching for news and other public disclosures by buyers and sellers of carbon offsets. The VCS registries' websites can help identify carbon offset buyers and sellers. A list of VCS registries is available at **www.v-c-s.org**.

References

REFERENCES CONTENTS

LIST OF ACRONYMS

BAU	Business-As-Usual
CQP	Carbon Quantification Project
GHG	Greenhouse gas
GWP	Global Warming Potential
M&V	Measurement and Verification
PA	Project Administrator
PP	Project Proponent
mtCO2e	Metric Tons of Carbon Dioxide Equivalent Emissions
QA/QC	Quality Assurance/Quality Control
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VERPA	Verified Emission Reduction Purchase Agreement
VM0008	Methodology for the Weatherization of Single Family and Multi-Family Buildings
VVB	Validation and Verification Body

GLOSSARY

Terms followed by '***(VM0008)***' and '***(VCS)***' are defined by VM0008 and VCS Program documents, respectively, and have official VCS meaning that may be updated from time to time. Definitions provided in this section may differ from specific guidance provided in official VCS materials.

Appliance *(VM0008)* – A major or minor household Appliance such as refrigerator, microwave, dishwasher, space heater, and water heater.

Building Envelope *(VM0008)* – The exterior thermal boundary of the physical structure of an individual building.

Carbon Accounting – An agreed upon process designed to assure buyers and other users that carbon offsets are of high quality.

Carbon Offset – A term used in this guide to describe one metric ton of Carbon Dioxide equivalent emission reductions. In this guide, the term 'carbon offset' is often used in the place of 'carbon credit' or 'VCU' for simplicity purposes. The VCS does not officially approve of the term carbon offsets as used in this guide.

Cooling Degree Days *(VM008)* – A measure of the cumulative degree difference between the warmer outside temperature and the base temperature of the conditioned space on a daily basis during the cooling season.

Double Counting *(VCS)* – The scenario under which a singular GHG emission reduction is monetized separately by two different entities or where a GHG emission reduction is sold to multiple buyers.

Dwelling *(VM0008)* – A single family house, including a mobile home, or an apartment within a multi-family building.

Energy Load *(VM0008)* – The sum of the heat load, cooling load and the electricity demand per Dwelling.

Grouped Project *(VCS)* – A project to which additional instances of the project activity, which meet pre-established eligibility criteria, may be added subsequent to project validation.

Heating Degree Days *(VM0008)* – A measure of the cumulative degree difference between the colder outside temperature and the base temperature of the conditioned space on a daily basis during the heating season.

Instance *(VCS)* – See 'Project Activity Instance.'

R-value *(VM0008)* – A measurement of thermal resistance.

Methodology *(VCS)* – A specific set of criteria and procedures, which apply to specific project activities, for identifying the project boundary, determining the baseline scenario, demonstrating additionality, quantifying net GHG emission reductions and/or removals, and specifying the monitoring procedures.

MaineHousing – The Maine State Housing Authority.

Performance Benchmark *(VCS)* – A benchmark against which the performance of individual projects is assessed for the purpose of determining additionality and/or the crediting baseline.

Performance Method *(VCS)* – A methodological approach that establishes a performance benchmark to determine additionality and/or the crediting baseline in accordance with the VCS rules.

Program Administrator – An entity that is responsible for coordinating a weatherization program and its component project activity instances.

Project *(VCS)* – The project activity or activities implemented as a GHG project and described in the project description.

Project Activity *(VCS)* – The specific set of energy efficient measures specified in VM0008 which result in GHG emission reductions.

Project Activity Instance (Instance) *(VCS)* – A particular set of implemented technologies and/or measures that constitute the minimum unit of activity necessary to comply with the criteria and procedures applicable to the project activity under the methodology applied to the project. For VM0008, an instance may be defined as an eligible energy efficiency retrofit or replacement of a Dwelling or Appliance.

Project Crediting Period *(VCS)* – The time period for which GHG emission reductions or removals generated by the project are eligible for issuance as VCUs, the rules with respect to the length of such time period and the renewal of the project crediting period being set out in the VCS Standard.

Project Crediting Period Start Date *(VCS)* – The date on which the first monitoring period commences.

Project Description *(VCS)* – The document that describes the project's GHG emission reduction or removal activities and that uses either the VCS Project Description Template or the project description template specified by the relevant approved GHG program.

Project Method *(VCS)* – A methodological approach that uses a project-specific approach for the determination of additionality and/or the crediting baseline in accordance with the VCS rules.

Project Proponent *(VCS)* – The individual or organization that has overall control and responsibility for the project, or an individual or organization that together with others, each of which is also a project proponent, has overall control or responsibility for the project.

Project Start Date *(VCS)* – Date on which the project began generating GHG emission reductions.

Project Unit – A set of retrofit activities defined to be part of the Same Building Stock per VM0008. A Project Unit has the same eligibility criteria and the same method for calculating the baseline, additionality, and emission reductions.

Same Building Stock *(VM0008)* – Means Dwellings 1) in the same state, province, or region, 2) in the same category (single family or multi-family), and 3) inhabited by the same income group (low-income, middle-income or high-income) as defined by a recognized authority.

Residential Offset – Carbon offsets from weatherization activities measured using VM0008. The VCS does not officially approve of the term Residential Offset as used in this guide.

Weatherization *(VM0008)* – Energy efficiency measures in Dwellings. Weatherizing shall refer to the act of installing energy efficiency measures in Dwellings.

Validation – A systematic, independent and documented process for the evaluation of a project's GHG assertions in a Project Description (PD) against criteria established by a methodology and the VCS Program.

Validation/Verification Body (VVB) *(VCS)* – An organization approved by the Verified Carbon Standard Association (VCSA) to act as a validation/verification body in respect of providing validation and/or verification services in accordance with the VCS rules.

Verification – a systematic, independent, and documented process for the evaluation of a project's GHG assertion against criteria established in the relevant PD, methodology, and VCS guidance.

Verification Report *(VCS)* – The written report of the verification prepared by the validation/verification body in accordance with the VCS rules.

Verified Carbon Unit (VCU) *(VCS)* – A unit issued by, and held in a VCS registry representing the right of an accountholder in whose account the unit is recorded to claim the achievement of a GHG emission reduction or removal in an amount of one (1) metric tonne of CO2 equivalent that has been verified by a validation/verification body in accordance with the VCS rules. Recordation of a VCU in the account of the holder at a VCS registry is prima facie evidence of that holder's entitlement to that VCU.

Verification Period *(VCS)* – The time period specified in a verification report during which the GHG emission reductions or removals were generated and have been verified by a validation/verification body.