Financing Residential Energy Efficiency with Carbon Offsets

Steve Erario
Energy Programs Associate at Alarm.com

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Steve Erario served as the Carbon Project Coordinator at MaineHousing, which houses the state of Maine’s weatherization program. In that role, he helped develop the certified carbon offsets project from 2010 to 2012. Ultimately Steve managed the sale of carbon offsets to Chevrolet Motors, and the revenue from the sales are currently being used to weatherize low-income homes in Maine.

Prior to MaineHousing, Steve helped create a sustainability nonprofit, Sustain Mid-Maine, and consulted internationally on greenhouse gas, watershed quality, and natural resource management issues.

Steve holds a B.A. in Environmental Policy from Colby College and he has certifications from the Greenhouse Gas Management Institute, the Building Performance Institute, and the Environmental Change Management Institute.

He was awarded the Colby College Philanthropist of the Year award, he is a Morris K. Udall Scholar, and he was a Clean Air-Cool Planet Climate fellow. Steve is currently a Senior Fellow at the Environmental Leadership Program and serves on the board of the Udall Scholar Alumni Association.
Overview

- MaineHousing
- Carbon Financing Model
- 8 Phases of Residential Offset Development
- Questions
MaineHousing

- Maine agency that administers Weatherization Assistance Program (WAP) funding

- Existing need for low-income weatherization funding was greater than funding availability

- Began focusing on carbon offsets as an additional financing stream in 2008

- Secured investment from Chevrolet in 2012, proving the concept
MaineHousing Goals

• Develop Methodology

• Pilot Project – Develop and Sell Carbon Offsets

• Share Lessons Learned
# MaineHousing Funders and Partners

<table>
<thead>
<tr>
<th>Methodology Development</th>
<th>Project Development</th>
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<tbody>
<tr>
<td><strong>Funders</strong></td>
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<td>Ford Foundation</td>
<td>Chevrolet</td>
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<td>New Jersey Housing and Mortgage Finance Agency</td>
<td>U.S. Department of Energy</td>
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<td>Pennsylvania Housing Finance Agency</td>
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<td>Unity College</td>
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<td>Harvard Law School</td>
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<td>Lee International</td>
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<td>Oak Ridge National Laboratory</td>
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<td>Verified Carbon Standard</td>
<td>Lee International</td>
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<td>Verified Carbon Standard</td>
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Timeline:
- '08
- '09
- '10
- '11
- '12
- '13

Source: MaineHousing
Contributing Organizations

- CLIMATEFOCUS
- INTERNATIONAL
- clean energy solutions
- Stantec
- Conservation Services Group
- NREL
- NASCSP
- leap local energy alliance program
Handbook and Financial Calculator

Available for download at:  www.mainehousing.org/carbon
Carbon Financing Model
Definition: A reduction in emissions of carbon dioxide or greenhouse gases made in order to compensate for or to offset an emission made elsewhere.

In this presentation, carbon offsets are also called “residential offsets”.

Source: MaineHousing
Voluntary Carbon Market Transaction Value

Figure 8: Historic Voluntary Carbon Market Transaction Value
US$/tCO₂e

Source: Ecosystem Marketplace. Note: Based on 862 observations.
Verified Carbon Standard

• VCS is a greenhouse gas (GHG) program that provides a framework for measuring GHG reductions or removals

• Sets rules for and approves:
  – General carbon accounting
  – Methodologies
  – Third-party auditors

• Does not typically get involved in:
  – Detailed technical reviews of specific projects
Validated VCS Methodology

VM0008, The Methodology for Weatherization of Single Family and Multi-Family Dwellings, is available for download from www.v-c-s.org
Financing Model

Source: NREL

Source: Maine Housing
8 Phases to Residential Offset Project Development
8 Phases of Project Development

Phase 1: Feasibility Assessment
Phase 2: Project Financing
Phase 3: Project Description
Phase 4: Validation
Phase 5: Monitoring
Phase 6: Verification
Phase 7: Issuance and Sales
Phase 8: Marketing

Weatherization Program Activities
- Ongoing Emission Reductions

Figure 8: The Eight Phases of Residential Offset Project Development

Source: MaineHousing
Project Timelines: 1 to 3 Years

One Year -
- Rigorous Online Data and Monitoring
- Few Legal Issues
- Clear Ownership
- Willing Buyer
- Previous Experience with M&V

Two Years +
- Manual Data and Monitoring
- Ownership in Question
- Lack Project Management Resources/Personnel
## Phase 1 – Feasibility – Allowable WAP Activity

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

Source: MaineHousing
Whether an organization decides they can generate profits from carbon offset sales depends on a number of factors:

- Is there sufficient scale (or can the organization partner to achieve sufficient scale?)
- What price can be secured for carbon offsets?
- Are there financial benefits that might arise aside from the actual sale of carbon offsets?
Phase 1 & 2 – Feasibility and Financing Other Benefits

• Proof of Positive Program Impacts
  o Third-party verification of weatherization program energy savings
  o Can be streamlined with other measurement and verification (M&V) requirements to reduce incremental costs
  o Highlight other weatherization benefits such as job creation, cost savings, and occupant comfort

• Improvement in Program Management
  o Tracking of weatherization process and its outcomes
  o Framework and financial incentive to enhance program management oversight

• Organizational Capabilities and Branding
  o Demonstrate:
    – ability to attract non-traditional long-term funding sources
    – capacity to plan and execute advanced projects
    – organizational support of energy efficiency, climate change mitigation, job creation, and local economic growth
  o Attract non-carbon financing from internal or external sources
• Similar to writing and securing third-party approval for a weatherization program energy efficiency savings M&V plan

• Based on weatherization activities that will occur in the future
  o Include projections of various data
  o Expected savings per home
  o Expected number of completed weatherization units per year
Phase 3 – Project Description

• A description of the weatherization program and project activity boundaries

• A description of the features that will be shared by each of the weatherized 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
Phase 3 – Project Description, Continued

• 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 Project Proponent and Project Administrator for each project unit, including contractors (e.g. energy auditors and construction crews).
Phase 4 – Validation Documentation

February 2012

VALIDATION REPORT: VCS Version 3

Summary:

The Weatherization of Low-income Dwellings in Maine project (the Project) is a grouped project involving energy efficiency improvements to single family, multi-family, and mobile home dwellings of low-income residents within the state of Maine. The Project reduces the heat load of dwellings, thereby reducing fossil fuel consumption and resulting in a net reduction of CO₂ emissions. The Maine State Housing Authority (MaineHousing) is the Project Proponent and owns all rights to emission reductions generated by the Project.

The validation process consists of the independent third-party assessment of the project design and emission reduction assertion against the criteria stated in the Verified Carbon Standard (VCS) Standard, 1 February 2012, v3.2 and the approved VCS methodology VM0008 (Version 1).

During the validation process, First Environment, Inc. issued several clarification and corrective action requests – all of which were addressed adequately by MaineHousing. In summary, First Environment, Inc. is reasonably assured that the Project meets all relevant VCS Version 3 requirements and correctly applies the approved VCS methodology VM0008.
Phase 5 & 6 – Monitoring & Verification

• Similar to gathering data and gaining third-party approval for energy efficiency savings and M&V calculations

• Based on weatherization activities that have previously occurred

• Based on actual data that has already been collected
Phase 5– Monitoring Report

- 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 Project Description

- 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
Phase 6 - Verification Report

February 2012

VERIFICATION REPORT: VCS Version 3

Summary:

The Project is a grouped project involving energy efficiency improvements to single family, multi-family, and mobile home dwellings of low-income residents within the state of Maine. The Project reduces the heat load of dwellings, thereby reducing fossil fuel consumption and resulting in a net reduction of CO$_2$ emissions. The Maine State Housing Authority is the Project Proponent and owns all rights to emission reductions generated by the Project.

The verification process consists of the independent third-party assessment of the project design and emission reduction assertion against the criteria stated in the Verified Carbon Standard (VCS) Standard, 1 February 2012, v3.2; the approved VCS methodology VM0008 (Version 1) and the validated Project Description (VCS PD).

The Project claims emission reductions of 7,008 metric tonnes CO$_2$e for the verification period of February 10, 2010 through December 31, 2011. First Environment is reasonably assured that the Weatherization of Low-income Dwellings in Maine Project meets all relevant requirements in the VCS Standard, 1 February 2012, v3.2, and is consistent with the VCS methodology VM0008 (Version 1) and the validated VCS PD.
Voluntary carbon market, where carbon offsets are sold, is liquid and variable

Transactions total roughly $500 million per year

The most typical buyers are businesses looking for some type of public relations benefit

Types of sales approaches for weatherization programs
  - Direct sales – No middleman, requires more time and knowledge of markets
  - Brokered sales – Uses middleman to identify willing buyer(s)
  - Retail sales – Similar to brokered sale, except sold to more smaller volume buyers
Phase 7 – Sales

• Contracts for the purchase of GHG offset projects are typically called Voluntary Emissions Reduction Purchase Agreements (VERPAs)

• MaineHousing consultant Lee International acted as the carbon broker
  o Carbon brokers have contacts with interested buyers in the carbon offset space

• MaineHousing and its consultants negotiated on price and terms with Bonneville Environmental Foundation (BEF), who acted as the broker for Chevrolet

• Like most contracts, the one between MaineHousing and BEF specify that price and terms cannot be disclosed
Phase 8 – Marketing

• Emphasize the co-benefits of the project

• Speak to the overall robustness of the VCS Program

• Provide additional transparency regarding weatherization program outcomes

• Engage supportive environmental non-governmental organizations early on in the process
Questions?

Guidebook and financial calculator available free for download at:
www.mainehousing.org/carbon

Contact:
s.erario@gmail.com