



WHY DOES THIS MATTER?

A detailed understanding of the types of projects that can generate carbon offsets will help campuses evaluate their options in procuring offsets, and will aid their decision in determining which types of projects will best meet the institution's goals.



INTRODUCTION



TYPES OF OFFSET PROJECTS

Carbon offsets can be produced in a number of ways. This primer includes descriptions of common types of carbon offset projects, with examples of each from the voluntary carbon market. The project types included are:

- Energy Efficiency
- Fuel Switching
- Renewable Energy
- Biological Sequestration
- Methane Gas Destruction
- Industrial Gas Destruction

ENERGY EFFICIENCY

Energy efficiency projects use less energy and less fuel than a business-as-usual scenario. Examples of this type of project include converting a fleet of vehicles to a fleet of more fuel-efficient vehicles, replacing inefficient HVAC mechanical or water heating systems, renovating buildings to make them more efficient at retaining thermal energy, or replacing incandescent light bulbs with LED light bulbs. There are also creative ways that energy efficiency can be achieved. For example, installing auxiliary power units in tractor-trailer trucks produces heat and light more efficiently than idling diesel engines.



CONSIDERATIONS

Energy efficiency projects tend to have straightforward carbon accounting and methodologies, however there are some challenges worth considering including establishing a baseline and determining additionality.

For energy efficiency projects, continued monitoring is also important to ensure emissions reductions are consistent and efficiency is maintained over time.

EXAMPLES OF ENERGY EFFICIENCY PROJECTS

- 1 The University of Illinois, Urbana-Champaign Campus Wide Clean Energy & Energy Efficiency** is an energy efficiency project registered with the Verified Carbon Standard (VCS) program. The university remodeled its high energy-use buildings to reduce energy, cut on-site coal use and gas cogeneration facilities, and implemented lighting retrofits.
- 2 Improved Household Charcoal Stoves in Ghana** is a project registered through the Gold Standard program. This project reduces emissions by replacing inefficient cookstoves with fuel-efficient charcoal stoves for both residential and commercial uses.
- 3 Weatherization of Low-Income Dwellings in Maine** is a VCS project that implemented energy efficiency improvements to single-family, multi-family, and mobile homes. Improvements included replacing existing mobile homes with high-efficiency, Energy Star rated homes.

FUEL SWITCHING

Fuel switching projects reduce the consumption of fossil fuels by switching to cleaner or renewable fuel sources for the same activity, thereby producing legitimate offsets. Examples of this include switching from oil to natural gas to power an on-campus electricity generating plant, or powering a fleet of vehicles with ethanol instead of gasoline or biodiesel instead of fossil diesel.



EXAMPLES OF FUEL SWITCHING PROJECTS

- 1 Metrolina Greenhouses, Inc.**, a VCS project, is switching from fossil fuels to renewable biomass in its heat generation equipment in Huntersville, North Carolina. By serving as a primary heating source, the biomass heating system will achieve greenhouse gas (GHG) reductions by using renewable biomass instead of natural gas to produce thermal energy needed for the company's operations.

- 2** **The Rio Negro Ceramic Fuel Switching Project** is a VCS project in Brazil that switched from nonrenewable biomass to renewable biomass for thermal energy generation in the ceramic industry. This reduced rates of deforestation, resulting in emissions reductions.

RENEWABLE ENERGY

Renewable energy offset projects move energy production away from reliance on fossil fuels and promote long-term sustainability. They include both thermal and electric applications. Thermal projects may consist of building infrastructure for geothermal, solar thermal or biomass (e.g. wood chips). Electricity projects may consist of installations of photovoltaic solar power, wind, hydro, and biomass in the form of waste wood, wood chips, cow manure, or other organic products. Investment in renewable energy projects can develop the renewable energy market, bring down costs in the future, and eliminate dependence on fossil fuels.



CONSIDERATIONS

Signatories considering purchasing offsets from renewable energy projects should ensure that the offsets meet proper additionality standards and are not double-counted. It is important to distinguish between renewable energy projects that are tied to the grid and those that are standalone. Projects that are tied to the

grid are more likely to be double-counted and be incentivized by regulations. Standalone or thermal energy projects may have less potential for double-counting, but should still be examined to make sure they are additional to existing or proposed regulations.

EXAMPLES OF RENEWABLE ENERGY PROJECTS

- 1** **Reading Wind Energy, LLC., is a VCS project** where fossil fuel-powered electricity generation is displaced by wind-powered renewable electricity generation. The project installed 62 new wind power turbines in Lyon and Osage Counties, Kansas. It's estimated to achieve 300,000t CO₂e reductions over the 10-year crediting period.
- 2** **La Ferme-Bambous solar photovoltaic power plant** is a VCS project that constructed a 15.2 MW solar photovoltaic power plant in Mauritius. The plant will produce electricity to replace coal and fuel oil-powered electricity currently available on the grid.
- 3** **Ball State University** implemented a district scale geothermal plant on campus to generate carbon offsets through VCS. The geothermal plant replaced the school's coal-fired boilers and will cut the campus carbon footprint roughly in half.

BIOLOGICAL SEQUESTRATION



Biological sequestration includes a range of forest-based activities such as afforestation, reforestation, enhancing forest management, expanding the use of sustainable forest products, and reducing emissions from deforestation and forest degradation (also referred to as REDD). Biological sequestration can also include different types of land-management projects such as avoided grassland conversion.

CONSIDERATIONS

As deforestation is a large source of anthropogenic GHG emissions, any activities that promote the protection, replanting, and sustainable management of forests can be an important part of colleges and universities' Climate Action Plans. Forestry offset projects do have some concerns, such as permanence and leakage. Planting trees on land that has not been forested previously may remove carbon from the atmosphere in the short term; however, forests may be lost altogether due to a disturbance such as a

forest fire or insect outbreak. In such cases the carbon sequestered by the forest would be re-released into the atmosphere, the removal would not be permanent, and any offset credits produced from the initial activity would no longer be valid. Biological sequestration projects can also have problems with leakage. Leakage is a decrease in the amount of carbon sequestered by the project because planting or conserving forests in one area cannot prevent clear-cutting in another area.

EXAMPLES OF BIO. SEQUESTRATION PROJECTS

- 1 The White Mountain Apache Tribe Carbon Project** is an Improved Forest management project through the American Carbon Registry (ACR). Management of this Arizona forest will increase the forest carbon stock relative to the baseline harvesting activities and thus reduce carbon emissions.
- 2 The Cuyamaca Rancho State Park Reforestation Project** is a reforestation project in California registered with the Climate Action Reserve (CAR). This project will sequester carbon from the atmosphere by replanting and restoring a conifer forest that was destroyed by a fire.
- 3 The Cochabamba Project** is a project in Bolivia through the carbon program Plan Vivo. This project focuses on reforestation and economic development of small-scale farmers to reduce emissions from deforestation.
- 4 The Lightning Creek Ranch project** in Wallowa County, Oregon, is a CAR project that is conserving 4,112 acres of grassland by placing it under a permanent no-till conservation easement. This will avoid the emissions by preventing the conversion of this grassland to cropland.

METHANE GAS DESTRUCTION



Methane is a potent greenhouse gas with a global warming potential 21 times that of CO₂ on a 100 year timeframe. It is most often emitted from landfills, livestock, and from coal mining. Methane projects can produce carbon offsets through capture of methane and energy production. When the methane is captured and burned, the resulting CO₂ can be used to produce heat and electricity. Some landfill operations are a typical example.

CONSIDERATIONS

Methane projects are currently a popular offset project type given their credibility, cost-effectiveness, and straightforward approach. It is usually quite easy to establish additionality for methane projects because there is generally no other source of revenue from the

activity aside from the sale of offsets. Moreover, the GHG emissions reductions estimates are often more straightforward than other offset project types, as methane projects typically involve measuring gas flowing through a pipe and do not rely on predictions.

EXAMPLES OF METHANE GAS DESTRUCTION PROJECTS

- 1 Elk Creek Coal Mine Methane Destruction & Utilization** is a CAR project that utilized and destroyed methane gas from the Elk Creek coal mine in Somerset, Colorado. Mine methane which would have been released into the atmosphere was destroyed to produce electricity.
- 2 The Big Sky Dairy** is a project in Idaho certified through ACR. The dairy farm replaced its manure management system with a digester to capture and destroy biogas produced by the manure. The new system reduces agricultural emissions while also generating electricity.
- 3 The Avoidance of Methane Emissions at Organic Compost Soil Amendment Facility** is a Gold Standard project in Alabama. Chicken litter and green waste will be collected and composted by aerobic decomposition to generate high quality organic compost. The composted materials are diverted from landfill, thus avoiding methane generation from anaerobic decomposition.
- 4 Spartanburg County Landfill Gas Combustion** project, through VCS, destroys landfill gas from a landfill in South Carolina. The landfill gas is collected and destroyed through a flare.

INDUSTRIAL GAS DESTRUCTION



Many gases that are manufactured for industrial use, or byproducts of industrial processes, have very high global warming potentials. Examples include N₂O, HFCs, PFCs, and SF₆. Because of the high global warming potential, destruction of industrial gases can provide a large number of emissions reductions at a very low cost.

CONSIDERATIONS

Industrial gas destruction projects are sometimes criticized for the risk of discouraging regulations needed to phase the gases out, or worse, creating

an incentive to build more factories that produce industrial gases, so that they can benefit from future carbon offset projects (SEI, 2011).

EXAMPLES OF INDUSTRIAL GAS DESTRUCTION PROJECTS

- 1 Honeywell HFC-23 Destruction Project**, through the VCS program, will reduce the potent industrial gas HFC-23 released into the atmosphere by decomposing it in the manufacturing plant located in Baton Rouge, Louisiana. Honeywell undertook construction and installation of capital equipment that is capable of collecting and decomposing the HFC-23.
- 2 Terra Yazoo City Nitrous Oxide Abatement Project** is a CAR project to reduce the N₂O released as a byproduct of nitric acid production. The project installs a catalyst to abate the N₂O after its formation.

CONTACT US:

We hope this document is helpful.
Have questions or recommendations for improvement?

Please contact us at info@secondnature.org.

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