



Urban Forest Greenhouse Gas Reporting Protocols

US Forest Service, Pacific Southwest Research Station, Center for Urban Forest Research

Key concepts

Project activity

- Carbon storage: Carbon stored in above and belowground biomass minus GHG emissions for tree care (mandatory)
- Energy conservation: Reduced emissions of CO₂ at the power plant due to reduced energy use (optional, recommended, but not registerable)
- Bioenergy: Displaced emissions through use of tree residue as biofuel (optional, recommended, but not registerable)

Additionality

All project activity must exceed the baseline before it can be registered.

Project baseline

- Municipalities: 0.001 net gain trees per capita
- Campuses: 0.03 net gain trees per maintained acre
- Utilities: No baseline

Leakage

Projects must result in an overall net gain of GHG benefits for an entity and not simply shift resources around.

Tree maintenance plan

- Planting
- Removals
- Pruning
- Administration

Ownership

Project developers must demonstrate that they either own the land the trees are planted on or must receive clear contractual rights to the carbon stored in the trees in perpetuity.

Verification

Third-party verification helps meet the Registry's standards of relevance, completeness, consistency, transparency, and accuracy.

Overview of the reporting process

Initial Project Report

Entity components

1. Provide general background information on your entity.
2. Describe your existing tree resource, including a summary description of your inventory and current management levels of service and budgeting.
3. Calculate carbon stock of existing tree resource (optional).
4. Create a **tree maintenance plan** for nonproject trees documenting future maintenance levels of service and expected budgets by program area. Note any anticipated future trends in maintenance or budgets based on tree health, overall species and age diversity, new development plans, changes in funding guidelines.

Project components

1. Provide general background information on the project.
2. Document the eligibility requirements for your project.
3. Create a **tree maintenance plan** for project trees documenting future annual tree planting, removal, replacement, maintenance levels of service and expected expenditures by program area..
4. Describe how the project will be monitored over its lifetime.
5. Calculate the **project baseline**.
6. Characterize, quantify, and forecast the **project activity** based on modeling assumptions. Estimate **carbon storage** (mandatory) and other GHG benefits due to **energy conservation** and use of tree residue for **bioenergy** (optional and not registerable, but recommended).
7. Estimate **GHG emissions** related to tree care.
8. **Assess additionality** as the difference between emissions reduced due to project activity and the baseline, accounting for tree-care-related emissions.
9. Characterize and quantify potential negative and positive impacts of the project (both optional).
10. Assess potential **leakage**.
11. Submit your report for pre-screening if desired or together with your first year's Annual Monitoring Report.
12. Have project activity **verified** by third-party verifier.

Annual Monitoring Report

1. Document compliance within 10% for both tree maintenance plans to assess leakage.
2. Calculate the year's and the running baselines.
3. Quantify the project activity for the year, account for GHG emissions, and assess additionality.
4. Have CRTs verified every six years.

Utility Company Case Study

The program will increase tree canopy permanently by maintaining 5,000 new sites permanently in tree cover to:

- Produce approximately 49,000 metric tons (t) of GHG benefits over the 100-year program lifetime (~7,750 t will be verifiable).
- Reduce annual and peak demand for air conditioning.
- Improve the environment, economy, and quality of life for customers in sparsely treed neighborhoods.

UtCo will plant 5,000 tree sites in 2008 with #24 box trees and will plant replacements each year for trees that die. The sites will be strategically located to shade the west walls of new residences with central air conditioning. Trees will be located 20 to 40 ft (6-12 m) from west walls. To maximize GHG benefits, large-stature trees will be the focus of planting. The 100-year program will end in 2107, although GHG benefits will accrue beyond that time.

Residents must sign an agreement obligating them to:

- Deed ownership of carbon in the tree(s) to UtCo in perpetuity
- Obtain training in tree planting and maintenance as needed
- Agree to provide regular watering, inspect/prune and to report tree health problems
- Agree to plant the approved species in the designated location, as per specifications
- Agree to permit access to the tree for monitoring or tree care activities

During the first two years after planting, trained volunteers from a local nonprofit tree organization will visit each tree site at least once a year to assess tree growth and health. Pertinent tree care information will be shared with residents at this time. Thereafter, growth and health monitoring will be largely accomplished using high-resolution color infrared aerial photography and a geographic information system (GIS). Every year UtCo will conduct a full inventory using remote sensing imagery. UtCo personnel will field survey 250 sites annually to calibrate remotely sensed tree size and health data.

It is estimated that 21,409 trees will be planted over the 100-year program lifetime to continuously maintain canopy cover on the 5,000 tree sites. It is conservatively estimated that by the end of the 100-year reporting period, all but 5% of the original 5,000 will have been replaced.

Program costs are estimated to total \$6.8 million for the 100-year period:

- Trees and planting - \$2.1 million (\$100/tree, 21,409 trees)
- Tree inspection/pruning - \$420,000 (\$10/tree site/yr for the first two years)
- Tree removal - \$410,000 (\$25/tree)
- Administration/other - \$2.5 million (\$5/tree site/yr)
- Monitoring - \$600,000 (\$6,000/year)

- Verification - \$750,000 (\$7,500/year)
- Total cost - \$6.8 million (\$68,200/yr, \$13.60/tree site/yr)

The total 100-year GHG benefit from the program is 49,000 t:

- Sequestration: 9,061 t (gross)
- GHG emissions due to tree care: 1,310 t
- Net sequestration (CRT): 7,750 t (~16%)
- Reduced emissions due to energy conservation: 19,000 (~84%)

The total cost per CRT is \$880. After including energy conservation GHG benefits the cost is \$138 per ton.

The program trees will provide other ecosystem services with an estimated value of approximately \$25 million (\$49/tree site/yr) for the 100-year period. Most significant benefits include air pollutant uptake and conserved energy. Because tree species will be judiciously selected to exclude high water users, species that may contribute to ozone formation, and invasive, no negative impacts are anticipated from this program.