Utilizing the Village of Howard's Public Trees to Offset the Village's Carbon Footprint

By Christopher Clark, Park Superintendent/Forester, Village of Howard, Wisconsin

Urban forests have been recognized as important storage sites for greenhouse gases, primarily CO_2. This process is known as carbon sequestration, or the removal of carbon from the atmosphere and depositing it into a reservoir. Terrestrial carbon sequestration is the process through which carbon dioxide (CO_2) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils.[1] The urban forest vegetation can reduce atmospheric carbon dioxide in two primary ways:

- Trees directly sequester carbon dioxide in their stems and leaves while they grow.
- Trees that grow near buildings can reduce the demand for air conditioning and heating, thereby reducing emissions from energy production methods.[2]

The Village of Howard's urban forest produces many benefits to the community, including energy savings, reducing atmospheric CO_2, improving air quality, reducing storm water runoff, and aesthetics as well as other social , economic, and health benefits.[3]

In a report performed in 2010 for the Forestry Division's Comprehensive Urban Forestry Management Plan, the *i-Tree Streets* urban forestry analysis and benefit computer software program was utilized to quantify the previously described benefits for the Village's public trees located along streets, in parks, and on other Village properties.

i-Tree is a state-of-the-art, peer-reviewed software program developed by the USDA Forest Service and numerous cooperators including Davey Tree Expert Co., National Arbor Day Foundation, Society of Municipal Arborists, and the International Society of Arboriculture. More than 4,900 communities and organizations throughout the country utilize this program to assess the effects and values of their urban forests including Milwaukee, Wisconsin; Minneapolis, Minnesota; Pittsburgh, Pennsylvania; and the Wisconsin Department of Natural Resources.[4]

In 2009, the Village of Howard's L.E. O'Connor Fellow, Jennifer Pollitt, produced the Carbon Footprint Report for the Go Green Save Green Taskforce. This report summarizes the annual CO_2, Energy, and Costs associated with the Village's operations for a multi-year time period of 2006-2008. This report was generated using ICLEI's Clean Air and Climate Protection 2009 Software. The most recent figures that were available in the report were from 2008.

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[1] http://www.epa.gov/sequestration/faq.html
[2] Midwest Community Tree Guide – Benefits, Costs, and Strategic Planting. USDA.
[3] Midwest Community Tree Guide – Benefits, Costs, and Strategic Planting. USDA.
[4] http://www.itreetools.org/

These figures were compared with the information obtained from the Comprehensive Urban Forestry Management Plan to evaluate the benefits the Village of Howard's urban forest has with relation to carbon sequestration and energy savings.

Table 1

	Government Operations Output[5]	Public Tree Benefit[6]	Net Difference
CO_2 (tons)	1063	1247	+184
Energy (MMBtu)	18,714	12,635	- 6079
Costs/Benefits	$665,049	$194,497	- $470,552

The Costs/Benefits in Table 1 compared only energy savings, air quality, and CO_2 sequestration as these were the three metrics used to calculate the carbon footprint of village operations. The total annual benefits for the Village's urban forest for 2010 are summarized in Table 2.

Table 2

Annual Benefits	Total ($)	Quantifiable Resource Units
Energy	153,259	12,635 MMBtu
CO_2	18,707	2,494,235 lbs.
Air Quality	22,531	8,084.7 lbs.
Storm Water	139,668	5,153,458 gal. of rainfall interception
Aesthetics / Other	174,900	Tangible & intangible
Total Annual Benefits	**509,065**	

As the urban forest grows, individual trees will continue to sequester more and more carbon throughout the life of a tree. The overall public tree benefits will increase as the "green infrastructure" of the urban forest grows.

It should be noted that Village-owned natural areas and wooded parklands were not included in these calculations as quantifiable data on trees located in these areas does not currently exist. However these locations, and trees and other vegetation that grow there also contribute to the storage of atmospheric carbon dioxide, as well as other benefits listed earlier.

In summary, the Village of Howard's urban forest has a benefit of carbon dioxide sequestration that currently exceeds the local government's operational output. As additional public trees are planted and grown, the energy savings will continue to improve thus reducing the current negative net difference. Future revisions and calculations to the Carbon Footprint Report as well as the Comprehensive Urban Forestry Management Plan will continue to show the benefits of the Village of Howard's urban forest in relation to the carbon and energy outputs from village operations.

This information will be beneficial in helping the Village achieve target goals and milestones outlined in the Carbon Footprint Report as well as exemplify the Village's commitment to the environment and mitigation of its carbon footprint.

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[5] Carbon Footprint Report – Village of Howard, WI. 2009.
[6] Comprehensive Urban Forestry Management Plan - Village of Howard, WI. 2010.