

Cateechee Strives to Make Footprint in Sustainability



by J. B. Workman

Golf courses play an increasingly important role as some of the only professionally managed green space available in our urban areas today. Carbon dioxide (CO₂) and other greenhouse gases from fossil fuel-based energy are being emitted into the atmosphere and potentially causing changes to our climate and ecosystems. Fortunately, plant life including turfgrasses are able to remove harmful gases from the air.

When turfgrass grows, carbon is sequestered by the plant and deposited in soil and thatch through photosynthesis (Rossi, 2008). Although golf courses are sometimes viewed by those outside the industry as detrimental to the environment, turfgrass managers are extremely responsible stewards of the land. More efficient water use and chemical use are just two examples of how golf constantly strives to enhance its environmental performance.

As pressures mount from state and federal governments to reduce greenhouse gas emissions, a golf club's ability to remove carbon and conserve energy represent potential environmental benefits going for-

ward. A clearer understanding of how carbon processes are managed at golf courses is necessary to improve resource efficiency and environmental performance.

In 2016, Buck Workman, certified golf course superintendent at Cateechee Golf Club in Hartwell, and I investigated the club's carbon footprint. The objectives were to identify which areas of the property emitted and sequestered the most carbon, understand Cateechee's environmental impact on its community and determine where the club could save money.

All carbon emitting processes including energy use, fuel, pesticides, fertilizers and mileage from company vehicles were recorded each month. We also estimated total acres of managed turf, trees and native grasses. Cateechee is unique in that it only manages 70 acres of turf on a 370-acre property, leaving 300 acres of unmanaged native land (e.g. trees, native grasses and shrubs).

All of our recordings were entered into a carbon calculator provided by Andy Staples, president of Staples Golf Design in Scottsdale, AZ (www.staplesgolfdesign.com/tools/). The calculator was developed jointly with Environmental and Turf Services of Wheaton, MD. The calculator is specifically designed to account for carbon producing and sequestering processes at golf facilities. Analyses were conducted at the end of the year to figure a carbon footprint for Cateechee.

Cateechee Golf Club sequestered more carbon from the atmosphere in 2016 than it generated.



Our calculations revealed that the club emitted 190 tons of carbon, which may read like a big number. But over the same period of time, the club removed 195 tons of carbon from the atmosphere by sequestration. That results in an estimated negative five-ton emission for 2016 (five-ton net sequestration; Table 1).

The highest percentage of emissions were generated by energy use at the clubhouse and maintenance facilities (86 percent). The clubhouse's heating and cooling units, along with the pumping station that distributes water to the golf course, contributed large carbon outputs. Most golf courses are close to or at carbon neutral when both the club and pump house emissions are excluded from carbon calculations (Staples, 2016).

Fuel use from equipment and mileage from company vehicles combined for 11 percent of the golf club's emissions. Rough and fairway mowing consumed the most fuel out of all golf maintenance practices that use gasoline or diesel.

Chemical and fertilizer use were low emitters when compared to the other carbon emitting processes. However, chemical use could have been even lower if Cateechee had newer varieties of bentgrass or bermudagrass on the greens. High amounts of fungicides were required to manage the club's 20-year-old blend of Crenshaw/L93 bentgrass greens during the summer months.

That the club was still able to sequester more carbon than it generated was thanks to the significant role played by the club's estimated 200 acres of trees and 100 acres of native grasses. Although trees are not always a golf course superintendent's best friend, our study showed that they remove the most carbon on the property and therefore should be integrated into the landscape as long as shade and nutrient uptake doesn't interfere with turfgrass growth.

Our study showed that golf clubs like Cateechee, which manages what is required to play the game of golf and leaves the rest native, can effectively negate greenhouse gas emissions and therefore have a positive impact on the environment in this area, as they do in so many others.

We found energy use to be the most important management aspect that Cateechee needs to examine going forward in order to save money and provide a more environmentally friendly business to the community. The club could also decrease its carbon output at its facilities by integrating more efficient use of resources or by incorporating renewable energy sources. Solar and wind power are becoming more viable and golf clubs may benefit by incorporating them as cost-control measures.

On the maintenance side, clubs may decrease their carbon output by exploring more efficient ways to reduce their pumping station's overall kilowatt/hour use (kWh). This can be accomplished by shifting away from conventional power sources to less carbon intensive sources like natural gas or the aforementioned solar.

To reduce the amount of fuel being consumed by equipment, identifying which maintenance practices require the most fuel each year is a

Table 1. Cateechee's Carbon Emissions & Sequestration 2016

85.7%	Energy Use	Electricity	640,800	kWh
		Natural Gas	24,000	therms
		Propane	2,055	lbs
2.0%	Fertilizer Use	Organic Nitrogen	85	lbs
		Nitrogen	5,115	lbs
		Phosphorus	1,120	lbs
		Potassium	2,800	lbs
		Lime	1,200	lbs
1.2%	Pesticide Use	Herbicides	420	lbs
		Insecticides	1	lbs
		Fungicides	500	lbs
		Growth Regulator	16	lbs
9.3%	Fuel Use	Gasoline	3,568	gal
		Diesel	2,649	gal
1.8%	Mileage	Mileage	25,000	mi
	Sequestration	Managed Turf	70	acres
		Native Grasses	100	acres
		Trees	200	acres
		Shrubs	3	acres
		Total Emissions:	190.6	tons
		Total Sequestration:	195.2	tons
		Net Emissions:	-4.6	tons

good starting point. Cateechee found that rough and fairway mowing consumed the most fuel in 2016 and so is now looking to implement more resource-conscious mowing techniques and increase operator proficiency.

The fact Cateechee removed more carbon than it emitted during the course of the year provides our industry with a unique opportunity to hone an even more positive message to the non-golfing public. Combine this with our expertise in water conservation and the golf industry can gain the praise it deserves as forward thinking and sustainable. ■

References

- Staples, Andy. Carbon Sequestration and Golf Courses - Superintendent Magazine, 2016.
- Rossi, Frank. Can a Golf Course be Carbon Neutral? A Preliminary Assessment - Cornell University Turfgrass Times, 2008.
- To register for the Carbon Save Calculator, download at www.staplesgolfdesign.com/tools/
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