

## When Tubing is Tapped Out: Recycling Maple Plastics

*Andrea Caluori*

**A**s the maple industry has grown, so too has the use of plastic sap tubing. Solutions are needed to help producers dispose of tubing when it is past its useful life, in ways that ensure it is not merely ending up in landfills.

### Plastic Removal to Increase

Plastic tubing was first introduced to the maple industry in the 1950's, meaning we have spent nearly 70 years generating scraps and discarded used systems. Lateral lines have a lifespan of 10-15 years, and the recommended use for drops is only a few years at most. That's a lot of waste generated in a short time, and the amount of discarded tubing is growing each year.

Sending this plastic to the landfill or leaving it in the woods have typically been the only answers for disposal. But although plastics are inexpensive to produce and require less energy than glass or metal, the concern regarding the environmental impact of plastic in general is on the rise, and consumers are demanding solutions. In some cities single-use plastic bags are banned and companies are becoming more intentional about use of biodegradable and compostable materials for product packaging. With the growing concern surrounding consumption and the effects of waste disposal on the planet, plastics have become a significant part of this public conversation. The maple industry needs to be part of a positive solution when considering the role of plastics in the environment.

### Recycling Maple Tubing

The maple industry primarily uses polyethylene sap lines. When these plastics are discarded into a landfill, they slowly break down into micro-plastics. As they degrade, releasing greenhouse gases contributing to climate change, the small particulates can leach into the environment, contaminating soil and water and even our food supply. The challenge of providing alternative ways to dispose of tubing after removal has been identified by maple researchers as a critical need in light of climate change and the effects of plastic pollution.

Recycling is one option, but only for some. Due to the amount of tubing expected to enter the waste stream in coming years, sugarmakers in some areas can now recycle sap tubing at some waste management facilities. At the heart of this conversation is Dr. Mark Isselhardt at the University of Vermont's Proctor Maple Research Center. In 2018 maple producers in the state of Vermont alone used 10,400 miles of tubing, the equivalent of driving across the United States 3.5 times. Isselhardt is part of a working group currently researching plastic recycling in the maple industry, and helped to launch one of Vermont's pilot programs at the Lamoille Regional Solid Waste Management District. At two of their locations, sugarmakers can schedule drop-offs of maple tubing to be recycled for a small fee. Recycling clean tubing, with all fittings removed, costs \$10 per cubic yard to dispose of.

At the Northwest Solid Waste Man-

agement District in Fairfax, VT, producers can schedule drop-off of clean maple tubing at \$5/cubic yard, or tubing with taps, tees, and other fittings for \$20 per cubic yard. It's important to note that the only acceptable plastic is Polyethylene (PE) sap line. PVC sap line or any other pipe material is not accepted for recycling. If sugarmakers are unsure whether their tubing is PE or PVC, they can simply test a small piece of tubing in water. If it floats, then it is made of Polyethylene and is acceptable for recycling.

One of the issues specifically related to maple tubing is the material's flexibility, which makes it somewhat difficult for automated recycling systems to consolidate – or even to be received initially at most waste management centers. It is a clumsy product to transport and, while lightweight, takes up a lot of space. It is challenging to store and process and requires higher gauge metal to recycle it into new plastic items. To prepare maple tubing for drop-off at facilities, producers are required to cut main line into 3-foot lengths, remove tees, taps and fittings (or pay a higher fee, as indicated above, at the Northwest Vermont Solid Waste Management District) and coil or bundle tubing for easy transport. Each district's waste management unit may have different requirements for drop-off preparations and a varied fee structure depending on whether loads have fittings removed or not.

While in Vermont is home to a handful of established tubing recycling programs, there aren't many others in the Northeast U.S. that appear to be in operation. New York State previously had a program, as did western Massachusetts, although both of these appear to be defunct. If your local waste manage-

ment district does not offer this service, sugarmakers might consider contacting local districts to urge them to launch a pilot program. More demand will help spur more of these facilities to accept tubing for recycling.

Once received by a Vermont recycling facility, tubing is sent to processing plants in Vermont and Arkansas where the material is transformed into smaller particulates to sell to manufacturers making new products such as fleece vests, shopping bags, bottles and other items.

In Québec, the company Environek operates a facility in Saint-Malachie with all of the equipment required to transform maple syrup tubing into granular particulates that can be made into various objects such as agricultural drains, plastic containers, and park accessories. According to the company's website (<https://environek.com/tubulures/>), in Québec approximately 2,900 tons of plastic sap tubing is removed every year – enough to almost fill 9 Olympic swimming pools. Environek offers three options for maple producers to recycle their tubing:

- (1) If all fittings are removed from 5/16 tubing, producers receive \$250/ton.
- (2) If fittings are still present, then Environek will take the tubing at no cost to the producer.
- (3) If metal components (clamps, etc.) are on the tubing at the time of delivery the producer is charged \$150/ton.

In some instances, the company can refuse material for recycling, particularly if tubing is coated with contaminants or plastic film that may reduce

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the quality of the recycled material. Additionally, any tubing received needs to be clean, with as little debris as possible, and not mixed with any other materials. Producers are charged a fee if Environek receives contaminated tubing. Sugarmakers located in Québec interested in recycling their tubing may bring recyclable material directly to the Saint-Malachie factory by scheduling an appointment.

## **Opportunities for Community Engagement**

Recycling or repurposing maple tubing is a great way to engage local community groups and give back to the environment while teaching the public about maple. In 2018 at the Lamoille Regional Solid Waste Management District, UVM Extension partnered with the Stowe Mountain Lodge Employee Epic Volunteer Program where volunteers spent the day removing fittings and taps, cut tubes into smaller lengths and helped recycle over 100 cubic yards of tubing. This helped reduce labor costs plus saved time and money for maple farmers. Sugarmakers might consider contacting nearby scout troops, schools, and volunteer groups interested in supporting local agriculture and looking for service learning opportunities. It's a great way to get cost-free labor while educating visitors about maple. Such volunteer days can also help connect community with grassroots farming and build solid connections between new consumers and their local maple producers.

For those without nearby recycling facilities willing to take maple tubing, other creative solutions may be to partner with neighborhood school art classes interested in turning old sap tubing

into recycled sculptures, or perhaps afterschool craft programs looking for donated materials for creative projects. Summer camps often provide campers with arts and crafts programs, too. Producers could offer to showcase some of them in the sugarhouse as a way to promote the role of their operation within the community. Even farm education programs can use old sap tubing for both art projects and as a part of their toolkit for teaching kids about maple production. Program initiatives such as these inspire community participation in local agriculture through a shared interest in protecting the environment.

### **The Challenges of Recycling Plastic**

Recycling plastics comes with challenges. It's important to consider the related costs, energy use, and labor involved in processing the material. The value of recycled plastic is also determined by the price of crude oil at a given time. If the value of oil is low, then recycling tubing may be seen as a not very cost-effective process, particularly given the energy and labor involved. But no matter the financial costs, the cost to the environment remains significant. As taphole sanitation practices now recommend more frequent spout and dropline replacement, plastic waste from the maple industry will only increase. Additionally, as some producers are finding 3/16" tubing to not live up to its promise, even more plastic is likely to come out of the woods sooner than had been anticipated.

Given the risks climate change poses to the planet and to the maple industry, and the adverse effect plastic waste has on the environment, the industry needs to consider meaningful alternatives to offset maple production's carbon footprint related to the manufacturing and disposal of plastics, in the same way

that energy consumption has been dramatically reduced in recent years by the adoption of high-efficiency evaporators and reverse osmosis machines.

The fabrication of plastics necessitates the extraction of oil and natural gases, carbon-intensive activities in themselves. In the United States alone 12.5 million to 13.5 million metric tons of carbon dioxide per year are emitted in order to extract and transport fossil fuels for plastics manufacturing. (Brook, <https://www.yaleclimateconnections.org/2019/08/how-plastics-contribute-to-climate-change/>) An increase in greenhouse gas emissions, plus deforestation from continued fracking, all release significant amounts of carbon dioxide into the environment. Just five years ago, the annual emissions for creating ethylene, one of the foundational components of plastic production (including sap lines), were 184.3 to 213 million metric tons of carbon dioxide. While the maple industry represents just a fraction of overall plastics usage, it is significant enough to consider alternatives.

### **Bioplastics**

One new technology developed to create more renewable, less carbon-producing, manufacturing options for plastics, is bioplastics. Compostable plastic plates and compostable plastic shopping bags have become more common. This material can either be biobased (derived from a renewable resource) or biodegradable (can break down naturally) or both. (<https://www.plasticsindustry.org/article/bioplastics-101>)

Biodegradable bioplastics can be as durable as other plastic materials but break down in a different way and over

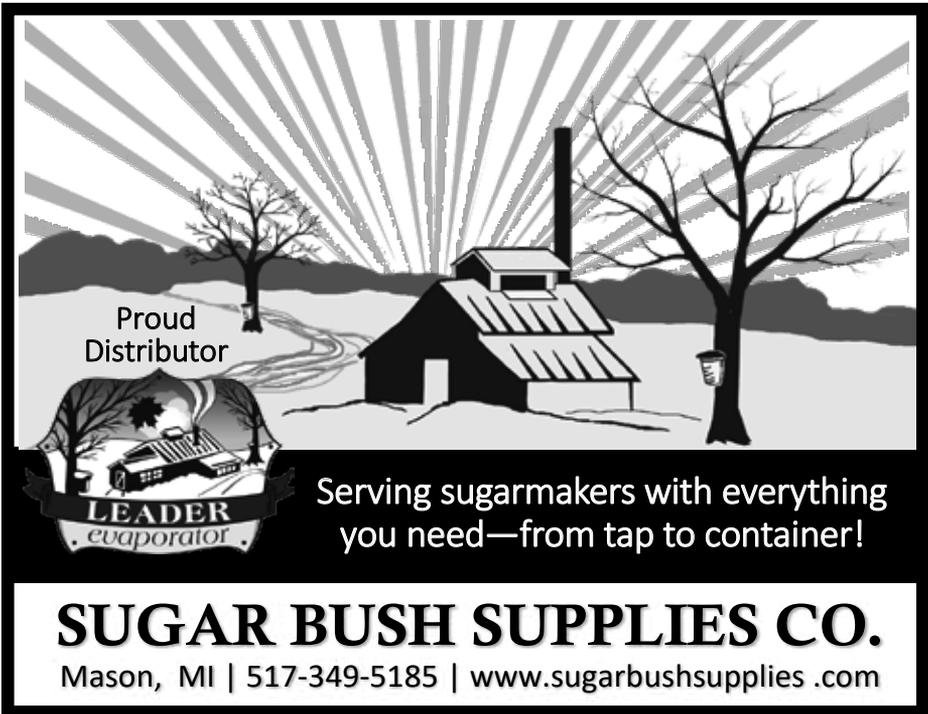
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a shorter amount of time. The production of bioplastics may help reduce the use of fossil fuels in manufacturing and can be made of renewable resources such as used cooking oil, sugarcane, wood, corn, castor beans and algae. Not only can bioplastics be recycled, but durable bioplastics that are not single-use can also be designed for industrial composting – another alternative to landfill disposal and a healthier end of the plastic’s life cycle. Bioplastic tubing would need to be a material that can hold up to year-round, all-weather conditions in the woods for a similar lifespan as current tubing and compatible with the pressures of a vacuum system, and would also have to be able to be produced at the same price point as plastics to allow sugarmakers to remain economically sustainable.

**Looking Forward**

Although recycling plastic tubing is challenging and is still a relatively new concept, it is better than discarding the waste in landfills and certainly a positive step for the maple industry to mitigate waste and contribute to emissions reduction. Plastic pollution has a critical environmental impact and its long-term use is being reevaluated across all industries. For the maple industry, it may mean coming up with alternative solutions. The established recycling programs in Vermont and Quebec can serve as models for other states and districts to follow in launching similar programs that allow producers to recycle old tubing from the sugarbush. Recycling is one way maple producers can play a role in reducing plastic pollution and participate in an ongoing conversation about conservation, maple, and the environment.



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