REVERSE OSMOSIS CAPITAL FUNDING APPEAL

2019 was an outstanding sugaring year for Spring Hills Farm. We produced 640 gallons of syrup from 1600 taps. This came to 0.4 gallons of syrup per tap, our best yield yet. We replaced the old tubing with skinny tubing that allows a natural vacuum to form. It is basically powered by gravity. Talk about a clean, cheap, reliable energy source!

This year we only tapped a portion of our woods. Sugar content was very low, and sap yield was very high. To boil the 44,010 gallons of sap down, we burned about 26 cords of wood. It felt rather time consuming and wasteful to be making only about 25 gallons of syrup per cord. At some point during the 200 hours of boiling, the dream of having a reverse osmosis machine was reignited.

Reverse osmosis is a common technology in sugaring. It works as follows: A high pressure pump forces raw sap against a membrane that only allows small molecules through. Larger molecules do not make it through the membrane. In the case of maple sap, it the water molecules that make it through. The sugar molecules do not. The result is that you feed raw sap in, and you get pure water and concentrated sap out. Approximately 75% of the water in the sap is removed in this way. The resulting concentrate is then boiled in the evaporator as usual. All the water that is produced is saved in a tank. It is run backwards through the membrane each day in order to clean it.

Using this machine in a season like last year's would save about 19 cords of wood. The pumps in the RO machine run on electricity. Processing 44,000 gallons of sap would use about 660 kilowatt hours of electricity. To make an efficiency comparison, the cords of wood and the KWH can be converted to BTUs. 19 cords of wood is about 384,000,000 BTUs. 660 KWH is about 2,252,000 BTUs. Thus, the RO machine uses about 1/170 the amount of energy as the burning of

19 cords. Amazingly, we have solar panels behind the sugarhouse that produce about 660 KWH of power every 15 days. Also, burning the 19 cords of wood releases about 98,000 lbs. of carbon dioxide into the atmosphere. This is equal to the annual carbon footprint of 2.2 average Americans (4.5 Spaniards, 140 Ethiopians…).

There are substantial financial savings as well. Switching to the RO would save about $3,800 in wood purchases each year. There would also be an enormous savings in time spent evaporating.

There is a used RO machine of the appropriate size at CDL Maple Pro in Saint Alban's, VT. The RO machine is very durable and comes with a 1-year warrantee. An additional need is a small insulated room in the sugarhouse to house the RO machine.

This is capital appeal to purchase three items should pay for itself within three years.

The costs are as follows:

RO machine:	$6,500
New Tank:	$2,200
Small Room:	$1,000
Total:	$9,700

Sincerely,

Dylan Zeitlyn