Technical Assistance for Improved Water, Chemical, and Energy Utilization – Electrodialysis at a Winery

Client
Located in the Finger Lakes Region in Dundee, NY, Glenora Wine Cellars produces about 60,000 cases/year of red, rose’ and white wines.

Opportunity Area
Cold stabilization (cooling of the wine in large tanks to below 30 degrees for weeks) is the common method used in wineries and at Glenora Wine Cellars to remove tartrates. Significant amounts of energy are used in this refrigeration process. It is estimated that over 100,000 kWh/year of electricity at a cost of $12,000/year is used to precipitate tartrates from the wine solution.

Objectives
Determine whether electrodialysis (ED), a membrane-based separation process, is a viable alternative to the current cold stabilization process used at Glenora in terms of reduced environmental impacts as well as increased economic competitiveness.

Work Performed
NYSP2I performed a detailed literature and equipment search to evaluate successful winery ED applications and determine which ED systems are currently commercially available. An onsite meeting at Glenora took place with an ED expert on winery applications to confirm details on operational expectations. Engineering analysis was performed to estimate differences in energy and water consumption between ED and cold stabilization. Finally, a financial analysis template was created to estimate payback on capital investment for an ED system.

Results
There is sufficient justification for Glenora to consider implementation of electrodialysis as a replacement process for their current cold stabilization process. While ED has not yet been implemented in NY, the literature search indicates that successful installations exist in the western part of the U.S., Canada, Australia, and Europe. The most attractive option is to purchase a refurbished ED system rated at 400 gal/hour with a selling price of $115,000.

- Annual savings of approximately $46,000 that includes over 96% reduction in energy costs and less product loss as compared to cold stabilization (0.5% loss for ED versus 3% loss for cold stabilization)
- Discounted payback period of 2.8 years (pending utility rebates from the local energy supplier) and 3.1 years with no incentives
- Water use would increase by an additional 8500 gal/year since ED needs fresh water to separate out the specific ions, but current onsite septic system has adequate capacity to handle additional water flows; water use costs are also very low since well water is the primary source