Algaeventure Systems (AVS) has developed a modified harvester prototype designed to increase system flow rate and lower energy consumption per unit mass of algae harvested when compared to the AVS pilot unit. Capture efficiency, power consumption per unit mass, and system flow rate were measured as a function of filter membrane speed for both harvesters. Five filter belt speeds were selected and a test was conducted at each speed on both harvester systems. Each test consisted of a 3.0 g/L Scenedesmus dimorphus culture at a controlled volume of 5 gallons. Power consumption was measured in real time using a PLC data acquisition system and a power transducer. This allowed the average electrical consumption to be calculated once the system reached steady state. A membrane filter, with an average pore size diameter of 25μm was used on both harvester units, which was slightly larger than the average cell diameter of the Scenedesmus dimorphus (22.6 μm). The results from these tests are demonstrated below.

Results from the tests demonstrated that system flow rate and capture efficiency were linearly dependent on membrane filter speed, however, they were inversely proportional to each other. Power consumption per unit mass remained nearly constant at the highest membrane speeds. When comparing the two harvesters, the modified harvester had an average decrease in power consumption per unit mass of 108.5% with an average flow rate increase of 61.7%. The modified harvester capture efficiency was an average of 3.1% lower than the AVS pilot model, which is likely caused by the higher flow rate experienced. Because of the average decrease in electrical consumption per unit mass, and increase in flow rate, the modified harvester unit was scaled from the 8” wide harvester well section to a 30” wide well section on the SuperSeparator modified harvester. The goal of this harvester unit is to be able to process a larger volume of microalgae culture and consume even less energy per unit mass than its predecessors. A similar study of membrane speed will be conducted once the unit is complete to determine the scaling factor for this well design.