Case Study

Type of waste:
Food waste

Client/ Location:
Miami, Florida, U.S.A (June 30th - July 12th 2017)

The project:
Home to the city's Major League Baseball franchise the stadium is located on 17 acres of land and has a capacity 36,740 people. As well as baseball, the venue hosts soccer matches, fundraising galas and other events. A variety of foods are sold at this venue producing food and packaging waste that is compacted and removed from site at high cost. The client has incorporated a comprehensive sustainability strategy through their design and construction which includes water and energy use reduction, an event recycling program, regionally sourced and recycled materials. They are the first park globally to achieve the 'Leadership in Energy and Environmental Design' gold certificate. Research into their waste disposal lead the client and Advetec to undertake an XO demonstration during a 2017 Major Baseball game to showcase the reduction ability on food waste.

Objectives:
The aim of the trial was to show that the XO reactor can reduce the volume of waste going to landfill; processing the waste quickly and efficiency. This would decrease the environmental impact of the venue, simultaneously improving their eco-friendly credentials. In addition, the client hoped to be able to process their waste onsite in future to eliminate to need to hire expensive waste haulage firms.

Implementation:
The XO used for the demonstration has a capacity of 100kg a day, with a main installed power of 2.6 kW. The temperature on the heat pads were altered during the commissioning period to tailor the conditions for the specific waste being entered into the XO reactor. During the trial, 6-gallon buckets were distributed to collect waste which was then weight and loaded into the reactor 3-4 times daily between the hours of 6am and 8pm. The digestate weight and volume was also recorded. A summary of the input and output logs is featured in table below.

Date	Feedstock mass in (kg)	Digestate mass out (kg)
30/06/2017	0.00	0.0
01/07/2017	88.6	0.0
02/07/2017	98.1	0.0
03/07/2017	68.9	0.0
04/07/2017	87.4	0.0
05/07/2017	86.4	0.0
06/07/2017	61.7	0.0
07/07/2017	85.1	0.0
08/07/2017	77.1	0.0
09/07/2017	71.4	0.0
10/072017	0.0	0.0
11/07/2017	0.0	36.0
12/07/2017	0.0	120.0 (dug out)

Results:
Between the 1st and the 9th of July, the XO received 724.7kg of mixed organic waste including fruit, vegetables, grilled meats, burgers, hot dogs and bones. During this time, the XO dispensed 36.0kg of digestate. This is a mass reduction of 95% during the reactors operation. Similarly, the 724.7kg had a volume of 1,274 litres and the 36.0kg of digestate equates to 318.5 litres, meaning the XO yielded a volume reduction of 94.6%. After the completion of the pilot study, the resident biomass inside the XO was dug out and added to the digestate figures (however during operation of an XO there will always be a resident biomass). This gave an overall mass and volume reduction of 78.5% and 75% respectively. This demonstration did not used a shredder/hopper system with manual out-feed, meaning it operates at a lower efficiency than automated commercial units.

Summary:
The waste reduction during the machine operation achieved a 95% reduction of the original mass in just 72 hours. This means that the client would be able to efficiency dispose of all their waste on site if they invested in a larger XO machine. The trial proved they would benefit from significant waste reduction, preventing that waste from entering landfill. Furthermore, they would see considerable economic savings compared to the cost of landfill. This would add to the high environmental reputation of the park and add to their portfolio of energy efficient features.