



the porto protocol

FULL BIOLOGICAL TREATMENT OF WINERY WASTE WATER AS A MEANS OF REDUCING ENERGY AND CARBON EMISSIONS

ARTICLE

ABSTRACT

Dealing with winery wastewater is a challenge and the processes are often ineffective due to the large peaks and troughs of flow throughout the year.

We needed to have a solution from day one that would be able to cope with the variation in flow as well as provide a reliable treatment of our wastewater.

SUSTAINABLE TARGET

Reduction of energy and carbon emissions. Wastewater treatment.

PARTNERS

Bio-Bubble Technologies

REASON WHY/ MOTIVATION

Our location with the South Downs National Park and within a Nitrate Vulnerable Zone meant we needed to find a solution that would ensure there would be zero risk to both the local environment but also our own and the local water company's borehole supply.



RATHFINNY

COMPANY SUMMARY

Rathfinny is a family-owned Wine Estate producing some of the world's finest vintage sparkling wines from a perfect single-site vineyard in Sussex, England. We are committed to producing exceptional wines and experiences, enjoyed the world over, that reveal the character of our family Estate in Sussex, using methods that are kind to our land, people, community and wider environment.

WEBSITE

rathfinnyestate.com



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DESCRIPTION and STRATEGIES

The system was designed to deal with 40m³/day during seasonal production and using Bio-Bubbles Advanced Aeration process is able to cope with large seasonal fluctuations typical of wineries. The system is based on a sequenced batch reactor (SBR) is ideally suited because it can operate successfully with feast and famine conditions. With wineries; vast quantities of waste are produced for just 2 ~ 3 months in a year, the waste is typically 15 ~ 20 times organically stronger than sewage waste and with an eventual capacity to process circa 1,200 metric tons of grapes means the treatment plant has a population equivalent to circa 2000 PE. As a contrast for the other 9 months, the only waste produced is by permanent staff and visitors.

A biological process takes time to become established (usually 6 ~ 8 Weeks from start up) to have a plant that was switched on at the start of production would mean the effluent quality would have been poor until half way through the season, further to this nutrients required for an effective process would be deficient if the winery waste alone was treated, imported nutrients would have been needed. To combine the sewage waste streams from the on-site hospitality business and staff facilities and mixing it with the winery waste means delivery of expensive imported nutrients is reduced but more importantly the Biological process can be fed to keep it biologically potent and be ready for the start of the peak season.

The Bio Bubble process is a modular design facilitating growth in line with the business' plan as well as probably being the most environmentally friendly process on the market. Energy usage and the energy required to digest the organic load received at the plant is monitored and linked to site and the Bio-Bubble Process Engineers via an online remote link.

- Oxygen levels are regularly monitored, once sufficient levels are reached for the given load the system is programmed with the intelligence to react cutting back energy use by variable speed drives and shortening aeration duration.
- Flow volumes are monitored so that should there be insufficient waste to warrant initiation of a process cycle, a sleep mode cycle would be selected to save further energy. In essence the plant only works when there is something to do.
- The use of deep vessels within which to collect and store as well as process the waste has a direct relationship to Kilowatt Hours of energy used, whilst initial capital expenditure is greater the payback in Energy saving and carbon footprint is more than adequate justification.
- A process cycle always operates with the Reactor Full to the design top water level, coupled with using Micro Bubble Diffusers each bubble with maximum surface area in contact with the water for an extended duration due to the depth makes for the least amount of energy and smallest motor size to gain the required Oxygen levels in the water. The same volume of air made up of smaller bubbles "fine bubble" as opposed to "coarse bubble" has a far greater surface area.



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DESCRIPTION and STRATEGIES Continued

The Bio-Bubble will significantly reduce the amount of sludge, as all the waste is processed (except for the grape marc which is composted on site) not just the liquid. The sludge is composted within the process reducing the sludge volume.

ACHIEVEMENTS SO FAR

- Treating the sludge at source and only using the necessary energy means that the Bio-Bubble Process has a greatly reduced carbon footprint when compared to alternative processes
- Additional instrumentation to the dissolved oxygen probe such as ultra sonic level control, pH and temperature probes, mixed liquor and suspended solids probes provides the plant management information required to run the plant remotely and provide support without the need for so many visits to site keeping engineer attendance to the minimum and off the roads.

LESSONS LEARNED

Whilst the initial investment is significant and may seem daunting at first, the mid to long term benefits of a system like this outweigh any concerns regarding cost.

NEXT STEPS

By trending flows and loads specific to the site the operating experience allows optimization of the treatment plant parameters for further future savings

POTENTIAL FOR REPLICATION

High