CASE STUDY:

ADVANCED AMMONIA MASS CONTROL

In 2021 Air Technology Ltd -working in partnership with a major UK water utility- started working on refining the utilities existing ammonia control on a site with a PE of 15,000. Due to the site being subject to very large diurnal flow swings with additional- but separate- large swings of load, optimisation of the ammonia control to factor this in was viewed as a priority.

The existing ammonia control was developed by Air Technology Ltd and installed upon the client's own PLC- working by varying the ASP's first zone DO setpoint based upon the inlet ammonia levels. This is controlled by an ammonia meter placed within the anoxic zone of the ASP that automatically adjusts the DO levels depending upon the incoming load. This is supplemented by ammonia meters towards the end of the lanes of the ASP which provides control to the 2nd Zones & further zones as required. If the ammonia levels reach a pre-set HIGH level on the inlet or 2nd zone meters then the system is reverted to fixed DO control at a higher set point to allow for maximum treatment during exceptionally high loading periods. This allows the plant to operate with exceptional resilience to unexpected and highly variable loads. **The benefits are both process resilience and energy savings as the site no longer needs to run in a 'worst case' scenario with high DO setpoints ready for an unexpected or high load.** It is commonly installed with a variable pressure set point to further reduce unnecessary energy consumption from the blowers, this works by reducing blower system manifold pressure if the average position of the actuators is low (which creates a large pressure drop) and in turn the pressure is increased as actuator position increases to allow for increased treatment when required.

Air Technology's work with the client produced an additional level of control- now taking into account not only ammonia PPM but also retention time within the ASP. At periods when average or high loads would not normally have enough time to be treated the DO setpoint would be increased to an additional 'high' setpoint. However, when high strength ammonia was detected but it was determined that it would receive a long retention time- **DO setpoints were restricted and as such energy was saved**.

Once commissioning was completed Air Technology returned to validate the work. In doing so it was found that an additional saving of 28,942kWh had been achieved, this energy saving was fully validated and crossed checked by the client. This result means that, with a kWh price of 13p, **savings of £3762 per annum have been achieved**- an additional reduction over standard ammonia control of approximately 10%. Since then, the client has proposed a program of installing this new additional control into multiple sites with existing ammonia control- as well as determining that all suitable new ammonia control installations include this as standard.