

Energy Management at the World's Busiest Single Runway Airport

In this regular feature, we focus on how organisations across different industries approach energy management. In this issue, we are exploring the world of the aviation industry with Martin Bilton, the Utilities Manager at Gatwick Airport.



Located in West Sussex, Gatwick Airport Ltd (GAL) operates the world's busiest single runway with 280,000 air traffic movements and over 46 million passengers per annum; around 53 airlines offer over 228 worldwide destinations.

The airport consumes circa 155GWh of electricity and 60GWh of gas

annually and uses energy 24 hours a day to operate the airfield, 2 terminals and operations of the more than 120 businesses based here. The airport has extensive private HV and LV networks as well as making substantial use of regional supply networks for gas and water. The largest percentages of energy is used to light, heat and cool buildings; whilst airport buildings also have large number of lifts, escalators and passenger walkways plus some unique systems such as baggage handling, fixed electrical ground power for aircraft and lighting for stands, taxiways, car parks and the runway.

What does energy management mean at Gatwick Airport?

Energy management is a critical aspect of planning and operational management that needs to cover a broad set of business issues. In practice this means that we have to have a focus on at least four things:

Energy systems are an essential enabler for business change and growth; this means almost continuously reviewing our development plans to ensure our systems have sufficient capacity and expandability to change and adapt our facilities to meet the

needs of passengers, airlines and associated commercial businesses.

Energy systems provide an important, if hidden, aspect of operational resilience that are built-in to support a 24/7 operation with very little downtime as well as protect the operation from 'foreseeable' issues or events. This means designing-in resilience, expandability, redundancy, standby and back-up systems as well as having operational contingences.

Energy efficiency is a key component of operational efficiency and sustainability so the Gatwick engineering team gets involved early in airport development projects to influence the scope and set the right technical standards for project designers. A current example of this approach is the Pier 6 extension project where early involvement has led to adopting a goal of BREEAM Excellent, designing in passive energy reduction measures, a rainwater harvesting system for toilet flushing and a low carbon electric air source heat pump for generating heating and domestic hot water. We collaborate with the sustainability team to devise challenging targets and then monitor these on a regular basis. Once a project is delivered, Engineering strive to maintain, and if possible optimise, the efficiency of the systems as they operate day to day. This includes expanding and improving our metering systems as an intrinsic aspect of energy management.

Energy management also means managing cost; this means having flexible and environmentally evaluated gas and power contracts, appropriate risk management strategy as well as dealing with the basics of bill validation, budgeting and forecasting. Additionally, because an airport operation requires lots of organisations to work together on the same site, there is



also a significant focus on supplying energy to our tenants and managing the related income.

How does Gatwick Airport deal with energy management?

As you can see from how we define Energy Management, we try to incorporate it into how we work, operate and plan. Our Engineering team takes the lead on energy management, with teamwork across other departments including Development, Planning and Sustainability, Procurement, Finance and Environmental Health and Safety.

At a strategic level, Gatwick's sustainability strategy, called "Decade of Change", includes 10 year targets for energy efficiency and renewable energy. Today, Gatwick uses 12% less energy than in 2010, and is 40% more energy efficient on a per passenger basis. We have also purchased 100% certified renewable electricity since 2013.

We produce an airport master plan every five or six years which provides a strategic 'look forward' at airport development opportunities; and our capital investment programme (CIP) sets out the investments in infrastructure, facilities and systems needed to support such plans. The CIP includes investments in energy systems capacity reinforcement, resilience improvements and facility upgrades or asset replacement. This means energy efficiency can be factored into strategic investment and the replacement of outdated, obsolete or life expired mechanical, HVAC, electrical systems or indeed building fabric components.

Technical standards play a key role in how we operationalise energy efficiency. For every element of the CIP, a specific project scope will be developed that includes Gatwick's 'technical standards' which cover all aspects of the airport's system design requirements including those for energy efficiency and energy metering. Energy contract and cost management is a partnership between our Engineering, Procurement and Commercial teams. Engineering manages the airport's overall utility budget, forecasting and invoice validation. Engineering and Procurement manage energy contract negotiation and renewal as well as risk management strategy. The commercial team manages airport tenant energy and water related income; they have invested huge effort in improving the processes and systems around all aspects of manual and AMR meter read technology, web portal data storage, billing and reporting.

Another key aspect of energy management is our external accreditations: ISO14001, the Carbon Trust Standard for Energy/Carbon, and Airport Carbon Accreditation. Gatwick was also the first airport in the world to join RE100, the global campaign to promote renewable electricity.

What areas of every day's business at Gatwick are most challenging in terms of energy management?

An airport is a complex environment with many stakeholders and competing business requirements and this presents challenges, but also makes it an exciting environment to work in. We have a strategic focus on power resilience, having sufficient power capacity where it is needed, and it is an ongoing challenge to link metering communications to reporting platforms. I think the energy efficiency challenge is an interesting one although I doubt it is unique to an airport! I always say we are not short on energy efficiency ideas, I only need to walk around with my 'energy manager' eyes open.

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The challenge is (a) having sufficient resource to scope and cost the best solutions, (b) translate those best ideas into compelling business cases when delivering work at an airport is expensive and energy is still comparatively cheap and (c) access to funding when there is huge competition for the capital needed to maintain and grow the business. Where teams have kept detailed maintenance costs for specific assets or where we can lever the support of other teams to see the benefit of improving assets, this can often really help support the business case.

For example where you see a good opportunity to replace normal lighting, but when you look into the detail, the escape lighting or ceilings also need attention, suddenly the project is no longer just about energy efficiency. This means, if we are to succeed in terms of energy efficiency, departments need to work together to identify the best projects. I also believe that control system optimisation skills i.e. the skills to modify the BMS, lighting and other control systems are in short supply and often lacking within maintenance contracts. This is certainly something I continue to try to tackle at Gatwick.

How is energy management viewed by the organisation's stakeholders?

Our stakeholders expect us to manage the airport safely and efficiently, and to minimise or mitigate our environmental impact. Our energy strategy incorporates these expectations, hence our integrated focus on energy resilience, cost management, energy efficiency and cleaner energy.

We have set ourselves high standards and robust targets, and we aim to meet or exceed them. We report annually on our energy performance in our Decade of Change sustainability report and also have detailed internal performance metrics and reporting as well.

Can you describe an energy management project that reflects the organisation's principles and/or corporate responsibility when it comes to energy management and the environment?

The project that springs to mind for me is one related to upgrading the lighting for our external long-stay and staff car parks. The engineering manager responsible for external lighting worked-up a design solution with a manufacturer for a 'single fitting' induction light & integrated control system for over 2,000 fittings. The £0.9m project provided a good business case with around £200k savings from the previous energy and maintenance costs; it was funded by Gatwick and the project delivery was managed by the manager that inceptioned the solution. Additionally, the project introduced a software monitoring & control system for every fitting that means the maintenance team now has full visibility of car park lighting, any faults and programming functionality from one screen.



Why I think this reflects Gatwick's approach is that I feel the project delivered on multiple fronts; energy efficiency and carbon reduction; asset standardisation for the maintenance team; a high quality light output with low glare for the car park users as well as setting a future technical standard for how we should monitor and control external lighting systems.

What is in the pipeline for the future?

Our Capital Investment Plan includes a number of projects either in development or delivery which will enhance our energy infrastructure and our energy efficiency. For example, we are investing £5 million over five years on electric vehicle infrastructure which involves identifying the most suitable locations for power supply and charge-points from the operational, spatial and efficient utilisation points of view. The shift to electric vehicles will use more electricity and we will apply efficiency principles to the technology options as with any other functional use.

Our Property team has recently started a full refurbishment of the on-site airport fire station, a great opportunity for energy efficiency improvements. They also have plans to upgrade HVAC plant in a couple of office buildings and a busy programme of office refurbishments.

The Terminals team will shortly start delivery of a complex project to replace ceilings & lighting in South Terminal Check-in. The Baggage projects team are in full swing delivering new hold baggage screening machines; once

this work is complete they have future work planned for significant lighting upgrades to baggage areas.

The Engineering team will continue with the power resilience work stream and also the boiler decentralisation programme in South Terminal where old 1960s boiler plant and associated high temperature hot water network is being gradually replaced with modular gas boiler & low temperature hot water plantroom solutions. In 2020 we reach the end of our first 10 year 'Decade of Change' sustainability plan. We will get the chance to reflect on our sustainability performance, recognise the hard work, innovations and successes of colleagues over ten years, take important learning for where things did or didn't go as planned; ultimately leading onto to us setting new goals for 2030 and beyond!

Author's profile:

Martin is a Chartered Engineer, member of the Energy Institute and has over 25 years' experience in airport engineering roles covering mechanical services design, asset maintenance, contract and cost management. As Gatwick Airport's Utilities Manager since 2009, Martin is closely involved in scoping business cases for energy projects including lighting projects, HVAC & boiler replacement and exploring options for site generation technology.