

Wilson & Partners' Sustainability Series

Sustainability in Design

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Back in September we released the first in our series of articles on Sustainability. The first article gave an overview of Sustainability generally as a topic, what it means to us as a business and looked at some facts and figures on sustainability in the UK. This issue, we will be looking deeper into Sustainability in action: in the aspect of Mechanical & Electrical Engineering Design.

For this article, we interview two of our "Sustainability in Design" Champions, Nathaniel Godden and Luke O'Brien, who led us through flagship projects of very different character.

Built-in Sustainability

As of November 2018, Wilson & Partners instated a new standard element of our Fee Proposals; "Built-in Sustainability". Part of our role as responsible designers in the built environment is to manage our clients' risk and energy efficiency is one due to price elevation and finite resources. We have also developed a new "Built-in" Sustainability philosophy so that every client has the opportunity to maximise the value of their project both in energy saving and supporting commitments. As part of that, we advise the best options for a project, in terms of longevity and value-added design solutions. This could be strategic exploration of centralised heating plant, innovative design of LED lighting or a managed changeover of existing plant, to a more energy efficient alternative.

Sustainability in action: Croydon Factory



Project Brief

We worked on an industrial project in Croydon that included the design of a new facility for housing part of their foam production process. W&P have been working on the site since 2014 and successfully handed over the new facility in January 2019.

What were the sustainable features?

- ❖ Utilisation of high thermal efficiency building fabric elements
- ❖ Installing A++ white goods
- ❖ Solenoid water control valves
- ❖ A heat pump recovery system that utilised heat recovered from space to generate hot water for domestic use
- ❖ Triple glazed windows
- ❖ Natural day lighting via perimeter office windows and roof lights
- ❖ Automated lighting controls
- ❖ Variable refrigerant volume space heating and cooling with integrated heat/cooling recovery
- ❖ Attenuators to reduce noise pollution to residential neighbours
- ❖ Water usage monitoring
- ❖ Energy monitoring

How did we incorporate these?

The priority was to achieve maximum efficiency for the manufacturing process, which is why we opted for sustainable passive design measures favoured on low carbon projects. **A heat pump VRV system** was selected for heating and cooling to the production support area, which incorporated heat recovery via the cooling process for hot water service production. **The fabric insulation** values were maximised to limit summer heat gain and winter heat loss.

What about cost?

The capital cost of the selected systems and fabric are generally above "standard compliant" installations. The heat pump, for example, VRV system, is approximately 75% dearer than a simple combination boiler installation, however the high coefficient of performance results in a low primary fuel source input, suitable for the client's long-term interest in the facility return on investment.

Water saving and flow control systems limit the impact of leaks and reduce treatment energy losses. In turn less wasted water results in reduced quantities required from treatment plants, lower consumption of both resources.

Case Study 2: The Froud Centre



Project Brief

W&P were tasked with a change-of-use project, converting a community centre in East London into a GP surgery and medical centre, creating more rooms and with a BREAAAM "Very Good" target rating.



Nathaniel Godden: led on sustainability

Sustainable elements: Mechanical

We deployed a number of low carbon and sustainable features via the mechanical services systems. These included:

Variable refrigerant flow (VRF) ... to enable the centre to pass thermal energy from one room to another, depending on demand; diverting excess heat to where it is more needed.

Air source heat pump ... a 45kw heat pump using the vapour compression cycle to extract low grade energy from the surrounding air ...

Water conservation ... via **leak detection and solenoid valves**. The valves are located in each room, concealed within the ceiling void or behind IPS and connected with passive infra-red detectors able to detect human activity and energise circuits powering through the solenoid valves to allow water to flow to fittings and outlets.

Further facts ... The central air system uses a 90% efficient heat recovery wheel with latent heat transfer capability. This coupled with low specific fan power due to optimised ductwork systems, sized for low pressure drop, results in an efficient supply and extract system. This system is used to provide tempered air to all internal spaces to create a healthy, pollutant-controlled environment.

Feature topic: CIRCADIAN RHYTHM

Luke recently researched Circadian Rhythm with a view to offering it to a residential client. In this instance, the client did not opt for it, but it's certainly something we would like to use on future projects.



What is Circadian

Rhythm? Circadian Rhythm is our internal body clock, that determines our sleep patterns – our level of sleepiness or wakefulness.

Human centric lighting: afternoon



In lighting design, CR comes in the form of installing devices that mimic and work with natural sunlight, to

give the correct tone of light to match the time of day. This helps antibodies stay in sync with nature and improve our mental well-being. At noon, for example, the light is bright and white fading to a deeper yellow by late afternoon. By changing the light temperature through the day we can minimise the effect of the "mid-afternoon slump" that many of us suffer from, allowing us to stay more focused and less distracted which is hugely beneficial in designs for schools.

Who is using it – and what's the success?

Whilst use of CR engineering solutions is not widespread in the UK, primarily due to up front cost, it is well established in The Netherlands.

Saving hips: Netherlands Care Home

At one care home in Holland, hip injuries were reduced by 80% after CR lighting devices were installed in the home. Due to residents' bodies following a more natural rhythm, there was less need for sleep medication at night, which caused them to feel drowsy and disoriented and increased the risk of an injury getting out of bed. In addition to the obvious benefits for the wellbeing of the residents, there is a long-term cost saving from reduction in hip operations.