Sustainability Matters

To outstanding and beyond!

May 2019

Future Army buildings and refurbishments may require even more focus on sustainability and efficiency. It is probable that it will no longer be sufficient to develop solutions which meet the DREAM version 6 'excellent' rating. We must go beyond this rating and identify innovative, cost-effective and sustainable efficiencies.

Major General Richard Wardlaw, the Army's Director of Basing and Infrastructure, is responsible for planning and managing future spend on barracks and the training estate. In a recent briefing he summarised plans for the Army Estate, which currently contains 20,000 buildings of which 50% are over 50 years old. He explains a strategy involving: 1.) Prioritising and optimising expenditure, 2.) Modernising and rationalising the existing footprint and 3.) Increasing efficiency through focussing on maintainability and sustainability.

Major General Wardlaw's briefing can be viewed through this link:

https://www.youtube.com/watch?v=n04X3ENCLs8&feature=share

An immediate priority is to reduce a £91 million annual spend on heating and lighting. To achieve this there are plans to improve energy efficiency and also exploit renewable power sources particularly where there are income generation opportunities. These plans include the installation of photovoltaic solar farms on MoD land around the camps in the next couple of years.

Plate 1: UK Solar Farm (image credit: farminguk.com)

Near Zero Energy Buildings / Advancing Net Zero

The Army strategy is likely to involve a variety of options, opportunities and innovations. Options include incorporating the Energy Performance in Buildings Directive definition of Near Zero Energy Buildings (NZEB) and the UK Green Building Council's drive to advance net zero (in carbon terms for the built environment) into specifications. The very low amount of energy required for a NZEB could be covered by energy from renewable sources, including new solar farms nearby. The Army strategy requires all innovations to achieve a cost-optimal balance between the investments involved and the energy costs saved throughout the lifecycle of the building. The approach to achieving a NZEB is therefore likely to involve a combination of options. Considerations include: reducing energy consumption and carbon dioxide (CO_2) emissions, passive architectural design principles, energy efficient envelope and technologies, modelling and Building Energy Management Systems (BEMS). More information about advancing net zero in the built environment can be found at: https://www.ukgbc.org/ukgbc-work/advancing-net-zero/

Control and flexibility

In the past it has been common to see rows of opened windows at the beginning of October when heating systems are normally switched on. This may be prevented by effective use of BEMS, but this could be taken further through smart phone apps or individual smart metering energy responsibility systems. This would make users more aware of their impact on heating and lighting demand. With sales of electric vehicles also growing quickly, it has been estimated the UK will need an additional 8GW of electricity generation. This is the equivalent to building 2.6 Hinkley Point C power stations just for new UK electric vehicles! Will there now be a need to include electric vehicle charging infrastructure into the next generation of buildings and car parks inside garrisons? Perhaps there will be other design implications for our future living and technical buildings, for-example walls that incorporate batteries to store renewable energy and roof tiles made of integrated photovoltaic panels.

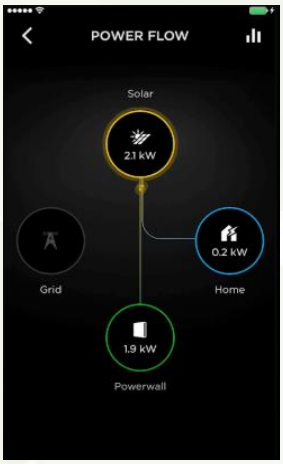

Plate 2: Smart phone App to control personal energy usage, storage and renewables generation (image credit: Tesla Powerwall support)

What does good look like?

Agreeing appropriate cost-optimal approaches will be a complicated exercise. There are opportunities to benchmark ideas against some of the most recent buildings which have achieved the BREEAM 'Outstanding' standard. A selection of case studies from their 2019 report are copied below.

Ny Horten Videregående Skole, Norway

This school was the first public building in Norway to achieve BREEAM Outstanding. The school adopts passive design measures, makes extensive use of wood and is intended to be 'energy positive'. It is considered an exemplar for school buildings in Norway and elsewhere and pushes a number of relatively unexplored boundaries including its approach to delivering net positive electrical generation in a northern climate and 'fossil free' construction processes.

Plate 3: Ny Horten Videregående School (image credit: BRE)

Unilever Food Innovation Center, the Netherlands

This design has been rated BREEAM Outstanding by focussing on health, flexibility, energy usage, material efficiency and circularity. It houses a mini-factory, a food and customer experience area, offices and laboratories. It is intended to be inspiring, sustainable and practical as well as facilitating innovative ways of collaborating.

Plate 4: Unilever Food Innovation Center (image credit: BRE)

New Logic III – The Tube, the Netherlands

This BREEAM Outstanding building is a local landmark with a futuristic aesthetic. Combining office and warehouse space it is designed for future flexibility, with sustainable features including a focus on high levels of airtightness and 11,620 photovoltaic panels. Data gathering is helping to maintain a healthier workplace, through such actions as measurement of CO_2 concentrations.

Plate 5: New Logic III (image credit: BRE)

National College for High Speed Rail, UK

This landmark building's design has a strong focus on energy reduction and on the health and wellbeing of its occupants. Sustainable features include combined heat and power technology, photovoltaic panels and a carefully planned ventilation strategy to meet the needs of its communal areas, teaching spaces and workshop. The clarity and transparency of the design solution with a clear focus on robust, cost-effective solutions and well-presented biodiversity gains were noted as were the references to the architectural heritage of the railway network in the UK.

Plate 6: National College for High Speed Rail (image credit: BRE)

This review is linked with UN Sustainable Development Goals (UN SDGs) 3,6,7,8,9,11,12,13,15. More information about the 17 UN SDGs can be found at: https://sustainabledevelopment.un.org/?menu=1300