reducing the carbon footprint of existing buildings at airports

dmu.ac.uk
DE MONTFORT UNIVERSITY LEICESTER

Jim Parker
jparker@dmu.ac.uk

Institute of Energy and Sustainable Development
www.iesd.dmu.ac.uk

DEPARTURES

The carbon footprint of UK airport buildings

During 2009 over two hundred million people passed through the UK's airports. That's equivalent to every person in the country travelling by air at least three times in a year. (1) The environmental effects of aviation are significant; 3% of global green house gas emissions are attributable to it with only 2.5% of the global population involved in regular international air travel. (2) Obviously, Airports play a pivotal role in this sector; they are the conduits to the skies. Airport energy use can be separated in to three main activities: air craft movement, surface access and airport operations.

Airports incorporate a diverse range of buildings and their terminals are amongst the most complex building types. The largest airports operate on the same scale as small cities. The 2008 carbon footprint breakdown for East Midlands Airport (EMA) is shown in the adjoining diagram. For the portion of emissions that EMA and their tenants have a direct influence on, over 90% are attributable to buildings. (3) EMA have no direct control over ground transport and air craft emissions.

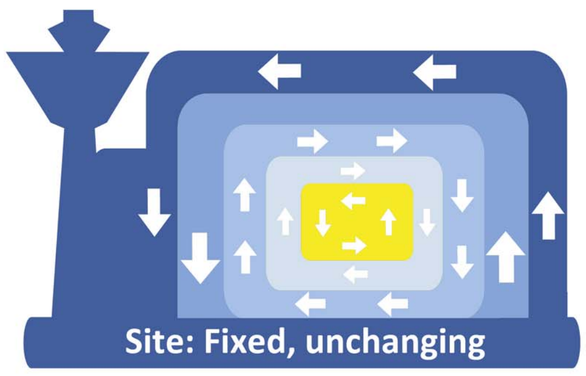
Project Aims

As the vast majority of buildings that will serve the UK's airports for the next 50 years already exist, the greatest energy savings can be made from refurbishment of this stock. This research aims to produce a retrofit pathway that will incrementally reduce the carbon footprint of existing buildings at airports. Retrofit of these buildings will target a one hundred percent reduction in carbon footprint by 2050.

ARRIVALS

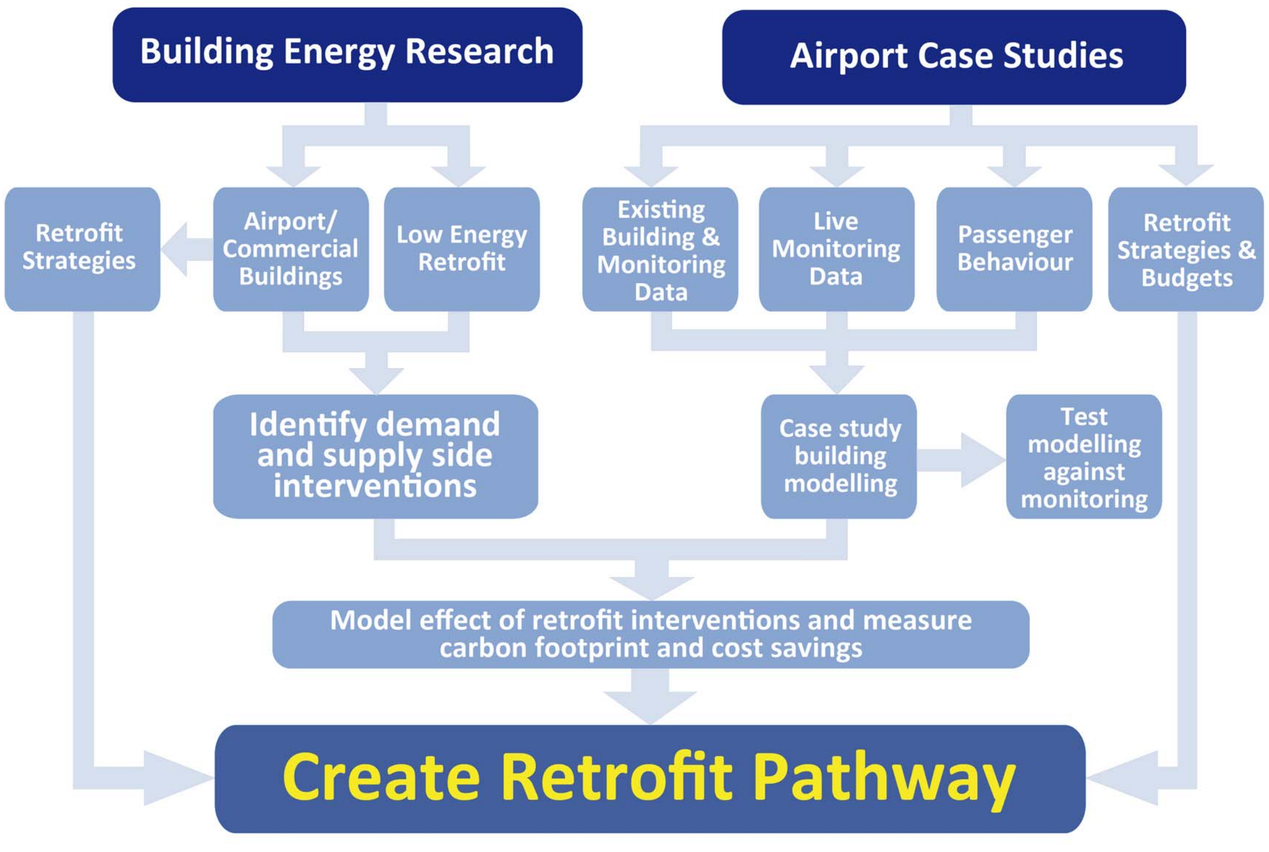
Reduced emissions from a retrofit pathway

Investigation relies on accurate computer modelling simulations of case study buildings. Required data includes building design and specification, plant and services, operating hours/activities and occupancy details. Appropriate low carbon interventions will be identified and applied to the building models. A detailed set of results will be produced simulating the expected carbon footprint of the buildings at different stages of refurbishment. Case study buildings have already been agreed with East Midlands Airport and meetings have been held with Birmingham International and Liverpool John Lennon Airports.



Building Feature	Equivalent Airport Feature	Frequency of Change
Stuff	Office equipment, appliances etc	5-10 years
Space Plan (Layout)	Retail units, bars and restaurants Terminal fixtures and fittings	3-5 years 20 years
Services	Plant and equipment: heating, cooling and operational	5-20 years
Structure	Terminal building, pier, satelite structures, run-ways, taxi ways & aprons	50-100 years
Skin (Fabric)	Terminal Building, pier and satelite structures	50 years

As buildings grow older, they naturally evolve. The diagram shown on the left illustrates some of the basic elements that make up an airport terminal and the anticipated life span for these. (4&5) Drivers for change can include performance and efficiency but there are also more complex commercial, legislative, personal safety and security pressures which can influence the retrofit of airport facilities. All of these influences will need to be accounted for when creating practicable retrofit pathways.



References

1. Civil Aviation Authority 2010. Available at: http://www.caa.co.uk
2. GOSSLING, S. and UPHAM, P. (eds.) (2009) Climate Change and Aviation: Issues, Challenges and Solutions. London: Earthscan
3. East Midlands Airport 2008 Carbon Footprint Report
4. Original diagram: BRAND, S. (1994) How Buildings Learn. London: Viking
5. EDWARDS, B. (1998) The Modern Terminal. London: E & FN Spon

Contributors

1st Supervisor: Professor Li Shao
2nd Supervisor: Doctor Paul Cropper
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