moixa TECHNOLOGY

Department of Energy & Climate Change

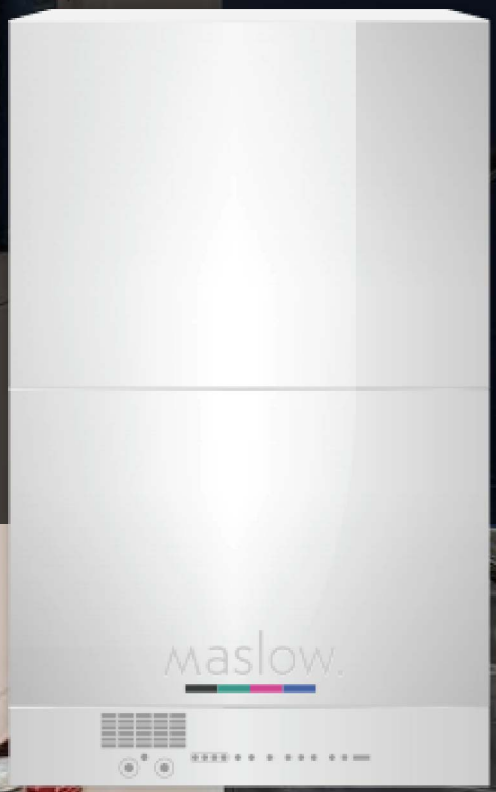
Recommended by:

BEEHIVE ENERGY LTD.

T: 01225 920 199 E: biofund@beehiveenergy.co.uk

DECC energy storage demonstration

MASLOW – Distributed Energy Storage for essential consumer and grid-scale network



Moixa Technology was awarded a contract by the Department of Energy and Climate Change (DECC) [1] in the 2013 Storage Demonstrator Competition. Under this contract Moixa have installed MASLOW storage systems in 250 locations, and demonstrated various energy services to end users and via aggregation for network needs.

maslow.
case study

June 2015

[1] http://www.moixatechnology.com/press-release/moixa-wins-share-of-decc-5m-contracts-for-energy-storage.php

DECC Pilot - MASLOW – Distributed Energy Storage

This case-study summarises major deliverables from the project and advantages of distributed energy storage systems.
MASLOW is a smart energy storage system for homes and offices, which stores spare solar or night electricity to reduce peak demand and costs. We have now completed a deployment of 250 MASLOW systems across various sites in the UK under our DECC contract. This has validating improved hardware design, installation and demonstrated various benefit cases across end users, and how storage can be aggregated as a service for various network challenges:

Department of Energy & Climate Change

- Development and field testing of the Maslow Storage system across different environments
- Integration with existing, new or enabling direct PV. Self-consumption benefits to users
- Installation across different property types, optimized installation and app/tools
- Aggregation of storage across sites, communities and deployment for network services
- Co-installation with DC LED lighting providing resilient, off peak, efficient lighting
- Dashboards for end user awareness, or community control

The maslow brochure explains the benefits of the maslow system: www.meetmaslow.com

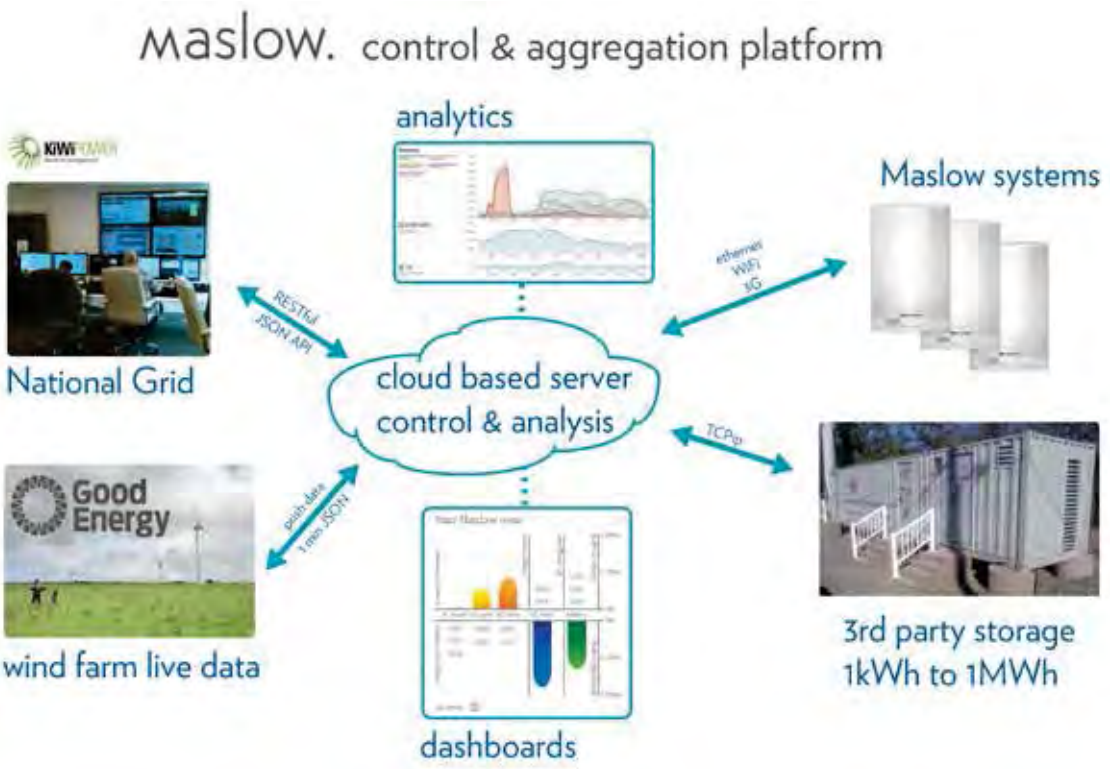
250 Systems Installed

We have developed a network of installers and also partnered with AVC-NextGen during the project for large multi-site installations – who previously installed satellite TV systems across the UK. This has helped to define storage and DC (Direct Current) installation processes, optimise install to typically 1-2 hours enabling multi installs per van team/day. This has also improved survey and co-installation approaches for DC Lighting and new solar.

The project has helped validate how good hardware design (compact, wall-mounted, all-in-one) and tools, help minimise on site-time and could enable an efficient and rapid deployment to millions of UK homes.

aggregation for grid level services

The DECC project has enabled Moixa to develop a cloud software platform for aggregated grid level energy services. This platform is now being extended under Innovate UK projects to control 3rd party storage resources such as EVs.



services in partnership with Kiwi

For the DECC project Moixa have partnered with the aggregation service Kiwi powered. The Moixa platform aggregating a large number of maslow units to form a single unit for contracting under the Kiwi platform. This allows Moixa to access National Grid services such as STOR and FCDM at indermediate scales.
The illustration shows an example of a Kiwi contract event utilising Maslow units.

KiWiPOWER
demand management

dashboards

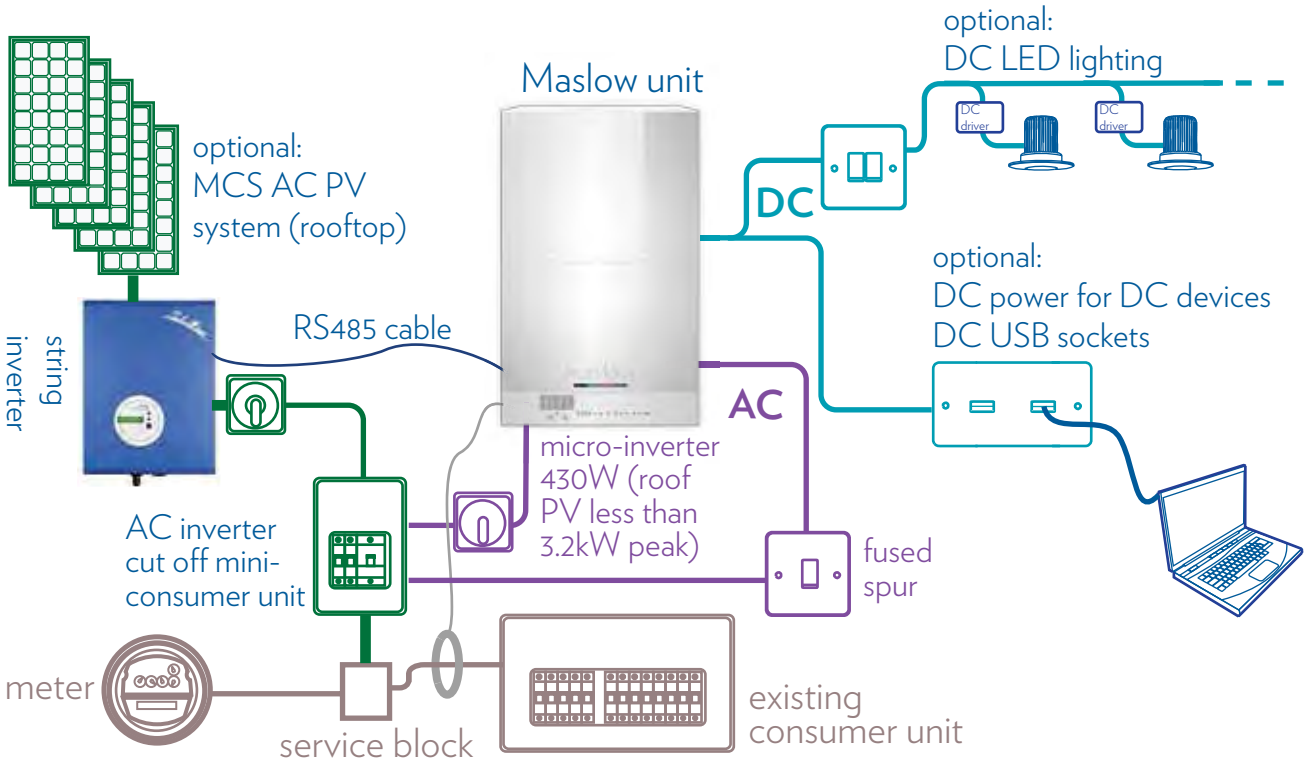
Users can login to see the performance of their maslow system, and its energy impact on their home. There are also more complex dashboards that allow for maintaining the energy service contracts

Back-up and Efficient power for DC (Direct Current) Lighting & Electronics

Moixa have worked with leading LED manufacturer Photonstar to develop DC versions of their pendant bulb, as well as testing utilising leading LED downlights. A proportion of the install sites have been implemented with DC lighting circuits powered from the maslow unit, offering extremely good levels of efficiency and resilience in the case of power cuts

Improving DC installation standards

Moixa have worked with the IET, IEC, IEEE and other industry experts to develop standards for installing DC systems in buildings,



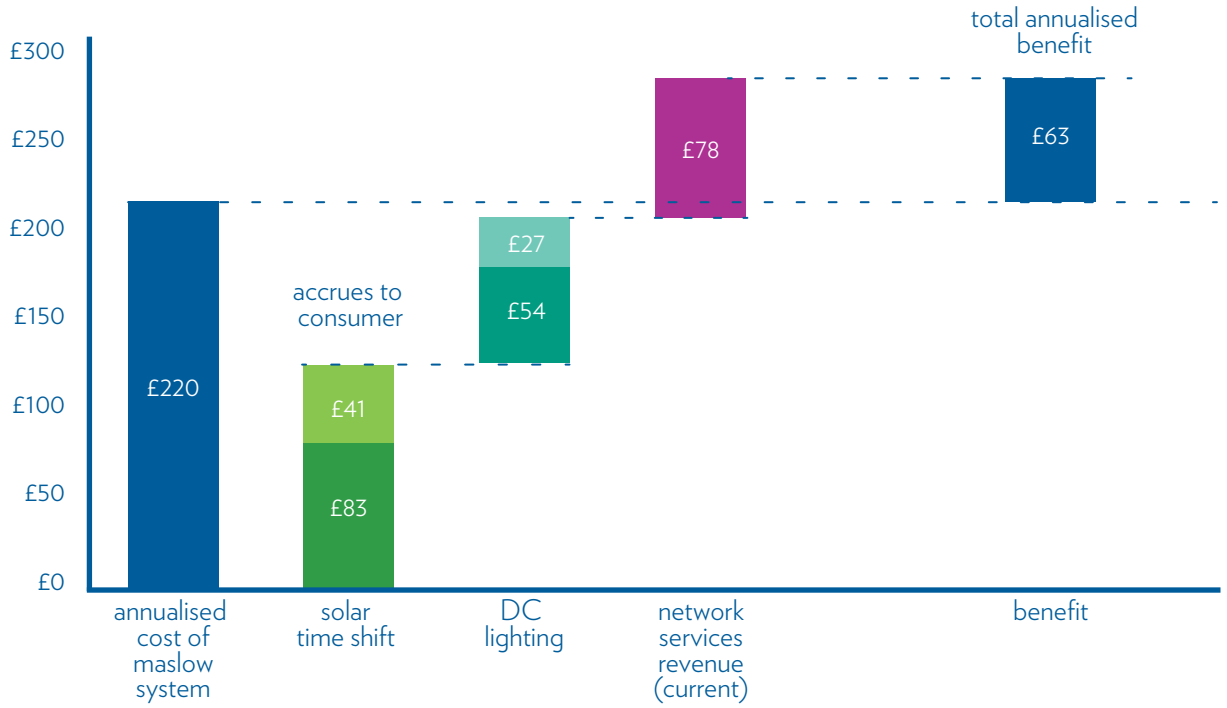
As part of this work we were on expert committee guided by the IET developing a code of practice for best practice installing DC in buildings, which has now been published.

IET The Institution of Engineering and Technology

IEC

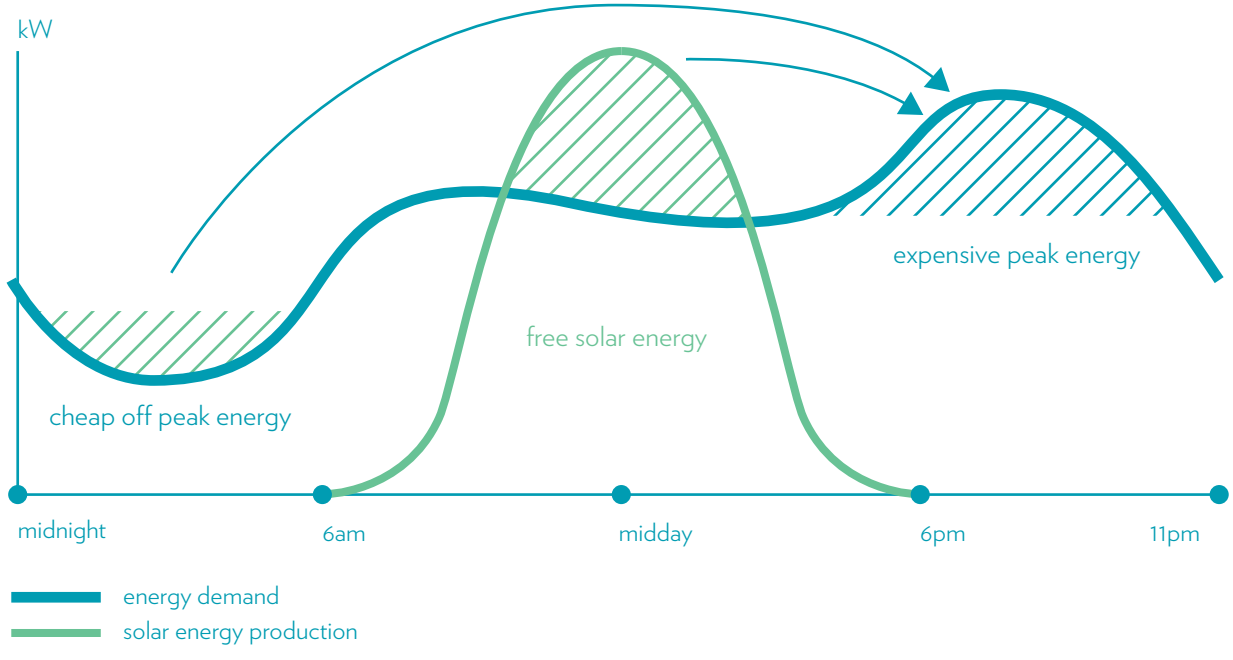
benefit use cases.

self-consumption and grid sharing benefits



peak reduction: solar and night energy shift

The maslow cloud service understands the configuration of each maslow unit, and the performance planning algorithm makes predictions for the energy that will be used in the house. It also predicts the energy that will be generated, and using these works out the most benefifical time to store energy.



Hardware TRL Improvements and testing

maslow UL tested & CE marked

Under the DECC contract we have worked with Universal Laboratories (UL) to ensure that the Maslow system is qualified for sale in the UK, and the rest of Europe. As part of this we have tested the unit to EN60950, and performed EMC testing. As a result of this the Maslow unit is now CE marked and on sale.

scale manufacturing

The bulk order from DECC has allowed Moixa to scale up manufacturing with a UK based OEM partner.
We have developed manufacturing and test procedures suitable for scaling our volume as we ramp sales in the UK and around the world.

Brunel University

32kWh
STORAGE DEPLOYED

Moixa Technology, in conjunction with the UK Government's Department of Energy and Climate Change, have installed 16 maslow® energy storage units and high efficiency LED lighting into Fleming Hall at Brunel University London. It is part of a 300 site deployment of maslow systems to demonstrate end-user and aggregate grid balancing services.

Storage

Moixa has worked with Kiwi Power and 1248 to provide Demand Side Management capability. A cluster of maslow units can be used as one larger storage resource, like a virtual power plant.

DC LED Lighting

Brunel and Moixa have used Surelight's LED low voltage Apollo, Selene and Cubus range of downlights and wall lights in conjunction with the maslow system. Surelight's LEDs use up to 90% less energy, with much longer projected lifetime than conventional lighting.

Installation

A single Maslow was installed in each of 16 flats to supply all the utility DC lighting (corridor and kitchen). AVC NextGen carried out the installation of the maslow units and replacement of the existing fittings with LED lighting.

Energy savings (per year)

42.2 MWh.

There was no high-resolution data prior to the installation of maslow so the pre-install consumption profile was estimated using a reduction factor. This assumption is justified, as the pattern of usage is independent of whether the load is on AC or DC.

Load reduction

85%

9,142 Wh
TOTAL DAILY ENERGY PRE-INSTALL (ESTIMATED)

→

1,340 Wh
TOTAL DAILY ENERGY POST-INSTALL (MEASURED)

Carbon savings (per year)

21.6 t.

Aggregating the 16 flats, the overall carbon produced for the year drops from 25.3t to 3.7t

Cost savings (per year)

£5,655

Assuming 13.4 pence per kWh the annual bill for the 16 flats reduced from £6,628 to £972.

Resilience

A further benefit of the maslow system is that if a grid power outage occurs, lighting continues to operate meaning students with a maslow are not affected. The maslow can provide power for several hours; through most typical power outages.

Peak Lopping

The UK faces a significant peak capacity crunch. The residential sector represents the majority of UK energy demand in peak hours so maslow combined with LED lighting ensures peak reduction.

Domestic customer

4kWh
STORAGE DEPLOYED

The Blomefield houshold was an early customer of the maslow energy storage system, and has 2 x 2kWh systems installed - one powering the whole house DC lights and the other with an inverter to store excess solar energy for peak use. The house has a 4kw peak solar system distributed between east, West and SOUth facing roofs.

Storage

Maslow is a distributed 2kWh battery storage system that provides smart power to homes, offices and flats and supports a DC Microgrid to avoid AC-DC conversions.
It also increases the efficiency of LED lighting and consumer devices. Maslow can store energy on smart tariffs at night or when local solar is in surplus, then export energy from its battery to reduce peak grid demand or avoid peak pricing. Moixa has worked with Kiwi Power and 1248 to provide Demand Side Management capability. A cluster of maslow units can be used as one larger storage resource, like a virtual power plant.

DC LED Lighting

Moixa selected pendant and spot lights from Photonstar lighting for this project. These are 80% more efficient than incandescent units, and have a lifetime in excess of 15 years.

Installation

Initially a single DC maslow was installed to power the lighting in the house, which was being updated as part of a refurnishment project. The house is around 2700 sq ft and one Maslow was found to power this with ease .
When the solar PV was installed on the roof a second maslow was installed with an inverter to enable timeshifting the energy being prodcued by the PV system.

Energy savings (per year)

1.2 MWh.

There was no high-resolution data prior to the installation of maslow so the pre-install consumption profile was estimated based on the fittings that where in place, and DECC data on lighting use. All energy for lighting now comes from stored PV.

Load reduction - lighting

84%

2200 W
PRE UPGRADE LIGHTING → **350 W**
INSTALLED MAX LOAD

Carbon savings (per year)

0.6 t.

Based on the average carbon content of UK electricity published by DECC of 500g/kWh

Cost savings (per year)

£168

Assuming 14 pence per kWh the annual bill for the house is reduced by £168

Resilience

A further benefit of the maslow system is that if a grid power outage occurs, lighting continues to operate meaning students with a maslow are not affected. The maslow can provide power for several hours; through most typical power outages.

Peak Lopping

The UK faces a significant peak capacity crunch. The residential sector represents the majority of UK energy demand in peak hours so maslow combined with LED lighting ensures peak reduction.

Funded Renewable Solutions for Business

BEEHIVE ENERGY LTD.

T: 01225 920 199 E: biofund@beehiveenergy.co.uk

moixa TECHNOLOGY

Department of Energy & Climate Change

KiWiPOWER demand management

Good Energy

Colchester Borough Homes

Circle Housing

Brunel University London

AVC NextGen:

book a viability assessment?

For more information:
T: 01225 920 199
E: assessments@beehiveenergy.co.uk

www.beehiveenergy.co.uk

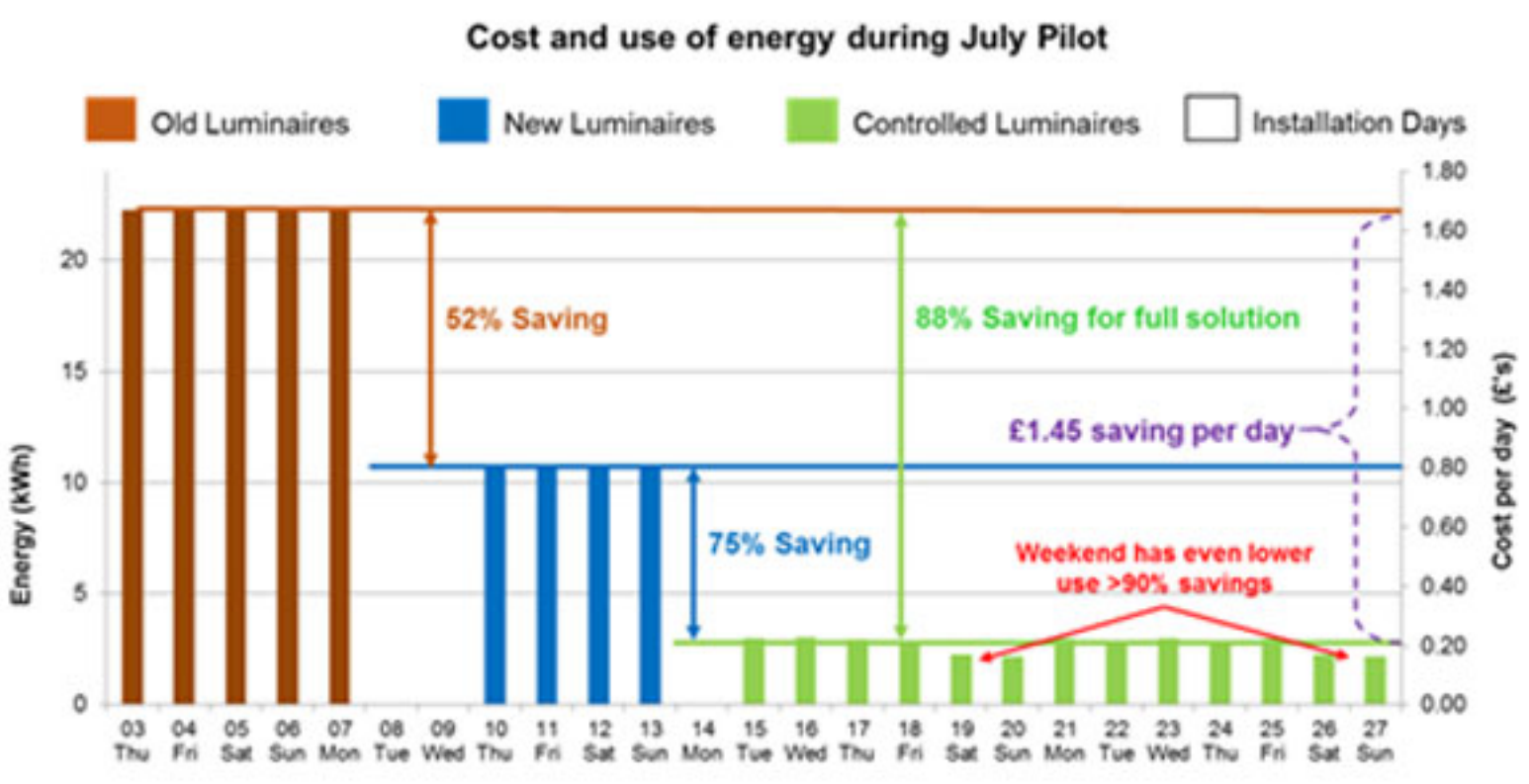
more information?

For more information:
T: 020 7734 1511
E: info@meetmaslow.com

www.meetmaslow.com
www.moixatechnology.com

Case Studies:
iUK - ERIC - Oxford: http://goo.gl/2NYKlu
Brunel University: http://goo.gl/5Larg3
Arcola theatre: http://goo.gl/gO2aTH

Moixa Technology Ltd 110 Gloucester Avenue London NW1 8HX


Cost and use of energy during July Pilot
Old Luminaires
New Luminaires
Controlled Luminaires
Installation Days
Energy (kWh)
Cost per day (£'s)
0
5
10
15
20
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
52% Saving
88% Saving for full solution
£1.45 saving per day
75% Saving
Weekend has even lower use >90% savings
03 Thu
04 Fri
05 Sat
06 Sun
07 Mon
08 Tue
09 Wed
10 Thu
11 Fri
12 Sat
13 Sun
14 Mon
15 Tue
16 Wed
17 Thu
18 Fri
19 Sat
20 Sun
21 Mon
22 Tue
23 Wed
24 Thu
25 Fri
26 Sat
27 Sun