Info-package 2

Energiesprong 2050 Project

Energy

Introduction

Description

The 2050 Homes is a pilot project that aims to deliver the first ever Energiesprong retrofit in the UK. The project is delivered with a unique contract which requires the Main Contractor (Melius Homes) to guarantee that the solution meets the performance specification for a 30 year period. Performance is outcome based, not element based. Hence the contractor is responsible for actual performance. The average maximum cost of energy per household must not exceed £300 per annum. The contractor will install equipment to monitor the measures installed.

The solution includes energy efficiency, communal heating, and private wire (communal electricity supply). Providing both heat and power, and storage in an integrated system is highly innovative and it provides multiple immediate benefits, and further future potential.

A communal energy centre has been installed containing ground source heat pumps, and storage (thermal and electrical). Low temperature heating (& DHW) is provided to 7 houses and 3 bungalows. The insulation measures installed mean that we can use low temperature heating. Having low temperature heating and thermal storage means we can maximise the efficiency of the heat pumps. The PV feeds into the private wire system, 'spare' PV can be stored in the battery, when the battery is full spare PV can run the heat pumps because we can use the thermal stores. This maximises the on-site use of PV.

Using the storage (electrical and thermal) means that we can take power from the grid when it is cheapest – delivering further cost reductions.

Figure

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 646511

Goals

- Deliver aspirational homes that are warm, comfortable, affordable, healthy and sustainable.
- Develop a delivery model that delivers guaranteed performance.
- Create an innovative solution to deliver lower carbon and lower cost homes that are fit for 2050.
- To deliver within 15 days per property.
- 30 years (yr) Performance Specification:
  - The cost of Energy consumption per household must not exceed £320 per year. The average cost per household for energy consumption is expected to be £300 per year.
  - The CO2 emissions from the property must be reduced by a minimum of 25%.
  - Each dwelling must use less than 40 kWh/m^2/yr for heating demand and achieve a mínimum of 21°C in living Spaces and 18°C in all other rooms. The heating must be able to achieve 23°C in living space whilst the outside temperature is -5°C.
  - A fair use allowance of 2,300 kWh/yr of electricity per household for lighting and cooking.
- The system must have the capacity to deliver 200 litres of hot water at greater than 45°C (or equivalent at higher temperatures) in one hour.
- Each household must use less than a total of 1500 kWh net consumption (Import (kWh) – Export (kWh))
- The design must ensure that overheating in summer months is limited to a maximum of 108 hours over the comfort temperature of 28°C in living areas and 26°C in non-living areas.
- The indoor air quality must comply with part F Building Regulations for new dwellings.
- The property must look like new build on completion of the works.

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Progress

Describe here the overall progress of the development of the solution.

The installation of an integrated PV system to the roof space providing electricity.

The hierarchy of use is as follows:

Firstly direct use in homes. Any ‘spare’ generation is then fed into the battery in the energy centre to be released at peak times for occupant usage. If the battery is full the electricity can be used by the heat pumps to put heat into the thermal stores – only after all of these on-site uses would PV generation be ‘lost’ out to the grid.

The off-site manufactured wall panels craned onto the buildings to achieve airtightness and high insulation values.

There is also roof insulation, additional cavity wall insulation, under-croft insulation, new windows and doors, and an insulated supporting trench at the foundations.

The drilling rig used to install (5) boreholes to a depth of 135m. The one pictured in the rear garden of 36 West Walk.

The energy centre is also in place and it will be operational immanently.

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Lessons learnt

01	Installing boreholes to 135m depth in a densely populated area is very challenging due to the size of the plant and waste water generated by the activity.
02	A customer text service providing daily updates to residents has been a huge success giving residents advanced notice of pending works.
03	Future roll-out of the energiesprong model will require more use of off-site manufacture in order to achieve the required 15 day delivery.
04	The wall panels used for this project are over engineered for the pilot in order to ensure that they achieve the performance specification. Cost savings can be made by reducing the specification of the wall panels whilst still achieving the correct performance levels.
05	Standard surveying practices are not currently sufficiently accurate for offsite manufacture of panels. Surveys which were carried out for this project had discrepancies of up to 60mm, which could cause significant issues if panels arrived with windows which were 60mm too big / small or too far left or right. Being very specific about the key surveying requirements will help this, and lots of checks on site are required before manufacture.

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