

## Results of competition: Future energy management for buildings – Collaborative R&D

Total available funding for this competition was £3m from the Research Councils UK and the Technology Strategy Board.

**Note:** These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

| Participant organisation names   | Project title   | Proposed project costs | Proposed project grant |
|--|---|------------------------|------------------------|
| <b>BMSHOME Limited (lead)</b><br>Gentoo Group Limited<br>GSPK Design Limited   | Thermionix - A Predictive/Adaptive Energy Consumption Control System (PEACCS) | £399,450               | £234,677               |
| <b>Project description - provided by applicants</b>  |   |                        |                        |
| <p>Thermionix is a Predictive/Adaptive Energy Consumption Control System (PEACCS) which makes the most efficient use of energy in domestic, commercial and industrial settings by predicting energy demand and balancing the timing and amount of energy used to minimise cost.</p> <p>The system ensures that only the energy actually required is used, reducing carbon emissions by cutting waste and saving cost.</p> <p>Thermionix is smart grid compatible and can balance energy demand across the day, reducing peak demands and taking advantage of lower cost "smart tariff" energy.</p> |   |                        |                        |

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| <b>Cybula Limited (lead)</b><br>Asda Stores Ltd<br>Centre for Low Carbon Futures<br>Leeds Metropolitan University  | Retail Energy Management System (REMS) | £510,850               | £315,534               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>This project aims to build a software tool (Retail Energy Management System or REMS) which uses novel pattern matching tools on sub-metered energy data collected at 30 minute intervals from a portfolio of supermarket stores. The project team want to link the energy data to other external data (weather data and building data) so that normalisation models can be used to compare performance between stores.</p> <p>We will build AURAMonitor, a pattern matching tool which will detect and alert on anomalies over time and use shape-based pattern tools to detect known events (eg, asset failure, human behaviours).</p> <p>The consortium will use data from Asda's current energy monitoring system and use other data from their building management software.</p> <p>The software will be developed by Cybula, an SME specialising in analysis of time series data using the expertise of the Leeds Sustainability Institute in building energy management.</p> <p>The Centre for Low Carbon Futures will use their links with UKTI and overseas embassies to construct a plan for exploitation of REMS.</p> |  |                        |                        |

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| <b>Demand Logic Ltd (lead)</b><br>Environmental Design Solutions Ltd<br>London South Bank University<br>Verco Advisory Services Ltd  | Energy Management & Analysis<br>Exploiting Existing BMS<br>Infrastructure & Data | £909,099               | £632,667               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>Our proposal is to acquire and apply a broad range of knowledge and skills to substantially expand the capabilities and applications of an existing, Ashden Award 2014 nominated, building performance analysis platform.</p> <p>The current platform extracts data from existing BMS systems and undertakes analysis far beyond the capabilities of the BMS (designed for control, not analysis). It has already identified £500k of annual saving at King's College London and extensive savings at other sites.</p> <p>Our proposal is to collaborate with Environmental Design Solutions Ltd, Verco and London South Bank University to: draw on data-mining techniques to increase speed and scope of analysis, interface with modelling software to compare design versus performance, interface with strategic carbon management software, enable dynamic demand control and develop interfaces for a range of audiences – including education and training.</p> |  |                        |                        |

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| <b>E2E Services Ltd (lead)</b><br>Bath & West Community Energy Ltd<br>Encraft Ltd<br>University of Nottingham   | EMPower       | £557,822               | £393,868               |
| <b>Project description - provided by applicants</b>   |               |                        |                        |
| <p>This project aims to help communities have a greater say in how their electricity is generated and managed, and to reward energy customers financially through savings on their electricity bills. A feasibility study in the Technology Strategy Board’s Buildings Better Connected programme demonstrated through simulation that communities with electricity micro-generation and storage capability could have a lower carbon footprint and see a better return on investment through co-operative energy management than they would have without storage capability, based on the same total consumption.</p> <p>This project will design and implement a prototype to validate and market test the concept. The project is innovative because it optimises energy generation and usage at the community level rather than building level. The approach is very scalable. The project team is E2E Services to develop the technical solution; Encraft for commercial design and energy market expertise; University of Nottingham for energy assessment tools and techniques; and Bath &amp; West Community Energy in the role of launch customer with a track record of delivering innovative solutions into the community energy market.</p> |               |                        |                        |

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| <b>Empower Energy Systems Ltd (lead)</b><br>Hearth Housing Association<br>Oaklee Homes Group<br>Queens University Belfast   | Energy Management System<br>incorporating Integrated Retrofit<br>Decision Model (EMSIRDecMo) | £716,089               | £493,458               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| Development of a Decision Tool, integrated within an Energy Management System, for predicting outcomes of energy-related building retrofit actions, plus development of domestic demand side management functionality to enhance system stability, improve electricity market efficiency, increase wind energy utilisation and reduce carbon emissions. |  |                        |                        |

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| <b>iSotera Ltd (lead)</b><br>Manchester Metropolitan University<br>Xsilon Ltd   | Smart in-building micro-grid for energy management | £733,672               | £513,814               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>Most building energy management applications require some form of networking. Currently the deployment of these applications is greatly hampered by the lack of an appropriate communications infrastructure in most existing buildings. The aim of this project is to provide existing buildings with a communications infrastructure that opens them up for the cost-effective installation of control and other systems that conserve energy and/or improve occupant well-being.</p> <p>The easy-to-install unified power and communications network that will be the result of this project will allow building owners and occupants to add functionality in a modular plug-and-play fashion at a much lower cost than existing solutions. In terms of data rate the network will be future-proof, able to deal with narrow-band applications up to CCTV surveillance.</p> <p>As all electronic modules that run off this system benefit from the protective network environment, equipment life will be extended as well.</p> <p>As the network lends itself for a wider variety of applications, not only energy-related, the investment in the basic network is amortised over a broader range of functions, improving ROI.</p> |  |                        |                        |

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| <b>Sustainable Homes Ltd (lead)</b><br>AmicusHorizon<br>EnergyDeck Ltd<br>Northwards Housing Limited<br>Orsis UK Ltd<br>Oxford University (Dept. Engineering Science)<br>Parity Projects Ltd   | Carbon Reduction Options for Housing Managers - Real Time (CROHM RT) | £499,720               | £313,086               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>CROHM RT will develop a new, validated tool that combines analysis of hourly energy usage data with detailed asset information and resident behaviour patterns. On a day-to-day basis, integration with visual analytics tools will support asset managers with large stock portfolios to identify and appropriately respond to anomalies of high (or low) energy use, providing social or technical support as needed.</p> <p>As a strategic planning tool it will help organisations to plan the most effective means of reducing energy use, helping organisations and the UK to cut carbon emissions and address fuel poverty.</p> <p>These capabilities will help landlords to provide a better service to their residents, through more accurate and responsive property management and more effective quality assurance. An online platform will also empower residents themselves with more detailed monitoring and comparative performance data to inform personal energy management and behaviour change.</p> |  |                        |                        |

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| <b>Sustainable Venture Development Partners Ltd (lead)</b><br>National Energy Foundation<br>Orbit Group Ltd   | MyCloudControl - Known Energy Bills | £329,250               | £225,084               |
| <b>Project description - provided by applicants</b>   |                                     |                        |                        |
| <p>This project will establish a consortium to innovatively address heating control management in the domestic sector. MyCloudControl is a robust, self-learning cloud-based heating control platform that will monitor the micro and macro environment of homes by using sensor systems and a novel algorithm. The scheme will enable an improvement in heating efficiency and manage annual budgeting to meet the householder's need without compromising their thermal comfort. As additional features, MyCloudControl will offer non-intrusive monitoring of the vulnerable based on system engagement, and track boiler CO emissions to predict servicing needs.</p> <p>Presently, no such integrated technology exists. A Technology Strategy Board SMART "Proof of Market" study highlighted the need for the device by the end users and domestic boiler suppliers.</p> <p>The experienced management and advisory team together with the main collaborating partner, the National Energy Foundation and the Orbit Group will develop a "Beta" prototype, a self-learning algorithm, de-risk the business and deliver the project objectives within the £329,180 budget in 15 months.</p> |                                     |                        |                        |



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| <b>Tayeco Ltd (lead)</b><br>Edinburgh Napier University<br>Scottish Power UK PLC   | ADDRESSING THE SME<br>ENERGY CHALLENGE | £549,644               | £393,341               |
| <b>Project description - provided by applicants</b>  |  |                        |                        |
| <p>Ewgeco (trading name of Tayeco Ltd), Edinburgh Napier University and Scottish Power will work together to better understand how energy is consumed in SMEs through the analysis of real time data and user behaviour and to develop test devices and software that will help verify the viability of new energy management products that could be commercialised to SMEs in UK and overseas markets.</p> <p>The project will take approximately 24 months and the outcome will be to provide integrated SME energy management solutions that could deliver up to 20% energy savings, at a suitable cost and based on real understanding of SME energy consumption profiles.</p> |  |                        |                        |

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| <b>TerOpta Ltd (lead)</b><br>Costain Group plc<br>Monodraught Ltd<br>National Energy Foundation<br>University of Nottingham   | ASSEMBLE   Adaptive SystemS<br>for Energy Management in<br>Buildings with Low cost and<br>Enhanced usability | £666,371               | £458,123               |
| <b>Project description - provided by applicants</b>   |  |                        |                        |
| <p>The aim of this project is to develop an innovative, easy to install, flexible, low cost building monitoring and management system infrastructure and interface. The system will harness the benefits of the power line carrier technology currently used by TerOpta in its lighting control system in avoiding the need for additional wiring whilst not being subject to the constraints and drawbacks of wireless technologies.</p> <p>This in turn will make the product well suited to both new build and refurbishment applications. It will be well suited to smaller and simpler commercial buildings which would not traditionally have BMS installed. The product will comprise a basic energy metering and monitoring layer which is then expandable through the addition of supplementary modules offering the ability to incorporate control and management functions of varying levels of sophistication depending on the building context and targets.</p> <p>Particular emphasis is to be placed on innovation in simplification ie, creation of a BMS system that is as low cost, robust and as simple to install and commission as possible.</p> |  |                        |                        |