

Hybrid Heat Pump for Micro Heat Network

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Abstract : Achieving nearly zero carbon heating continues to be identified by UK government analysis as an important feature of any lowest cost pathway to reducing greenhouse gas emissions. Heat currently accounts for 48% of UK energy consumption and approximately one third of UK's greenhouse gas emissions. Heat Networks are being promoted by UK investment policies as one means of supporting hybrid heat pump based solutions. To this effect the RISE (Renewable Integrated and Sustainable Electric) heating system project is investigating how an all-electric heating sources hybrid configuration could play a key role in long-term decarbonisation of heat. For the purposes of this study, hybrid systems are defined as systems combining the technologies of an electric driven air source heat pump, electric powered thermal storage, a thermal vessel and micro-heat network as an integrated system. This hybrid strategy allows for the system to store up energy during periods of low electricity demand from the national grid, turning it into a dynamic supply of low cost heat which is utilized only when required. Currently a prototype of such a system is being tested in a modern house integrated with advanced controls and sensors. This paper presents the virtual performance analysis of the system and its design for a micro heat network with multiple dwelling units. The results show that the RISE system is controllable and can reduce carbon emissions whilst being competitive in running costs with a conventional gas boiler heating system.

Keywords : gas boilers, heat pumps, hybrid heating and thermal storage, renewable integrated and sustainable electric

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