Clanfield Energy System - Executive Summary

This report assesses the feasibility of low carbon energy developments within the Clanfield Parish and village of Clanfield, West Oxfordshire. The recommendations summarised in this document establish how energy developments can benefit Clanfield's residents and businesses, including through income generation, energy bill savings, energy system improvements, as well as pollution and greenhouse gas emissions reduction.

Project summary

This feasibility study has been conducted with the support of the Community Energy Fund by Heat Clanfield Limited (HCL), a community-benefit society which encourages and supports low carbon opportunities at the local level.

Undertaken during 2024/25, the study objectives are to:

- Provide a forum for the local community to learn about living sustainably.
- Reduce greenhouse gas emissions from energy consumption.
- Reduce energy costs for Clanfield's residents and businesses.
- Reduce reliance on fossil fuels for heating.

Furthermore, the project seeks to deliver a system which is owned and operated by HCL for the benefit of the local community.

Recommendations

A summary of the recommended energy system options is provided below, alongside information about the technical specifications, financial viability, and wider implementation considerations.

Scenario 1: Community-owned Solar Array

Three solar sites were assessed adjacent to and within Clanfield, including:

- Small-scale: 151 kilowatt (kW) array located on land adjacent to Marsh Lane, to the south of Clanfield.
- Large-scale: 1,500 and 3,000 kW arrays located on Adventure Plus owned land to the west of the village.
- Rooftop: 8kW array mounted on the roof of Clanfield Pre-School.

Of these scenarios, the site with the best financial performance is a large-scale array totalling 1,500 kW to the west of the village. The system is anticipated to cost £1.7m, providing lifetime cumulative net income of £2.0m and paying back initial investment within 15 years. Additionally, low carbon electricity generation would provide a lifetime greenhouse gas emissions reduction of 7,879 tonnes of carbon dioxide equivalent (tCO_2e) over its lifetime, totalling 14% of Clanfield's current heat and electricity emissions.

The proposed solar array would require planning permission from West Oxfordshire County Council, as well as consultation with the Clanfield community to ensure system siting and design are appropriate and considerate of local needs and concerns.

Scenario 2: Community-led Building Decarbonisation

Building decarbonisation focuses on low carbon heating systems and improving building energy efficiency, seeking to reduce energy bills and greenhouse gas emissions. Whilst communal heating infrastructure was appraised during the study, the recommended community-led solution focuses on supporting and enabling Clanfield's residents and businesses to undertake building decarbonisation activities.

A targeted approach to supporting households in reducing carbon emissions and energy costs can be successfully implemented. Community-led action, such as via an energy advice café, awareness events, and home assessments, could enable an additional 34 ASHP installations by 2035, and 77 ASHP installations by 2050. This would lead to an additional £13,114 in annual savings for residents and 268 tCO_2e annual carbon savings.

The following actions, listed in order of increasing level of ambition, can accelerate community heat decarbonisation:

1) **Home energy events:** Public information sessions covering the benefits, costs, and practicalities of installing low-carbon technologies.

2) **Energy café:** A regular event where trained volunteers or experts provide tailored advice on energy efficiency, grants, and home upgrades.
3) **Thermal imaging camera service**: Free or low-cost home heat-loss surveys, helping residents identify insulation and retrofit opportunities.
4) **Home energy assessment scheme**: Surveys and retrofit plans for properties.

Further Outcomes

Two energy development scenarios were assessed but not recommended as of 2025, including:

Clanfield Heat Network

Clanfield has a total heat energy requirement of 8.1 gigawatt hours (GWh), with over 2,000 tCO_2e emitted from the burning of oil, gas and the use of electricity for heating. Heat decarbonisation is therefore a priority and an assessment of communal heating ("heat network") was undertaken to address this need.

This scenario would see the installation of an energy centre, obtaining heat from boreholes to power heat pump units, providing space and water heating to properties in the south (site 1) and north (site 2) of Clanfield.

Site 1: This site would include 213 properties, totalling 3.3 GWh of annual heat demand. The system would require an energy centre building (~200m^2), 170x200m deep boreholes, and 5,317m of heat network piping between properties. The system would have a peak thermal capacity of 2.5 megawatts (MW) and is anticipated to cost £7.6m, with lifetime cumulative net income of -£8.9m and annual carbon saving of 832 tCO_2e.

Site 2: This site would include 91 properties, totalling 2.5 GWh of annual heat demand. The system would require an energy centre building (~150m^2), 72x200m deep boreholes, and 4,216m of heat network piping between properties. The system would have a peak thermal capacity of 2.0 megawatts (MW) and is anticipated to cost £6.1m, with annual carbon saving of 247 tCO_2e.

Both systems are not viable without significant grant funding or leading to far higher energy bills for heat network customers.

Community-owned Hydroelectric

The feasibility of a hydroelectric generator at Radcot Lock was assessed, indicating that a low-head hydro scheme would be technically feasible but is not financially viable, as of 2025. This is because revenue from PPA export to grid is not sufficient to cover the £1.2m capital cost of the proposed system. A viable system would be contingent on direct supply of electricity to a nearby customer, which is not present, and the site is constrained by a lack of grid capacity, meaning energy export opportunities are limited.

Community-owned Wind

In accordance with the local planning guidance, development of large-scale (>90m in height) wind turbines is unlikely to be feasible within this region of West Oxfordshire. Consequently, two smaller scales of development were appraised at 100kW (40m) and 150kW (50m). These developments were deemed unlikely to be consented based on visual impact and radar, due to the proximity to RAF Brize Norton and other nearby airports. Furthermore, with no local electricity users close to the development site, the financial prospects of export-only schemes were found to be either marginal or non-viable.

Rooftop Solar PV

A further roof-mounted 8-kW rooftop solar installation on the roof of the nursery building was assessed. This would be a self-funded scheme with prospective lifetime net income of £35,012 via energy bill savings and energy export. This scheme has excellent viability from the perspective of Clanfield Primary School & Nursery but is not an attractive prospect from the perspective of HCL, due to the small-scale of the proposed development.

Conclusion

The greatest challenge within the net zero transition is building energy decarbonisation. HCL is in a strong position to support the local community to better understand and address this issue through promoting energy efficiency and low carbon heating uptake in both domestic and non-domestic buildings. This is a "soft" measure, which does not directly alter the energy system in Clanfield but seeks to influence residents and businesses to undertake low carbon activities and upgrades. This pathway requires significant time, resources and financial input on the part of HCL, and it is recommended that a building decarbonisation business plan is developed to define and guide the organisation's activities.

Large scale electricity generation has a less direct effect on Clanfield as the recommended solar array would export electricity to the national grid rather than provide local energy users. The scheme is therefore recommended based on financial viability, providing significant income for community re-investment and emission offset potential, totalling 14% of the parish's annual greenhouse gas emissions. Our recommendation is to progress large scale solar as a community-led venture. Key activities to be undertaken include securing an option agreement with the landowner (Adventure Plus), conducting detailed system designs, develop a business plan, and secure planning permission. This will ensure that the community is best placed to progress the scheme where a local customer is identified and / or preferential export rates are secured.