

Introduction

A community group has been established called CATCH – Loch Leven, (Climate Action Through Community Heating), with its website <https://catch-lochleven.org>. This working group is intended to be short lived (perhaps one year) and exploratory in nature, either showing a path to a subsequent operating vehicle, or halting with a negative conclusion about the wisdom of continuance. A good outcome is to justify and secure funding to commission a credible, commercial feasibility study to support subsequent development and implementation plans.

CATCH Goal

To describe the cost, benefits, and challenges, for all stakeholders, of implementing a District Heating (DH) system which can reduce the energy costs for the community of Kinross and Milnathort (the Towns). Along with utilising other sources, this could draw heat from Loch Leven, with potentially helpful consequences for the stressed ecosystem of the internationally significant nature reserve.

Motivation

Arguably, we are currently in a Climate Emergency, with international ambition to head quickly to NetZero emissions. Alongside this, there are strong economic pressures which act unequally on different segments of the population. People are hurting.

By acting together, we believe that we make a bigger difference to address cost of living issues while also reducing our impact on climate change, beyond that which individual efforts can achieve.

What is a District Heating system?

District Heating systems are much more commonplace on the continent than in the UK, following different responses to the 1973 energy crisis, where the UK had access to ‘cheap’ gas from the North Sea.

DH systems comprise two separate elements:

- A **distribution network** of pipes carrying heat to individual houses, community buildings and commercial businesses. Installing this would necessitate disruption of the streets, but the network would typically have a working life of many decades, protecting the incomes of families in the Towns.
- An **Energy Centre**, which can be physically modular and distributed. This may also incorporate storage elements to mitigate the daily or seasonal availability of energy from renewable sources.

While the easiest integration with old boiler/radiator systems is using high temperature heat (80°C), recent systems, seeking to reduce transmission losses, have tended to reduce supply temperature relying on more local step up for household requirements. Newer, well-insulated housing stock, ideally with underfloor heating, can work effectively with 35-50°C heat. The choice of operating temperature for the network drives the cost of integration for households, capex and operating costs for the system, and the simplicity of connecting a multiplicity of renewable heat sources. There are big ramifications for the funding logic and the hurdles limiting adoption according to the balance of ‘grid’ and household investment.

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An overview – October 2022

David Cairns

As there is a mix of housing build standards in these Towns, including historic architecture in the conservation area, implementing highly effective insulation may be difficult, so street or estate level step-up for local delivery of higher temperatures may be appropriate.

Looking round the Towns, there are many sources of potential energy consistent with supporting such a network, including the Loch, wastewater treatment, commercial properties which generate waste heat as a by-product of their processes, the ice rink, community roofs which could take solar PV etc.

Ownership of DH schemes follow different approaches. Strong community involvement has potential to deliver significant ongoing benefits for the Towns into the future, reinvesting any profits.

Benefits Sought

A soundly implemented DH system has potential to deliver many benefits, including:

- **Low-cost heating** for residents, businesses, and community premises. This is about economies associated with larger scale systems.
- **Move the CO2 emissions needle** significantly, by replacing gas with renewable sources of heat, providing access to green technologies for more people.
- **Cooling the Loch**, reversing some of the impacts of climate change, in a way which might be a positive exemplar of what could be done elsewhere.
- Acting on this, perhaps in a Community Development Trust manner, might stimulate richer **community involvement** and further projects, making the Towns more attractive places to live, creating local jobs too.

Risk Factors to be Managed

There are many challenges to be described and effective solutions identified, including:

- **Complexity of stakeholders** – there are many with widely varying needs
- **Protection of the Loch**. Any envisaged system must do no harm to the ecosystem, indeed, should deliver positive impact for the RAMSAR Nature Reserve.
- **Land and access agreements**. Infrastructure needs to be placed at relevant positions, requiring agreement of landowners, planning authorities etc.
- **Ownership**. The community should have a strong role in this, to help support a high buy-in level for energy usage, assuring access to lower cost finance options and coping with implementation disruption.
- **Insulation of housing stock**. A deliberate programme to be “DH ready” will be required, supporting folks with limited capital and/or motivation or just because it is difficult to do, to improve their house energy efficiency.
- The **economics** must work for heat users. There are alternative individual approaches. The DH route must be demonstrably better. It must be fundable.

Forward Path

CATCH is currently working to describe elements of the case, with the aim of being able to identify a relevant partner for the feasibility study, shape good questions to be answered by it and to secure the necessary funding.

With an initial rounded description, assuming there is a plausibly positive argument, key stakeholders can be approached to clarify any blocking issues needing careful and creative solutions.

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Work continues to:

- Identify good models to describe the sustainable heat capacity of the Loch
- Search for literature which can help illuminate the potential for ecosystem benefits resulting from temperature reduction
- Extract a street-by-street analysis of heat needs which, along with pipe lengths, should enable a first pass estimate of the size, costs, and plausible viability of the scheme, and clarify those relative to the contra-factual case of alternative available energy approaches.
- Communicate with stakeholders, including outreach to residents about likely engagement levels. This is not a difficult story to communicate – provided the numbers are right.

Ideally, we will be in position to commission a sound feasibility study before the end of the first half of 2023.

Further Reading

Comparison of 4th and 5th generation District Systems

Looks at the economics of existing systems in Copenhagen and London and the influence of operating temperature.

https://www.researchgate.net/publication/350508808_Comparison_of_4th_and_5th_generation_district_heating_systems

A Scottish DH system

Queen's Quay in Clydebank is up and running as a 5th generation network. Funded by the Scottish Government and West Dunbarton Council, district heating underpins the regeneration activity.

<https://www.queens-quay.co.uk/>

<https://www.vitalenergi.co.uk/our-work/queens-quay-heat-network-design/>

Useful Resources

A good set of pertinent resources is available at

<https://www.districtheatingscotland.com/resources/>