

LED Community Leisure Ltd
and
East Devon District Council

**Options to Reduce Energy Consumption
at East Devon Swimming Pools
Initial Feasibility Study 2023**

Background

The objective is to develop and agree a medium to long term vision for the leisure centres within the LED Leisure Management Contract and the Flamingo Pool in Axminster, which sits outside this agreement. Swimming pools are large energy consumers; EDDC are the landlords of the three public pools in Exmouth, Honiton and Sidmouth and see the need for them to be as carbon neutral as possible before the target date of 2040.

LED Community Leisure (LED), who operate EDDC's 3 pools as well as the district's other community leisure centres, are currently experiencing a significantly increased financial burden from energy prices, which have had to be passed on to the Council. This is not expecting to get any better in the next 24 months, due mainly to factors outside of their control to manage the costs incurred.

LED and EDDC should work together on looking at the principles of change and what is involved with this process. This paper will focus on current energy savings schemes / equipment, and which site / sites would be best suited to which principal change.

Three key points:

- a. A clear view of the potential of the pools in terms of demand and revenue.
- b. A costed plan for phased investment which is justifiable in business terms.
- c. A model for future operational management. This requires expert advice tailored to the specific circumstances of EDDC and the Leisure Strategy.

ADDITIONAL RESEARCH DATA

To date there are 6 main drivers to Leisure Centre energy / equipment provision. This report will look at these main drivers and associated issues of each where possible.

1: **Hybrid Heat pumps.**

Hybrid pumps are very much in their infancy and not yet ready for the public market let alone the commercial market. This form of heating would use the existing pipe lines for gas supply and run a gas and heat pump in unison. The principal idea of the Hybrid pump is for businesses that are looking to lower carbon heating systems or to reduce energy bills if a standard heat pump installation is not suitable. With this option you would still be dependent on gas but not as much, and capital outlay and payback period would be substantial compared to others.

Conclusion: Not an option at present

2: **Ground Source Heat pumps / Bore holes.**

GSHPs, whether they be placed in a mass off land or via bore holes, are an option for some facilities. The principle of a GSHP is this system is efficient and effective if the land and permission to bore very large and long holes into the earth is granted. To be considered before considering GSHP:

- Access to the ground and whether you choose trenches or a borehole to lay the ground loop
- The brand, model and size required for the size of the facilities
- How much heat is required

Whilst GSHPs are one of the most efficient they are also the most expensive to install.

Conclusion: Not a viable option due to land unavailability outside all the sites?

3: **Air Source Heat Pumps**

Technology and the latent demand for ASHPs particularly over the past 3 years, has made this a very viable option for public and community facilities. Many local authorities have installed ASHPs in their public facilities and this has proven to have achieved energy efficiencies. Whilst ASHPs are very cost-effective against other equipment, the initial investment in them is very high. Installing ASHPs into buildings that are gas reliant is quite a large job with many changes to the plant and its management systems. Once installed they are efficient, and savings can become apparent very quickly. Not every building can apply ASHP to the structure of the plant etc and this will always be a deterrent. Further down this document is the explanation to how this system works and the theory behind its workings.

Conclusion: Viable option for most facilities

4: **Photo Voltaic (PV) or solar panels**

PV panels, like ASHPs, are the recommended change to any aging or new build facility. After 2025 any new build may require PV from the offset of planning. PV is relatively cheap compared to ASHPs and GSHPs but what we must not forget is PV only creates heat in sunny conditions. PV should therefore be installed on roof space that faces predominantly south. For PV to generate large amounts of energy and become effective, very large surface areas are required. Looking at the 4 pools in question only Exmouth Leisure Centre has enough roof space to make it a viable option, although the initial investigation indicates that the centre would still require another heating option as well as PV due mainly to the energy needed to run the site.

Conclusion: Viable option for Exmouth LC (and potentially Ocean and Pavilion)?

5: **Combined heat and power (CHP)**

Combined heat and power (CHP), also known as cogeneration, is:

The concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy. A type of distributed generation, which, unlike central station generation, is located at or near the point of consumption. It comprises of a suite of technologies that can use a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling.

CHP technology can be deployed quickly, cost-effectively, and with few geographic limitations. CHP can use a variety of fuels, both fossil- and renewable-based. It has been employed for many years, mostly in industrial, large commercial, and institutional applications. CHP may not be widely

recognized outside industrial, commercial, institutional, and utility circles, but it has quietly been providing highly efficient electricity. It is reasonable to expect CHP applications to operate at 65-75% efficiency, a large improvement over the national average of about 50% for these services when separately provided. Most of the LED sites could apply CHP as their power source but an independent survey would be needed to advise which and the viability.

Conclusion: Possibility but would need expert guidance given the respective sites set ups and plant room needs.

6: ASHP and Gas boilers / MIX

As EDDC are looking to becoming carbon neutral by 2040, the existing gas and electrical heating of its sites will need to be phased out over the next 17 years. Electricity is becoming very expensive, and gas has always been much cheaper and continues to outweigh the cost of electricity by around 60%. In the conclusion and additional report this option would be favourable. As recommended at the start of the report focussing on the 3 EDDC swimming pool sites with large energy use is a must.

Conclusion: An option for some sites

Development and scope for change

Supporting information:	Energy saving trust
Utility Review source:	Nottingham /Energy Partnership
Author:	Alan Waistell
Due Date:	February 2023

The prime part of this project is **evaluating the current energy** use of the centres. For this reason I would like to go through an evaluation of energy options before focussing on the prime objectives.

Utility Evaluation of the EDDC / LED Contract

Different energy sources are measured in different units: litres, therms, BTU, kWh, units, cubic metres and many more. This makes it very difficult to compare the actual costs for powering a heating system between different energy sources and their efficiencies when balanced against each other.

For this reason, standardised units and costs are needed. I have applied these calculations for the main fuel types. In making these calculations, sources of data and assumptions have been used, which have been referenced. I have taken Nottingham energy partnership (NEP) samples on energy costs per unit as, who knows what the cost of units will be in the **next 12 months**. This helps to form **a base line figure** on each form of heat source.

A heat pump can be used to extract far more energy from the heat source (the air, the ground or a body of water) than it consumes. Heat pumps are measured according to their coefficient of performance or COP (sometimes CP or COP) and typically produce a COP of 2.5-3.5. That means a heat pump using **1 kWh of electrical energy can deliver say 3.0 KWH of heat**, making it competitive in the right circumstance with fossil fuel sources. The average energy gains over the year are often described as the Seasonal Performance Factor (SPF).

Energy Cost Comparison – FEB 2022

Fuel	Fuel price (p per unit)	Unit	Pence per kWh (after boiler efficiency)	Energy content (kWh per unit)	KgCO2e per kWh*
Electricity Standard Rate ¹	38.94	kWh	38.94 (100%)	1	0.231
Electricity Online Rate ¹	38.41	kWh	38.41 (100%)	1	0.231
Mains Gas Standard Rate ²	11.51	kWh	12.79 (90%)	1	0.215
Mains Gas Online Rate ²	11.06	kWh	12.29 (90%)	1	0.215
Kerosene ³	97.49	Litre	11.08 (90%)	9.8	0.298
Gas oil ⁴	121.26	Litre	13.34 (90%)	10.4	0.316
**LPG ⁵	N/A	Litre	N/A (90%)	6.66	0.240
Butane ⁶	191.20	Litre	29.34 (90%)	7.97	0.247
Propane ⁷	135.57	Litre	22.69 (90%)	7.07	0.239
Seasoned Wood (Logs) ⁸	35.86	Kg	10.04 (85%)	4.20	0.028
Pellets (Bagged) ⁹	62.37	Kg	14.44 (90%)	4.80	0.053
Pellets (Blown Bulk) ¹⁰	53.80	Kg	12.45 (85%)	4.80	0.053
Smokeless fuel ¹¹	60.87	Kg	12.11 (75%)	8.51	0.398
Coal ¹²	64.60	Kg	10.83 (75%)	6.20	0.398
GSHP ¹³	38.94	kWh	11.13 (350%)	1	0.083
ASHP ¹⁴	38.41	kWh	14.23 (270%)	1	0.108

As you will see from the figures in the table, the most efficient / cost effective systems are still gas boilers and air source heat pumps. What the council need to establish is the timelines to when they are to go greener or carbon neutral.

These factors will have a pinnacle part on what can be achieved in the 3 timelines.

Utility Costs overview:

Electricity at this present moment in time is 3 times more expensive than mains gas. No one can predict if this is going to change given the current economic climate. Air source heat pumps are as efficient as mains gas.

Replacing an ageing gas boiler at 20 years plus would save utility costs but very little. New boilers in plant rooms would incur potential savings of circa 10% - 20% against the already established older units. These are not combination boilers and are straight gas provision boilers, therefore a work-horse system not a combination system. You could not put combination boilers in the plant room as the pool requires heat all of the time not when called for like a combination boiler.

Efficiencies do not necessarily translate into financial savings. A new boiler would incur less maintenance as long as it is serviced as needed, therefore direct savings rather than predicted savings. What is needed is the cost of maintaining a boiler against the cost of maintaining ASHPs.

ASHP/ GSHP / CHP are a greener way of producing energy but the initial installation costs against an already established plant room set up for mains gas, would make it an expensive option initially unless seen as a long-term solution. There are other factors needed before a decision for each site is made. Predominantly the insulation of the sites, costs associated with removing plant for the ASHP works and what changes are needed to the plant room and building pipework to entertain ASHPs if this is the option.

Comparisons of current and predicted energy costs:

- *With current trends and looking at leisure centres across the UK, it is estimated that a combined increase of electricity and gas is currently sitting at 270% in 2022. LED has had to reforecast many times as the prices change weekly, and we no longer have a contract. To date, against budget, we are tens of thousands overspent. The utility broker we use and have done for many years, has estimated that the increase will slow down but we are still to budget an 11.7% increase over the coming 12 months.*

For evaluation purposes:

On average across the UK, electricity costs have risen circa **200 – 300%** across the leisure sector. On average gas prices have risen circa **100%** across the leisure sector.

Conclusion / Observations

EDDC and LED have the community and its needs close to their hearts. Due to the ongoing conflict in Ukraine, there is no light at the end of the tunnel at present. Local government and local authorities are in a tough place financially and this is not expected to improve any time soon.

Leisure as a sector is also in a very precarious position with capped bills coming to an end in April 2023. As a partnership we can help soften the blow financially but there is considerable capital investment needed for any of the options to come to fruition. On average, if ASHPs are the way forward, they currently range from £100k per building to £300k depending on the KWS needed to manage the site. The existing gas supply can be adjusted just to manage the hot water element of the building's needs, and over the next 18 years there may be a solution to turn these off and maybe manage via either a new ASHP or add on. A mix of gas and ASHPs would enable the sites to achieve the best results and help maintain continuity when it comes to heat requirements at peak times. A mix will also help with future bills as gas at present is considerably cheaper than electricity, and in some sites ASHP would not incur any savings but cost more than the current set up, as at Sidmouth Pool. Whilst we appreciate there is a need to improve the carbon footprint what needs to be addressed is at what cost. It may be that removing gas from some sites and introducing electricity powered equipment only, would increase costs?

This initial paper gives the reader an idea of what we have, what we can do and how. At present to my knowledge there is not a system that can do all of what is needed, but there are systems that can help substantially with energy consumption. I have attached a further report that has been devised via site visits in March 2023 by two external experts. This report was based on what was found at sites, what can be achieved at site and their professional opinions on the options. Both contractors have very extensive knowledge of mechanical and plant maintenance, with one of the contractors being one of the biggest suppliers of pumps and ASHPs in the UK.

This is the first step in reducing EDDC's and LED's carbon footprint at the leisure centres. There are many factors that need to be considered but I would hope this report gives some insight to the options and provide the Council's consultants with a 'starter for ten'.

The Government's recent announcement of a £63million fund for public swimming pools, of which £40million is for 'decarbonisation' projects (and for which EDDC qualifies), may be an opportunity to bid for any viable short-term capital (and revenue) projects, although a longer-term replacement strategy will be needed for some sites, such as Sidmouth Pool.

As mentioned in the Facilities and Activities report, we have also just commissioned the Deep Green heat transfer system at Exmouth Leisure Centre, although the reduction in heating costs that this will bring has yet to be evaluated.

Neither has any evaluation been undertaken of the 'dual use' school sites leisure facilities as these should be the primary responsibility of the respective schools or academies and reviewed as part of the respective management agreements that are now underway.

Alan Waistell

Director of Leisure

28th March 2023