CLADE

SUSTAINABILITY REPORT//

2022

INTRODUCTION //

2022 was a dramatic year in the energy transition. The invasion of the Ukraine prompted a huge spike in energy prices and put energy security firmly on the national agenda of the UK. Heat and hot water are many times greater in energy consumption than electricity and so the shift to alternative heating sources has accelerated this year.

2022 has been an exceptionally challenging year in business, and in society. For a while, Net Zero took a back seat. However, it is coming back fast and is being accelerated by energy security. At Clade, we have progressed in our sustainability plans and are looking forward to a fantastic 2023 when we will strive to do even better.

This year we're proud to present our updated sustainability report. 2021 was our very first report and this year we'll present updates on the existing and new sustainability activities. We have, for example, conducted a lifetime carbon assessment on one of our heat pumps - the results of which are really interesting and support our market value proposition.

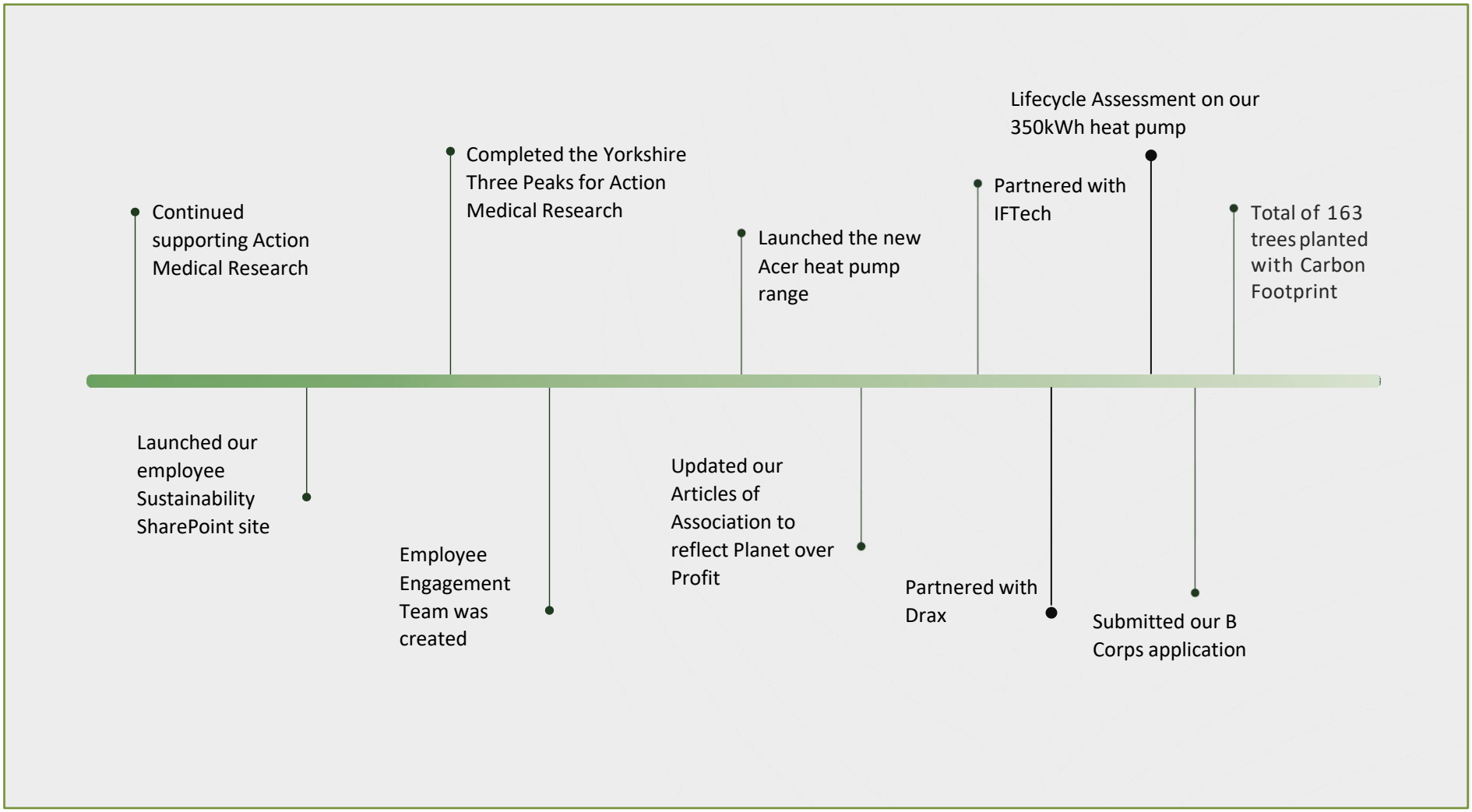
In addition, we are excited to announce wider partnerships with IFtech and Drax which extend the sustainability of heat pumps through energy storage and grid flexibility. As we look forward to this year, we're focused on exceptional delivery and furthering our own sustainability agenda on behalf of our staff, our customers and our planet.

ABOUT CLADE //

Clade is an industrial engineering and technology company which manufactures, installs, and connects heating and cooling assets to energy systems across the built environment. With over 30 years of experience of working for blue chip customers, Clade is leading the energy transformation in heating and cooling using cutting edge natural refrigerants.

Clade takes sustainability seriously and is well on the road to becoming a B Corp accredited company as well as wider ESG impact initiatives for customers, staff, and the environment.

2022 HIGHLIGHTS//



GOVERNANCE //

Sustainability is at the heart of Clade and is reflected in our governance structure. Dean Frost, the MD, is responsible for the delivery of the sustainability strategy. He is supported by the board who ensure their respective areas of responsibility are fully aligned.

Reporting to the board is a sustainability committee, chaired by Tim Reynolds. The sustainability committee is open to all staff and is responsible for this report, the targets and metrics and internal communications.

As part of becoming a B Corps, we recently updated our legal Articles of Association to reflect our commitment to having a material, positive impact on society and the environment, as well as the success of the company and its members. Further demonstrating our commitment to putting **Planet over Profit** and considering all of our stakeholders when making decisions.

MARKET VIEW //

In 2022 the market changed dramatically; the invasion of Ukraine brought energy security to the fore. It also brought significant uncertainty which stalled investment and pushed Net Zero to the back of many agendas. Towards the end of the year, we saw signs that this trend is reversing back to normal. In many ways, the energy security issue aligns with Net Zero - two positive effects for the price of one! The Chris Skidmore review highlighted this as well as the pressing need to put policy into action.

Hydrogen has received considerable interest. However, the market analysis shows that it will be expensive to produce and therefore, will not be used to heat buildings or hot water. Currently, nearly all hydrogen is derived from fossil fuels. Heat pumps remain the only viable, scalable, and available low carbon heating technology.

Natural refrigerants are becoming more popular as the messages about GWP, toxic PFAS and security of supply become more widely understood. 2022 saw several legal actions against PFAS producers as well as regulations tightening in the US and EU. The EU continues to lead the world in phasing out F-Gas, controlling chemicals and thereby promoting natural refrigerants.

Clade is well positioned to take full advantage of both the push to heat pumps and natural refrigerants.

The market for refrigeration is growing incrementally, chilling and cooling applications are expected to increase as the climate warms and the effects of urban heat islands increase. There are still many refrigeration systems with high GWP refrigerants which will need to be replaced with natural refrigerants, this is likely to happen as systems are naturally renewed.

The energy security crisis has highlighted the importance of the flexible use of electricity hungry appliances, such as heat pumps. The flexibility markets have really begun to take off with various schemes rolled out at domestic and commercial tariff levels. Clade has signed a partnership with Drax and completed the first end-to-end flexibility proof of concept. Next year, we expect to develop this further and deploy to live projects.

Skills remain in high demand with a shortage at all levels. There is a considerable amount of work that Clade continue to do to educate and inform customers, team members and the wider sector. As a leader in the sector, during a period of great change for the heating industry, this is a necessary and vital role.

We expect the market to grow in all dimensions, across all our technologies in the coming year.

SOCIAL IMPACT & VALUES (SDG 3,5&11) //

"Working together for a greener and brighter future".

People are at the core of everything that we do. From the Installation Engineers working nights in supermarkets, to the Manufacturing teams working on the latest CO2 technology, to the technical teams constantly tweaking and enhancing our products and the Management and Admin teams that work tirelessly to ensure that things run as smoothly as possible – everyone is of equal importance.

It is for that reason that we spent a considerable amount of time in 2022 creating our values.

To create our values, it was important to us that this was employee led because we wanted a meaningful statement that describes what it means to work for Clade and how we could reward behaviours against these values. Several sources were used to collate this information, including employee surveys.

Led by Sarah Sayles (Head of People), an Engagement Team was formed with representatives from each part of the business:

Caroline Baker (Projects Installations Coordinator),
Vicki Bacon (Projects Procurement Coordinator),
Laura Klimkowicz-Freeman (Central Finance Assistant),
Dameon Sherrard (Plant Shopfloor Manager).

The team then collated a list of values and rewards which went to the Board for their feedback and comments. As a result, our new value statement is:

Part of enhancing our benefits package meant the introduction of some new items which include the following:

1) A day off for your birthday,
2) Holiday buy scheme,
3) Long service awards,
4) A new charity has been selected for fundraising which is Cancer Research UK,
5) Team events are being planned, that include giving back in our communities (for e.g. support a local food bank, tree planting, DIY for a local charity etc).

SUSTAINABILITY //

Our aim is to achieve a reduction in our own carbon emissions and climate impact whilst supporting our customers in their own ambitions to achieve Net Zero. We aim to be Net Zero in scope 1 and 2 emissions by 2050. We have also taken steps to identify a baseline for the carbon emissions involved in manufacturing a heat pump. Actions taken to date are:

- Rooftop solar PV supplying power to the Technology Centre in Leeds,
- A Clade 250kWh heat pump has been installed to heat the factory at the Technology Centre,
- Increased the use of electric vehicles across the fleet – currently 51%,
- Funding the planting of trees for each product sold,
- Recycling all wood packaging via Leeds Wood Recycling,
- Our general waste is sent to a provider that operates zero waste to landfill,
- We only use natural refrigerants in the products that we design.

The UK Environment Act 2021 set out a requirement for the government to produce targets. In December 2022, these targets were released. Targets that Clade can significantly influence are:

- Deliver Net Zero ambitions and increase tree cover to 16.5% of total land area by 2050. Clade commits to planting 5,000 trees by 2030, contributing towards the increased tree cover target,
- Cut exposure of the most harmful air pollutant to human health - Particulate Matter 2.5 emissions (PM 2.5) by continuing to manufacture natural refrigerant heat pumps. Clade's heat pump installation and solar at the Technology Centre in Leeds reduces our likelihood of creating PM 2.5.
- Restore precious water bodies to their natural state by cracking down on harmful pollution from sewers and abandoned mines and improving water usage in households. We contribute to this target by only designing and supplying natural refrigerant products, as opposed to PFAS alternatives.

CLADE

SUSTAINABILITY //

Commitments & Targets (SDGs)

We have continued with the same Sustainable Development Goals (SDGs) that we identified as being relevant to us in 2021. These are as follows:

3 – Good health & wellbeing,

5 – Gender equality,

7 – Affordable & clean energy,

9 – Industry, innovation and infrastructure,

11 – Sustainable cities & communities,

12 – Responsible consumption & production,

13 – Climate action.

The following sections of the report entitled 'Our Impact' are categorised against these SDGs.

This report contains further information about our commitments and progress against these SDGs.

Future reports will build on this and may add or change reporting criteria as global sustainability reporting matures.

OUR IMPACT – EMISSIONS CALCULATIONS (SDG 7, 12, 13) //

Our Impact:

Carbon Emissions

Scopes & Descriptions	2022 - metric tonnes CO2e	2021 - metric tonnes CO2e	2022 vs 2021
Scope 1: Direct emissions from owned/ controlled operations	0.85	14.98	-14.13
***Scope 2:** Indirect emissions from the use of purchased electricity, steam, heating, and cooling	56.66	129.38	-72.72
****Scope 3 emissions**			
Employee commute (fixed placed of work)	42.17	29.05	13.12
*****Business travel (Engineers, Project Managers, Exec etc)	277.50	483.49	-205.99
Plant outbound deliveries	11.30	14.46	-3.16
Inbound deliveries	56.12	0.00	56.12
Total Emissions	**444.59**	**671.36**	**-226.77**
******Trees Planted**	**27.17**	**75.50**	**-48.33**
Net Emissions	**417.43**	**595.86**	**-178.44**

*Includes an estimate for energy used by employees that work from home

**These categories have been selected based on a level of materiality

***This includes an estimate for subcontractors. It also includes an element of electricity mix supplied to the grid and any associated grid losses (relating to EVs)

****This is an estimate based on 163 trees planted in 2022

Our waste partner does not send any waste to landfill, and we have continued partnering with Leeds Wood Recycling who transform our waste wood into interesting furniture etc.

We have also drastically reduced the quantity of engineers that we have on the road. This has reduced our business travel significantly.

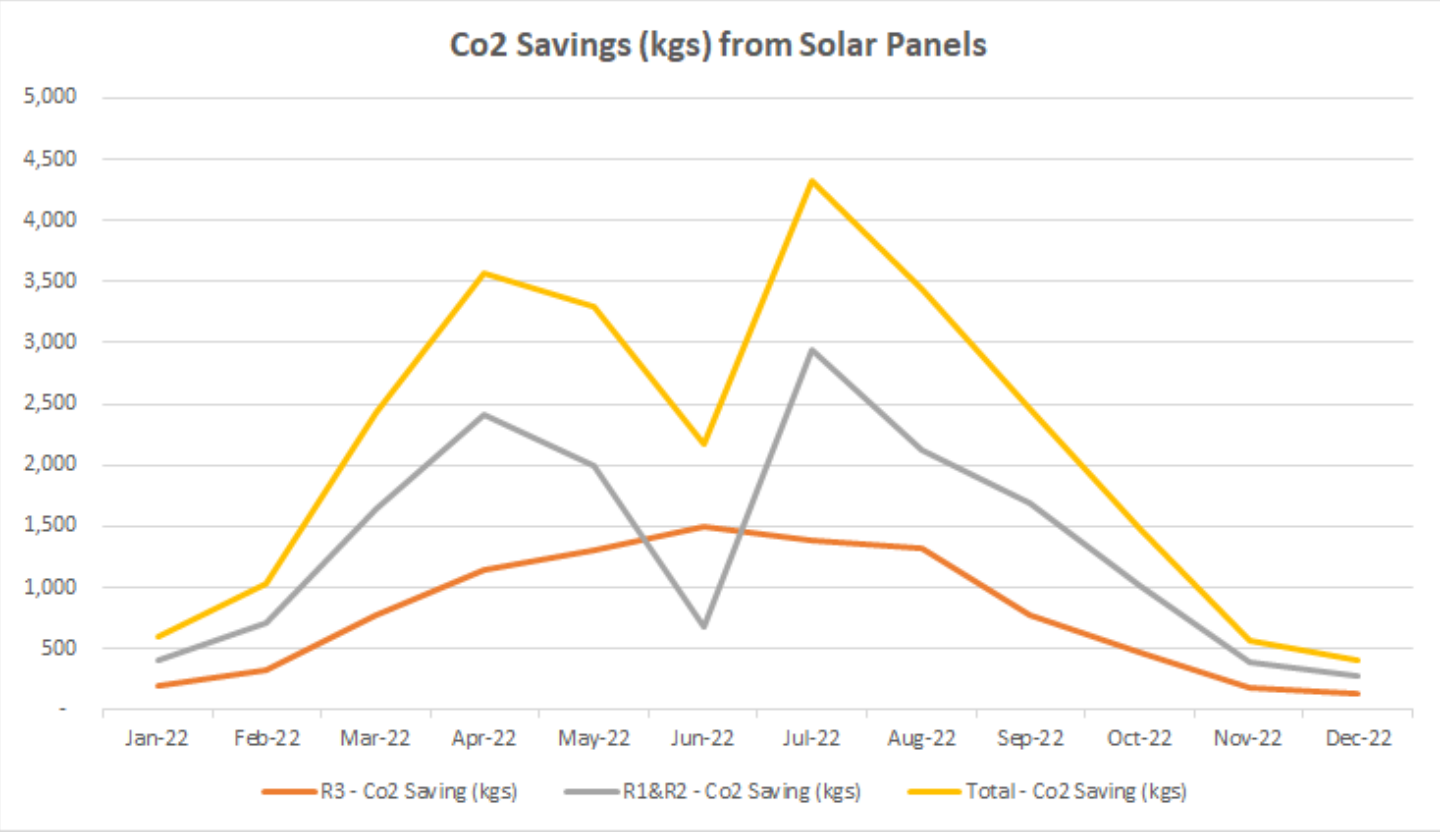
Post-Covid, we have continued to encourage home working (where feasible) to reduce the hours spent driving a car. Microsoft Teams meetings are always the default now too.

We have calculated the impact of miles travelled from the deliveries of our biggest supplier. The data for this was not available in 2021. We will continue working with them and the rest of our supply chain to make these deliveries as efficient as possible.

OUR IMPACT – SOLAR & HEAT PUMPS (SDG 7, 9, 13) //

Since the Sustainability report in 2021, we have installed a solar panel array of 137 kWp on the roof of our Technology Centre in Leeds. Between April and September, the solar panels were our largest supply of electricity, further improving our carbon footprint and reducing our reliance on the grid.

The carbon saving of this installation is demonstrated in the following graph:



OUR IMPACT – SOLAR & HEAT PUMPS (SDG 7, 9, 13) //

During 2022, we manufactured an Oak 250 kWh heat pump to provide the electricity for our Technology Centre in Leeds. It has incorporated innovative Smart technology to help reduce energy bills and carbon footprint, through the utilisation of SMART 4.0 predictive intelligent technology.

The heat pump will provide predictive, intelligent heating/cooling, utilising external data to predict future demand and select the most cost-efficient way to heat/cool and/or store energy. The technology can also prioritise only green energy sources or utilise cheaper energy prices.

We are excited to share that, following extensive R&D, it was turned on towards the end of 2022 and our gas boiler has been turned off, so we hope to see further emission savings from this in 2023 and beyond!

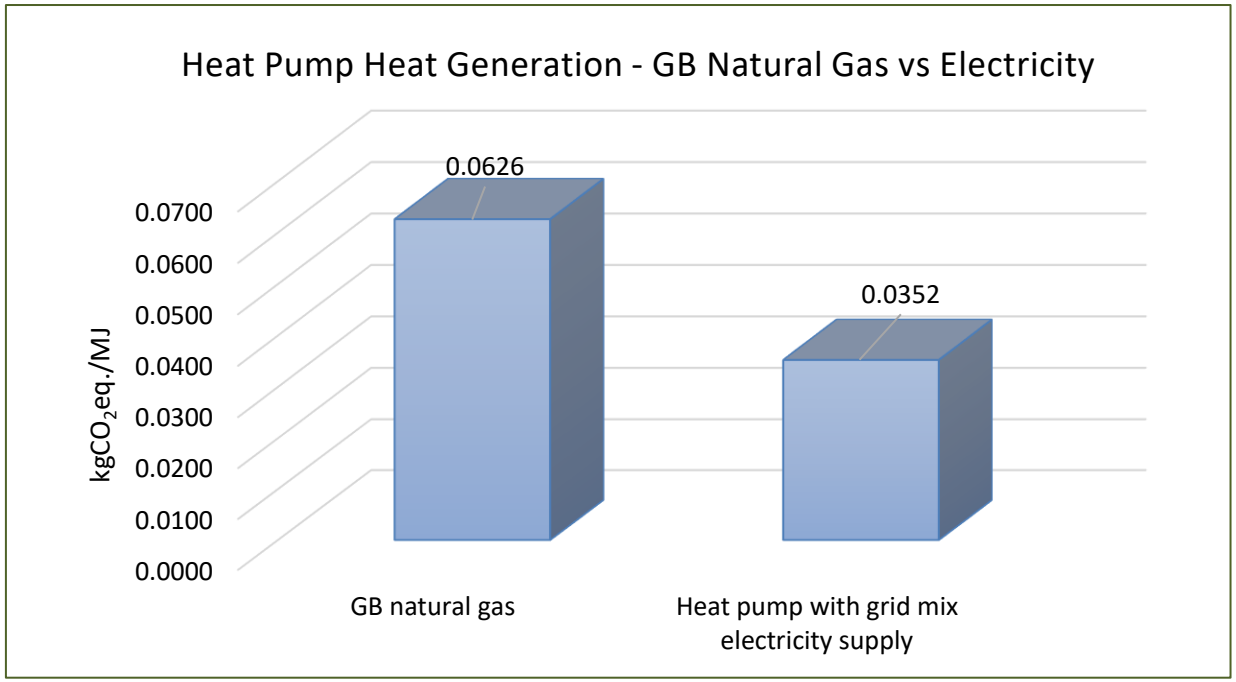
OUR IMPACT – LIFECYCLE ASSESSMENT (350KW ASHP) - SDG 7, 9 & 12 //

We recently engaged with Exeter University about collaborating on a Lifecycle Assessment (LCA) for our 350kWh heat pump. This was to enable us to fully understand the environmental impact of manufacturing a heat pump.

Zachary Kutz, an MSc student at the University worked closely with members of the Clade team so that he could create a cradle-to-grave LCA and calculate the total amount of embodied carbon associated with each stage.

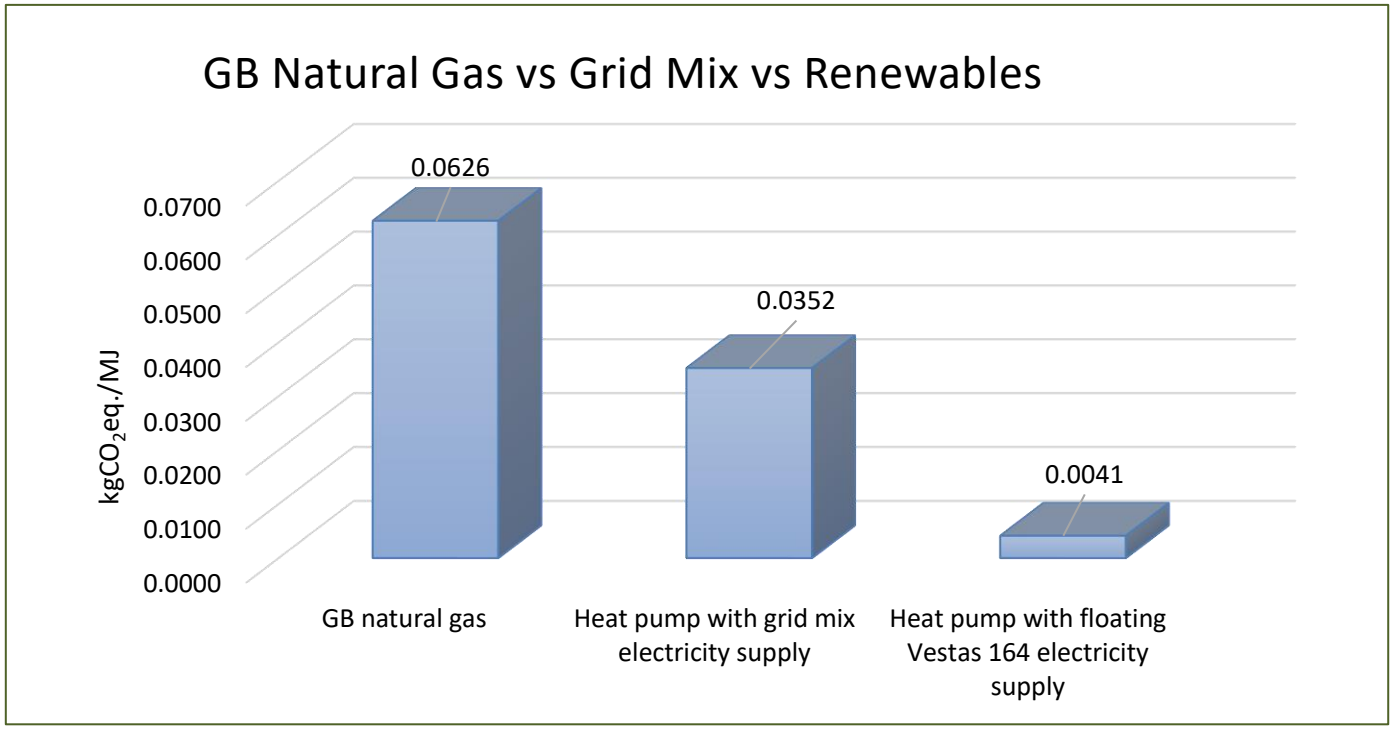
"The total carbon was calculated to be just under 58t CO_2e. excluding the electrical usage during operation. Most of this was driven by the material extraction lifecycle stage."

The heat pump with grid mix electricity supply was converted and compared to the alternative source of natural gas. The results below clearly show a significant improvement compared to a gas boiler alternative:



OUR IMPACT – LIFECYCLE ASSESSMENT (350KW ASHP) - SDG 7, 9& 12 //

The biggest improvement is seen when the electricity source is renewable. The following graph demonstrates what could be expected if the electricity source was provided by a floating wind turbine:



OUR IMPACT – LIFECYCLE ASSESSMENT (350KW ASHP) - SDG 7, 9 & 12 //

"One of the largest environmental impacts of a heat pump can be the leakage of refrigerant. All our heat pumps use CO_2 as a refrigerant which means it has a Global Warming Potential (GWP) of 1. A more common refrigerant for heat pumps is R32 which has a GWP of 677. **If R32 was used in this heat pump, the leakage alone would equal 84,625kg CO_2e.** This value would be higher than all the other life cycle stages."

A limitation was the shortfall in the supply chain for gaining relevant data on components and knowledge of where raw materials are extracted, processed, and manufactured. This has made it clear that as the public and manufacturers become more self-conscious of their environmental footprint, a simplified system needs to be constructed that allows the tracing of raw materials as they go through different processes and manufacturing stages to become components and products.

The findings of this report identified that the installation of a 350kWh Oak CO_2 Air Source Heat Pump would have **reductions of almost 50% when comparing 1MJ of heat generation to natural gas**. This can be improved further by using a renewable electricity source. For e.g. a large-scale floating wind turbine could reduce the impact by up to 13 times.

POTENTIAL CERTIFICATIONS AND POSITIVE PARTNERSHIPS (SDG 3, 5, 11) //

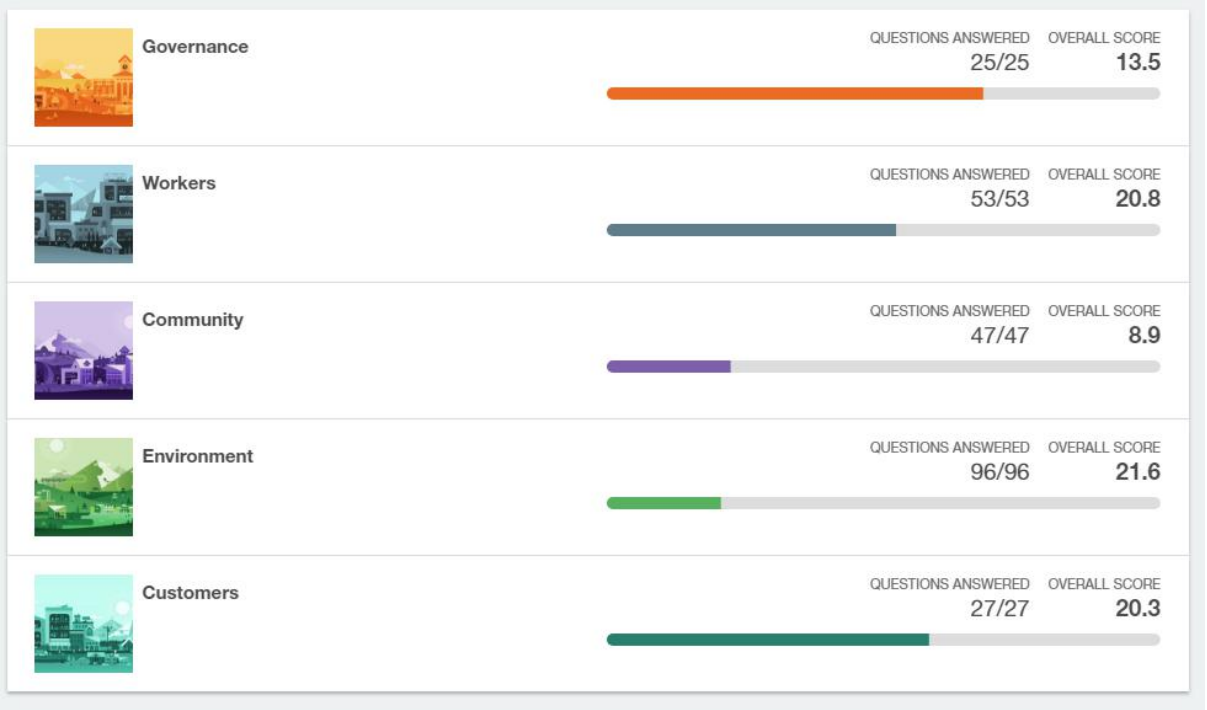
B Corps

B Corps are a group of companies (1,000 in the UK and 4,000 globally) verified to meet high standards of social and environmental performance, transparency, and accountability. The Board decided that gaining accreditation was an exciting opportunity to demonstrate that we are committed to the Environment, to good Governance, to our Workers, to our Customers and the wider Community.

Since our 2021 Sustainability Report, we have continued the process of becoming a B Corps accredited company.

The process to become accredited is quite onerous. However, we are very pleased to say that we completed a detailed B Impact Assessment (BIA) and achieved the 80-point threshold required to qualify. We are looking forward to the next stage which is Verification.

The results from our BIA across each area are below. These results are subject to the Verification stage of our application, but it highlights the areas that we are strongest in and the ones that require improvement.



POTENTIAL CERTIFICATIONS AND POSITIVE PARTNERSHIPS (SDG 3, 5, 11) //

Leeds Wood Recycling

We have continued working with Leeds Wood Recycling. They are an ethical, cost effective and convenient social enterprise in West Yorkshire that diverts wood from going to landfill.

We were their first customer four years ago, and since then we've also supported them with Health and Safety consultation services. We have also worked collaboratively to help additional local charities by creating outdoor furniture from the waste wood that we have collected from our operations.

Carbon Footprint Ltd

Tree planting to reduce our carbon emissions with Wendy Buckley and the team at Carbon Footprint continued in 2022. We planted a total of 163 trees.

A tree can absorb as much as 21kgs of carbon dioxide per year and can sequester 907kgs of carbon dioxide by the time it reaches 40 years old. We plant trees in the Leeds area so that we can give back to the local community.

IFTech Thermal Storage

We recently partnered with IFTech, a specialist underground thermal storage provider.

Thermal storage is set to become a big deal as the cost of energy continues to rise and we're ever more conscious of the carbon cost of wasting it. Storing heat and cool for short or long periods will even out the demands on the grid, reduce costs for consumers and make a major contribution to reducing the UK's carbon footprint.

Drax Energy Solutions

Towards the end of 2022, we also began a partnership with Drax Energy Solutions. The combination of heat pumps and optimised power tariffs is a fantastic way to keep energy costs low.

Drax will help you optimise how you use the heat pump to generate energy cost savings. They'll commit to delivering you these savings by reducing the unit cost of the power you consume by a fixed amount over 12 months.

FUTURE AMBITIONS AND SUMMARY //

We have made significant progress over the last 12 months but recognise that there is much more to do. Therefore, we commit to the following activities and will continue to measure and report progress in subsequent reports:

- To reach Net Zero by 2050,
- Evolve and develop our understanding/reporting of our scope 3 carbon emissions. We plan to do this by working with our supply chain to better understand the footprint of the products that we manufacture,
- To prevent pollution, minimise waste and recycle, repurpose materials,
- To work to ISO 14001:2015,
- Transition to an all-electric fleet,
- Become paperless within the business and when issuing documents to customers,
- Minimising waste in our manufacturing processes by improving and developing the accuracy of all bill of materials',
- Become a B Corps accredited company!

FUTURE AMBITIONS AND SUMMARY //

2022 was a challenging year for Clade, primarily due to events beyond our control. The knock-on effects from the geopolitical events in Europe and the continued supply chain problems, in part due to China's extended Covid lockdown. These things have all played a part in making this past twelve months difficult.

However, we have continued to develop our range of heat pump products, with the introduction of our smallest heat pump, the Acer (50kW). It uses CO2 as its refrigerant and comes in two models – low noise (48dB) and ultra-low noise (33dB). It is also as close to plug-and-play as a commercial heat pump can get!

We have grown our Design and Applications Engineering Team in the past six months, with many new additions to the business. The Board are delighted to be able to welcome these very skilled individuals to Clade. They are already making a significant difference to our business. This team will continue to grow in the next year.

CONTACT US //

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