

GeoDrilling International



Water wells

Around the world, the need to drill water wells continues whether that be for domestic or commercial use

Ground source heating

As the world moves away from fossil fuels the drilling sector continues its focus on ground source heating projects

Core drilling

As one of the mainstays of drilling core sampling and collection plays an important part in our industry

GTD

The GT35

A new benchmark in productivity for ground source drilling rigs?



Growth opportunities in ground source drilling

Simon Sergides from ground source drilling supplies specialist GTD Group, asks is now the time to improve, expand or set up a new ground source drilling operation?

There is a seismic shift in the climate conscience of the public, planners, and politicians. Ground source drilling is on the right side of the argument and will continue to grow traction as the cleanest, greenest, and most sustainable energy source for 'Climate Control' in every sense of the word.

It is a very different business landscape due to demand frequently outstripping drilling capacity internationally and here in the UK. Try booking a reputable driller, and the common thread of conversation usually revolves around long lead times. Good news for the drillers, but an escalating source of frustration for customers, and one that does not look like it will be resolved unless we as an industry increase our ground source drilling capabilities.

Local and international government net-zero carbon targets, combined with significant legislation changes, are creating expansion opportunities and accelerating demand way beyond the capacity of the current number of operational rigs.

Historically there has been hesitancy to specialise in ground source drilling, with a previously small pool of prospect projects compounded further by drilling prices that were being driven down in a bid to secure work. The hesitance was understandable with such a volatile combination. But fast forward to today, and the outlook and opportunities are far more attractive. Projects are consistently getting more extensive, and borehole demand is increasing exponentially, creating a business case that, at last, is tempting to explore.

Such is the demand; leading ground source drilling contractors are typically charging a minimum of around £40 per metre (including materials), with reports of some projects in London exceeding £175 per metre. This gives a broad stroke insight into the current chargeable rates in the UK, but what do the projects look like and what metreage is achievable?

PROJECT CATEGORIES

Projects are split into four typical categories. Large commercial projects (3,000m plus) which can be anything up to 200 plus boreholes across one site, offering consistent productivity for extended periods, with opportunities for multi-rig operations. Smaller commercial projects: range from 1,000-3,000m and represent consistent drilling for long periods. High-end domestic (individual property) projects are

usually on spacious sites, often new builds without the complexities of retrofit projects and involve drilling around 400-1,000m. Finally, there are domestic retrofit jobs (individual property) where the boreholes range from 100-400m.

The margins and profits attainable in ground source drilling are now lucrative and sustainable for large-scale national operations and smaller owner/operator regional drillers. Even the less productive domestic retrofit market has the potential to bring in strong income each week, something that could have been perceived as unattainable just a few years ago. Still, demand is continually growing, not just the potential volume of work but also where and how you might operate.

Staying local was previously not an option, as the lack of work meant you had to spread yourself

The GT35 - a purpose-built geothermal ground source drilling rig specifically designed for high productivity





Mud recycling equipment plays a key part in a productive drilling operation ▶ far and wide, increasing the burden on operational costs, reducing productivity, and limiting returns. Local operations can have a competitive advantage with specialist knowledge of complex local geology (UK geology is notoriously challenging). This enables the team, drilling processes and specialist equipment to be tuned and refined to be more productive, delivering better results for the operation and its customers.

MARKET POTENTIAL

Sources indicate that the sector is currently operating at under one per cent of the potential UK market share. Still, honestly, market data is a little thin on the ground when it comes to ground source drilling specifically, as there is a tendency to bundle all 'heat pump' related statistics together. According to the Heat Pump Association installations in the UK are expected to almost double this year, to between 60,000 and 70,000 units. This will require a 10-fold rise to meet the goal set by prime minister Boris Johnson last November to install 600,000 a year by 2028.

Impressive growth for heat pumps, but what does this tell us about ground source drilling

specifically? Not much at all... apart from that, there is still a lack of understanding and distinction between the types of heat pump systems within the policymakers, planners, and persons in charge of this drive for clean energy.

However, what we can decode from within our industry, is that we cannot possibly meet a fraction of that goal without dramatically increasing our drilling capacity in the UK – this is a high-priority problem for ground source drilling operations.

A big opportunity is to scale 'just in time' with the actual demand. It will require a far more dedicated approach to ground source drilling as a primary business activity – eliminating the temptation of multi-hatting with other drilling disciplines or dipping the proverbial toe in the water to see what it might be like. Both noncommittal scenarios will likely reveal that existing equipment and practices are unlikely to yield the full potential – and that you will be better placed to explore this new business opportunity with a more entrepreneurial spirit and distinct probability of needing to procure the right equipment for the job.

A wise person once said: "Would you use a Ferrari to plough a field?" This leads us quite nicely on to what equipment, what specification and what you might consider when exploring the potential of your operation set-up. Nicholas Bosch, managing director GTD Group, comments: "Don't presume if you buy a rig built in Europe for the European market that it will work productively in the UK. If only it were that simple! The complex British geology presents a unique conundrum when specifying and procuring an effective drill rig. The rig needs to be powerful and precisely spec'd to cope with the unpredictable geology. To make a sound business case, it must also be capable of drilling down efficiently and fast, yet robust and purposely simple to maintain. It's all about reducing downtime, the nemesis of productivity."

SPECIALIST KNOWLEDGE

The Bosch family has been specialising in ground source drilling in the UK and Europe for nearly two decades, and their experiences, successes, and hard lessons learnt, have been the catalyst for GTD's relentless commitment to developing capable and cost-effective equipment, which makes ground source drilling more accessible and profitable. Notably, they have been developing a portfolio of products specifically engineered and designed to tackle the UK geology challenges head-on.

Bosch explains: "We are happy to share our experiences and knowledge gained from years of drilling in Europe and particularly in the UK. It makes far more business sense to close the gap between productivity and profit through working partnerships and collaboration. There is absolutely no competitive advantage in holding crucial insights and information close to our chest, and it won't benefit us, our industry or our customers.

"To truly succeed and maximise the potential of the ground source drilling sector, we need to transform how we do business, how we equip ourselves and our operations to increase capacity and productivity dramatically. The UK requires equipment that is specifically 'dialled-in for the territory', and we can advise, supply and support you in integrating the necessary kit.

"The ideal rig set-up is a balance of capability and cost. Strip out the unnecessary, then refine and simplify the functional requirements, which genuinely improve productivity. It's not so much about manufacturer brand loyalty or familiarity, more so than capability, affordability, and availability to build and expand effective ground source drilling operations. You need to reframe what the 'best' solution might be – it's not necessarily the highest spec component, but in many cases, the best option might be a lower cost, quicker to replace the part

that allows you to keep the drill turning, avoiding potentially huge downtime and lost productivity.”

RIG SPECIFICATIONS

However, what should you consider when specifying a drill rig for ground source work? The first thing is the power output. Why the need for more powerful engines? UK drilling requires mud pumps to work extremely hard. Heavy geology and deep holes all add to the strain on pumps. To run pumps at capacity, they need a large amount of horsepower, over 100hp alone in some cases. Then factor in the additional draw from auxiliary equipment such as pit pumps (sand guzzlers), and all too soon all of the available overall power is being absorbed. Here at GTD, we specify powerful engines, as they can have a significant fuel saving when only running at 1,200rpm as opposed to 1,500rpm plus. If you are not looking to compromise on your set-up, circa 300bhp is where you need to be.

Next, it is time to consider rod length. It is simple maths, double the rod length and halve the number of actions needed. This equates to faster, more efficient drilling, less wear, and less risk. Minimising the number of required rod movements equates to increased productivity. A rig with 6m rods will cut the number of movements of 2m rods by 66 per cent resulting in significant efficiency gains.

Consider an automated rod handling system. In this day and age, it is essential. Not just for productivity but the longevity of your drill crew. Without an auto system, you are limiting yourself to the smaller length rods staff can manually handle, while also increasing the health and safety risk too. We would not spec a rig without a rod handling system.

Now for the mud pumps. No pump is perfect, they all fail. So, when selecting pumps, it comes down to the cost and capability consideration. Dual acting piston pumps are great, who does not want 40 bar and

1,000lpm available. However, they are expensive, and when they do break, the downtime can be horrendous adding insult to injury. Realistically, around 90 per cent of the time, you do not need the performance. Therefore, we find it far more effective to run lower cost centrifugal pumps and consider them a consumable item. The downtime of swapping them out with a spare is minimal, GTD rigs can come fitted with a backup already installed. This means you minimise downtime, and productivity is maintained, quickly paying for any losses in a consumable pump cost.

Lastly, it is time to talk about rod internal diameters. There is finally a shift in the market with many suppliers and drillers already realising the benefits of using rods with a larger internal diameter than the traditional 2-3/8in rods. Considering most of the drilling in the UK uses water rather than air, it makes sense to spec rods accordingly. The increased internal diameter means less backpressure and increased flow, resulting in greater up-flow velocity, allowing cuttings to clear the hole quicker, with reduced risk of collars. It also allows you to increase the penetration rate, which is a massive benefit in pursuing productivity. The solids to fluid ratio are reduced, and your mud cleaning equipment works

more efficiently with greater capacity. The reduced back pressure and cleaner fluids also mean pumps will last longer, and consequential wear on other contented equipment is reduced too.

The GT35 model (featured on the magazine's cover) is potentially the most complete and productive ground source drilling rig for the UK market regarding cost and capability. Its features include: a 292hp motor; 16t pull up; 6t push down; triple clamps; automated rod rack and handling system; 6m rods; BR50 50mm ID rods, 89mm, 10mm wall, 250mm tool joints; dual centrifugal mud pumps (main and spare); air drilling triplex mist pump; auxiliary hydraulics for pit pumps; hammer oiler; main winch; wireline winch, 7.5 generator (240v/110v); an arc welder; and remote control tracking.

ANCILLARY EQUIPMENT

It is not all just about the rig, though. Without a complete balanced system of ancillary equipment to support your rig and a capable team, you simply will not get the productivity.

Mud recycling equipment is essential to the drilling operation and a key component to increasing productivity. Removing the solids from the drilling mud quickly and effectively enables the pumps to work more ►

An automated rod rack and handling system with dual controls for either the lead driller or second man



- ▶ efficiently, reducing wear and increasing the lifespan of all the equipment connected. It also increases the up-flow velocity, meaning the hole is cleared quicker, reducing the risk of collars while increasing the penetration rate.

The loop reeler is often overlooked, but we consider it a vital part of the operation. A smooth-running reeler can reduce the amount of weight required to counteract the buoyancy of the loop, directly saving money on every install. Smooth, consistent unreeling of the loop also reduces the risk of damage and stoppage. Quick, controlled unreeling saves time and workforce energy.

Grouting is the least enjoyable part of any drilling operation.

However, it is now less painful with the pre-mix grouts. You can make your life even easier with a continuously operating mixing pump. There is no need to mix sand, bentonite, and water. Simply add dry bags of pre-mix, either 25kg or 1,000kg bulk bags, straight into the hopper, increasing productivity.

With regard to drill bits, the common theme here is to improve productivity while embracing equipment that is capable of reducing the cost per metre, with the recent development of more affordable PDC bits coming on the market, specifically designed for ground source drilling. Brands such as 'Pink Penetrator' might just make you reconsider what your 'go-to' bit should be.

SUCCESSFUL OPERATION

Without question, probably the most important element of any successful operation is the ground source drillers themselves. They must be motivated by productivity and remunerated accordingly. Leading firms pay their staff well and incentivise them with metrage bonuses. The prospect of becoming a drilling owner/operator has never been so accessible. A company like GTD Group can supply a complete ecosystem of equipment and consumables for the ground source drilling sector. It is offering comprehensive packages with support and finance to build scalable operations. ▼

GTD case studies

AstraZeneca's HQ and global R&D centre in Cambridge, UK

At the time this was the largest ground source heat pump install in Europe and was made up of 178 boreholes, double (four collectors and one grout pipe) 40mm loops, 200m deep. The project was completed with two rigs and one shared central mud recycling system. Completed over a 12-week period with crews completing up to two holes per rig in a day.

"The Biomedical Campus was a major UK building project, and delivering the project efficiently and timely, is key to the way Skanska operates. GTD exceeded our expectations, not only in their speed and efficiency, but their use of technology met the very strict wastewater regulations that we adhere to. Over 2.5 million litres of grey water were recycled during their drilling process, helping Skanska gain green awards

for this project," explains Sean Carter, project environmental advisor, Skanska.

Thornton Park in Clapham, London, UK

A job completed in October 2021, in the notoriously difficult London geology saw GTD drill 48 boreholes, single 40mm, 200m deep.

The scheme that required the drilling is comprised of 294 apartments (over 200 private rented and 90 affordable apartments), commercial space, underground basement car parking, gymnasium, and landscaped gardens.

The 200m loops were drilled with a PDC stepped four-wing bit down to and through the Thanet sands at 110m, before tripping back out and swapping to a rock roller and continuing down through the chalk to 200m. No casing was used and the holes were completed by 3 pm each day.

An essential part of achieving a 1,000m a week in Central London on jobs like this is having the correct mud recycling equipment including a decanter centrifuge to reduce the build-up of fines within the drilling fluids.

Retrofit geothermal project for Kensa Heat Pumps

A typical retrofit project on a housing estate, this one for Kensa Heat Pumps included drilling nine 160m holes and one TRT hole. The total project length was three weeks over which time 1,600m of drilling was completed. GTD uses the same size rig to carry out retrofit domestic and large-scale commercial projects, with mud clean equipment and other ancillary equipment being used. Just because the project is downscaled does not mean the equipment should be downscaled.



A UK record for the number of metres drilled with one rig in a single day – 2 x 200m double loops installed



Drilling 50 boreholes to 200m in London saw 1,000m completed in one week



Retrofitting ground source heating as part of a domestic housing installation