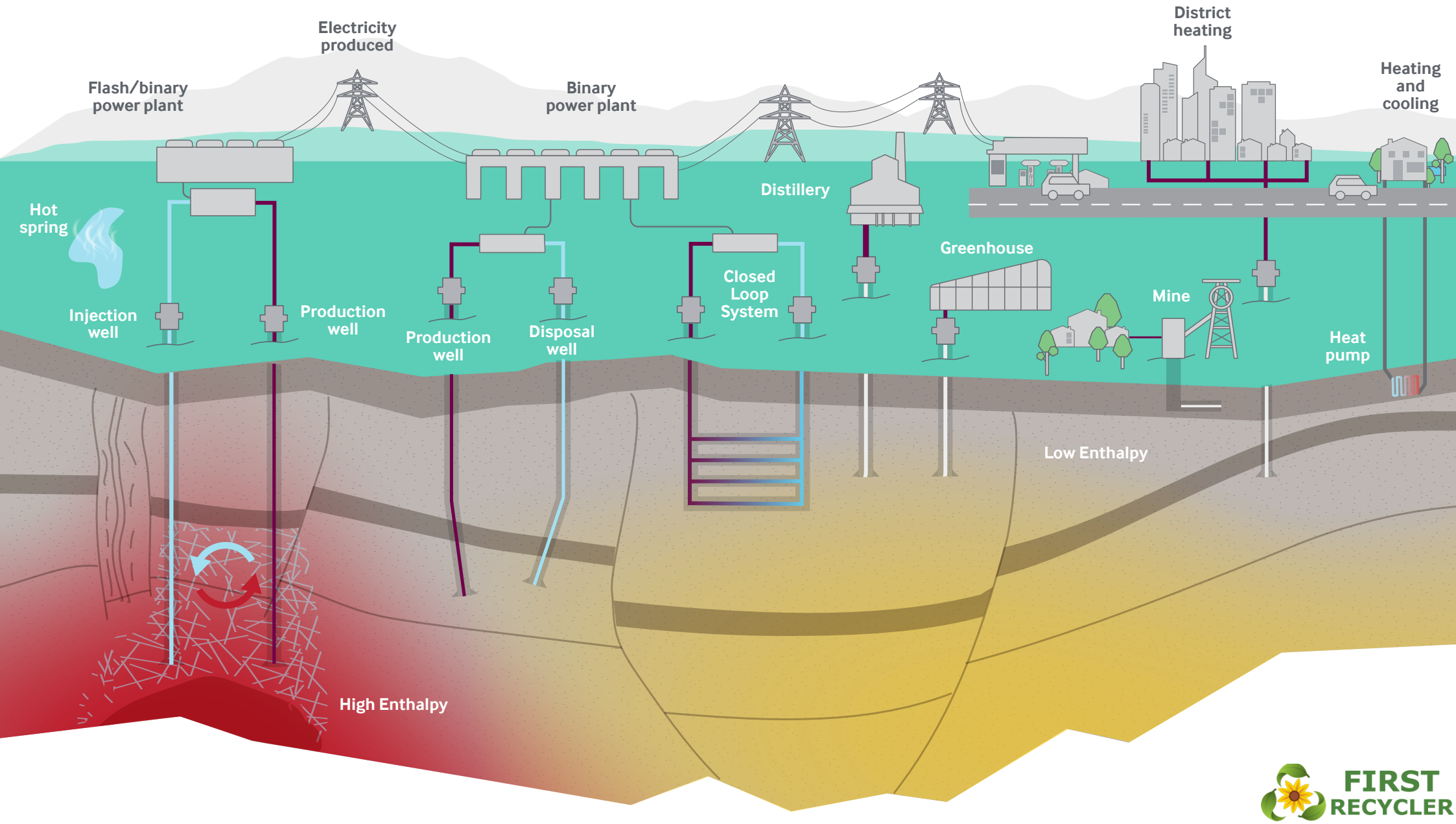
GEOTHERMAL ENERGY

Supporting our clients to thrive in a low carbon economy



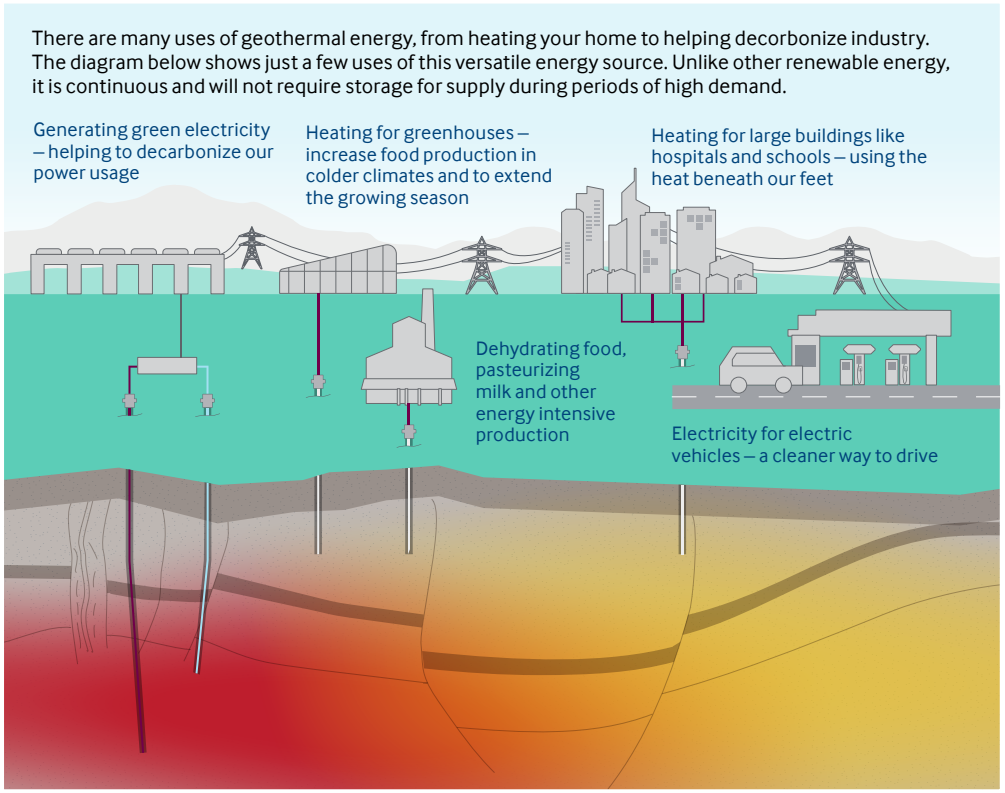
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USING THE HEAT BENEATH OUR FEET

Geothermal energy is poised to play a vital role in a global energy transition to more sustainable, renewable energy sources. However, these projects must be developed quickly, safely, and environmentally responsibly and meet financial sustainability for geothermal energy projects to maximise their role in reducing carbon emissions. We use our deep expertise across multiple disciplines to provide commercial and technical advice to our clients to advance these projects and develop them globally.

How is geothermal energy used?

There are many uses of geothermal energy, from heating your home to helping decorbonize industry. The diagram below shows just a few uses of this versatile energy source. Unlike other renewable energy, it is continuous and will not require storage for supply during periods of high demand.



A continuously flowing source of clean energy

Unlike other renewable energy sources, geothermal energy is continuous and does not require storage for supply during periods of high demand. It can be used to heat as well as generate electricity. The heat accessible in the upper 10 km of the earth's crust is enough to supply humankind with energy, for millions of years, without producing any CO_2.

Why is geothermal energy important?

Renewable carbon free technology – The accessible heat in the upper 10 km of the earth's crust can supply us with energy for millions of years without producing any CO_2.

Continually flowing – Its clean energy, delivered on-demand 24 /7, which can be used to heat or generate electricity.

Flexible – Besides the uses we've already highlighted here, we're discovering more every year!

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Operating within reduced or smaller space

Geothermal energy has the smallest land footprint of any comparable energy source in the world based on land use per gigawatt hours. This makes it perfect for urban areas, where instant, constant dispatchable heat or power is required. As with everything else, size is relative to their heat and electricity supply requirements. A typical geothermal power plant uses the equivalent of 1,046 sq. km (404 sq.m) of land. Wind energy would need 3,458 sq. km (3237 sq. m) to produce the same GWh. Coal plants in comparison, use approximately 9,433 sq. km (3,642 sq. m).

Locations do not have to have volcanic activity

Geothermal energy can be found in many parts of the world, not associated with volcanic activity. It refers to any heat derived from the ground, whether that's a few metres (shallow geothermal) or a few hundred kilometres (deep geothermal) below the surface. As our understanding of the geology and new technologies to extract heat evolves, the prospects for geothermal energy projects are also increasing.

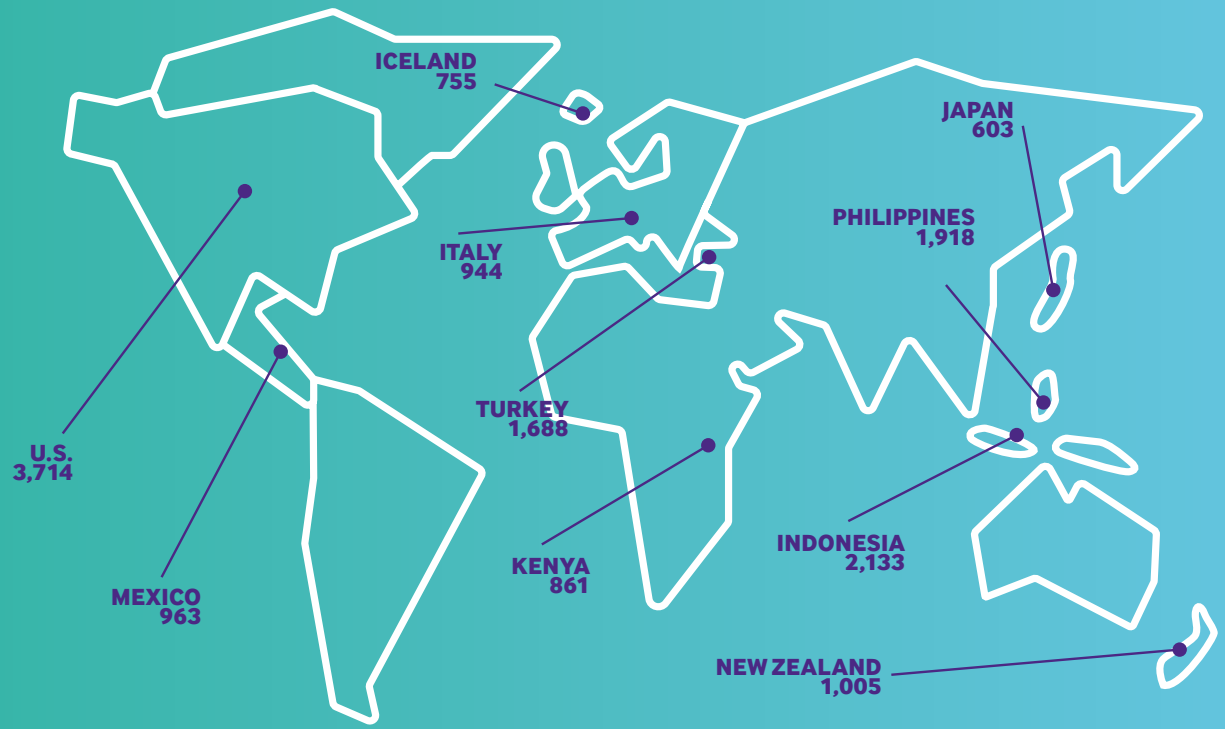
More investable than ever before

In 2020, global geothermal investments increased six-fold from the year before, exceeding $675 million. There has been greater market awareness and a reignited interest in geothermal investment. Using technological advances developed for oil and gas, such as Horizontal drilling or HPHT (High Pressure and High-Temperature technology), we can drill deeper and access hotter geothermal fluids, making previously ignored locations geothermally accessible.

Closed loop systems allow fluids to circulate with a higher heat absorption capacity than water, enabling the use of geothermal energy in previously unfavourable areas. The repurposing of disused mine discharge waters also makes a more buoyant investor potential.

Most of theworld's geothermalenergy is produced by 10 countries, but more are seeing the benefits.

Installed capacity in megawatt electrical (MWe)



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SUPPORT ACROSS THE ASSET LIFECYCLE

BUSINESS CASE AND DUE DILIGENCE

WE can help you develop your business case and project scope to align with regulatory frameworks, stakeholder needs, market and financial feasibility conditions and preferred models of funding and delivery. We offer the advice and guidance you need to define what success looks like for your geothermal project and develop a clear plan for achieving your goals.

What we do	Making complex easy
Commercial advisory	Our team provides energy producers with strategy and commercial advice, guiding energy exploration and asset infrastructure development worldwide. Our economists and energy specialists draw on the latest economic, consumer and other relevant data to deliver informed opinions and independent evaluations to guide geothermal developments, by understanding alternative funding streams and supply chains.
Sub-surface geology and reservoir engineering	Understanding sub-surface geology is key to determining a geothermal project's feasibility. Our team of geologists, geophysicists, and engineers have over 40 years of experience interpreting, evaluating, and modelling the subsurface and its behaviour. We have developed our independent expertise across the vast majority of the world's energy-producing basins, often working in challenging geographic locations and complex geological environments. We take a data-driven approach to facilitate transparent communication, accurate decision-making, and the right conversations with investors, regulators and key stakeholders.
Independent reporting	Independent reporting on complex energy projects requires highly experienced technical and commercial professionals with international operating experience to provide an impartial, informed and considered view for the client. RPS has a wealth of experience in providing independent technical and economic assessments of energy assets internationally. Our specialists work closely with clients to find the most practical and cost-effective solutions – to deliver long term viability and ongoing value to stakeholders and shareholders.

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APPROVALS AND ENGAGEMENT

We support your team to plan for success in the approvals phase while mitigating key project risks. From development applications and approvals strategy to environmental assessment and the negotiation of offsets and conditions, our team is here to help you navigate the complexities of project planning and lay the groundwork for a smooth design and delivery phase.

What we do	Making complex easy
Consents, permits and licences.	Our environmental permitting and compliance team profoundly understand what it takes to get large-scale energy infrastructure projects approved. We have extensive experience in approval processes and regulatory regimes and apply a data-driven approach to environmental consulting, utilising state-of-the-art technologies, including visualisation, spatial intelligence and dynamic scenario modelling. Shaping informed decisions, we support our clients as they develop geothermal projects across the globe.
Environmental Impact Assessments	Environmental Impact Assessments (EIAs) are integral to the planning and development process of a geothermal project. Our environmental specialists prepare environmental assessment documentation containing site-specific data, and we identify any environmental and socio-economic impacts that might arise from development. To reduce risk and cost, we follow a staged approach that identifies potentially significant adverse effects early in the process, so they are avoided, managed, mitigated, or offset. We have delivered EIAs for many large- scale renewable energy projects around the globe.
Stakeholder and community engagement	Understanding community values is one of the most crucial yet complex aspects of doing business today. We create engagement programs that are evidence-based, meaningful and measurable, assisting clients to connect with their stakeholders, communities and customers. Working throughout the project lifecycle we design and deliver engagement that facilitates shared understanding of intent, impact and benefit.

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DESIGN AND TECHNICAL SERVICES

We support your team to plan for success in the approvals phase while mitigating key project risks. From development applications and approvals strategy to environmental assessment and the negotiation of offsets and conditions, our team is here to help you navigate the complexities of project planning and lay the groundwork for a smooth design and delivery phase.

What we do	Making complex easy
Sub-surface geology and reservoir engineering Sub-surface geology and reservoir engineering	Using knowledge built up over decades of hydrogeology and petroleum geology studies, we can identify, delineate and geologically describe both low and high enthalpy geothermal projects. Understanding the geology and the geothermal conditions helps capture and limit the subsurface uncertainty inherent in any geothermal development.
Field development planning and operations	The best opportunity to influence project life cycle economics starts with development concept selection and continues through to Front-End Engineering Design (FEED). It's during these phases that our project team comprising all the sub-surface disciplines, and integrated with key personnel for conceptual engineering, will identify, assess and rank feasible options, with the objective of selecting the preferred development scheme to maximise ultimate recovery and optimise economic performance over the life of the field.
Seismic operations management and support	Seismic data can reveal what lies beneath the earth's surface and is essential for geothermal exploration and appraisal. However, it must be collected safely and efficiently and meet technical specifications. At RPS, we manage survey design, commercial oversight, in-country and onshore support, health and safety, seismic processing, and data hosting, with this constantly in mind. We support our clients throughout each phase of their seismic acquisition project - from defining and planning, seismic acquisition through to data preparation and delivery.
Drilling support and wellsite geology	When drilling a geothermal well, project delivery outcomes need to be balanced technically, socially, environmentally and economically.
Water resourcing and water/ environmental management	Depending on the geothermal development, to produce geothermal energy, water is needed. Our expertise covers all aspects of water resource investigation and development, including abstraction, reinjection and discharge, and management. From strategic planning and site investigation to detailed design, construction supervision and environmental monitoring, we provide solutions that reflect and respond to local environments, objectives and constraints.

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PROJECT MANAGEMENT AND DELIVERY SUPPORT

RPS supports your team in delivering projects on time and on budget while managing risk. From tendering and contractor engagement, to program management and contract administration, we can assist you in selecting the consultants and contractors that best suit your project, location and needs.

What we do	Making complex easy
Program management	Program management is recognised for its key role in enabling organisations to manage and navigate change to deliver lasting value. We have the experience and skill to advise you on how best to implement and manage successful programs of change and adaption. Our collaborative approach can help you to realise the benefits of strategic change to uncover innovative solutions through strategic advice, management and business-wide support. Our expertise spans all phases of a program and underlying projects, as well as the management and staffing of program offices. We can also assist with the establishment of and advise on project prioritisation within a program.
Project management	We have the expertise to guide you through the life cycle of your project, from inception to completion. With our specialisms in project planning, procurement, design and delivery, we are experts in advising clients on how to achieve the right balance of time, cost and quality.
PMO systems and structures	We work with your team to develop a customised project control framework, while introducing efficiencies, monitoring and controls that expand your team's capability to deliver positive outcomes. From an independent review of your Project Management Office (PMO), programs and projects to the evaluation of service requirements for delivery, we are committed to delivering innovative and economical solutions that enhance the value of your project investments.

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CAPABILITY DEVELOPMENT

We design flexible and scalable training solutions that cover a wide range of subjects.

We set our clients up for success by sharing technical knowledge and transferring skills. We increase understanding and improve individuals' and teams' decision-making through various development solutions so that energy can be brought to market, cost effectively and safely.

Our courses cover topics on energy transition, renewable energy, oil and gas, ESG, professional skills development and health and safety.



Geothermal courses are currently in the development include fluid dynamic and thermal modelling, hydrogeology and groundwater modelling, mining hydrology and hydrogeology, geomechanics, subsurdface geophysics and modelling, geochemistry, repurposing oil and gas fields for geothermal, well design and full-cycle economics.

Instructor-led training is delivered in the classroom, virtually or in the field and can be blended with self-paced learning. Courses are also available for in-house training.

OUR STORY

The stand out for our clients is that we use our deep expertise to solve problems that matter, making them easy to understand and we're easy to work with — Making complex easy.



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