



**How it works**

Adrok's technology works by sending pulses of electromagnetic waves into the ground using micro and radio waves. The pulse is then reflected back by the various rock layers and the energy changed by the materials it has passed through on the way.

Reaching great depths, it learns how different substances, including hydrocarbons, interact with the light waves passing through them and pinpoints their composition. The technology measures dielectric permittivity of rock layers in the ground and characterizes the nature of the rock types based on spectroscopic analyses of the resonant energy response from Adrok's transmitted beams reflected back from the ground.

Adrok's ADR scanner delivers output measurements based on:

- Dielectric permittivity
- Resonant behaviours of molecules
- Spectroscopy



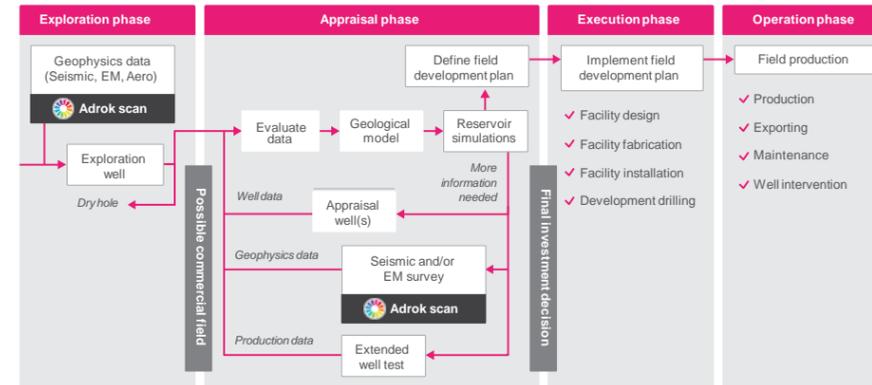
**Value-Add**

Adrok's main goal is to try to find subsurface hydrocarbons and minerals better, stronger, faster.

**Geophysical survey services**

Adrok provides geophysical survey services, usually for a pre-agreed fixed-price during our client's exploration and/or appraisal activities as a complementary survey to seismic or as a cost-effective alternative.

We typically aim to save our clients up to 90% of the cost of physically drilling the ground using a borehole.

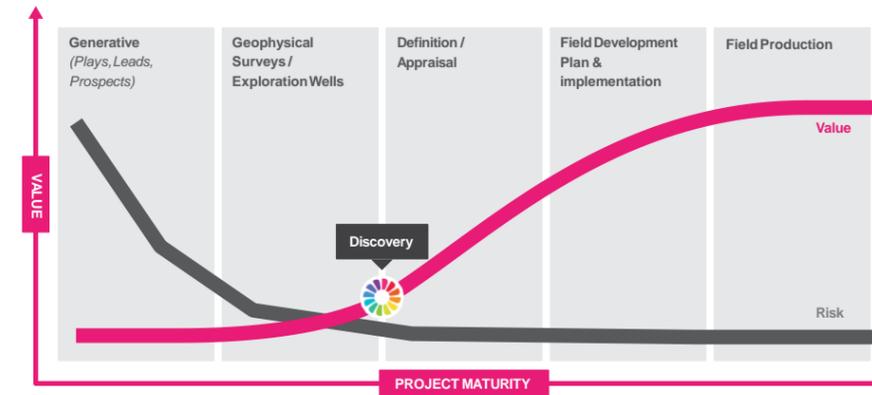


**Drilling company allies**

We like teaming-up with drilling companies to help them pass on a value-adding pre-drilling service to their respective clients, ahead of their drilling programme.

When we do this right, first time, there appears to be a virtuous circle of benefits shared with the end-client, our drilling partner and ourselves. The drilling company impresses their client by providing a cost-effective way to suggest the better positions to place their drill bit.

The end-client should save money on drilling fewer "dry" or "barren" holes. Imagine having a drill programme which was originally for 100 drill locations (with each drill costing on average \$500,000) and only having to drill 90 or even 80 of those original planned drills after increasing your subsurface knowledgebase with an Adrok survey!



**Pioneering geophysical services**

Adrok is passionate about helping to make the world a better place by helping to better understand what lies beneath Earth's surface.

Adrok uses advanced Atomic Dielectric Resonance (ADR) technology to supply pioneering geophysical services for the location, identification, mapping, and exploration of subsurface natural resources.

Companies from across a variety of sectors, including oil and gas, mining and civil engineering can utilise our ADR technology to gain substantial competitive advantages.



**Our commitment**

Adrok seeks to constantly push the boundaries of technology and further advance the specialist solutions it can offer clients. The company develops its products and services in line with its stringent quality management system to provide a high calibre offering to clients.



**International experience**

Adrok uses its proprietary electromagnetic technology to supply geophysical services to clients from all over the world, providing them with measurements of subsurface natural resources, rock types and rock sequences before drilling. So far Adrok has worked extensively throughout *Canada, USA, Ireland, Australia, Oman, Morocco, Egypt, Northern Ireland, The Netherlands, England, Scotland, Vietnam, Mexico, Chile* and the *Arctic Circle*.

**Get in touch**

+44(0) 131 5556662  
 49-1 West Bowling Green Street  
 Edinburgh, EH6 5NX, Scotland  
[www.adrokgroup.com](http://www.adrokgroup.com)

# Technology & Services

Adrok supplies innovative electromagnetic related knowledge, technology and geophysical services for the precise identification, imaging and mapping of resources and materials.

## Technology

The ADR Scanner is used for detecting and analysing the electromagnetic radiation absorbed or emitted by a substance. This accurate method offers clients a useful understanding of the shape and contents of materials examined.

Adrok's ADR Scanner provides:

- Image of the target objects scanned
- Material classification of subject
- Thematic mapping of image and material classification

Within the oil and gas and mining sectors, substances can be identified and quantified before extraction. The ADR scanner penetrates both soft and hard rock allowing higher resolution geological mapping and can easily be used with a boat, plane, helicopter or truck for all-terrain exploration. The technology can also be used to develop new reserves and monitor producing fields.

The benefits of ADR technology include:

- Low energy used
- Non-destructive waves to minimise chemical or biological changes to material under examination
- The ability to operate at close or long range
- The scanner can work through air, water and rock
- Lightweight tool for greater accessibility and transportation
- Field-rugged and able to scan large remote areas for enhanced geological exploration
- Cost effective scanning solution



## Results Delivery

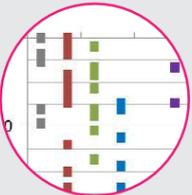
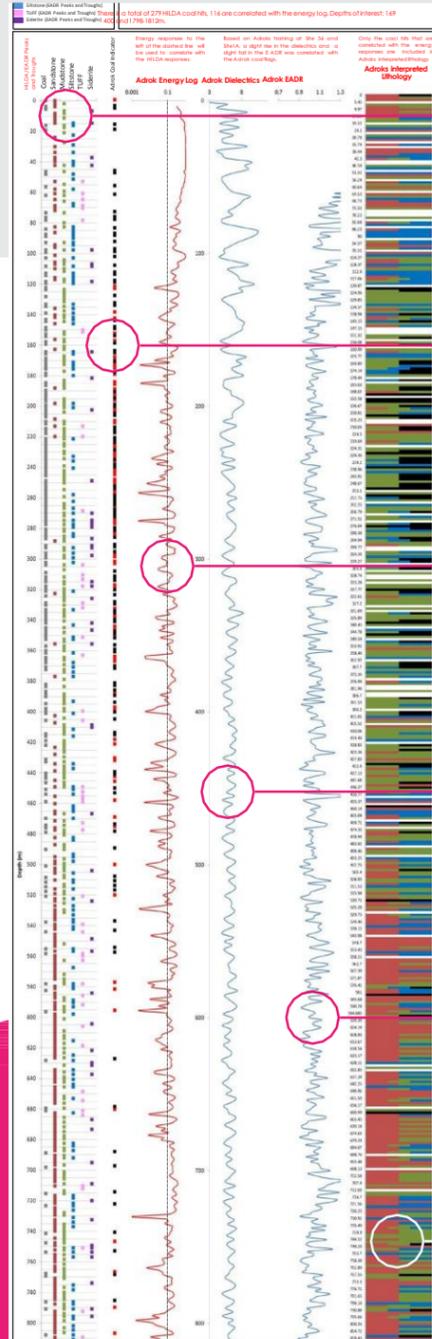
Example of Adrok's Virtual Borehole Lithological Log

Adrok supplies innovative electromagnetic related knowledge, technology and geophysical services for the precise identification, imaging and mapping of resources and materials. The deliverable sent to our client is what we call a Virtual Borehole Log. This is an interpretation of subsurface rock layers and rock sequences from below the ground surface.

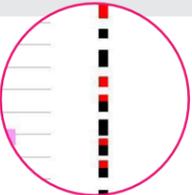
Here is an example of the deduced lithology at a client's property:



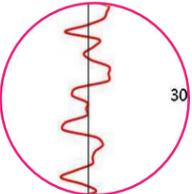
Deployable Adrok survey kit



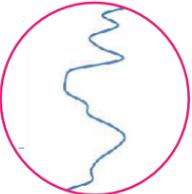
**Adrok's rock database**  
The left-hand side track shows Adrok's predetermined trained database of rock types our client is interested in (in this instance, our clients wanted to know where we had good correlations with coal, sandstone, mudstone, siltstone, tuff, and siderite).



**Material direct match indicator**  
The next track to the right, is our direct coal indicator (in this example), which we set an algorithm up to match against our field measured data with depth.



**Energy returns**  
Returns from the subsurface (we transmit broadband radio waves at multiple frequencies into the ground, and this curve shows the energy amplitude reflected and refracted from the Earth).



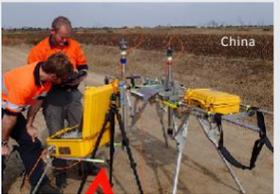
**Dielectric measurements**  
Based on our Radar Equation calculations of dielectric permittivity.



**Returned frequencies**  
(which we have called EADR).



**Interpreted lithology**  
The final right-hand side track is our final interpreted lithology, based on an analyses of all of the previous tracks and measurements; Adrok's Virtual Borehole Log.



## Survey Process

Adrok supplies innovative electromagnetic related knowledge, technology and services for the precise identification, imaging and mapping of materials.

Adrok's typical workflow for client projects is:

**PRE-SURVEY FIELD MODELLING AND PROJECT SCOPING**  
Adrok's geoscientists can generate models of prospects and sites before conducting fieldwork

**ADR SCANNER TRAINING FOR SIGNATURES**  
Material signatures can be logged, based on energy absorbed or reflected and radiation frequency, for ADR scans at Adrok's laboratories, core stores or in situ in the field

**ON-SITE SURVEY DATA ACQUISITION**  
Data collection at each survey point. On-site Quality Assurance / Quality Control

**DATA PROCESSING AND INTERPRETATION**  
At one of Adrok's operations centres using Adrok's innovative workflows, software & hardware

**ANALYSIS AND RESULTS DELIVERY**  
Presentation of final report and logs to client

**INTEGRATION TO OTHER DATASETS**  
Adrok can provide data for standard seismic imaging and data processing products

## How to apply our technology

Method	Principle	Physical property measured	Interpreted parameters
<b>Onshore / Offshore geophysical survey</b>	Scan the subsurface from the ground surface. Detects electromagnetic propagation, reflections and resonance in subsurface materials. Data acquired in time-domain and then converted into energy-and-frequency spectra.	Dielectric permittivity. Amplitude-time offsets. Velocities of wave returns.	Stratigraphic logs. Dielectric values. High resolution vertical depths and inter-layer rock horizons. Structural analysis (thin-bed analysis)
<b>Core Sample Petrophysics</b>	Dielectric properties of rock are indicators of wettability, porosity, mineralogy, pore structure and pore geometry	Moisture content. Dielectric permittivity. Dielectric spectrography.	Pore-fluid analysis, presence of carbonates, shaly sands. Rock type classification based on spectra.