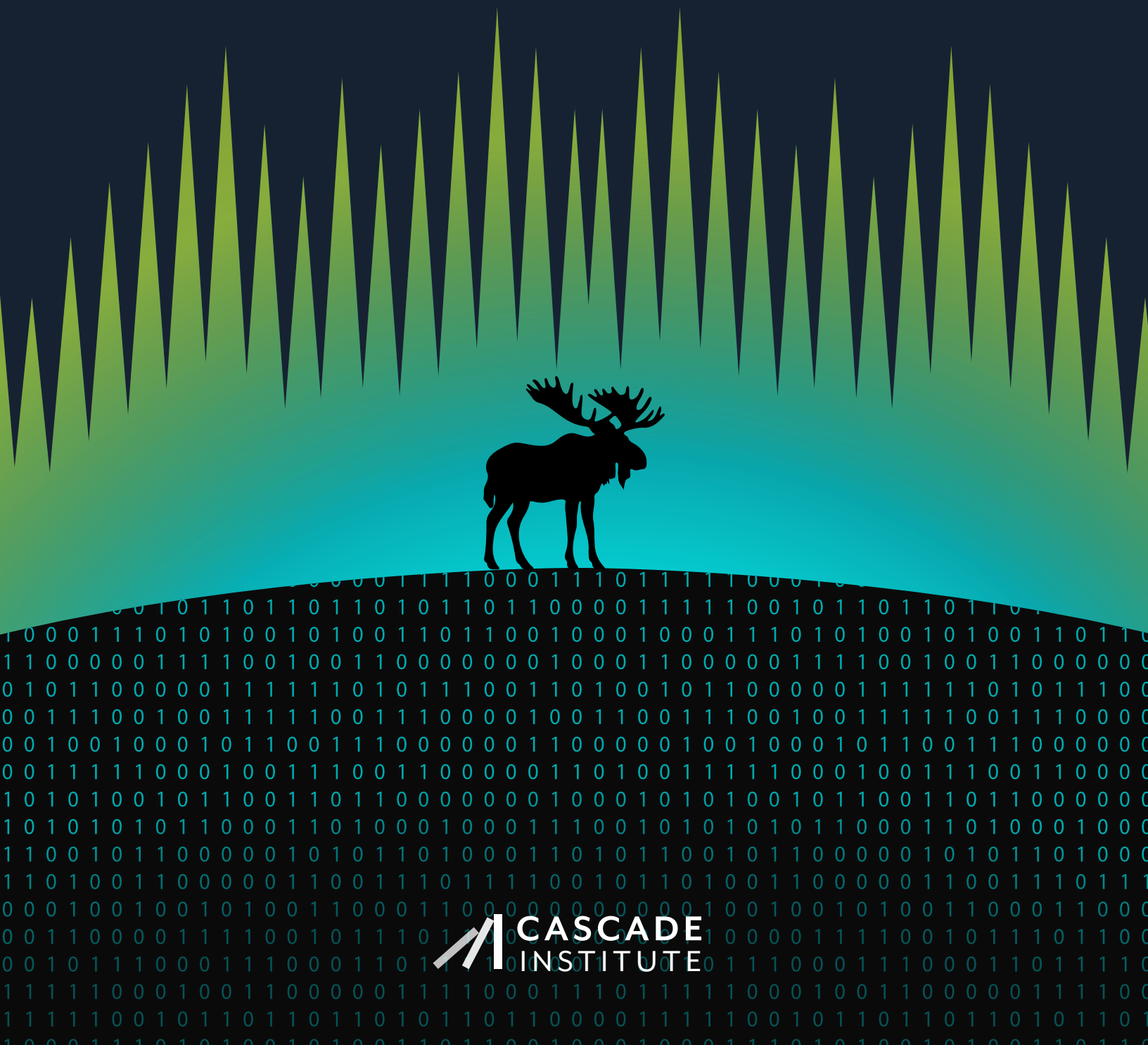
Geothermal Exploration, Data Sovereignty, and Indigenous Power

By Leighton Gall and Cyndi Bonn

April 2026



CASCADE INSTITUTE

Contents

Acknowledgments

This brief is informed by collaborative research and discussions connected to the Tu Deh-Kah geothermal project, which is wholly owned by but does not speak on behalf of Fort Nelson First Nation, as well as conversations with Indigenous knowledge holders in Nunavut. These relationships shaped the ideas explored here, while responsibility for interpretation and any errors remain solely with the author. This research is supported by the Accelerating Community Energy Transformation initiative.

Institutional partners

Authors

Leighton Gall is the Technical Lead and Indigenous Energy Lead on the Cascade Institute's Ultradeep Geothermal program. A member of the Métis Nation and a specialist in sustainable geothermal and advanced drilling technologies, he blends his deep Indigenous heritage with a global outlook, enriched by extensive international experience. Leighton holds a Master of Global Management from Royal Roads University.

Cyndi Bonn serves as Training and Employment Coordinator for the Tu Deh-Kah Geothermal project and contributes to its strategic development. An affiliate member of the Fort Nelson First Nation, she acts as a key liaison between project partners, consultants, and the Nation's leadership, helping ensure alignment between project activities and community priorities. Cyndi is committed to advancing Indigenous-led energy development that reflects long-term environmental values and sustainable economic opportunity.

Sharing and permission

About the cover: Rooted in Dene traditional knowledge and shared by Elders of Fort Nelson First Nation, the Whole Moose Methodology is a culturally grounded framework that emphasizes the full and respectful use of all resources, natural and human, for the benefit of current and future generations. This methodology derives its name from the traditional teaching that when a moose is harvested, every part is used with purpose and gratitude. In geothermal development, this teaching guides how energy, co-products, and economic opportunities are approached holistically, efficiently, and sustainably. Cover and interior design by Laurie Barnett.

Suggested citation: Gall, L., & Bonn, C. (2026). *Geothermal exploration, data sovereignty, and Indigenous power*. Version 1.0. Cascade Institute. https://doi.org/10.5281/zenodo.19264697

Bison graze beside Highway 97, For Nelson First Nation. Photo by Leighton Gall (CC BY 4.0).

Executive summary

Geothermal energy offers a clean, reliable way to power our future, but the search for it carries a hidden risk for Indigenous communities. To find underground heat, companies use advanced technologies to scan beneath the earth. While these surveys are often pitched as low-impact and environmentally friendly, they create highly detailed, permanent digital maps of the subsurface. The danger is that these maps do not just show heat—they also reveal valuable minerals, oil, and gas.

Because digital data persists, information collected today for a clean energy project could be sold, shared, or reused decades later to justify mining or drilling on Indigenous lands without the community's renewed consent. This practice, known as *data colonialism,* strips Indigenous Nations of their power to decide what happens on their territories. If communities do not control the data gathered from their lands, they risk losing out on economic opportunities and having their self-determination undermined by outside interests who hold the keys to this valuable information.

To prevent history from repeating itself, Indigenous Nations must assert *data sovereignty*—the right to control how their information is collected, stored, and used. Rather than treating all data as equally benign or equally sensitive, Indigenous Nations and partners should take a risk-informed approach by classifying datasets by likelihood of secondary use, potential to attract extractive interest, and resolution or granularity. By treating digital data with the same protective care as the land itself, Indigenous Peoples can ensure that the transition to renewable energy builds a foundation for justice, economic autonomy, and true self-determination.

Northern lights in the Canadian Rockies, Jasper.
@.Martina | Adobe Stock.

Introduction:
Survey data as agents of power

In the unfolding era of climate emergency, the search for resilient and renewable energy sources has pushed technological inquiry ever deeper into the molten seams of the Earth itself. Geothermal energy, which harnesses heat deep within the Earth to generate renewable heat and electricity, offers an alluring promise: clean, reliable, always-on power with a minimal surface footprint, tapping the Earth's inner heat without the carbon curse.

But as Indigenous Peoples begin to assess the potential for geothermal energy to power our communities cleanly and securely, we must also ask: What are the exploration technologies? Who owns the data that the operators of those technologies find? Who decides whether geothermal or extractive projects can proceed on Indigenous lands? Who develops those projects, and who benefits?

These questions—some new, some as old as colonization—are now urgent for Indigenous Peoples worldwide, particularly in regions where traditional lands hold significant geothermal potential. Advanced geophysical methods used to locate geothermal reservoirs such as gravity surveys, magnetotellurics (MT), and seismic imaging are not passive measurements. They are agents of power and extraction. They create maps of value, and those maps may one day serve purposes far beyond renewable energy.

A familiar pattern underlies this risk. In northern Canada, for example, land and airborne geophysical surveys initially conducted for "mapping" and "scientific understanding" paved the way for mineral staking rushes, often without renewed consent from the Indigenous Nations whose lands were scanned (Government of Northwest Territories, 2017). What began as neutral data collection quietly transformed into proprietary intelligence, enabling

extraction decisions decades later without community involvement. This history underscores a central truth: subsurface data does not expire, but the consent often does.

For Indigenous Nations, there is danger in the data.

Once companies or governments gather subsurface data on traditional lands, the rightsholders of those lands may struggle to maintain their right to decide what is done with those datasets. The same dataset gathered under the premise of geothermal sustainability might be licensed, sold, or reinterpreted decades later for mineral extraction (Couldry & Mejias, 2019). Companies might argue the data are de-identified or public domain. Governments may classify datasets as strategic infrastructure or public geoscience assets. This is data colonialism: a mode of dispossession not through violence, but through information gathering.

To assert and defend Indigenous data sovereignty, Indigenous communities and project proponents must understand how these technologies work and the diverging futures they could usher in, depending on who wields them and how. This paper provides a brief introduction to the kinds of data geothermal exploration reveals and offers some recommendations for how Indigenous communities can exercise their data sovereignty and safeguard their data.

Crawler drilling rigs perform engineering and geological surveys. © Philipp Berezhnoy | Adobe Stock.

Oil and gas field in the Arctic. © mangz | Adobe Stock.

Geothermal datasets are not only technical information; they are a form of decision-making power that can either strengthen or undermine Indigenous sovereignty.

What's at stake for Indigenous Peoples?

Geothermal exploration data can create benefits, but can also create long-term risks if Indigenous Nations do not control how the data are used. Subsurface datasets are durable: Once they exist, they can be stored, copied, sold, and reinterpreted years later using new techniques. This creates the possibility that data collected under the banner of geothermal sustainability could later support activities the Indigenous community did not consent to, such as mineral exploration, oil and gas play assessment, or future claims that extraction is "already justified" by existing evidence.

There can also be lost opportunities when Nations do not control geothermal-relevant data. Without data governance, communities may lose economic development pathways such as Indigenous-owned data services, paid access agreements, or equity leverage in project negotiations. More importantly, lack of data sovereignty can weaken self-determination: it shifts power to outside actors who interpret the subsurface, define what is "valuable," and influence land-use decisions. Some Nations have even had to purchase data back at great expense in order to pursue community-led developments. Geothermal datasets are not only technical information; they are a form of decision-making power that can either strengthen or undermine Indigenous sovereignty. And massive public and private investment in Canadian critical minerals increases the likelihood that geothermal-relevant datasets will be reinterpreted for non-geothermal purposes over time.

"In the digital world, data is like land. If we do not have control, governance, and ongoing guardianship of our data as Indigenous people, we will be landless in the digital world, too" (Jones, as cited in Schertow, 2025).

What survey technologies determine the potential for geothermal energy?

Geothermal exploration uses a small number of scientific tools to “see” underground without digging (Pearce et al., 2025). These tools measure gravity, electricity, magnetism, and vibrationss to help identify where heat and fluids may be moving below the surface. For conventional geothermal, surveyors will be looking for deposits of hot water or steam deep underground that can be pumped to the surface to generate heat, electricity, or both, before being returned to the depths. For next-generation geothermal, the goal of exploration is to understand how far down, through what types of rock, one would need to drill to reach areas hot enough to power closed- or open-loop geothermal systems.

While these surveys are often described as low-impact or preliminary, geothermal survey technologies do more than identify heat. They generate durable subsurface datasets with intergenerational economic and political value. Understanding what each method reveals, and how that information can be reused or reinterpreted, is a prerequisite for informed consent and effective data governance. Without this technical grounding, Indigenous Nations cannot fully assess the downstream implications of exploration activities conducted within their traditional territories.

Gravity surveys

Geothermal exploration often begins with gravity surveys. These surveys use satellites or ground-based instruments to measure very small changes in Earth’s gravity. These changes happen because different types of rock have different weights, or densities. Lighter or fractured rock can sometimes hold hot water or steam, which may point to a geothermal resource (Hinze et al., 2013, pp. 16-18). However, the same gravity data can also be used to locate oil and gas reservoirs or dense rock bodies that may contain minerals such as uranium or rare earth elements.

Magnetotellurics (MT)

MT surveys measure natural electrical signals that move through the Earth. These signals travel differently depending on the temperature of the rock and whether fluids, such as water or brine, are present underground (Chave & Jones, 2012 p.11). In the geothermal context, magnetotellurics surveys are used to detect clay caps and fractured zones with high conductivity—prime targets for geothermal development.

However, MT data are not limited to heat. When re-examined later, the same data can reveal signs of lithium-rich brines or metal-bearing rock formations. These signals may attract mining interests seeking to extract those resources, even if the original survey was approved only for geothermal purposes.

Seismic imaging

Seismic surveys use vibrations to build 3D models of subsurface formations. These vibrations travel through rock and return information about faults, fractures, and the shape of rock layers below the surface (Majer et al, 2007). In geothermal projects, seismic data help identify safe drilling locations and reduce the risk of damaging wells or triggering unwanted ground movement.

At the same time, seismic data are highly valuable to oil, gas, and mining companies. Once collected, these datasets can be reused to locate other subsurface resources or plan future extraction projects. For this reason, seismic surveys often carry long-term consequences that extend far beyond a single geothermal project.

AI reprocessing

Data from gravity, MT, and seismic surveys are increasingly stored in digital maps and database formats that can be fed into future machine learning systems. This creates a serious governance challenge. Data gathered today for geothermal development may enable future extraction activities that were never discussed during the original consultation. Even if drilling never occurs, the data itself can continue to shape decisions about Indigenous lands long after consent was given. What we cannot see today, an algorithm might detect tomorrow (Goodfellow et al., 2016).

Seismic reflective survey.
@ Lakeview Images | Adobe Stock.

TABLE 1:

Key exploration tools for deep geothermal power

Method	What it does	Why it matters
Magnetotellurics (MT), including 3D	Detects conductive zones associated with hot brines, fractured rocks, and clay caps	Data can indicate areas rich in lithium, metal-bearing brines, or fault systems useful to mining
Aerial magnetic surveys	Detects magnetic anomalies in rock formations; used to infer heat-altered zones or faults	Useful for locating mineralized zones (e.g., iron, nickel, gold)
Remote sensing (e.g., Satellite Thermal IR, LiDAR)	Identifies surface geothermal features (hot springs, fumaroles); LiDAR maps topography	Data can be used for forestry, mining access planning, or pipeline routes
Geochemical sampling	Analyzes gases and waters from hot springs or soil to estimate geothermal system characteristics	Can also indicate the presence of metals, lithium, or hydrocarbons
Gravity gradiometry	Measures subtle changes in the gravitational field to detect density contrasts (faults, intrusions, basins)	Advanced gravity data can help map basin-hosted mineral deposits (e.g., uranium, zinc)
Passive seismic (Microseismic monitoring)	Uses natural earth vibrations to identify active faults or fluid movement	Useful for tracking fracking-like stimulations or pre-mining stress fields
3D seismic reflection	Produces high-resolution 3D images of subsurface structures—faults, fractures, stratigraphy	Same data are used in oil and gas to find reservoirs; once collected, it can be reprocessed for decades

What tools can help communities understand their data sovereignty status?

Understanding what data have already been collected on or near Indigenous lands is a crucial first step toward asserting data sovereignty. Fortunately, there are public tools that allow Indigenous communities to access information about wells, seismic programs, and permits, even if they were not consulted during exploration. Indigenous communities can use the following tools to see what data has been collected on their lands and to track ongoing exploration activity.

1. **GeoScout:** GeoScout is a subscription-based mapping tool widely used by energy and mining companies. It shows the location of wells, seismic lines, permits, and other subsurface activities. Indigenous Nations can use GeoScout to see where drilling or seismic work has occurred or is planned, who the operators are, and what approvals have been issued. While GeoScout itself is a private platform, similar information may be accessed through provincial regulators via public databases, data rooms, or formal data requests.
2. **Stack DX (formerly Petro Ninja):** Stack DX is a free smartphone application that provides map-based access to well locations, permits, and basic infrastructure data. It allows users to quickly identify what activities are occurring in a specific area and who is responsible for them. Indigenous communities can use Stack DX to get a first look at nearby drilling or exploration activity and to support early questions or follow-up with regulators. It can be downloaded for use on Android and iOS platforms.
3. **SPECTRA (GHGSat):** SPECTRA is a free online platform that shows methane concentrations detected from satellites. Methane plumes can be a sign of leaking wells or other fossil fuel infrastructure. Indigenous communities can use SPECTRA to monitor emissions near their lands, identify possible environmental or health risks, and document evidence that may support regulatory complaints or further investigation.
4. **Copernicus Satellite Monitoring:** Copernicus provides free and open access to a vast array of satellite data through its **Data Space Ecosystem**. This platform offers users the ability to search, visualize, and download data from the Sentinel satellite missions, including Sentinel-1, Sentinel-2, Sentinel-3, and Sentinel-5P. Copernicus data can be instrumental for Indigenous communities seeking to monitor environmental impacts on their lands. For instance, Sentinel-2 provides high-resolution optical imagery suitable for detecting land cover changes, while Sentinel-1 offers radar data that can penetrate cloud cover, helpful in observing ground movements and infrastructure changes. Indigenous communities can use Copernicus data to monitor environmental impacts, track infrastructure development, and document changes to land and water systems—even in remote or cloud-covered areas.

5. **Public subsurface mapping portals:** There are several public mapping tools created by provincial geological surveys. Here are some examples the Fellows at Cascade Institute use that may exist in your area in different forms. The Alberta Geothermal Atlas provides heat-flow estimates and temperature gradients. Alberta also shares subsurface lease information publicly with GeoView. In British Columbia, the BC Geological Survey provides access to geological maps and geophysical survey data using MapPlace.

Using these tools, Indigenous communities can identify historic and active exploration and extraction activities in their area, including the extent and timeline of well drilling, seismic programs, and other resource developments. They can also review detailed well data, including operator names, permit types, and any associated documentation that might inform legal or regulatory inquiries. This empowers communities to track and verify potential emissions leaks from facilities or wells that may impact local health and the environment. Additionally, by cross-checking whether geothermal surveys were filed alongside oil, gas, or mineral intentions, communities can determine whether exploration activities align with their land use priorities or infringe on their rights. Finally, by integrating satellite monitoring platforms like GHGSat and Copernicus, Indigenous communities can monitor and track environmental risks over time, providing critical evidence to support data sovereignty, environmental stewardship, and informed decision making.

Knowledge is power. These tools are a starting point for building knowledge, building power, and preparing legal strategies to protect Indigenous data rights.

Geological exploration work.
© Anoo | Adobe Stock.

What are the implications of this analysis for geothermal project developers?

In Canada, geothermal-relevant data exist in three forms. First, there are public geoscience datasets produced by government and academic institutions, such as regional maps and surveys. Second, there are proprietary datasets collected by private companies through exploration campaigns. These are usually higher-resolution geophysical surveys, well logs, and specialized computer interpretations, which are treated as commercial assets. Third, there are hybrid datasets, where data are collected with public funding and move from public repositories to private archives over time. The key issue is not only whether data are public or private, but whether the communities have meaningful authority over how data are collected, stored, and used over time.

Legacy datasets collected decades ago, often without Indigenous consent, are already widely distributed in public and private systems. The data cannot be un-collected, of course, but this does not mean Indigenous Nations are powerless. Government and industry can take steps to improve access for Nations and provide transparency on who holds copies of the data.

New datasets offer a clearer governance opportunity. When data are collected today, Indigenous Nations can require strong agreements upfront, covering ownership and conditions for future use. Where old data may require mitigation and repair, new data provide an opportunity to implement data sovereignty principles from the start.

Not all subsurface data carry the same risk. Some information such as generalized heat-gradient models at coarse resolution is less likely to trigger immediate extraction interests. Other datasets, such as high-resolution magnetic, gravity, radiometric, geochemical or detailed seismic surveys, can be more easily repurposed for mineral targeting or hydrocarbon play assessment. Rather than treating all data as equally benign or equally sensitive, Indigenous Nations and partners should take a risk-informed approach by classifying datasets by likelihood of secondary use, potential to attract extractive interest, and resolution or granularity.

What level of granularity should be governed?

Data sovereignty questions become more complex when models generate estimates without using a single measurement from the specific territory in question. For example, a heat-gradient model may infer temperature potential for a 10-by-10 kilometre area using neighbouring measurements and physics-based assumptions. Even when a community's specific data are not directly used, the resulting map can still influence land-use decisions and development pressure in that territory.

One practical approach is to treat governance as layered. Coarse regional products may be appropriate for open sharing, while higher-resolution models normally used to justify project actions may require Nation-specific engagement. The goal is not to stop modelling, but to ensure that higher-resolution modelling does not bypass Indigenous decision-making authority.

What survey activities should raise concerns?

Indigenous governments considering geothermal development or responding to proposed survey activities must remain vigilant in defending their data sovereignty. While many exploration methods are framed as low-impact or preliminary, the data they generate can carry long-term extractive implications. The following warning signs highlight situations where additional scrutiny and safeguards are warranted.

1. **Any data collection beyond surface mapping:**
   If someone is flying, drilling, or laying out arrays, ask what they're measuring and who owns the data.
2. **Proposals for "low-impact" surveys:**
   These often precede more invasive activity. Gravity surveys, MT, and remote sensing may be pitched as harmless, but their data can reveal more than temperature gradients and the location of underground aquifers.
3. **Mixed-purpose geophysical campaigns:**
   A survey team may claim geothermal exploration as the purpose, but if they're also collecting high-resolution magnetic, gravity, or geochemical data, it could double as a mining reconnaissance mission.
4. **Lack of access to raw or processed data:**
   If your community cannot access the raw data or control their use, you do not own the future decisions it could influence. Data collected today to determine a temperature gradient could be run through machine learning models in 10–15 years to find new commercial resources long after the original consultation took place.

If you are a Lands Manager or Economic Development Officer reviewing exploration proposals or negotiating agreements, here are a few questions you should get answered before approving geothermal surveys. If any of these questions cannot be clearly answered, approval should be reconsidered or delayed:

- Have all datasets been disclosed?
- Is secondary use restricted?
- Does the Nation receive full raw data, as well as processed data?
- Is there clarity on ownership?
- Has independent technical advice been considered?

Deep-hole drilling. © Anoo | Adobe Stock.

What mechanisms can communities use to assert and defend Indigenous data sovereignty?

To avert another chapter in extractive history, Indigenous Nations must take an active role in controlling how geothermal data are collected, stored, and used on their lands. Data sovereignty means more than being consulted; it is about having real authority over decisions about data throughout its entire life cycle—from initial survey design to long-term storage and future reinterpretation (Kukutai & Taylor, 2016).

There are several practical ways Indigenous Nations can protect this authority:

- **Legal protocols:** Legal agreements are one of the strongest tools available to Indigenous Nations. Data governance clauses in exploration agreements can clearly define who owns the data, how it may be used, and what activities are prohibited. These agreements can restrict secondary use of geophysical data, prevent resale or transfer to third parties, and require renewed consent before data are reused for purposes such as mining or mineral exploration. When clearly written and enforced, legal protocols help ensure that consent remains meaningful over time.
- **Technical capacity:** Building Indigenous technical capacity reduces reliance on external experts and strengthens long-term control over data. This may include requiring that surveys be conducted by Indigenous-owned companies or under Indigenous-led technical protocols. Agreements can also require proponents to train local technicians or engineers, allowing communities to understand how data are collected and interpreted rather than receiving only final reports. Technical capacity supports informed decision making and strengthens community oversight.

- **Data infrastructure:** Control over data also depends on where and how it is stored. Community-controlled databases, secure data rooms, or encrypted cloud systems can limit unauthorized access and prevent data from being copied, sold, or reinterpreted without permission. Clear access rules help ensure that Indigenous Nations retain visibility over who is using their data and for what purpose, even long after a project ends. In Canada, Indigenous data governance is often guided by OCAP® principles—Ownership, Control, Access, and Possession—which provides a practical framework for asserting authority over data about Indigenous People and territories (Box 1).
- **Shared ownership:** Equity participation aligns financial returns with sovereignty. It does not replace data governance protections, but it does recognize that data contribute to project valuation and should generate shared benefit. Equity is strongest when it includes meaningful governance rights. Without governance participation, such as voting shares and board representation, there might not be the authority to influence changes when major project changes impact data control.
- **Strategic foresight:** Finally, Indigenous Nations can benefit from looking beyond the immediate project timeline. Strategic foresight involves asking how today's data might be used in the future as technologies evolve. Scenario planning and long-term risk assessment can help communities evaluate whether data collected for geothermal development could later support other forms of extraction. Considering these possibilities early allows Indigenous Nations to set conditions that protect their interests over decades, not just during a single project.

OCAP® and geothermal data

OCAP® (which stands for Ownership, Control, Access, and Possession) is widely used in Canada as a practical framework for Indigenous data governance. Applied to geothermal and subsurface data, OCAP® can be interpreted as follows:

OWNERSHIP: The Nation has recognized rights and interests in data collection on its territory, including the right to benefit from that data.

CONTROL: The Nation has decision-making authority over how the data are collected, shared, and reused over time.

ACCESS: The Nation can access raw data and results in usable formats, not only summary reports.

POSSESSION: A trusted Indigenous-controlled steward, or the Nation itself, retains custody of the data through secure storage and clear permissions.

For more information, consult the First Nations Information Governance Centre or visit fnigc.ca.

What else can communities do to defend data sovereignty?

1. **Demand data control agreements that:**
   - Limit data use to geothermal purposes only.
   - Prohibit resale or reinterpretation without free, prior, and informed consent.
   - Require return or destruction of raw and processed data after a project ends.
   - Give access to Indigenous staff from the community via secure data rooms or shared cloud-based folders to ensure long-term visibility and local capacity-building.
2. **Ensure joint ownership or full access to:**
   - MT and seismic models
   - Drilling logs and well reports
   - All processed datasets and interpretations
3. **Insist on a right of refusal for future reinterpretations with new technologies.**

Guardians James Morgan and Dustin Gray conduct water testing in the Gitanyow Lax'yip, summer 2016. Photo by Province of British Columbia (CC BY-NC-ND 2.0).

A sign welcoming visitors to Fort Nelson First Nation.
© davidrh | Adobe Stock.

Concluding thought: Toward a deeper power

By developing and owning our own sources of geothermal power, Indigenous Peoples are not merely harvesting energy—we are reshaping the terrain of sovereignty. For Indigenous Peoples, geothermal heat and power can be a path to energy autonomy, climate resilience, and economic self-determination. But only if the ownership of heat does not mirror the theft of land.

In the end, the question is not whether the Earth has power to give. It is whether we have the wisdom to receive that power without repeating the harms of the past. As we drill deeper, let us also think deeper.

References

Chave, A. D., & Jones, A. G. (2012). *The Magnetotelluric method: Theory and practice*. Cambridge University Press.

Couldry, N., & Mejias, U. A. (2019). *The costs of connection: How data is colonizing human life and appropriating it for capitalism*. Stanford University Press.

European Space Agency. (n.d.). *Copernicus open access hub*. https://www.copernicus.eu/en/copernicus-satellite-data-access

GHGSat Inc. (n.d.). *Monitoring emissions from space*. https://www.ghgsat.com/

Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep learning*. MIT Press.

Government of Northwest Territories. (2017, September 22). *Geoscience information leads to largest staking rush since 2014*. Press release. https://www.gov.nt.ca/newsroom/news/geoscience-information-leads-largest-staking-rush-2014

Hinze, W. J., von Frese, R. R. B., & Saad, A. H. (2013). *Gravity and magnetic exploration: Principles, practices, and applications*. Cambridge University Press.

Kukutai, T., & Taylor, J. (2016). *Indigenous data sovereignty: Toward an agenda*. ANU Press.

Majer, E. L., Baria, R., & Stark, M. (2007). Seismic monitoring at the Soultz geothermal field. *Geothermics*, 36(5-6), 627–645.

Pearce, R., Chhun, C., P.C. Salinas, S. Saltiel, & C.M. Saez. 2024. *Prospecting for superhot rock energy: Summary of a technology gap analysis for siting and characterizing superhot rock energy resources*. Cascade Institute. https://cascadeinstitute.org/technical-paper/prospecting-for-superhot-rock-energy/

Schertow, J. A. (2025, September 10). Indigenous futures in artificial intelligence: From language sovereignty to ecological stewardship. *Indigenous Climate Action Magazine*. https://icmagazine.org/indigenous-futures-in-artificial-intelligence-from-language-sovereignty-to-ecological-stewardship/