



An Introduction to Geothermal Permitting

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¹ The 19 western states targeted by GPW are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

Introduction

Simply put, geothermal permitting is getting legal permission to use a geothermal resource, be it in your backyard or on public land across the way. But for many, geothermal permitting is a riddle wrapped in a mystery inside an enigma. Fortune 500 companies and Mom-and-Pop-ers alike must contend with a maze of local, state, and federal regulations whether they use geothermal energy to produce megawatts or roses. The good news: With the right attitude and knowledge, a small business or entrepreneur can weave their way through the geothermal permitting maze with a minimum of wrong turns.

“An Introduction to Geothermal Permitting” was written to help geothermal entrepreneurs, small businesses, and developers better understand the seemingly overwhelming permitting process.

While the guide focuses primarily on small-scale (< 1 megawatt) power generation and direct use (aquaculture, greenhouses, industrial and agricultural processes, resorts and spas, space heating) geothermal projects, the permitting process is similar for large geothermal power plants.

The guide will track the permitting process through multiple levels, addressing the following questions:

- What is the importance of where the geothermal resource is located?
- How does the Federal Government define geothermal?
- What is a surface managing agency?
- What kinds of permits do I need?
- How does my state define geothermal?
- What state agencies issue geothermal permits in my state?

“Going into this adventure, it was not clear to us exactly how much permitting was involved.”

Dale Merrick
I'SOT, Inc.
Canby, California

This introduction is not an exhaustive source on all “things geothermal permitting.” It will not deal with obtaining a geothermal lease², nor will it address current permitting and siting difficulties including NIMBY³-ism, regulatory uncertainty, permitting delays, jurisdictional overlap, etc. The guide also will not deal with permitting geothermal district heating and cooling projects which raise complex utility issues.⁴

This brief introduction will, however, give the reader a better basic understanding of the geothermal permitting process at the federal, state, and local levels, and in Indian Country.

² The first step in any geothermal development—be it for direct use or power generation—is to gain access to the land on which the resource is located, either through ownership or leasing. The Geothermal-biz.com: Geothermal Leasing webpage presents a brief introduction to geothermal leasing on federal and state land in the 19 GeoPowering the West states. See <http://www.geothermal-biz.com/leasing.asp>.

³ NIMBY = Not In My Back Yard.

⁴ For more information on geothermal district heating and utility policy, contact R. Gordon Bloomquist in the Washington State University Energy Program, Tel: (360) 956-2016 or email at bloomquistr@energy.wsu.edu.

Location, location, location

Just as in real estate, the geographic location of a geothermal resource is key. Where a geothermal resource is located—on what type of land and in which state⁵—determines what regulations apply, which agencies have jurisdiction, and what permits are required. Geothermal resources are found on four types of land:

1. Federal,
2. State,
3. Private, and
4. Indian Country.

The exact steps you take to permit a geothermal resource vary depending upon where it is located, but basically can be summarized as follows:

- Gain access to lands.
- Contact local and state agencies to determine the requirements for local land use laws including zoning, land use, and building permits.
- Contact federal agencies if required.
- Secure water rights if applicable.⁶
- Secure mineral rights as needed.
- Prepare environmental review as required by the National Environmental Policy Act or state environmental laws.
- Obtain well construction permit.
- Drill exploration, production, and injection wells.
- Identify the composition of the resource which may affect the level of environmental impacts, waste disposal, etc.
- Determine fluid disposal plan and obtain permits for underground injection or surface disposal.
- Contact state agricultural department or state fish and wildlife agency if developing an aquaculture project.

⁵ This guide covers the 19 states which comprise the U.S. Department of Energy’s GeoPowering the West Program.

⁶ This is especially vital in some western states where water is a scare and valuable resource.

Federal land

“Approximately 90 percent of geothermal resources in the United States are located on federal lands, particularly those within eastern Oregon, western Utah and Idaho, and much of Nevada and California.”⁷ Almost half of America’s current geothermal energy production occurs on federal lands, primarily in the western United States.

Pursuant to the Geothermal Steam Act of 1970 (Title 30 U.S.C. Chapter 23), as amended, the Bureau of Land Management (BLM), an agency of the U.S. Department of the Interior, leases federal lands and reviews permit applications for geothermal development on those lands. The BLM’s authority encompasses about 570 million acres of BLM land, 193 million acres of National Forest System lands, other federal lands, and private lands where the Federal Government has retained mineral rights.

The U.S. Forest Service, an agency of the U.S. Department of Agriculture, manages federal public lands in national forests and grasslands.

What is a surface management agency?

A surface management agency (SMA) is any federal agency, other than the BLM, which is responsible for managing the surface overlying federally-owned minerals. In the case of geothermal resources, the SMA is often the U.S. Forest Service. While the BLM retains primary management of geothermal development on federal lands, the SMA must approve all leases and permits issued for lands it manages.

How does the Federal Government define geothermal?

The Geothermal Steam Act defines “geothermal steam and associated geothermal resources” as:

- All products of geothermal processes, embracing indigenous steam, hot water and hot brines;

⁷

Lava Law: Legal Issues in Geothermal Energy Development, Second Edition, by Stoel Rives LLP, 2005, Ch. 1 – Pg. 1.

-
- Steam and other gases, hot water and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations;
 - Heat or other associated energy found in geothermal formations; and
 - Any byproduct derived from them.

Geothermal resources are treated as mineral rights under federal law. Permitting processes are similar to those of oil and gas. Federal law, however, does not preempt state water law. While the Federal Government owns the mineral rights to geothermal resources on public land, if water is evaporated or consumed as part of the resource's use, which is often the case, the user may have to obtain a permit from the state water agency.

The federal "Geothermal Resources Leasing and Operations regulations" are outlined in Title 43 of the Code of Federal Regulations (CFR), Group 3200.⁸ In addition to lease bonds, all permit applicants must file a surety or personal bond with the BLM. Bonds range from \$5,000 to \$150,000 depending on the number, type, and location of operations.

All geothermal operations on BLM-managed land must:

- Meet all environmental and operational standards,
- Prevent unnecessary impacts to surface and subsurface resources,
- Conserve geothermal resources and minimize waste,
- Protect public health, safety and property, and,
- Comply with 43 CFR 3200.4.⁹

The following table describes the licenses and permits the BLM issues, their CFR reference where applicable, the activities they cover, and the relevant BLM form.

⁸ 43 CFR Group 3200 is posted in HTML, PDF, and Word formats on the BLM website at <http://www.blm.gov/nhp/300/wo310/geothermal/geothermalhome.html>.

⁹ Sec. 3200.4 What requirements must I comply with when taking any actions or conducting any operations under this part? When you are taking any actions or conducting any operations under this part, you must comply with: (a) The Act and the regulations of this part; (b) Geothermal resource operational orders; (c) Notices to lessees; (d) Lease terms and stipulations; (e) Approved plans and permits; (f) Conditions of approval; (g) Verbal orders from BLM which will be confirmed in writing; (h) Other instructions from BLM; and (I) Any other applicable laws and regulations.

LICENSE/PERMIT	COVERS <i>BLM FORM</i>
<p>SITE LICENSE</p> <p>43 CFR Subpart 3273</p>	<p>Separate from geothermal lease.</p> <p>Upon receipt of an application for a surface-use license, the BLM is required to complete, in a timely fashion, an environmental review, as required in the National Environmental Policy Act of 1969 (NEPA).</p> <p>The surface-use license holder is required to maintain a surety bond of at least \$100,000 if the facility is for electricity generation. For a direct-use facility, the bond amount is specified by the BLM. The license holder is liable for all damages to the lands or property of the US, and the bond will indemnify the US against any liability for damages or injury to life, person or property.</p> <p>A license holder may transfer or assign all or a part of his license to another party by submitting an application with a \$75 filing fee. BLM must approve transfer in writing.</p>
<p>EXPLORATION</p> <p>43 CFR Subpart 3250</p>	<p>Geophysical operations, drilling temperature gradient wells, drilling holes used for explosive charges for seismic exploration, core drilling or any other drilling method, provided the well is not used for geothermal resource production.</p> <p>Also includes related construction of roads and trails, and cross-country transit by vehicles over public land.</p> <p>Does not include the direct testing of geothermal resources, the production or utilization of geothermal resources, or injection testing.</p> <p>Lease is not required to apply.</p> <p>Surface management agency must also approve application.</p> <hr/> <p><i>Form 3200-9, Notice of Intent to Conduct Geothermal Resource Exploration Operations</i></p>
<p>DRILLING</p> <p>43 CFR Subpart 3260</p>	<p>For drilling wells and conducting related activities such as conducting flow tests, producing geothermal fluids, or injecting fluids into a geothermal reservoir.</p> <p>Required for construction of well pads or access roads to drilling operations.</p> <p>Lease required.</p> <hr/> <p><i>Form 3260-2, Geothermal Drilling Permit</i></p>

LICENSE/PERMIT	COVERS <i>BLM FORM</i>
<p>UTILIZATION</p> <p>43 CFR Subpart 3270</p> <p><i>Includes construction permits</i></p>	<p>For construction and operation of electrical generation facilities, direct-use steam plants, and related facility and well field operations, including well field production and injection.</p> <p>Site license or lease and construction permit are required before beginning site preparation work for facilities.</p> <p>Separate site license is required if the operator is not a party to the lease.</p> <p>Lease required.</p> <hr/> <p><i>Form 3260-3, Geothermal Sundry Notice</i></p> <p><i>Construction Permit Form</i></p>
<p>COMMERCIAL USE PERMIT (CUP)</p> <p>43 CFR Subpart 3274.11</p>	<p>Any commercial use operations once a facility has been built. Commercial operation means delivering federal geothermal resources, or electricity or other benefits derived from those resources, for sale.</p> <p>It also includes delivering resources to the utilization point, if you are utilizing federal geothermal resources for your own benefit and not selling energy to another entity.</p> <p>Applicant must inform the BLM of existing power purchase agreements.</p> <hr/> <p><i>Commercial Permit Form</i></p>

State land

A project developer must work with state agencies to develop a geothermal resource when:

- The geothermal resource is located on state land;
- The geothermal resource is located on private land; and
- State law requires permitting by state agencies, even if the resource is located on federal land.

State permitting, environmental, and operational requirements, as well as coordination between federal, state, and local agencies vary widely from state to state. Who owns the resource, and how they give permission for its use, is dictated by state water, mineral, and environmental laws. The surface or land owner may not own the subsurface minerals or water.

“Dr. Carl Austin of IdaTherm has come to several Idaho Geothermal Energy Working Group meetings with a stack of papers, as I recall almost 12 inches tall. I believe he said the documents were the [federal, state, etc.] permits he needed.”

K.T. Hanna
Idaho Department of Water Resources,
Energy Division
Boise, Idaho

Thus, before an entrepreneur can begin the permitting process, she or he must answer the following questions:

- How does my state classify geothermal?
- Who owns the geothermal resource?
- Who owns the mineral estate?
- Who owns the water rights?
- What permits may I have to get?
- Do I need to file a bond with the state? If so, how much?

The answers to these questions will determine which state agencies have jurisdiction over geothermal development, and help define the permitting process.

How does your state classify geothermal resources?

States classify geothermal resources in a several ways: as a mineral, water, *sui generis*, heat, or a combination of the above. *Sui generis* simply means of its own kind or genus, unique in its characteristics, e.g., neither water nor mineral.

If your state classifies geothermal resources as a mineral, ownership or leasing of the land includes the mineral rights to develop the underlying geothermal resource. “Under the rule of capture, the owner of the mineral estate can obtain title to geothermal resources (subject to the correlative rights of adjacent owners) as fast as he or she can get them out of the ground.”¹⁰

If your state classifies geothermal resources as water or groundwater, however, in addition to obtaining access to the land, a small business must also secure the water rights for that property in order to develop the geothermal resource. Title to water is not equivalent to real property ownership.¹¹ Water rights holders only have the right to use the water.¹²

“Geothermal resources are related to water, gas and minerals, to both the surface and subsurface estates, and to both water rights and mineral titles. How geothermal resources are defined affects other resource definition as well as all aspects of regulation.”

R. Gordon Bloomquist
Washington State University Energy Program
Olympia, Washington

In some states, if water is diverted from its natural course—evaporated or consumed as part of the resource’s use, the user may be required to obtain a permit from the state water agency.

A complication arises in the case of “split estate”—when one entity owns the surface rights while another owns the subsurface rights. “Often, a landowner will own the rights to both the surface land and the underlying geothermal resources, but sometimes surface ownership is severed from ownership of the underlying

¹⁰ Lava Law, Ch. 3 – Pg. 5.

¹¹ “While western water rights may not be exactly equivalent to real property, appropriated water rights can be traded and sold, under the rules of state water law and interstate compacts. Many western cities and mining companies have purchased ‘water ranches’.” (Jim Witcher).

¹² Lava Law, Ch. 3 – Pg. 5.

geothermal resource. In the latter case, a developer must negotiate with both the surface and resource owner.”^{13, 14}

What state permits and licenses may I have to get?

The following are examples of types of permits and licenses a geothermal developer may have to obtain from the state and county:

- Conditional use,
- Exploration,
- Well construction and drilling,
- Water rights,
- Air emissions,
- Fluid disposal,
- Building construction,
- Power facility,
- Hazardous waste disposal,
- License for direct uses, e.g., aquaculture,
- Pool permit for balneology, and
- Endangered species.

Geothermal is local

In addition to state agencies, a developer must also contact local and county agencies as soon as possible in the project development process to learn about the licenses and permits they may require. Relevant local and county agencies include:

- Local land use boards,
- Local planning commissions,
- Zoning boards,
- County boards of commissioners,
- Local sewer and water districts, and
- Regional boards, e.g., air pollution and water control districts.

County boards generally issue a conditional use permit. In most counties throughout the United States, a geothermal project is conditionally allowed in rural land use zones. To obtain a conditional use permit, an applicant must typically show that the project will be compatible with adjacent land uses.¹⁵

¹³ [Lava Law](#), Ch. 1 – Pages 7-8.

¹⁴ Many homesteaded lands gave the underlying mineral rights to the Federal Government.

¹⁵ [Lava Law](#), Ch. 1 – Pg. 9.

The table on the following pages shows how the 19 GPW states classify geothermal resources and define geothermal ownership. It also identifies the state agencies which are involved in geothermal permitting, briefly noting their roles.¹⁶



For a more extensive understanding of the permitting process in your state, contact your state agencies.

STATE	<i>GEOTHERMAL CLASSIFICATION OWNERSHIP</i>	AGENCIES
ALASKA	<p style="text-align: center;"><i>Mineral</i></p> <p>Waters below 120°C (248°F) are available for appropriation as groundwater, and subject to water law statutes.</p> <hr/> <p>Alaska claims ownership of all geothermal resources, including those under private lands. The State does, however, give the surface owner a preferential right to a prospecting permit or lease.</p>	<p>The Department of Natural Resources Division of Oil and Gas is responsible for the development of the State’s geothermal resources.</p>
ARIZONA	<p style="text-align: center;"><i>Sui generis</i></p> <hr/> <p>Arizona claims ownership of geothermal resources on state lands.</p> <p>The State reserves the right to lease or withhold state lands for purposes of leasing.</p>	<p>Several state agencies, including the Arizona Geological Survey (AZGS), have jurisdiction over aspects of geothermal development.</p> <p>The Arizona Department of Environmental Quality (ADEQ) is responsible for the disposal of waters associated with a geothermal project. The permit and process to be followed depend on whether the fluid is to be disposed of into surface waters or underground.</p> <p>The Arizona Department of Water Resources (ADWR) must be consulted to obtain a well construction permit and to secure water rights.</p>

¹⁶ Much of the information cited in the table is taken from R. Gordon Bloomquist’s excellent regulatory guides to geothermal direct use development on Arizona, Colorado, Nevada, Idaho, Montana, New Mexico, Oregon, Utah, Washington, and Wyoming. All are available in PDF format on the Washington State University Energy Program Publications webpage at <http://www.energy.wsu.edu/pubs/> by scrolling down to “Geothermal.”

STATE	<i>GEOTHERMAL CLASSIFICATION</i> <hr/> OWNERSHIP	AGENCIES
		The Arizona Department of Commerce Community Planning Office is knowledgeable about planning and zoning issues in communities across the state.
CALIFORNIA	<p data-bbox="634 436 724 464" style="text-align: center;"><i>Mineral</i></p> <hr/> <p data-bbox="451 533 911 646">California claims ownership when it owns the mineral estate, otherwise the resource is the property of the owner of the mineral estate.</p>	<p data-bbox="943 436 1409 550">The California Energy Commission issues permits for the siting of power plants ≥ 50 MW on all lands, including federal lands, in the State of California.</p> <p data-bbox="943 594 1409 707">The Division of Oil, Gas, and Geothermal Resources (DOGGR) is lead agency for the environmental review of exploratory wells (excluding Imperial Co.).</p> <p data-bbox="943 751 1409 865">The local authority is the lead agency for the environmental review of developmental wells, pipelines, and power plants < 50 MW.</p> <p data-bbox="943 909 1409 993">DOGGR permits the drilling, operation, plugging, and abandonment of all production and injection wells.</p>
COLORADO	<p data-bbox="646 1020 712 1047" style="text-align: center;"><i>Water</i></p> <hr/> <p data-bbox="444 1117 911 1144">Geothermal resources are a public resource.</p> <p data-bbox="451 1188 911 1331">A property right to a hot dry-rock resource is an incident of the ownership of the overlying surface, unless several resources are transferred with the subsurface estate expressly.</p>	<p data-bbox="943 1020 1409 1134">The Colorado Division of Water Resources (CDWR) is the lead state agency administering geothermal resource rules and regulations.</p> <p data-bbox="943 1178 1409 1354">The permitting of injection wells also falls under the jurisdiction of CDWR, although the U.S. Environmental Protection Agency, Region 8, has primacy and oversees the administration of underground fluid injection wells in Colorado.</p> <p data-bbox="943 1398 1409 1541">The Colorado Department of Public Health and Environment's Water Quality Control Division (WQCD) is responsible for administering surface disposal of wastewater, including geothermal fluids.</p>
HAWAII	<p data-bbox="634 1577 724 1604" style="text-align: center;"><i>Mineral</i></p> <hr/> <p data-bbox="451 1673 911 1757">State law defines a "geothermal resource" as having a temperature $\geq 150^{\circ}\text{F}$ and being used for electrical generation.</p> <p data-bbox="461 1801 901 1850">Hawaii claims ownership of geothermal resources on all state and reserved lands.</p>	<p data-bbox="943 1577 1409 1690">The Department of Land and Natural Resources (DLNR) regulates geothermal resource subzones and manages geothermal resources.</p> <p data-bbox="943 1734 1409 1848">The Department of Health (DOH) regulates emissions affecting air quality, noise, underground injection of fluids, and solid and hazardous waste disposal.</p>

STATE	<p style="text-align: center;"><i>GEOTHERMAL CLASSIFICATION</i></p> <hr/> <p style="text-align: center;">OWNERSHIP</p>	AGENCIES
	<p>“Reserved lands” are those which are owned or leased by any person in which the State or its predecessors in interest has reserved to itself, expressly or by implication the minerals or right to mine minerals, or both.</p> <p>“State lands” includes all public and other lands owned by or in possession, use and control of the State of Hawaii or any of its agencies.</p>	<p>The disposal of fluids is governed by Environmental Protection Agency (EPA) and DOH rules on underground injection.</p> <p>Geothermal development activity is administered by the Board of Land and Natural Resources (BLNR) for projects within a Conservation District, and requires a Conservation District Use permit (CDUP).</p> <p>Geothermal development for electrical generation can take place only within designated Geothermal Resource Subzones (GRS). Hawaii currently has four GRS.</p> <p>Development for direct use applications may be permitted both inside and outside of GRS.</p> <p>County permits and approvals are required for related activities including grubbing, grading, building, electrical, and plumbing.</p> <p>For geothermal development activity located within urban, rural, or agricultural districts, authority rests with the counties. If proposed activities within these districts are not permitted uses under the County’s General Plan and zoning ordinances, an application for a Geothermal Resource Permit (GRP) must be submitted for approval by the County Planning Commission.</p> <p>The County of Hawaii (COH), through its Planning Department, enforces the conditions of a Geothermal Resource Permit (GRP) issued by the Planning commission for non-conservation lands.</p> <p>Various county agencies have responsibility for approval and enforcement of grading, grubbing and stockpiling, building, electrical and plumbing permits.</p> <hr/> <p>Lower temperature fluids (< 150°F) are not regulated as geothermal resources, and need not obtain state geothermal exploration or well drilling permits. Wells</p>

STATE	<p style="text-align: center;"><i>GEOTHERMAL CLASSIFICATION</i></p> <hr/> <p style="text-align: center;">OWNERSHIP</p>	AGENCIES
		<p>for low temperature resources must still be permitted as water wells by the State Commission on Water Resources.</p> <p>To date, no one has permitted a direct use application in Hawaii (Gill, 2005).</p>
<p>IDAHO</p>	<p style="text-align: center;"><i>Sui generis and water</i></p> <p>Sui generis – Groundwater having a temperature $\geq 212^{\circ}\text{F}$ at the well bottom is classified as a “geothermal resource.”</p> <p>Water – Groundwater of between 85°F and 212°F at the well bottom is classified as a “low temperature geothermal resource.”</p> <hr/> <p>Idaho claims ownership of all geothermal resources underlying state and school lands.</p> <p>Idaho claims the right to regulate the development and use of all of the state’s geothermal resources.</p>	<p>The Department of Water Resources (DWR) issues water rights, well drilling permits, and injection well permits.</p> <p>The Department of Environmental Quality’s (DEQ) Water Quality Division is responsible for administering surface disposal of wastewater, including geothermal fluids.</p> <p>The Idaho Department of Lands has a process which includes permitting, bonding, and royalties. Information is listed on their website under “Minerals Leasing.”</p> <p>Idaho does not have comprehensive environmental review statutes.</p> <p>State does not coordinate permitting at the state level. Developers must obtain permits from state and local boards and agencies.</p> <p>The use of “geothermal resources” does not require a permit to appropriate water unless it will decrease groundwater in any aquifer or other groundwater source or measurably decrease groundwater available from prior water rights.</p> <p>The use of “low temperature geothermal resources” requires a permit to appropriate water.</p>
<p>KANSAS</p>	<p style="text-align: center;"><i>Water</i></p> <hr/> <p>Groundwater is available through appropriation.</p>	<p>The Department of Agriculture, Division of Water Resources, Water Rights Section requires a permit for water appropriation before a water supply well is constructed.</p> <p>The Department of Agriculture’s water appropriation program administers the Kansas water appropriation act and rules and regulations about the management of water resources. This program issues permits to appropriate water, regulates water use, and maintains records of all</p>

STATE	<i>GEOTHERMAL CLASSIFICATION OWNERSHIP</i>	AGENCIES
		water rights in the state.
MONTANA	<p data-bbox="618 342 740 369"><i>Sui generis</i></p> <hr data-bbox="443 401 911 405"/> <p data-bbox="451 438 902 527">On state lands geothermal resources are owned by Montana as part of their mineral reservation.</p> <p data-bbox="467 562 886 651">State water laws apply to all geothermal development involving production and diversion of geothermal fluids.</p> <p data-bbox="456 686 898 745">Groundwater is a public reserve that must be appropriated.</p>	<p data-bbox="943 342 1414 464">The Montana Department of Natural Resources and Conservation (DNRC) is responsible for issuing water rights and well construction permits.</p> <p data-bbox="943 499 1414 621">The U.S. Environmental Protection Agency, Region 8, oversees the administration of underground fluid injection wells in Montana.</p> <p data-bbox="943 657 1414 779">The Montana Department of Environmental Quality (DEQ) is responsible for administering surface disposal of wastewater, including geothermal fluids.</p>
NEBRASKA	<p data-bbox="634 800 724 827"><i>Mineral</i></p> <hr data-bbox="443 858 911 863"/> <p data-bbox="451 896 911 1236">When the subsurface or mineral estate has been severed from the overlying surface estate, ownership of the right to develop and produce geothermal resources shall derive from the subsurface or mineral estate, except that no such right shall attach to subsurface or mineral estates granted prior to 17 July 1982, unless the document conveying the subsurface or mineral estate specifically granted the right to develop and produce geothermal resources.</p>	<p data-bbox="943 800 1409 888">The Board of Educational Lands and Funds has the authority to lease state-owned geothermal resources.</p> <p data-bbox="943 924 1398 1077">The Department of Natural Resources issues Geothermal Resource Development Permits to authorize the withdrawal, transfer, and further use or reinjection of groundwater.</p> <p data-bbox="943 1113 1414 1356">The applicant shall attend a conference with the Department and the Department of Environmental Quality. At this conference the permit requirements under the Environmental Protection Act will be determined, as well as the scope of any studies which may be required to support the permit application.</p>
NEVADA	<p data-bbox="578 1383 781 1411"><i>Mineral and water</i></p> <hr data-bbox="443 1444 911 1449"/> <p data-bbox="451 1482 902 1604">Geothermal resources in Nevada belong to the owner of the surface estate, unless they have been reserved by or conveyed to another person.</p>	<p data-bbox="943 1383 1409 1505">The lead regulatory agency, the Division of Minerals of the Commission on Mineral Resources, issues permits to drill or operate a geothermal well.</p> <p data-bbox="943 1541 1398 1663">Permitting takes from 10 days to over a year, depending on the type of well, where it is located, and which agencies are involved.</p> <p data-bbox="943 1698 1409 1881">Permitting a temperature gradient hole or domestic use well could take as little as 10 days. Permitting a commercial or industrial well could take 45 days whether on private or federal land. Permitting wells on federal land by a federal agency will take a</p>

STATE	<p style="text-align: center;"><i>GEOTHERMAL CLASSIFICATION</i></p> <hr/> <p style="text-align: center;">OWNERSHIP</p>	AGENCIES
		<p>minimum of three months; a year or more is not unusual.</p> <p>The Nevada Department of Conservation and Natural Resources-Division of Water Resources (DWR) is responsible for issuing water rights.</p> <p>The Nevada Department of Conservation and Natural Resources-Bureau of Water Pollution Control (BWPC) oversees the administration of underground fluid injection wells, and is also responsible for administering surface disposal of wastewater, including geothermal fluids.</p> <p>The Nevada Department of Environmental Protection (NDEP) administers the Clean Water and Clean Air Acts.</p> <p>The State of Nevada has comprehensive environmental regulations with minimalist overtones.</p> <p>An Environmental Assessment (EA) or Environmental Impact Statement (EIS) are only done by the Federal Government for exploration or development on federal lands.</p> <p>Nevada does not coordinate permitting at the state level. Developers must obtain permits from state and local boards and agencies.</p>
<p>NEW MEXICO</p>	<p style="text-align: center;"><i>Mineral and water</i></p> <p style="text-align: center;">Water if the fluid produced has a temperature $\leq 250^{\circ}\text{F}$.</p> <p style="text-align: center;">Mineral if the fluid produced has a temperature $> 250^{\circ}\text{F}$.</p> <hr/> <p style="text-align: center;">New Mexico claims ownership of geothermal resources whenever it holds the mineral rights.</p>	<p>If produced fluid is $\leq 250^{\circ}\text{F}$, the resource is under the primary responsibility of the New Mexico Office of the State Engineer (NMOSE) for drilling and permitting.</p> <p>If produced fluid is $> 250^{\circ}\text{F}$, the resource is under the primary jurisdiction for the Oil Conservation Division (OCD) of the New Mexico Energy, Minerals and Natural Resources Department for drilling.</p> <p>The NMOSE, OCD, and the New Mexico Environment Department (NMED) have regulatory authority over geothermal discharge permits.</p>

STATE	<i>GEOTHERMAL CLASSIFICATION</i> <hr/> OWNERSHIP	AGENCIES
		<p>The OCD will also coordinate with the U.S. EPA Region 6, which has authority over wastewater discharge to surface waters in New Mexico.</p> <p>The New Mexico State Land Office leases the lands of the state mineral estate.</p> <p>New Mexico does not have comprehensive environmental review statutes.</p>
NORTH DAKOTA	<p><i>Heat</i></p> <hr/> <p>The owner of the surface estate owns the geothermal resource.</p>	<p>The Geological Survey of the North Dakota Industrial Commission Department of Mineral Resources issues permits.</p> <p>A permit is required prior to the commencement of operations for the drilling, boring, excavating, construction, or substantial modification of a geothermal energy extraction facility.</p> <p>A permit is not required for private residential heating or cooling purposes, or for facilities that use a treated municipal water supply as its sole source of water.</p> <p>A permit may be required by the state department of health and consolidated laboratories or the water utility, or both, for facilities hooked into a municipal water supply.</p> <p>The state geologist may grant a permit for up to 10 years.</p> <p>The state geologist may deny an application for permit if the construction of a geothermal energy extraction facility would violate correlative rights or would cause, or tend to cause, waste, damage to the environment, or contaminate underground sources of drinking water.</p>
OKLAHOMA	<p><i>Water</i></p> <hr/> <p>Groundwater is available through appropriation.</p>	<p>The Oklahoma Water Resource Board appropriates stream and groundwater supplies to various water users in the state.</p> <p>Permits are issued for the use of both surface and groundwaters in Oklahoma (domestic uses are exempt) and all waters must be used beneficially without waste.</p>

STATE	<i>GEOTHERMAL CLASSIFICATION</i> <hr/> OWNERSHIP	AGENCIES
		Groundwater utilized for a beneficial use (such as irrigation or municipal water supply), other than domestic, generally requires a permit. Two types of permits are available: (1) 90-day Provisional Temporary, and (2) Long-Term.
OREGON	<p data-bbox="578 499 781 527"><i>Mineral and water</i></p> <p data-bbox="451 562 911 680">Geothermal is characterized as water if the bottom hole temperature is < 250°F, and mineral if the bottom hole temperature is > 250°F.</p> <hr/> <p data-bbox="483 751 878 810">Oregon owns all geothermal resources located on state and private land.</p>	<p data-bbox="943 499 1393 617">The Oregon Water Resources Department (WRD) is the primary agency for production well construction, permitting, and water rights issues.</p> <p data-bbox="943 653 1414 770">The Oregon Department of Environmental Quality (DEQ) is the primary agency for the disposal of water in either surface or injection well applications</p> <p data-bbox="943 806 1365 865">Geothermal as water is regulated by the WRD.</p> <p data-bbox="943 900 1386 989">Geothermal as mineral is regulated by the Oregon Department of Geology and Mineral Industries (DOGAMI).</p> <p data-bbox="943 1024 1386 1113">The Department of State Lands issues exploration permits and drilling leases for resources on state-owned land.</p> <p data-bbox="943 1148 1398 1245">The state siting board has jurisdiction over geothermal energy facilities of 38.85 MW or greater.</p> <p data-bbox="943 1276 1373 1335">A developer may obtain permits directly from local land use boards.</p> <p data-bbox="943 1367 1344 1425">Oregon does not have comprehensive environmental review statutes.</p>
SOUTH DAKOTA	<p data-bbox="646 1457 716 1484"><i>Water</i></p> <hr/> <p data-bbox="483 1549 873 1577">Geothermal is appropriated as water.</p>	<p data-bbox="943 1457 1393 1604">The Department of Environment and Natural Resources, Water Rights Program is responsible for managing the appropriation and use of the state’s water resources.</p> <p data-bbox="943 1640 1398 1787">The Water Rights Program also oversees well driller and well pump installer licensing, well construction/plugging standards, and control/plugging of flowing wells.</p>

STATE	<i>GEOTHERMAL CLASSIFICATION</i> OWNERSHIP	AGENCIES
TEXAS	<p data-bbox="634 285 724 310"><i>Mineral</i></p> <hr/> <p data-bbox="461 384 898 443">Texas claims ownership on all lands that belong to the permanent school fund.</p>	<p data-bbox="943 285 1360 375">The Texas General Land Office is the management agency for state lands and mineral rights.</p> <p data-bbox="943 411 1365 501">The Commissioner of the General Land Office issues permits and charges reasonable fees for the permits.</p> <p data-bbox="943 537 1409 688">The School Land Board may lease land that belongs to the permanent school fund, excluding wildlife refuges and recreational areas, for the production of geothermal energy and associated resources.</p>
UTAH	<p data-bbox="646 716 712 741"><i>Water</i></p> <hr/> <p data-bbox="448 814 911 905">Ownership of geothermal resources derives from an interest in the land and not from an appropriated right to geothermal fluids.</p> <p data-bbox="448 940 911 1058">The right to a geothermal resource is based on ownership of the mineral rights or surface rights, which are usually obtained by direct ownership or leasing.</p>	<p data-bbox="943 716 1414 833">The Utah Department of Natural Resources, Division of Water Rights (DWR) has jurisdiction and authority over all geothermal resources in the state.</p> <p data-bbox="943 869 1295 928">DWR issues water right and well construction permits.</p> <p data-bbox="943 963 1382 1054">The Utah Division of Water Quality (DWQ) oversees fluid disposal plans and permits.</p> <p data-bbox="943 1089 1317 1148">Utah does not have comprehensive environmental review statutes.</p>
WASHINGTON	<p data-bbox="618 1178 740 1203"><i>Sui generis</i></p> <p data-bbox="448 1239 911 1329">Geothermal resources only include the heat energy that is practical for use in commercially producing electricity.</p> <p data-bbox="448 1365 911 1455">All direct use geothermal resources are considered to be groundwater and regulated accordingly.</p> <hr/> <p data-bbox="461 1520 898 1579">Geothermal resources are the property of the surface owner.</p> <p data-bbox="448 1614 911 1673">Groundwater is a public resource available through appropriation.</p>	<p data-bbox="943 1178 1377 1295">The Department of Ecology (DOE) is responsible for issuing water rights, well construction permits and fluid disposal plans, including underground injection.</p> <p data-bbox="943 1331 1406 1421">Developers must also secure ownership or lease rights to the site from the Department of Natural Resources Division of Lands.</p> <p data-bbox="943 1457 1382 1547">Environmental review required under the State Environmental Policy Act (SEPA) modeled after NEPA.</p> <p data-bbox="943 1583 1349 1673">The state siting council may take jurisdiction over issuing permits if the applicant requests.</p> <p data-bbox="943 1709 1390 1768">The siting body determinations operate in lieu of state environmental reports.</p> <p data-bbox="943 1803 1409 1894">Siting council has authority to issue permits under the Federal Clean Air Act and Clean Water Act.</p>

STATE	<i>GEOHERMAL CLASSIFICATION</i> <hr/> OWNERSHIP	AGENCIES
WYOMING	<p data-bbox="646 285 716 310"><i>Water</i></p> <p data-bbox="467 348 894 407">Geothermal resources are classified and regulated as groundwater resources.</p> <hr/> <p data-bbox="448 474 914 533">Geothermal rights are a public resource and only available through appropriation.</p>	<p data-bbox="945 285 1404 407">The State Engineer’s Office (SEO) is responsible for issuing water rights, well construction permits and is the lead agency in overseeing geothermal production wells.</p> <p data-bbox="945 443 1398 564">The Department of Environmental Quality (DEQ) is responsible for administering surface and groundwater disposal of wastewater, including geothermal fluids.</p> <p data-bbox="945 600 1370 659">Wyoming does not have comprehensive environmental review statutes.</p>

Private land

Permitting on private land is akin to permitting on state land except that the developer gets access to the land from the landowner rather than from the federal or state governments. If the project developer is not the landowner, however, “...obtaining the right to explore and produce geothermal resources is done through negotiation with private owner(s) of the subsurface minerals or geothermal estate.”¹⁷

Geothermal resources located on private land are subject to local land use restrictions as well as federal and state regulations.

Indian Country¹⁸

As Sovereign Nations, tribes have inherent authority over their land. Their approval must be obtained to use or lease tribal resources, e.g., land, water, and minerals. Tribes are not subject to state regulation; they can negotiate with state and local governmental agencies. Permitting in Indian Country may take different paths, depending on:

¹⁷ James Witcher, Witcher and Associates, Las Cruces, New Mexico, 2005.

¹⁸ Sources: Paula Blaydes, Blaydes & Associates, Santa Rosa, CA; Anna Carter, Geothermal Support Services, Rohnert Park, CA; and Stuart Russell, Russell Associates, Palo Alto, CA.

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1. The tribal authority provided by treaty or prescribed by constitutions developed under the Indian Reorganization Act of 1934,
 2. Powers specified by Congress, and
 3. The inherent tribal authority the tribe asserts as a Sovereign Nation.

Some general tenets of law in Indian Country are outlined below.

- Federal agencies, such as the U.S. Environmental Protection Agency, work directly with tribes on a “Government to Government” basis.
- Indian Country lands cannot be leased under the Geothermal Steam Act. They can, however, be leased under agreements with the tribe itself or with Indian Enterprise Corporations formed by the tribe, both with limitations on the rights granted. Often the tribes do not have commercial codes in place and cannot be sued without their permission.
- Indian Lands are generally (but not always) held in trust by the United States for the benefit of the tribes and administered by the Bureau of Indian Affairs (BIA), an agency of the U.S. Department of the Interior.¹⁹ The Bureau of Indian Affairs (BIA) is generally the SMA in Indian Country when there is a third party lease or minerals management agreement.
- Tribes can undertake exploration on their own, without BIA oversight.²⁰ Even if there is no lease, there will be times in a tribally-initiated project that will require working with BIA.

¹⁹ See “Understanding Environmental Regulation on Indian Lands” by Lynn H. Slade and Walter E. Stern of Modrall, Sperling, Roehl, Harris & Sisk, P.A.; 1999; http://www.modrall.com/articles/article_27.html.

²⁰ The BIA administers the Indian Minerals Development Act (25 C.F.R. 225) which covers geothermal projects. BIA “supplements” those regulations with 43 C.F.R. 3200 Geothermal Steam Act drilling regulations administered by the BLM. The Title 25 regulations, however, anticipate that operations will be conducted under a lease or a minerals agreement with the tribe. Where the tribe is undertaking exploration or development itself, and the land is not leased or otherwise encumbered, the applicability of the regulations is uncertain and requires clarification of jurisdiction with BIA—perhaps on a case-by-case basis.

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- Tribes can write their own regulations or adopt the regulations of other federal, state, or local agencies. They may voluntarily relinquish sovereignty for a limited time and defined purpose to take advantage of another state, federal, or local agency's rules and oversight.
 - Like states, tribes with appropriate regulations in place can apply for primacy over the Clean Air, Safe Drinking Water, and Clean Water Acts.
 - Projects with impacts outside of Indian Country may be subject to local and state permitting regulation.
 - Where no tribal ordinances applicable to a proposed action exist, an express federal statute allocating governmental authority over specific activities may control. Inherent tribal authority may also be preempted by a comprehensive federal regulatory scheme.
 - Tribes are not subject to the National Environmental Policy Act of 1969 (NEPA) unless they use funds from federal agencies such as the U.S. Department of Energy. In some cases, the BIA is the lead agency for NEPA on trust lands.
 - Where lands within Indian Country have been "allotted" to individual tribal members and then sold to non-Native Americans, another layer of jurisdictional uncertainty is created.
 - Tribes generally lack a history of natural resource development. Because of the recent growing appreciation and expanded assertions of inherent sovereign powers by tribes, they may have difficulty accepting that there are jurisdictional authorities imposed by federal regulatory schemes for natural resource development on their lands.

To determine the permitting path for a particular project, tribal sovereignty, tribal ordinances and codes, and tribal preferences must be weighed, along with other federal authorities. Tribes, consultants advising tribes, and members of industry forming contractual development agreements with tribes, are urged to ensure that standard requirements for safety, health, environment, and conservation of the resource are applied to the project as would be done by responsible geothermal

exploration and development projects on federal, state, and private lands where permitting and regulatory requirements are more clearly outlined.²¹

²¹ For more information: “Reservations of Right: An Introduction to Indian Law” by Gabriel S. Galanda of Williams, Kastner & Gibbs, PLLC; 2003;
<http://library.findlaw.com/2003/Mar/24/132651.html>.

Earth, water, and air

No discussion of geothermal permitting would be complete without a section on the environment and its importance to the permitting process. Due to the limited scope of this guide, however, we will keep it very simple.

Basic environmental issues

Geothermal development, be it for a small power plant or greenhouse heated by geothermal energy, like any human activity, impacts the environment. Most, if not all, of these impacts can be mitigated. The primary environmental issues related to geothermal development are:

Land use issues:

- Compliance with city or county land use criteria is required.
- If state has no coordinated permitting body, developer may have to negotiate permits directly with local land use boards.

Water:

- Issues include water use, quality, disposal, reinjection.
- May require water or brine discharge and consumptive use permits.

Emissions:

- May require air emission or abatement permits.
- Air permits are obtained either through a coordinated permitting body or state or regional board.
- Issue of temporary noise pollution permits, primarily during well drilling.
- Drill rigs are required to have H₂S detectors during drilling.

For detailed information on environmental issues related to geothermal power generation, refer to the Geothermal Energy Association’s two recent reports:²²

1. “Geothermal Literature Assessment: Environmental Issues,” a bibliographic review (May 2004); and
2. *A Guide to Geothermal Energy and the Environment (Earth Day, 2005)*.

NEPA, CEQA, SEPA—Oh My!

NEPA is the National Environmental Policy Act of 1969 (42 U.S.C. 4321).²³ NEPA requires that any geothermal project which sells power to a federal entity, moves power over a federal transmission line, or uses federal funding or federal land must undergo an environmental analysis in order to determine the project’s potential impact on the environment. Either a lengthy and costly Environmental Impact Statement (EIS) or a less expensive, less costly Environmental Assessment (EA) will be required as part of project permitting.

Of the 19 GPW states, only California and Washington have state regulations which require state and local agencies to consider the likely environmental consequences of a permit application before approving or denying it. CEQA is the California Environmental Quality Act²⁴; SEPA, the Washington State Environmental Policy Act.²⁵ NEPA, CEQA, and SEPA, which call for public comment and mitigation measures, may significantly increase project time and cost. It is possible to combine the NEPA and CEQA or SEQA documents into one joint document, cutting cost and time.

²² Both reports are available in PDF format on the Geothermal-biz.com website at http://www.geothermal-biz.com/enviro_groups.htm#fmi.

²³ For the text of the National Environmental Policy Act of 1969, as amended, see <http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm>.

²⁴ The California Environmental Quality Act webpage, <http://ceres.ca.gov/ceqa/>.

²⁵ The Washington Department of Ecology SEPA homepage, <http://www.ecy.wa.gov/programs/sepa/sepa/e-review.html>.

Other federal laws

In addition to NEPA, several other federal laws may apply to geothermal development, whether on federal, state, or private land, or in Indian Country. State agencies administer many federal clean air and water and other federal requirements in most states. Specific requirements differ from state to state.

Clean Air Act of 1990 (42 U.S.C. 7418 et seq.) – Requires federal agencies to comply with all federal, state, and local requirements regarding the control and abatement of air pollution. This includes abiding by the requirements of State Implementation Plans.

Clean Water Act of 1987 (33 U.S.C. 1251 et seq.) – Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the United States' water.

Endangered Species Act (16 U.S.C. 1531 et seq.) – Applicability of and compliance with the Endangered Species Act is specific to each site. While concerns may be managed and impacts mitigated, the Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), or both, must be involved to help define impacts and mitigation strategies. The FWS administers the Endangered Species Act for land and freshwater species; the NMFS is responsible for marine species, e.g., anadromous salmon.

National Forest Management Act (16 U.S.C. 1600 et seq.) – Manages renewable resources on national forest lands. Requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests. Applies to projects on national forest lands.

National Historic Preservation Act (16 U.S.C. 470 et seq.) – Expands protection of historic, cultural, and archaeological properties to include those of national, state, and local significance and directs federal agencies to consider the effects of proposed actions on properties eligible for or included in the National Register of Historic Places.

The SMA is responsible for initiating the "Section 106" review process and for consulting with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP).

Federal Land Policy and Management Act (43 U.S.C. et seq.) – Governs how the BLM manages public lands. Specifically requires the agency to manage for the multiple use and sustained yield of public land resources for both present and future generations. Applies where a right-of-way for a transmission line or other facilities cross federal land.

Next steps

It may appear from this brief introduction that permitting a geothermal small power or direct use project is an insurmountable process, one that many in their right minds would never tackle in a million years. Thankfully, while difficult and time consuming, permitting is certainly doable. The secret: Meet with your regulators early and often. Establishing a good working relationship will help move the process along.

“Although the I’SOT Geothermal Project has experienced probably every issue that can be faced on a small project, it is important to note that most of the agencies mentioned in this paper have been as accommodating as possible to help forward this project.”

Dale Merrick
I’SOT, Inc.
Canby, California

Federal, state, and local agencies generally recognize the economic, environmental, social, and energy security benefits of clean, green geothermal energy.

Do your homework, contact the folks at the agencies early and often, and your geothermal project will soon be on its way.

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Stoel Rives LLP. Lava Law: Legal Issues in Geothermal Energy Development, Second Edition, 2005. For more information, contact Cathie Baker at Telephone (503) 294-9661, or email at chbaker@stoel.com.