

## What is the National Geothermal Data System (NGDS)?

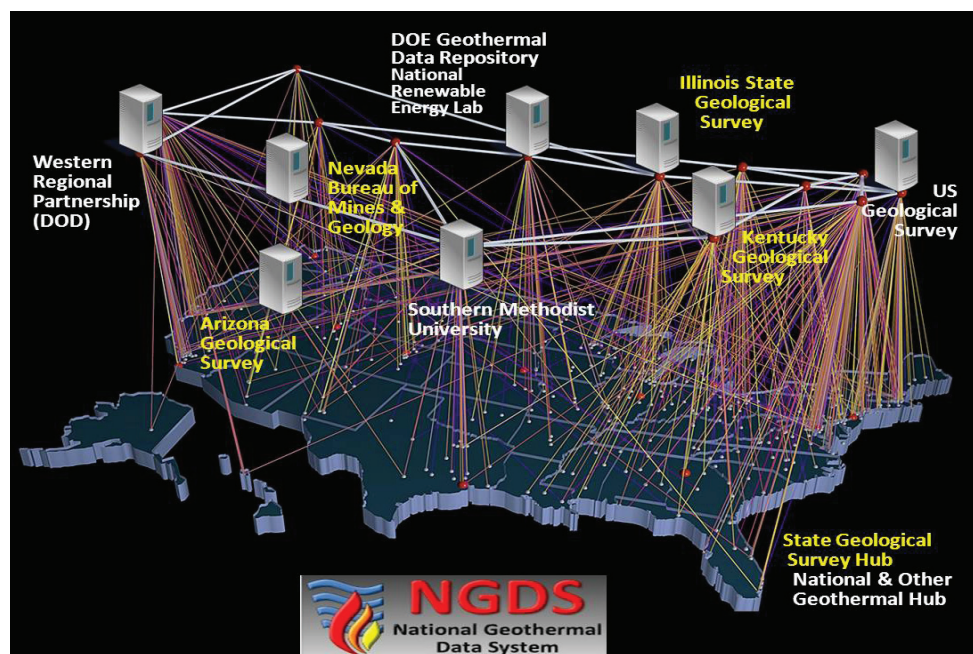
NGDS is an interoperable networked system of distributed data repositories accessed through federated catalog nodes, and is built upon an open architecture using open source software practices. The NGDS provides access to geothermal data from providers across the US, including all 50 state geological surveys, the nation's leading academic geothermal centers, the geothermal industry, and a variety of federal agencies. The NGDS model can easily be extended beyond the US to an international audience.

The system will serve as a platform for sharing consistent, reliable geothermal-relevant technical data with users of all types, supplying tools relevant for their work. As aggregated data supports new scientific findings, this content-rich linked data ultimately broadens the pool of knowledge available to fuel discovery and development of commercial-scale geothermal energy production. Growth in the depth and breadth of data accessed through NGDS will progressively yield higher quality analyses at every stage of geothermal development, from exploration through sustained production. This in turn will serve to drive down risks and costs that now tend to deter investment in geothermal projects.

The NGDS is on track to become fully operational by 2014 and will provide a platform for custom applications for accessing all geothermal data in the US and abroad.

The Geothermal Technologies Office (GTO) funds this enterprise to facilitate a seamless delivery of geothermal data for a variety of applications. Critical geothermal attributes will be accessible, such as temperature at depths, flow rates, and resource characterization.

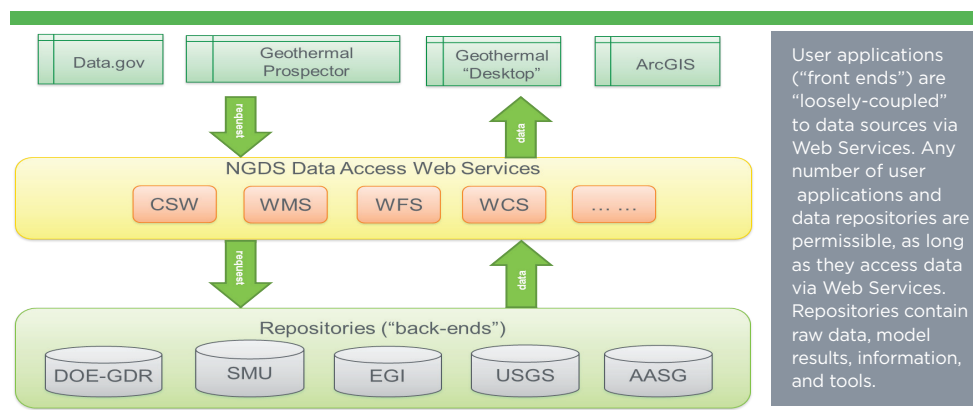
Visit the Geothermal Technologies Office website at [geothermal.energy.gov](http://geothermal.energy.gov) for more information on the NGDS, or contact [geothermal@ee.doe.gov](mailto:geothermal@ee.doe.gov). To learn more about the NGDS, log on at <http://geothermaldata.org>.



As new data come online across the nation, the United States Department of Energy advances industry access to vital resource characterization and new technologies that will ultimately enable new geothermal development.

## From Open Data to Linked Open Data<sup>1</sup>

The NGDS is being built using the US Geoscience Information Network (USGIN) data integration framework to promote interoperability across the Earth sciences community. The basic structure of the NGDS will employ state-of-the-art informatics to advance geothermal knowledge, as depicted below. NGDS nodes host data in a variety of formats, from simple digitized documents and images to raw field data to highly structured and intricately linked interpreted data. New data providers who want to become a node on the NGDS will be able to deploy the open source NGDS Node-In-A-Box software, based upon CKAN 2.0, and quickly get started. Alternatively, the NGDS project has published several standards for metadata and service endpoints, which can help a provider leverage their existing catalogs for interoperability with the NGDS. In addition, nodes such as the DOE-GDR (see reverse) are now online. A federal "Open Government Directive" mandates free access to information when use and re-use of data is critical. To simplify the process of accessing intricate geothermal data, pointers are embedded among the data at multiple levels of granularity.



User applications ("front ends") are "loosely-coupled" to data sources via Web Services. Any number of user applications and data repositories are permissible, as long as they access data via Web Services. Repositories contain raw data, model results, information, and tools.

<sup>1</sup>Bauer, Florian, and Martin Kaltenbock. Linked Open Data: The Essentials. Semantic Web Company. ISBN: 978-3-902796-05-9.

## How to Submit Data via the Geothermal Data Repository (DOE-GDR)

Below are instructions for all DOE Geothermal Technologies Office funds recipients.

### Step 1. Register

Funds recipients register for an account before submitting data by visiting the DOE-GDR at <https://gdr.openei.org>. For technical assistance with registration or help accessing the data submission interface, contact [GDRHelp@ee.doe.gov](mailto:GDRHelp@ee.doe.gov).

### Step 2. Submit

Once registered, users can log into the data submission site to submit data. For each data resource (Excel, Word, PDF, or data containment software), funds recipients will:

- ☐ Provide appropriate metadata and contact information
- ☐ Agree to the data handling terms of the DOE-GDR
- ☐ Specify the release date for any protected data consistent with the Intellectual Property Provisions
- ☐ Attach the data

Once data has been submitted, recipients will not be able to edit the data for the duration of the review and curation process. It is recommended that you retain a copy of the submitted data. For information and assistance concerning the preparation of data files, metadata, unique data requirements, or the data curation process, email [GDRHelp@ee.doe.gov](mailto:GDRHelp@ee.doe.gov).

### Step 3. Protect

Data submitted to the DOE-GDR and identified as "Protected Data" are subject to the terms and conditions set forth in the Intellectual Property Provision incorporated into the award. Prior to the public release date, Protected Data are held in a secure data store with restricted access. All other submitted data will be made publicly available.

### Step 4. Cancel or Resubmit

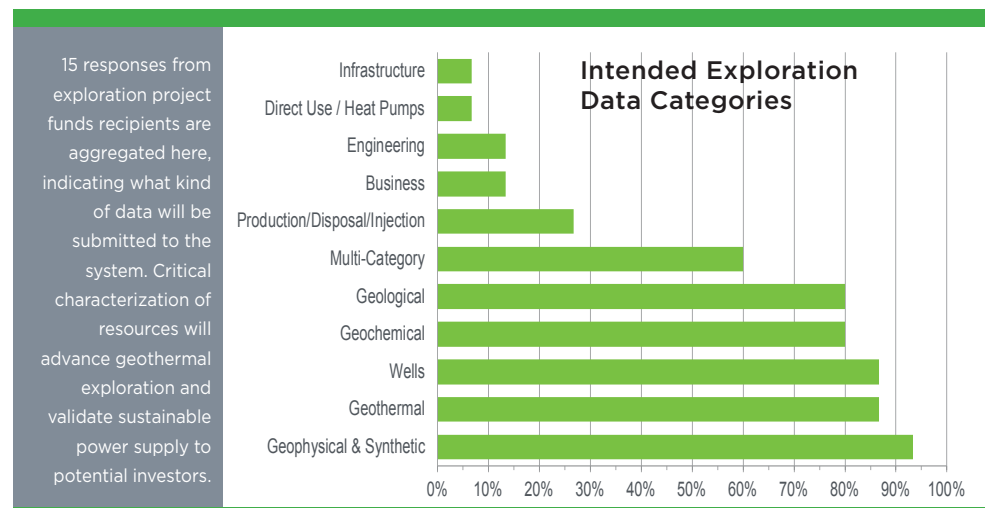
You may cancel a submission at any time prior to public release. Cancellation will terminate the curation process and remove any copies of the originally submitted data from the system. If you wish to edit data or metadata after submission, you will need to cancel and resubmit.

## DOE Geothermal Technologies NGDS Node

The Geothermal Data Repository (DOE-GDR) represents a vital node on the NGDS. GDR is hosted on the Open Energy Information (OpenEI) Platform which currently features over 55,000 content pages, more than 600 downloadable data sets, regional gateways on a variety of energy-related topics, and numerous online tools such as "Geothermal Prospector." All DOE funds recipients are required to submit their data as it is generated or no later than 90 days after the quarter in which the data is generated. Within 90 days of receiving their award, recipients must develop a data plan, listing the specific type of data that will be generated as part of each task and project deliverable.

Data Provision Summary	Website	Contact
Registration	<a href="https://gdr.openei.org">https://gdr.openei.org</a>	OpenEI Team at NREL <a href="mailto:GDRHelp@ee.doe.gov">GDRHelp@ee.doe.gov</a>
Data Submission	<a href="https://gdr.openei.org">https://gdr.openei.org</a>	OpenEI Team at NREL <a href="mailto:GDRHelp@ee.doe.gov">GDRHelp@ee.doe.gov</a>
General information about the DOE-GDR and the NGDS	<a href="http://www.geothermal.energy.gov">www.geothermal.energy.gov</a>	Arlene Anderson at U.S. DOE Geothermal Technologies Office <a href="mailto:arlene.anderson@ee.doe.gov">arlene.anderson@ee.doe.gov</a>

While the lack of reliable and accurate resource data and information has been a critical deterrent to potential geothermal investors, the NGDS supplies a robust set of data that reduces uncertainty and attracts capital. The graph below indicates an example of exploration data expected through the NGDS.



[geothermal.energy.gov](http://geothermal.energy.gov) / email [geothermal@ee.doe.gov](mailto:geothermal@ee.doe.gov)  
For more on the NGDS, <http://geothermaldata.org>

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