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| **Date:** | Friday, September 27, 2013 |
| **To:** | GDR Users |
| **From:** | Kate Young |
| **Subject:** | Overview of Geothermal Exploration Case Study database on OpenEI |

## Background

The goal of this project was to create a template (and associated form) on OpenEI to solicit crowd-sourced information sharing about various geothermal resource areas around the world. Over the past two years, twelve case studies have been researched by NREL staff testing the usability and content model developed. The goal in FY14 is to encourage crowd-sourcing of information to populate information for more areas.

The data can be found here: <http://en.openei.org/wiki/Geothermal_Areas>

## OpenEI

Information about Geothermal Areas have been collected on OpenEI. Some of the advantages of cataloging this information on OpenEI include:

1. The ability to crowd-source information

2. The ability to easily search for the information needed

3. The ability to query information to compare various techniques

4. The ability to link these data to other databases on OpenEI (for example, the NEPA database)

## Geothermal Area Properties

Properties are searchable and queriable and can be used to compare various geothermal areas and their properties, either directly on OpenEI, or by export and manipulation in other programs, such as Excel. Properties allowed (to date) for each Geothermal Area include:

* **Map** - The map of the resource area.
* **Place** - The city or state in which the resource area is located.
* **GeothermalRegion** - The geothermal exploration region in which the resource area is located.
* **GEADevelopmentPhase** - The phase of plant construction, as defined by GEA (can have more than one phase if more than one project)
* **Coordinates** - The coordinates (lat, lon) of the resource area.
* **MeanReservoirTemp** - The USGS-defined (2008) mean temperature in degrees Celsius.
* **EstReservoirVol** - The USGS-defined (2008) estimated reservoir volume in km³.
* **MeanCapacity** - The USGS-defined (2008) mean capacity.
* **GrossProdCapacity** - Gross production (including MW needed to run well field and site operations) [MW] of the field. In the case where outside power is purchased to run well field/site operations, Gross=Net.
* **NetProdCapacity** - Average Annual Net production [MW] delivered to the grid.
* **NumOfPlants** - The number of operating plants in the area (does not include plants in development)
* **Owners** - List of power plant owners in the area
* **Operators** - List of power plant operators in the area
* **Purchasers** - List of entities purchasing geothermal power from area
* **NumProdWells** - Number of production wells in an area
* **NumInjWells** - Number of injection wells in an area
* **NumRepWells** - Number of replacement wells in an area
* **GeofluidTemp** - Average temperature of geofluid into plants
* **ReservoirTemp** - Average temperature [°C] of the fluid at depth as measured by geothermometry techniques. Indicates the theoretical resource temperature.
* **SanyalTempWellhead** - Classifies resource area based on wellhead temperature which reflects enthalpy of the system that is used.
* **SanyalTempReservoir** - Classifies resource area based on deep reservoir temperature which reflects the enthalpy of the system that could potentially be tapped.
* **ReservoirTopDepth** - Average depth to reservoir top
* **ReservoirBotDepth** - Average depth to reservoir bottom
* **AvgReservoirDepth** - Average depth to reservoir
* **Overview** - Paragraph overview of the resource area
* **AreaGeology** - A description of the area geology
* **History** - A description of the history and infrastructure development in the area
* **TechProbSolutions** - A description of technical problems and solutions
* **RegEnvIssues** - A description of regulatory and environmental issues that have come about during development of the area
* **RDActivities** - A description of Research, Development and Deployment activities (e.g. DOE-funded projects) in the geothermal area
* **FuturePlans** - A description of future plans
* **ExplorationHistory** - A description of the exploration history
* **WellFieldDescription** - A description of the well field
* **HydroSystem** - A description of the hydrothermal system in the area
* **HeatSource** - A description of the resource heat source
* **Geochemistry** - A description of the geofluid geochemistry
* **OtherUses** - Other products being produced at the site
* **FirstWellDate** - Date of completion of first well
* **FirstWellName** - Name of first well
* **FirstWellCoordinates** - Coordinates of first well
* **FirstWellDepth** - Date of completion of first well
* **FirstWellFlowRate** - Initial flow rate of first well
* **FirstWellFlowComments** - first well flow test comments
* **FirstWellTemp** - initial temperature of first well
* **FirstWellLog** - name of uploaded well log file
* **StructuralZone** - Describes the structural zone in which the field lies. (e.g. East African Rift Valley, Taupo Volcanic Zone, Walker Lane)
* **TectonicSetting** - Describes tectonic process responsible for development of geothermal resource.
* **ControlStructure** - Describes underlying structure that controls permeability and hydrology of the reservoir (as described in REF)
* **TopoFeatures** - Describes topographic features within the vicinity of the field (e.g. volcanic features, rift valleys, extensional features) that may be significant reflections of underlying geothermal resources.
* **BrophyModel** - Application of Brophy's occurrence models to each area based on its tectonic and structural setting.
* **ModernGeoFeatures** - Describes modern surface manifestations present in vicinity of the resource area (e.g. hot springs, fumaroles, mudpots, geysers)
* **RelictGeoFeatures** - Describes evidence of ancient surface manifestations in the vicinity of the resource area (e.g. hydrothermally altered rock, hydrothermally deposited rock)
* **VolcanicAge** - Describes the time of the most recent volcanism by epoch, era, or period per available data.
* **HostRockAge** - Describes the age of the reservoir rock by epoch, era, or period per available data.
* **HostRockLithology** - Condensed description of the lithology of the reservoir rock.
* **CapRockAge** - Describes the age of the cap rock by epoch, era, or period per available data.
* **CapRockLithology** - Condensed description of the lithology of the cap rock.
* **SalinityLow** - Describes lower end measurements of salinity [ppm] of the geothermal fluid.
* **SalinityHigh** - Describes higher end measurements of salinity [ppm] of the geothermal fluid.
* **SalinityAverage** - Mean average of the low and high end measurements of the salinity [ppm] of the fluid.
* **BrineConstituents** – Describes major elements, compounds in geothermal brine
* **WaterResistivity** – Resistivity (MΩ.cm) of the geothermal fluid