April 2013

2013 Annual US Geothermal Power Production and Development Report

GEA

GEOTHERMAL ENERGY ASSOCIATION

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ANNUAL GEOTHERMAL POWER PRODUCTION AND DEVELOPMENT REPORT: FEBRUARY 2013

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GEA sincerely thanks its member companies, as well as other organizations and individuals, for their cooperation and assistance in gathering the information used in this report.

Please Note: GEA is reporting project information that is provided by developers or public sources. We do not independently verify the data provided or warrant its accuracy.

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Cover photo courtesy of EnergySource of its John L. Featherstone Plant in California

KEY STATISTICS FROM 2013

US INDUSTRY STATISTICS

- Installed geothermal power capacity grew by 5% or 147.05MW in the United States since GEA's last survey in March 2012.
- Seven geothermal projects became operational in 2012, including the first co-production plant. Additionally, the first hybrid solar-geothermal plant went online this year, although no new geothermal capacity was added at this plant.
- There are currently 175 geothermal projects under development in the U.S.
- About 5,150-5,523 MW of known geothermal resources are under development in the U.S., of which geothermal developers are developing 2,511-2,606 MW in potential capacity additions over the next decade.
- GEA revised its last year's estimate of total installed capacity to increase its estimate by 128 MW. Currently 3,386 MW of geothermal power are installed in the United States.

METHODOLOGY AND TERMS

To increase the accuracy and value of information presented in its annual US Geothermal Power Production and Development Report, the Geothermal Energy Association (GEA) developed a reporting system, known as the Geothermal Reporting Terms and Definitions, in 2010. The Geothermal Reporting Terms and Definitions serve as a guideline to project developers in reporting geothermal project development information to the GEA. A basic understanding of the Geothermal Reporting Terms and Definitions will also aid the reader in fully understanding the information presented in this annual report.

The Geothermal Reporting Terms and Definitions serve to increase reporting clarity and accuracy by providing industry and the public with a lexicon of definitions relating to the types of different geothermal projects, and a guideline for determining which phase of development a geothermal resource is in. These two tools help to characterize resource development by type and technology. They also help to determine a geothermal project's position in the typical project development timeline.

GEOTHERMAL RESOURCE TYPES AND THEIR DEFINITIONS

In reporting a project in development to the GEA, the developer of a geothermal resource is asked to indicate which of the following definitions the project falls under:

> **Conventional Hydrothermal (Unproduced Resource):** the development of a geothermal resource where levels of geothermal reservoir temperature and reservoir flow capacity are naturally sufficient to produce electricity and where development of

the geothermal reservoir **has not** previously occurred to the extent that it supported the operation of geothermal power plant(s). Such a project will be labeled as "CH Unproduced" in this report.

Conventional Hydrothermal (Produced Resource): the development of a geothermal resource where levels of geothermal reservoir temperature and reservoir flow capacity are naturally sufficient to produce electricity and where development of the geothermal reservoir **has** previously occurred to the extent that it currently supports or has supported the operation of geothermal power plant(s). Such a project will be labeled as "CH Produced" in this report.

Conventional Hydrothermal Expansion: the expansion of an existing geothermal power plant **and** its associated drilled area so as to increase the level of power that the power plant produces. Such a project will be labeled as "CH Expansion" in this report.

Geothermal Energy and Hydrocarbon Co-production: the utilization of produced fluids resulting from oil and/or gas-field development for the production of geothermal power. Such a project will be labeled as "Co-production" in this report.

Geopressured Systems: the utilization of kinetic energy, hydrothermal energy, and energy produced from the associated gas resulting from geopressured gas development to produce geothermal electricity. Such projects will be labeled as "Geopressure" in this report.

Enhanced Geothermal Systems: is the development of a geothermal system where the natural flow capacity of the system is not sufficient to support adequate power production but where hydraulic fracturing of the system can allow production at a commercial level. Such a project will be labeled as "EGS" in this report.

TRACKING PROJECTS THROUGH THE DEVELOPMENT TIMELINE

In addition to defining their projects according the above list of definitions, developers also indicate to GEA their projects' current status in the project development timeline using a four-phase system. This system captures how much, and what type of, work has been performed on that particular geothermal resource up until the present time. These four phases of project development are:

Phase I: Resource Procurement and Identification
Phase II: Resource Exploration and Confirmation
Phase III: Permitting and Initial Development
Phase IV: Resource Production and Power Plant Construction

Each of the four phases of project development is comprised of three separate sections, each of which contains phase sub-criteria. The three separate sections of sub criteria are resource development, transmission development, and external development (acquiring access to land, permitting, signing PPA's and EPC contracts, securing a portion of project financing, etc.). For a project to be considered as being in any particular phase of development a combination of sub-criteria, specific to each individual project phase, must be met.

PLANNED CAPACITY ADDITION (PCA) AND RESOURCE CAPACITY

Finally, at each phase of a project's development a geothermal developer has the opportunity to report two project capacity estimates: a Resource Capacity estimate and a Planned Capacity Addition (PCA) estimate. At each project phase the geothermal resource capacity estimate may be thought of as the megawatt (MW) value of the total recoverable energy of the subsurface geothermal resource. It should not be confused with the PCA estimate, which is defined as the portion of a geothermal resource that "if the developer were to utilize the geothermal resource under its control to produce electricity via a geothermal power plant . . . would be the power plants estimated installed capacity." In other words, the PCA estimate is usually the expected power plant's estimated installed capacity. In the case of an expansion to a conventional hydrothermal geothermal plant, the PCA estimate would be the estimated capacity to be added to the plant's current installed capacity. In each phase of development the resource and installed capacity estimates are given different titles that reflect the level of certainty of successful project completion. The different titles as they correspond to the separate phases are as follows:

Phase I: "Possible Resource Estimate" and "Possible PCA Estimate"
Phase II: "Possible Resource Estimate" and "Possible PCA Estimate"
Phase III: "Delineated Resource Estimate" and "Delineated PCA Estimate"
Phase IV: "Confirmed Resource Estimate" and "Confirmed PCA Estimate"

This section outlines how the Geothermal Reporting Terms and Definitions influence the reporting and presentation of project in development information in this report. For a detailed explanation of each phase of development and the outline of its sub-criteria please consult GEA's Geothermal Reporting Terms and Definitions, available at http://geo-energy.org/pdf/NewGeothermalTermsandDefinitions_January2011.pdf.

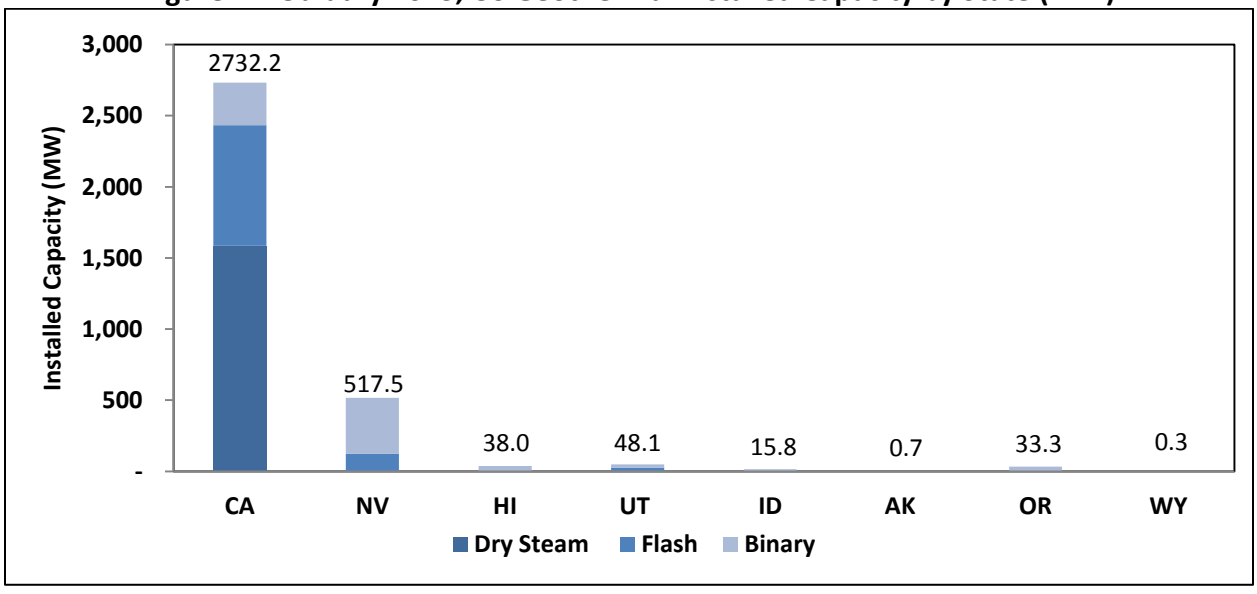
THE US GEOTHERMAL INDUSTRY

The development of geothermal energy resources for utility-scale electricity production in the United States began in the 1960's. Since that time, the continual development of geothermal resources and technology has positioned the US as a leader in the global geothermal industry. The US currently has approximately 3,386 MW of installed geothermal capacity, more than any other country in the world.

INSTALLED CAPACITY

Geothermal companies continue to increase the development of geothermal resources in the US. At the end 2012, geothermal energy accounted for roughly a third of a percent of total installed operating capacity in the United States.[1] Additionally, Geothermal was about 1% of new renewable energy projects brought online in 2012.[2] While this number may seem small on a national scale, geothermal is a significant portion of renewable electricity generation in the states of CA and NV. While the majority of geothermal installed capacity in the US is concentrated in California and Nevada, geothermal power plants are also operating or under construction in Alaska, Hawaii, Idaho, Oregon, Utah, Washington and Wyoming. A significant amount of additional geothermal capacity -- 574 - 620 MW -- could become operational by January 2016 if companies who participated in GEA's survey bring their plants online on time.

Figure 1: February 2013, US Geothermal Installed Capacity by State (MW)

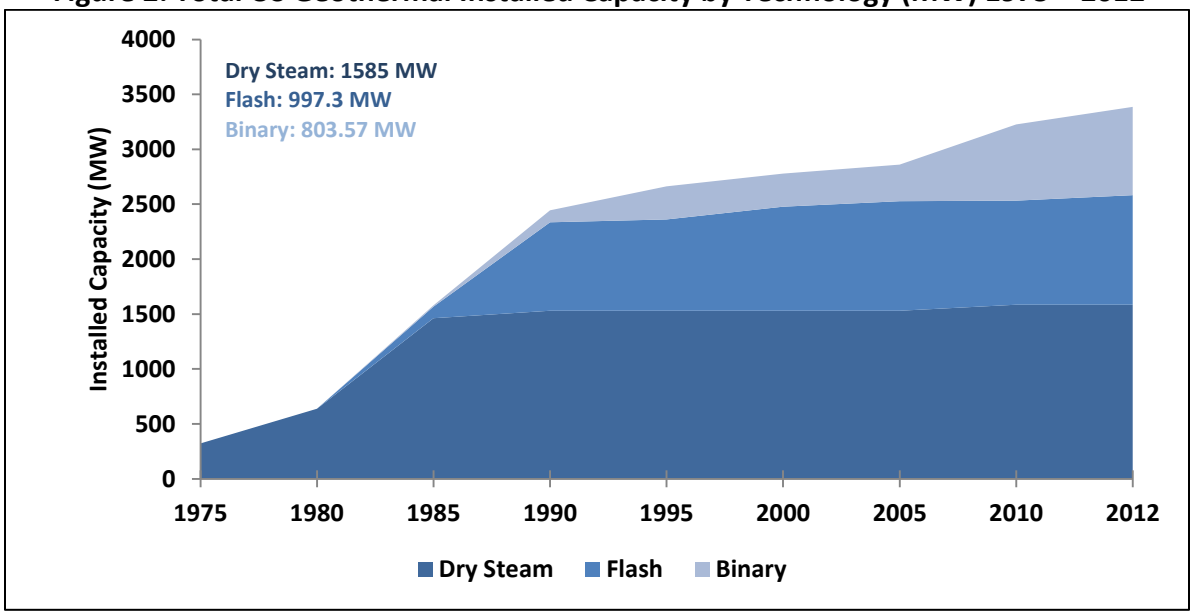


Source: GEA

[1] Office of Energy Projects 2012
[2] *Ibid.*

Due to the varying resource characteristics of different geothermal reservoirs and the lack of a standardized plant design, three generalized plant categories are used to define geothermal generators in the US: dry-steam, flash, and binary. Currently, dry-steam power plants account for approximately 1585 MW (47%) of installed geothermal capacity in the US, and are all located in California. Next, flash plants count for approximately 997 MW (29%), the majority of which are also located in California. With a few exceptions, though, most of the industry growth comes from binary plants, which utilize lower temperature resources. Binary capacity reached roughly 803.57 MW, or 24% of the geothermal installed capacity. Also notably the first co-production facility in the US came online in Nevada at Florida Canyon Mine and Enel Green Power North America brought the first hybrid solar geothermal plant online at their Stillwater facility.

Figure 2: Total US Geothermal Installed Capacity by Technology (MW) 1975 – 2012

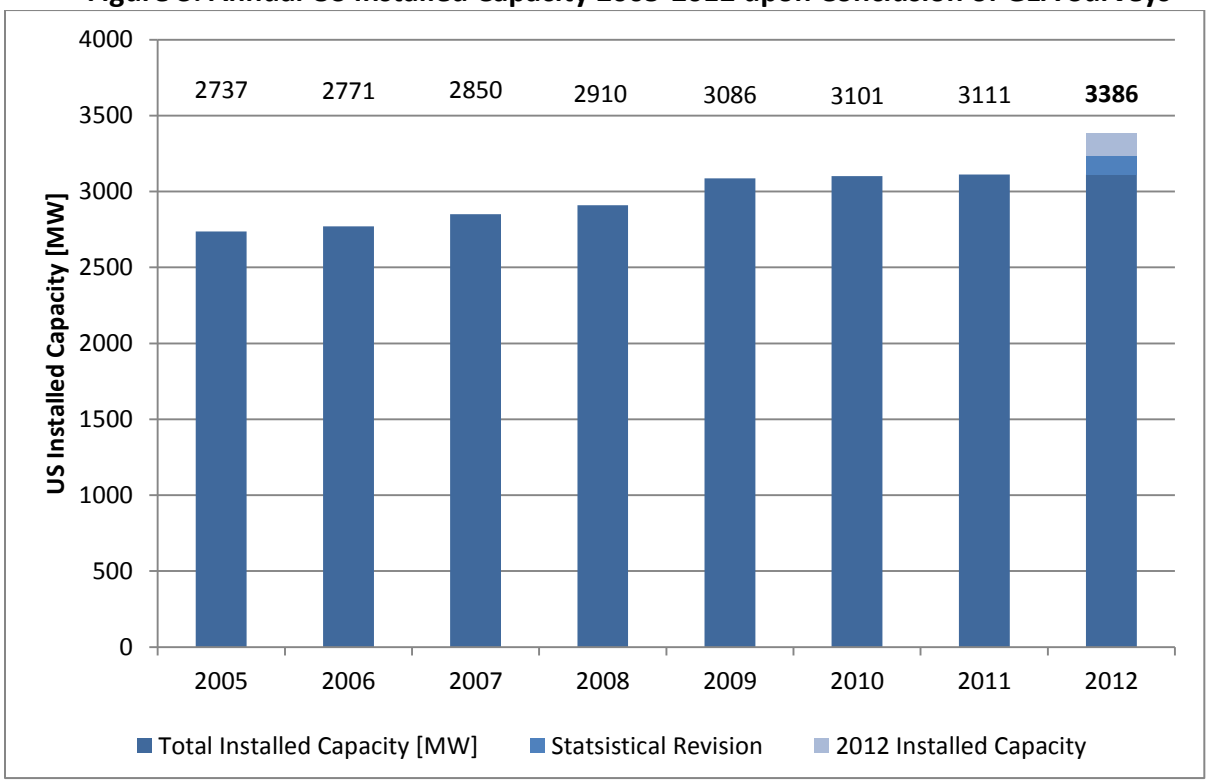


Source: GEA

The US geothermal industry's trend of sustained steady growth continued in 2012. In that year five geothermal power plants and two expansion projects to existing power plants were completed for a total of approximately 147.05 MW of newly installed capacity.

Additionally, GEA conducted a statistical revision of its information on existing plants and found that many power plants had slightly increased their installed capacity since GEA had last contacted those geothermal plant operators. Therefore, of the total 275 MW of growth since GEA's last survey, 147 MW came from plants installed in 2012, while 128 MW is a result of revision to GEA statistics. So the true increase in geothermal capacity this year was only ≈5%. The values shown in Figure 3 are Installed Capacity upon the conclusion of each annual GEA survey and not a time series. However, the data in Figure 4 and Figure 5 is adjusted into a time series with the amount of capacity installed at the end of each year shown.

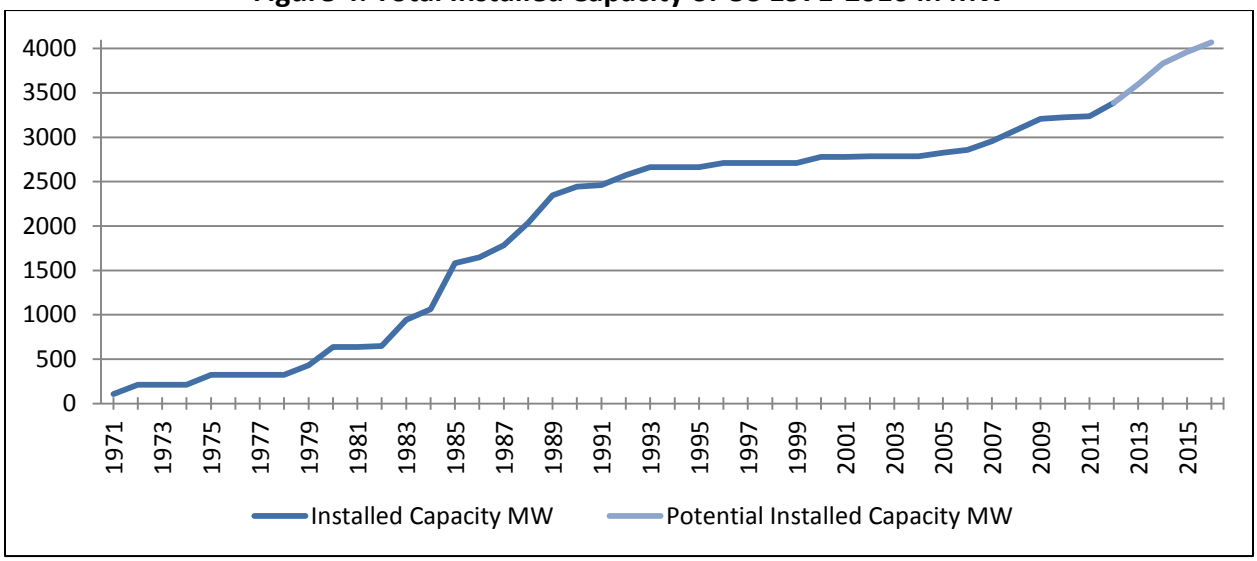
Figure 3: Annual US Installed Capacity 2005-2012 upon Conclusion of GEA Surveys



Source: GEA
Note: This graph is not a time series but the Installed Capacity upon the conclusion of each GEA survey. For time series information please view Figure 4 and 5.

The new geothermal capacity installed in 2012 came from five different geothermal companies. EnergySource completed their John L. Featherstone Plant with a capacity of 49.9 MW, ElectraTherm brought one of the first co-production plants in the US online at Florida Canyon Mines, and Terra-Gen's Dixie Valley expansion became operational. Additionally, Ormat Technologies brought its 18 MW Tuscarora geothermal power plant online in Elko County, Nevada and a second 30 MW plant online called McGinness Hills. U.S. Geothermal expanded electricity generation at its San Emidio resource by replaced old generating equipment at the site with a new 12.75 MW power plant and completed a 30 MW plant in Oregon. As a result, geothermal installed capacity increased in the US by approximately 147.05 MW to an overall total of 3,386 MW.

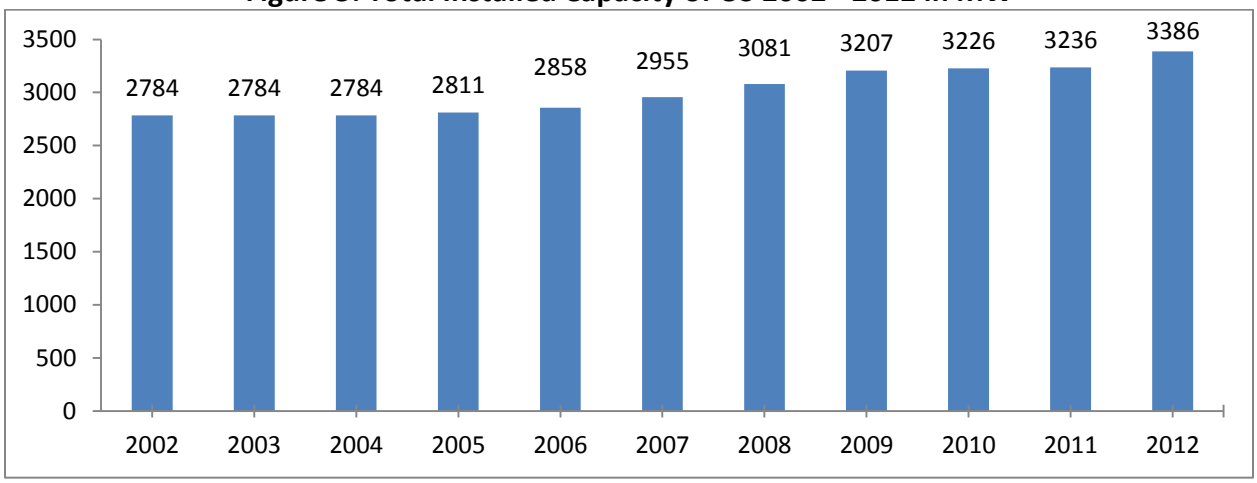
Figure 4: Total Installed Capacity of US 1971-2016 in MW



Source: GEA

Figure 4 above represents total installed capacity in the United States through 2012 and the potential installed capacity additions through 2016. **Additionally, the line that represents "Potential Installed Capacity" is not a GEA forecast, but a compilation of when project developers reported to GEA they expect their projects to reach completion.** Figure 5 is a time series showing the amount of geothermal capacity installed at the end of each year for the last decade.

Figure 5: Total Installed Capacity of US 2002 - 2012 in MW



Source: GEA

Table 1: Geothermal Development Completed in 2012

Plant Name	State	County	Installed Capacity [MW]	Plant Type	Developer	Resource Type
John L. Featherstone (Hudson Ranch 1)	CA	Imperial	49.9	Triple Flash	EnergySource	CH Unproduced
San Emidio Repower	NV	Washoe	12.75	Binary	US Geothermal	CH Expansion
Tuscarora	NV	Elko	18	Binary	Ormat	CH Unproduced
McGinness Hills	NV	Lander	30	Binary	Ormat	CH Unproduced
Neal Hot Springs	OR	Malheur	30.1	Binary	US Geothermal	CH Unproduced
Dixie Valley	NV	Churchill	6.2	Binary	Terra-Gen	CH Expansion
Florida Canyon Mine	NV	Pershing	0.1	Binary	ElectraTherm	Coproduction

Source: GEA

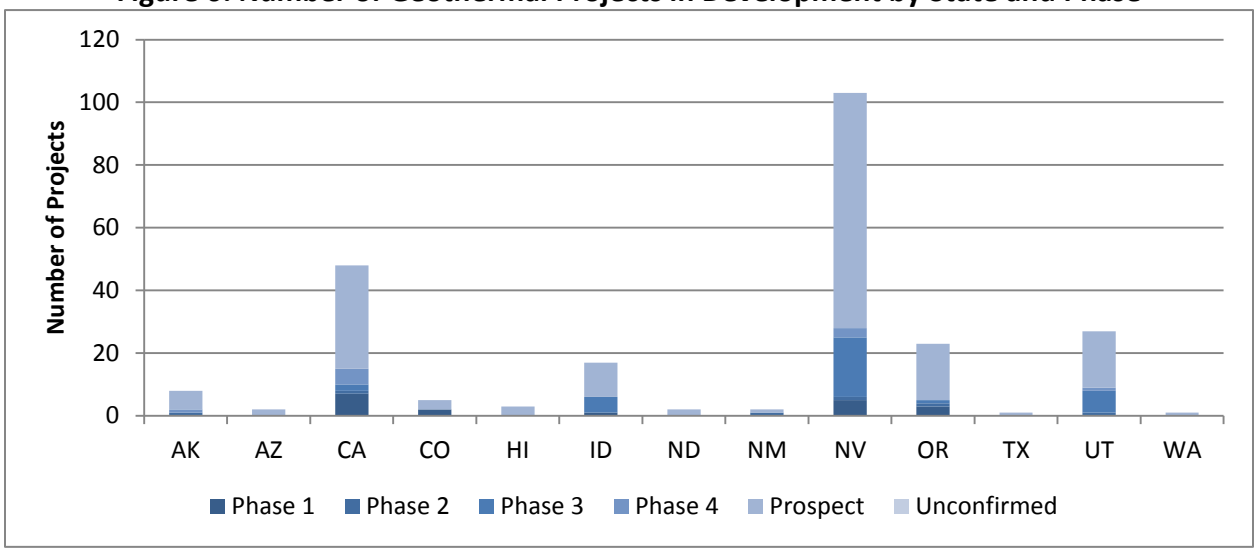
CAPACITY IN DEVELOPMENT

Installed geothermal capacity increased from 3,187 MW in early 2012 to 3,386 MW in February of 2013. As the economy recovers and the recent language alteration of the PTC tax credit effects the geothermal industry, significant growth is expected in 2013 and subsequent years. From the information GEA gathered from reporting companies, up to 14 plants could become operational in 2013 and 9 new plants in 2014 and 10 more plants in 2015, by over 20 different companies and organizations making 2013, 2014, and 2015 three of the most significant boom years for geothermal in decades.

As advanced geothermal projects enter or near the construction phase of development, geothermal companies in the US are also acquiring and developing early stage geothermal resources. In 2013, the geothermal industry is developing 175 geothermal projects (including prospects). The geographic spread of geothermal projects alone is significant, with projects in various phases of project development located in 13 different states.

Of the 175 projects 15 are “unconfirmed” by their respective developer. By “unconfirmed” GEA means the project developer failed to respond to GEA’s requests for information during the Jan. - Feb. data collection period. Thus, the information presented is based on public sources or the developer’s 2012 response.

Figure 6: Number of Geothermal Projects in Development by State and Phase

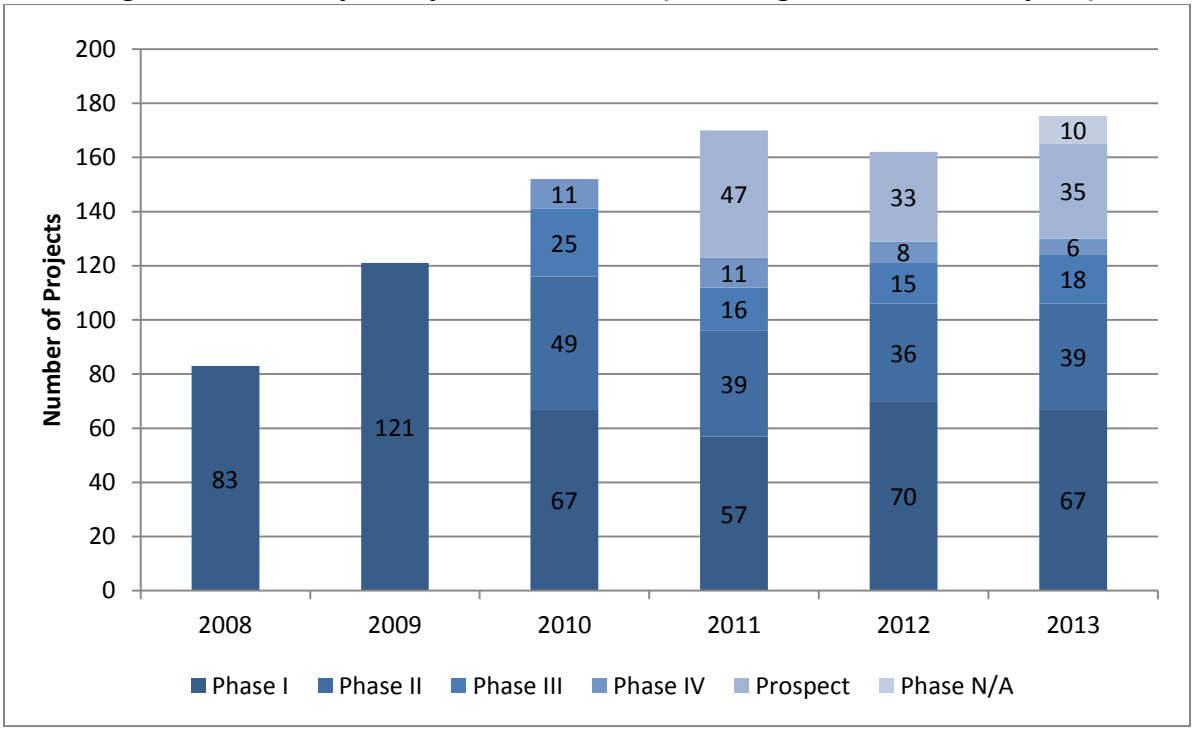


Source: GEA

The number of developing geothermal projects reported to GEA in 2013, excluding unconfirmed projects and prospects is 125. This result represents a slight decrease from 2012 at 130 projects. This decrease is partly due to companies failing to report to GEA, not necessarily because fewer projects are under development.

Beginning with the 2012 US Geothermal Power Production and Development Report, GEA allowed for the reporting of geothermal "prospects" by developers. The reporting of a prospect may occur when a geothermal developer has acquired access to a geothermal resource which has the potential for electricity production, but which has not yet met enough project criteria for the geothermal resource to be considered a Phase I project under the Geothermal Reporting Terms and Definitions (see Section 1). While not currently considered a geothermal "project," a geothermal prospect has the potential to become so. When including confirmed prospects, the total number increases to 160 confirmed projects and prospects.

Figure 7: Total Projects by Year and Phase (Including Unconfirmed Projects)



Source: GEA

The number of confirmed geothermal projects recorded in this report account for approximately 5,150-5,523 MW of geothermal resources in development and 2,511-2,606 MW planned capacity additions spread among 13 states in the Western US. However, these numbers exclude projects where the total resource capacity or the potential capacity additions (PCA) are unknown and are therefore lower than 'real' estimates. Some developers may only report the PCA or resource numbers to GEA. Additionally, projects in early stages of development do not always have estimates for PCA or resource available.

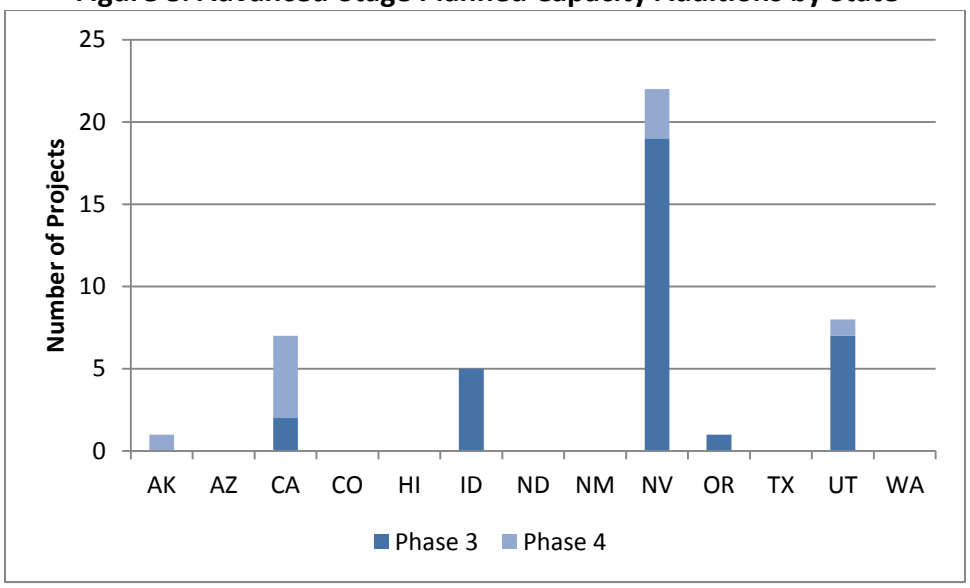
Table 2: Total Projects in Development by State

State	Total Projects	Planned Capacity Additions (MW)		Estimated Resource (MW)	
		Low	High	Low	High
AK	6	50	50	95	95
AZ	2	2	2	102	102
CA	33	995	1,061	1,736	1,827
CO	3	20	40	60	60
HI	3	-	-	-	-
ID	11	83	83	439	514
ND	2	0.60	0.82	-	-
NM	1	15	15	-	-
NV	75	1,056	1,061	2,150	2,275
OR	18	73	77	208	270
TX	1	1	1	-	-
UT	19	215	215	260	280
WA	1	-	-	100	100
TOTAL	175	2,511	2,606	5,150	5,523

Source: GEA
Note: Blanks indicate Resource or PCA estimates may not be unavailable or not yet measured. Projects in early stages of development often do not have Resource or PCA estimates. Some numbers may not perfectly sum because of rounding.

Note that while a project's resource capacity value provides an estimate of the amount of recoverable electricity (MW) from an underground reservoir, a project's potential capacity additions (PCA) estimate is the portion of that geothermal resource which a developer plans to develop for electricity production via a geothermal power plant (see Section 1 explaining the Geothermal Reporting Terms and Definitions used in this report). Currently, geothermal companies are developing 2,511-2,606 MW of potential capacity additions in the US. Of this total, 774 – 799 MW are advanced-stage (Phase 3 – 4) geothermal projects. These numbers in the Table 2 include all 15 unconfirmed projects.

Figure 8: Advanced-Stage Planned Capacity Additions by State



Source: GEA
Note: PCA values (Phase 3 and 4) have been rounded to the nearest megawatt.

While the majority of advanced-stage projects are currently located in Nevada and California, utility-scale projects are also nearing completion and production in Oregon, Utah, Idaho, and Alaska.

The total amount of PCA and Resource Capacity (MW) in development in the US in respect to location and project status (phase) is outlined in Table 3 below.

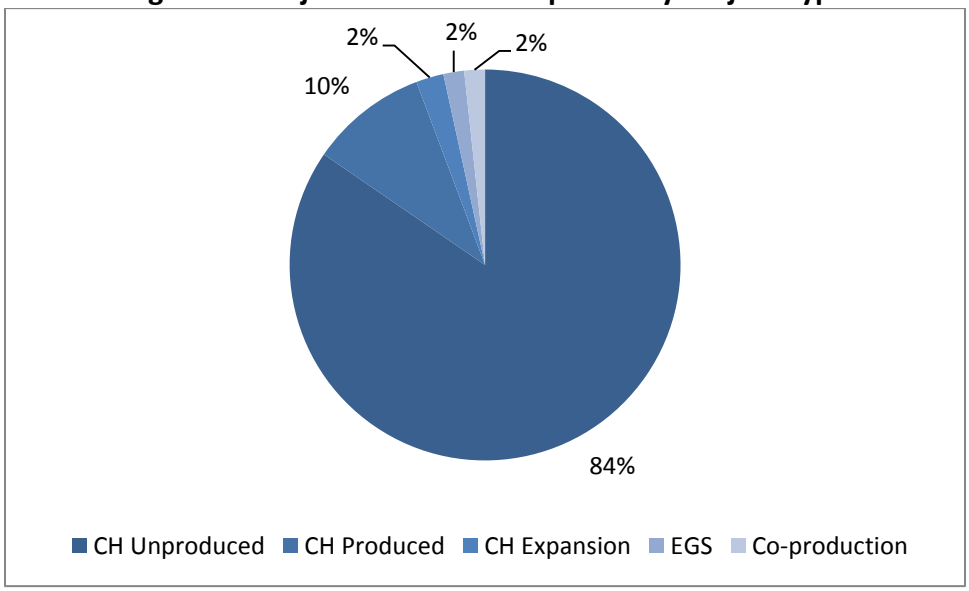
Table 3: Developing Geothermal Capacity by State and Phase

State	Phase I		Phase II		Phase III		Phase IV		Phase N/A	
(MW)	PCA	Resource	PCA	Resource	PCA	Resource	PCA	Resource	PCA	Resource
AK	10	50	15	15	-	-	0	5	25	25
AZ	2	102	-	-	-	-	-	-	-	-
CA	125	185	270	565	562	566	4	-	100	420
CO	-	-	-	-	40	60	-	-	-	-
HI	-	-	-	-	-	-	-	-	-	-
ID	17	-	-	150	17	114	-	-	-	-
ND	0.8	-	-	-	-	-	-	-	-	-
NM	-	-	-	-	-	-	15	-	-	-
NV	255	909	302	602	49	112	60	120	5	46
OR	30	120	20	40	23	38	4	10	-	-
TX	-	-	1	-	-	-	-	-	-	-
UT	20	-	-	30	-	-	25	60	20	20
WA	-	100	-	-	-	-	-	-	-	-
Total	459	1,466	608	1,402	690	890	108	195	150	511

Source: GEA
Note: PCA and Resource Estimate totals have been rounded to the nearest megawatt. PCA is higher estimate, Resource is lower estimate. Some estimates have been adjusted to avoid double counting.

As the geographical reach of the geothermal industry expands, developers are increasingly exploring for and developing conventional hydrothermal geothermal resources in areas where little or no previous development has taken place. Of the 175 projects surveyed (including unconfirmed), 148 (approximately 84%) are developing conventional hydrothermal resources in "unproduced" areas (CH Unproduced) where the geothermal resource has not been developed to support electricity generation via a power plant. Additionally, 17 or 10% are developing conventional hydrothermal projects in "produced" (CH Produced) areas, and four or 2% of projects are expansions to existing conventional hydrothermal power plants (CH Expansion). The remaining projects are three geothermal and hydrocarbon coproduction (Co-production) and three enhanced geothermal systems (EGS) projects.

Figure 9: Projects under Development by Project Type



Source: GEA

The exploration for and development of new resources, as well as the application of new technologies, has the potential to expand the geographic extent of the industry. Projects featuring the development of conventional hydrothermal resources as well as EGS pilot projects are increasing in the Western US. At the same time, the potential to generate geothermal electricity from low-temperature fluids co-produced with from oil and gas production is being explored through demonstration scale projects in states along the Gulf of Mexico and in North Dakota. A number of successful co-production test projects concluded this year. See "Emerging Technologies" section for more information on Co-production and EGS projects.

STATE TABLES: CAPACITY IN DEVELOPMENT

The following results identify 5,150-5,523 MW of estimated geothermal resource capacity under development in the United States including unconfirmed projects. There are 13 states with projects currently in various stages of development: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Nevada, New Mexico, North Dakota, Oregon, Texas, Utah, and Washington. Between confirmed and unconfirmed projects there are a total of 175 geothermal projects in development.

Per GEA's Geothermal Reporting Terms and Definitions (outlined in Section 1 of this report) the projects listed for each state are categorized by the following phases:

- **Phase I:** Resource Procurement and Identification (i.e. identifying resource, secured rights to resource, pre-drilling exploration, internal transmission analysis complete).
- **Phase II:** Resource Exploration and Confirmation (i.e. exploration and/or drilling permits approved, exploration drilling conducted/in progress, transmission feasibility studies underway).
- **Phase III:** Permitting and Initial Development(i.e. securing PPA and final permits, full size wells drilled, financing secured for portion of project construction, interconnection feasibility study complete).
- **Phase IV:** Resource Production and Power Plant Construction (i.e. plant permit approved, facility in construction, production and injection drilling underway, interconnection agreement signed).
- **Unconfirmed:** Project information obtained by GEA from publicly available sources but not verified by the project developer

To properly identify a project's "project type" please refer to the following key:

- **CH Unproduced:** Conventional Hydrothermal Unproduced Resource
- **CH Produced:** Conventional Hydrothermal Produced Resource
- **CH Expansion:** Conventional Hydrothermal Expansion
- **Coproduction:** Geothermal Energy and Hydrocarbon Coproduction
- **Geopressured:** Geopressured System
- **EGS:** Enhanced Geothermal System

The following sections list 13 states with geothermal projects in various stages of development. It should be noted that "NA" (i.e. "not available") is provided in the place of resource capacity or planned capacity addition (PCA) estimates where none was provided by the developer when the project was reported to GEA.
Note "*" indicated a project has been unconfirmed by the project developer meaning the project developer failed to respond to GEA's requests for information and the information is based either on public sources or the developer's 2012 response.

ALASKA

INSTALLED CAPACITY: 0.73 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 95 MW
ESTIMATED PCA IN DEVELOPMENT: 50.4 MW
NUMBER OF PROJECTS IN DEVELOPMENT: 6

The first geothermal power plant in Alaska was installed in 2006 at Chena Hot Springs. It is a small-scale unit, using Organic Rankine Cycle (ORC) or binary technology to produce 225 kW from a low-temperature resource. Subsequent units have been installed, bringing total capacity to 730 kW.

The State of Alaska has adopted a renewable energy goal, which aims to generate 50% of the state's electricity from renewable energy resources by 2025. New fields have subsequently been opened in Alaska for development. For example, the announcement by the Alaskan Department of Natural Resources that Augustine Island will be auctioned for geothermal development in 2013.[3]

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
SW AK Geo"*"	Naknek Electric"*"	25	25	25	25	Enhanced Geothermal Systems	AK	N/A
Unalaska Geothermal Project"*"	City of Unalaska"*"	10	10	50	50	CH (Unproduced)	AK, Aleutians West	Phase 1
Pilgrim Hot Springs	Alaska Center for Energy and Power (Research); Unaatuq (Land Owner)	5	5	5	5	CH (Unproduced)	AK, Nome	Phase 2
Akutan Geothermal Project	City of Akutan	10	10	10	10	CH (Unproduced)	AK, Aleutians East Borough	Phase 2
Mount Spurr	Ormat Technologies					CH (Unproduced)	AK	Phase 2
Chena Hot Springs 2"*"	Chena Hot Springs"*"	0.4	0.4	5	5	CH (Produced)	AK, Fairbanks North Star Burrough	Phase 4

Source: GEA

[3] Alaska Department of Natural Resources 2013

ARIZONA

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 102 MW
ESTIMATED PCA IN DEVELOPMENT: 2 MW
NUMBER OF PROJECTS IN DEVELOPMENT: 2

In November 2006, Arizona adopted rules to expand the state's Renewable Energy Standard (RES) to 15% by 2025. Utilities subject to the RES must obtain renewable energy credits from eligible renewable resources to meet their retail electric load. Of this percentage, 30% must come from distributed renewable resources by this past year (2012) and thereafter.[4]

Project Name	Developer	Estimated PCA (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Apache County Project	GreenFire Energy	2	2	2	2	Enhanced Geothermal Systems	AZ, Apache	Phase 1
Arizona	Gradient Resources			100	100	CH (Unproduced)	AZ	Phase 1

Source: GEA

CALIFORNIA

INSTALLED CAPACITY: 2,732.2 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 1736 – 1827 MW
ESTIMATED PCA IN DEVELOPMENT: 995-1061 MW
NUMBER OF PROJECTS IN DEVELOPMENT (INCLUDING PROSPECTS): 33

Geothermal capacity online in the US remains concentrated in California, which has approximately 2732 MW of installed geothermal capacity. With the support of an ambitious Renewable Portfolio Standard (RPS), the development of geothermal resources continues to move forward in California. In 2005, California's Energy Action Plan recommended a state RPS goal of 33% of electricity generation from renewable sources by 2020 and in April 2011, the goal was codified by Governor Edmund Brown.[5] The following table identifies 33 projects being developed by 14 different companies and organizations.

Project Name	Developer	Estimated PCA (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Buckeye	Calpine	30	50			CH (Produced)	CA	N/A
Four Mile Hill	Calpine			50	50	CH (Unproduced)	CA	N/A
Telephone Fiat	Calpine			50	50	CH (Unproduced)	CA	N/A
Glass Mountain	Calpine			320	320	CH (Unproduced)	CA	N/A

[4] Database of State Incentives for Renewables & Efficiency 2013a
[5] California Energy Commission 2011

Wild horse North Geysers	Calpine	30	50			CH (Unproduced)	CA	N/A
Bottle Rock Expansion	Bottle Rock Power	25	25			CH (Expansion)	CA, Lake	Phase 1
Northern California	Gradient Resources					CH (Unproduced)	CA	Phase 1
NAF El Centro/Superstition Hills	Navy Geothermal Program			25	25	CH (Unproduced)	CA, Imperial	Phase 1
East Brawley	Nevada Geothermal Power			60	60	CH (Unproduced)	CA, Imperial	Phase 1
Orita 2	Ram Power	49.9	49.9	49.9	49.9	CH (Unproduced)	CA, Imperial	Phase 1
Orita 3	Ram Power	49.9	49.9	49.9	49.9	CH (Unproduced)	CA, Imperial	Phase 1
Surprise Valley	Enel North America	15	20	15	20	CH (Unproduced)	CA, Modoc	Phase 2
Hudson Ranch Power II	EnergySource	49.9	49.9	50	50	CH (Unproduced)	CA, Imperial	Phase 2
NAF El Centro/Superstition Mountain	Navy Geothermal Program			5	15	CH (Unproduced)	CA, Imperial	Phase 2
MCAS Yuma Chocolate Mountains/Hot Minearl Spa	Navy Geothermal Program			5	5	CH (Unproduced)	CA, Imperial	Phase 2
MCAS Yuma Chocolate Mountains/Glamis	Navy Geothermal Program			5	5	CH (Unproduced)	CA, Imperial	Phase 2
Truckhaven	Nevada Geothermal Power	30	50	60	60	CH (Unproduced)	CA, Imperial	Phase 2
HV	Oski Energy			75	100	CH (Unproduced)	CA	Phase 2
KN	Oski Energy			75	100	CH (Unproduced)	CA	Phase 2
KS	Oski Energy			75	100	CH (Unproduced)	CA	Phase 2
Orita 1	Ram Power	49.9	49.9	49.9	49.9	CH (Unproduced)	CA, Imperial	Phase 2
Keystone	Ram Power	50	50	100	100	CH (Unproduced)	CA, Imperial	Phase 2
New River	Ram Power	50	50	50	50	CH (Unproduced)	CA, Imperial	Phase 2
Black Rock 5-6	CalEnergy	235	235	235	235	CH (Produced)	CA, Imperial	Phase 3
Black Rock 1-2	CalEnergy	235	235	235	235	CH (Produced)	CA, Imperial	Phase 3
Canby Cascaded Geothermal Development Project	Canby Geothermal, LLC	0.05	0.25	5	5	CH (Unproduced)	CA, Modoc	Phase 3
Lower Klamath Wildlife Refuge	Entiv Organic Energy	5	6	5	6	CH (Unproduced)	CA, Sisikiyou	Phase 3
Wister - Phase I	Ormat Technologies	30	30	30	30	CH (Unproduced)	CA, Imperial	Phase 3
CD4 (Mammoth Complex)	Ormat Technologies	30	30	30	30	CH (Unproduced)	CA, Mono	Phase 3
Geysers Project	Ram Power	26	26	26	26	CH (Produced)	CA, Sonoma	Phase 3
Mammoth Complex repowering	Ormat Technologies	4	4			CH (Expansion)	CA, Mono	Phase 4
Bald Mountain	Oski Energy					CH (Unproduced)	CA	Prospect
Wendel Expansion	Oski Energy					CH (Unproduced)	CA, Lassen	Prospect

Source: GEA

COLORADO

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 60
ESTIMATED PCA IN DEVELOPMENT: 20 – 40 MW
NUMBER OF PROJECTS IN DEVELOPMENT: 3

Colorado became the first U.S. state to create a renewable portfolio standard. Colorado requires 20% of its retail electricity sales in Colorado for the years 2015-2019 to come from renewable sources for its Investor Owned Utilities (IOU) and 10% of its retail electricity sales by 2020 to come from renewables for its cooperatives and municipalities serving 40,000 or more customers.[6] Currently, three conventional hydrothermal geothermal projects are in early-mid stages of development in the state.

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
City of Aspen Geothermal Project	City of Aspen					CH (Unproduced)	CO, Pitkin	Phase 2
Mt Princeton	Mt Princeton Geothermal LLC	10	30	50	50	CH (Unproduced)	CO, Chaffee	Phase 3
Poncha Hot Springs	Mt Princeton Geothermal LLC	10	10	10	10	CH (Unproduced)	CO, Chaffee	Phase 3

Source: GEA

[6] Database of State Incentives for Renewables & Efficiency 2013b

HAWAII

INSTALLED CAPACITY: 38 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: NA
ESTIMATED PCA IN DEVELOPMENT: NA
NUMBER OF PROJECTS IN DEVELOPMENT: 3

One geothermal power plant operates on the big island of Hawaii. This plant, the Puna Geothermal Venture, has a generating capacity of 38 MW. Additionally, the state of Hawaii has set ambitious goals to increase the generation of electricity from renewable resources, including geothermal energy.[7] In 2012, Hawaii Electric Light Company (HELCO) announced its intentions to seek Geothermal Requests for Proposals for up to 50 MW of additional geothermal energy supply. Three additional projects are currently being developed on Maui and the Big Island by Ormat Technologies. Further, the state has demonstrated its seriousness about geothermal with its release of Hawaii Geothermal Assessment and Roadmap compiled by Pacific International Center For High Technology Research (PICHTR) in January 2013. The roadmap pledges to support policy that lowers cost of drilling and drilling risk; target projects in range of $0.07-0.16/kwh and help reduce development costs through smart policy, permitting, and planning, as well as through investment in resource characterization.[8]

Project Name	Developer	PCA Estimated (MW)	Estimated Resource Capacity (MW)	Project Type	Location (State, County)	Project Development Status
Kona	Ormat Technologies			CH (Unproduced)	HI, Big Island	Phase 1
Kula	Ormat Technologies			CH (Unproduced)	HI, Big Island	Phase 1
Ulupalakua (Maui)	Ormat Technologies			CH (Unproduced)	HI, Maui	Phase 1

Source: GEA

[7] Database of State Incentive for Renewables Energy 2013e
[8] Pacific International Center For High Technology Research (PICHTR) 2013

IDAHO

INSTALLED CAPACITY: 15.8 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 439-514MW
ESTIMATED PCA IN DEVELOPMENT: 83.2 MW
NUMBER OF PROJECTS IN DEVELOPMENT (INCLUDING PROSPECTS) 11

In January 2008 the first geothermal power plant came online in Idaho. The Raft River binary plant uses a 300°F resource, and has an installed capacity of 15.8 MW. Expansions to this plant, as well as nine other projects, are under development.

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Newdale	Standard Steam Trust					CH (Unproduced)	ID	Phase 1
Parma	Standard Steam Trust					CH (Unproduced)	ID	Phase 1
Weiser	Standard Steam Trust					CH (Unproduced)	ID	Phase 1
Raft River Unit III	US Geothermal	16.6	16.6	114	114	CH (Produced)	ID, Cassia	Phase 1
White Mountain"*"	Eureka Green Systems"*"			150	150	CH (Unproduced)	ID	Phase 2
Raft River Unit II	US Geothermal	16.6	16.6	114	114	CH (Produced)	ID, Cassia	Phase 3
Grays Lake"*"	Eureka Green Systems"*"			100	100	CH (Unproduced)	ID	Prospect
Thatcher"*"	Eureka Green Systems"*"			25	50	CH (Unproduced)	ID	Prospect
Oakley"*"	Eureka Green Systems"*"			25	50	CH (Unproduced)	ID	Prospect
Twin Falls Oakley"*"	Eureka Green Systems"*"			25	50	CH (Unproduced)	ID	Prospect
Kodali Raft River	Kodali, INC.	50	50			CH (Unproduced)	ID, Cassia	Prospect

Source: GEA
***Raft River 2 and 3 are reported as being developed at the same geothermal resource. As such, when counting state resource capacity estimates for projects, the resource capacity estimate for Raft River 2 and Raft River 3 (114 MW) should only be counted once.**

NEVADA

INSTALLED CAPACITY: 517 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 2150-2275 MW
ESTIMATED PCA IN DEVELOPMENT: 1056 - 1061 MW
NUMBER OF PROJECTS IN DEVELOPMENT (INCLUDING PROSPECTS): 75

There are currently 29 operating geothermal power plants in Nevada with a total operating capacity of 517 MW. In the first quarter of 2012 67 MW alone became operational in the state of Nevada.
With a strong state RPS,[9] and more developing projects than any other state, it is expected that the development of geothermal resources could continue to march forward in Nevada. Estimates provided by project developers show that installed geothermal capacity could almost double in the state over the next three years.

Project Name	Developer	Estimated PCA (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
McGee Mountain"*"	Caldera Geothermal"*"			25	25	CH (Unproduced)	NV, Humboldt	N/A
Teels Marsh"*"	Caldera Geothermal"*"			21	21	CH (Unproduced)	NV, Mineral	N/A
Silver Peak"*"	Rockwood Lithium Inc."*"	5	5			CH (Unproduced)	NV, Esmeralda	N/A
Lee Hot Springs	Earth Power Resources			32	32	CH (Unproduced)	NV, Churchill	Phase 1
Lovelock	Earth Power Resources			32	32	CH (Unproduced)	NV, Pershing	Phase 1
Colado	Gradient Resources			350	350	CH (Unproduced)	NV	Phase 1
Aurora	Gradient Resources			190	190	CH (Unproduced)	NV	Phase 1
Gerlach Power	Kodali, INC.	60	60			CH (Unproduced)	NV, Washoe	Phase 1
McCoy	Magma Energy (U.S.) Corp					CH (Unproduced)	NV, Churchhill, Lander	Phase 1
Desert Queen	Magma Energy (U.S.) Corp					CH (Unproduced)	NV, Churchill	Phase 1
Soda Lake South	Magma Energy (U.S.) Corp					CH (Unproduced)	NV, Churchill	Phase 1
Upsal Hogback	Magma Energy (U.S.) Corp					CH (Expansion)	NV, Churchill	Phase 1
Granite Springs	Magma Energy (U.S.) Corp					CH (Unproduced)	NV, Pershing	Phase 1
Sou Hills	Montara Energy Ventures					CH (Unproduced)	NV, Pershing	Phase 1
Naval Air Station Fallon Test Ranges/Dixie Valley	Navy Geothermal Program			5	10	CH (Unproduced)	NV, Churchill	Phase 1
Blue Mountain 2	Nevada Geothermal Power					CH (Produced)	NV, Humboldt	Phase 1
Edna Mountain	Nevada Geothermal Power					CH (Unproduced)	NV, Humboldt	Phase 1

[9] Database of State Incentive for Renewables Energy 2013f

Hycroft	Ormat Technologies					CH (Unproduced)	NV	Phase 1
Quieta	Ormat Technologies					CH (Unproduced)	NV	Phase 1
Walker River Paiute	Ormat Technologies					CH (Unproduced)	NV	Phase 1
Brady EGS	Ormat Technologies					Enhanced Geothermal Systems	NV, Churchill	Phase 1
Tuscarora - Phase II	Ormat Technologies					CH (Unproduced)	NV, Elko	Phase 1
Smith Creek	Ormat Technologies					CH (Unproduced)	NV, Lander	Phase 1
Argenta	Ormat Technologies					CH (Unproduced)	NV, Lander	Phase 1
Mustang	Ormat Technologies					CH (Unproduced)	NV	Phase 1
Hawthorne	Oski Energy					CH (Unproduced)	NV	Phase 1
Rye Patch"*"	Presco Energy"*"	13	13			CH (Unproduced)	NV	Phase 1
Mary's River	Standard Steam Trust					CH (Unproduced)	NV	Phase 1
Mary's River SW	Standard Steam Trust					CH (Unproduced)	NV	Phase 1
Coyote Canyon	Terra-Gen (TGP Dixie development Company, LLC, TGP Coyote Canyon, LLC)	67	67	80	80	CH (Unproduced)	NV, Churchill	Phase 1
New York Canyon	Terra-Gen (TGP Dixie Development Company LLC, TGP New York Canyon, LLC)	70	70	220	220	CH (Produced)	NV, Pershing	Phase 1
San Emidio Phase III	US Geothermal	24.6	24.6			CH (Produced)	NV, Washoe	Phase 1
Fireball	Earth Power Resources			32	32	CH (Unproduced)	NV, Churchill	Phase 2
Hot Springs Point	Earth Power Resources			32	32	CH (Unproduced)	NV, Eureka	Phase 2
Fallon	Gradient Resources			70	70	CH (Unproduced)	NV, Churchill	Phase 2
Naval Air Station Fallon-Main	Navy Geothermal Program			5	10	CH (Unproduced)	NV, Churchill	Phase 2
Hawthorne Army Depot	Navy Geothermal Program			5	10	CH (Unproduced)	NV, Mineral	Phase 2
Pumpernickel	Nevada Geothermal Power	15	15	33	33	CH (Unproduced)	NV, Humboldt	Phase 2
North Valley	Nevada Geothermal Power	55	55	120	120	CH (Unproduced)	NV, Washoe, Churchill	Phase 2
Edwards Creek	Ormat Technologies					CH (Unproduced)	NV, Churchill	Phase 2
Dixie Hope	Ormat Technologies					CH (Unproduced)	NV, Churchill	Phase 2
Dixie Meadows	Ormat Technologies	30	30	30	30	CH (Unproduced)	NV, Churchill	Phase 2
Desert Peak EGS	Ormat Technologies					CH (Unproduced)	NV, Churchill	Phase 2
Leach Hot Springs	Ormat Technologies					CH (Unproduced)	NV, Pershing	Phase 2
Silver State	Oski Energy			25	50	CH (Unproduced)	NV	Phase 2
Hot Pot	Oski Energy			25	30	CH (Unproduced)	NV, Humboldt	Phase 2
Clayton Valley	Ram Power	160	160	160	160	CH (Unproduced)	NV, Esmeralda	Phase 2
Reese River - SGP	Ram Power	24	24	40	40	CH (Unproduced)	NV, Elko	Phase 2
Gerlach	US Geothermal	18	18	25	35	CH (Unproduced)	NV, Washoe	Phase 2
Darrough Hot Springs	Great American Energy			30	100	CH (Unproduced)	NV, Nye	Phase 3

Carson Lake	Ormat Technologies	20	20	20	20	CH (Unproduced)	NV, Churchill	Phase 3
Wild Rose	Ormat Technologies	16	16	16	16	CH (Unproduced)	NV, Mineral	Phase 3
Pyramid Lake	Paiute Tribe	0		2	2	CH (Unproduced)	NV, Pyramid Lake Paiute Tribe Reservation	Phase 3
San Emidio Phase II	US Geothermal	12.75	12.75	44	44	CH (Produced)	NV, Washoe	Phase 3
Patua	Gradient Resources	60	60	120	120	CH (Unproduced)	NV, Churchill	Phase 4
Devils Canyon	Cyrq Energy					CH (Unproduced)	NV, Nye	Prospect
Kodali Dixie Valley 1	Kodali, INC.	25	25			CH (Unproduced)	NV, Churchill	Prospect
Kodali Dixie Valley 2	Kodali, INC.	60	60			CH (Unproduced)	NV, Churchill	Prospect
Soda Lake East	Magma Energy (U.S.) Corp					CH (Unproduced)	NV, Churchill	Prospect
Tungsten Mountain	Ormat Technologies					CH (Unproduced)	NV, Churchill	Prospect
Alligator Geothermal	Oski Energy					CH (Unproduced)	NV	Prospect
Pilot Peak	Oski Energy					CH (Unproduced)	NV	Prospect
Dixie Valley North - SGP	Ram Power					CH (Unproduced)	NV	Prospect
Delcer Butte	Ram Power	24	24	32	32	CH (Unproduced)	NV, Elko	Prospect
Dixie Valley - SGP	Ram Power					CH (Unproduced)	NV	Prospect
Gerlach - SGP	Ram Power	25	25	36	36	CH (Unproduced)	NV	Prospect
Hawthorne - SGP	Ram Power	14	14	22	22	CH (Unproduced)	NV	Prospect
Howard - SGP	Ram Power	25	25	36	36	CH (Unproduced)	NV	Prospect
North Salt Wells - SGP	Ram Power					CH (Unproduced)	NV	Prospect
Salton Sea	Ram Power	76	76			CH (Unproduced)	NV	Prospect
Salt Wells - SGP	Ram Power	96	96	136	136	CH (Unproduced)	NV	Prospect
Sulphur - SGP	Ram Power					CH (Unproduced)	NV	Prospect
Wells - SGP	Ram Power					CH (Unproduced)	NV	Prospect
Barren Hills - SGP	Ram Power	46	46	99	99	CH (Unproduced)	NV, Lander	Prospect

Source: GEA

Note: San Emidio 2 and 3 are being developed at the same geothermal resource. As such, when counting state resource capacity estimates for these projects, the resource capacity estimate for San Emidio 2 and San Emidio 3 (44 MW) should only be counted once.

NEW MEXICO

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: N/A
ESTIMATED PCA IN DEVELOPMENT: 15 MW
NUMBER OF PROJECTS IN DEVELOPMENT: 1

In July 2008, a 0.24 MW pilot installation project went online in New Mexico. Since then, the pilot installation has been brought offline, but a full utility-scale project, Lightning Dock, is being developed at the location by Utah-based Cyrq Energy. It is currently expected to have installed capacity is 15 MW. Gradient Resources is in the early stages of a second project. Supported by strong state renewable energy incentives, geothermal energy could play an increasingly important role in New Mexico in the future.[10]

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)	Project Type	Location (State, County)	Project Development Status
Lightning Dock 1	Cyrq Energy	15	15		CH (Unproduced)	NM, Hidalgo	Phase 4

Source: GEA

[10] Database of State Incentive for Renewables Energy 2013g

NORTH DAKOTA

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: NA
ESTIMATED PCA IN DEVELOPMENT: .6 - .8 MW
NUMBER OF PROJECTS IN DEVELOPMENT: 2

While no large scale utility projects are under development in ND, a lot of groundbreaking research in co-production is underway in the state. The University of North Dakota is working with a number of companies to implement a geothermal energy and hydrocarbon coproduction demonstration project at an oilfields in North Dakota. Both projects will demonstrate the use of binary, Organic Rankine Cycle (ORC) technology to produce electricity from low temperature fluids.[11]

Project Name	Developer	Estimated PCA (MW)		Estimated Resource Capacity (MW)	Project Type	Location (State, County)	Project Development Status
UND Low Temperature Project	University of North Dakota	0.35	0.568		Hydrocarbon Co-production	ND, Stark	Phase 1
UND Coproduction	University of North Dakota	0.25	0.25		Hydrocarbon Co-production	ND, Slope	Phase 1

Source: GEA

[11] Gosnold et al. 2011, Gosnold 2013

OREGON

INSTALLED CAPACITY: 33.3 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 208-270 MW
ESTIMATED PCA IN DEVELOPMENT: 73 - 77 MW
NUMBER OF PROJECTS IN DEVELOPMENT (INCLUDING PROSPECTS): 18

A strong RPS has incentivized Oregon to develop a significant amount of geothermal projects. The state has established that large utilities -- those with 3% or more of the state's load -- must ensure that 20% of the electricity sold to retail customers is renewable by 2020. Additionally, groundbreaking research into EGS technology is underway at the AltaRock Energy Inc. Newberry project in Deschutes County. See the "Emerging Technologies" section for more information.

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Alvord	Cyrq Energy					CH (Unproduced)	OR, Harney	Phase 1
Newberry"*"	Davenport Newberry Holdings"*"	30	30	120	120	CH (Unproduced)	OR, Deschutes	Phase 1
Foley Hot Springs	Ormat Technologies					CH (Unproduced)	OR	Phase 1
Silver Lake	Ormat Technologies					CH (Unproduced)	OR	Phase 1
Summer Lake	Ormat Technologies					CH (Unproduced)	OR	Phase 1
Mahogany	Ormat Technologies					CH (Unproduced)	OR, Lake	Phase 1
Midnight Point	Ormat Technologies					CH (Unproduced)	OR, Lake	Phase 1
Goose Lake	Ormat Technologies					CH (Unproduced)	OR, Lake	Phase 1
Twilight	Ormat Technologies, Nevada Geothermal Power					CH (Unproduced)	OR, Deschutes	Phase 1
Neal Hot Springs II	US Geothermal					CH (Unproduced)	OR	Phase 1
Klamath Plant	Cyrq Energy					CH (Unproduced)	OR, Klamath	Phase 2
Olene KBG	Klamath Basin Geopower			20	20	CH (Unproduced)	OR, Klamath	Phase 2
Crump Geyser	Ormat Technologies/Nevada Geothermal Power	20	20	20	80	CH (Unproduced)	OR, Lake	Phase 2
Klamath Hills	Entiv Organic Energy	8	10	8	10	CH (Unproduced)	OR, Klamath	Phase 3
OM Power	Kodali INC. (OM Power 1, LLC.)	11	11	30	30	CH (Unproduced)	OR, Klamath	Phase 3
GeoHeat Center 2	Oregon Institute of Technology	1.75	1.75			CH (Expansion)	OR, Klamath	Phase 3
Paisley Geothermal	Surprise Valley Electric Corp.	2	4	10	10	CH (Unproduced)	OR, Lake	Phase 4
Olene Gap (Project Oregon)	Oski Energy					CH (Unproduced)	OR	Prospect

Source: GEA
Note: Crump Geyser is developed by two companies (Ormat and Nevada Geothermal) each responsible for 10MW.

TEXAS

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 0.8 MW
ESTIMATED PCA IN DEVELOPMENT: NA MW
NUMBER OF PROJECTS IN DEVELOPMENT: 1

The potential to utilize the hot water byproduct of oil and gas production to generate electricity using geothermal technology is being evaluated in a number of demonstration scale projects in the Gulf of Mexico region. Texas currently hosts one geothermal and hydrocarbon coproduction project in Goliad County.

Project Name	Developer	PCA Estimated (MW)		Estimated Resource Capacity (MW)		Project Type	Power Plant Type	Location (State, County)	Project Development Status
Goliad Coproduction"*"	Universal Geo Power"*"	0.8	0.8	1	1	Geothermal Energy and Hydrocarbon Coproduction	Binary	TX, Goliad	Phase 2

Source: GEA

UTAH

INSTALLED CAPACITY: 42 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 260-280 MW
ESTIMATED PCA IN DEVELOPMENT: 215 MW
NUMBER OF PROJECTS IN DEVELOPMENT (INCLUDING PROSPECTS): 19

A number of geothermal power plants operate in Utah. Unit 1 of the Blundell power plant has an installed capacity of 26.1 MW and Unit 2 has a capacity of 12 MW. In April 2009 the low-temperature 10 MW Hatch Geothermal Power Plant in Beaver County began delivering power to Anaheim, California. Utah has 19 projects under development of which several are expected to become operational in the next few years.

Project Name	Developer	Estimated PCA (MW)		Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Falstaff"*"	Verdi Energy"*"	20	20	20	20	CH (Unproduced)	UT	N/A
Thermo 2	Cyrq Energy					CH (Produced)	UT, Beaver	Phase 1
Cricket	Cyrq Energy					CH (Produced)	UT, Beaver	Phase 1
Thermo 4	Cyrq Energy					CH (Produced)	UT, Beaver	Phase 1
Cove Fort 2	Enel North America	20	20			CH (Unproduced)	UT, Beaver, Millard	Phase 1
Hill Air Force Base	Navy Geothermal Program					CH (Unproduced)	UT, Tooele	Phase 1
Drum Mountain	Ormat Technologies					CH (Unproduced)	UT	Phase 1
Whirlwind Valley	Ormat Technologies					CH (Unproduced)	UT	Phase 1
Drum Mountain	Standard Steam Trust					CH (Unproduced)	UT	Phase 1
Cove Fort	Oski Energy			30	50	CH (Unproduced)	UT	Phase 2
Cove Fort 1	Enel North America	25	25	60	60	CH (Produced)	UT, Beaver	Phase 4
Thermo Central	Cyrq Energy					CH (Produced)	UT, Beaver	Prospect
Thermo Greater	Cyrq Energy					CH (Produced)	UT, Beaver	Prospect
DeArmand	Cyrq Energy					CH (Unproduced)	UT, Iron	Prospect
Wood Ranch	Cyrq Energy					CH (Unproduced)	UT, Iron	Prospect
Cricket	Cyrq Energy					CH (Unproduced)	UT, Millard	Prospect
Drum Mountain	Cyrq Energy					CH (Unproduced)	UT, Millard	Prospect
Abraham	Cyrq Energy					CH (Unproduced)	UT, Millard	Prospect
Kodali Millard	Kodali, INC.	150	150	150	150	CH (Unproduced)	UT, Millard	Prospect

Source: GEA

WASHINGTON

INSTALLED CAPACITY: 0 MW
ESTIMATED RESOURCE CAPACITY IN DEVELOPMENT: 100 MW
ESTIMATED PCA IN DEVELOPMENT: NA
NUMBER OF PROJECTS IN DEVELOPMENT: 1

While there are no geothermal power plants currently operating in the State of Washington, one company, Gradient Resources, is in the early stages of developing its Mt. Baker project there. Washington does have and RPS supporting the development of renewable resources that will provide further incentive to develop geothermal resources despite its complex geology.[12] There is currently one project under development in Washington and over 100MW of reported resource.

Project Name	Developer	PCA Estimated (MW)	Estimated Resource Capacity (MW)		Project Type	Location (State, County)	Project Development Status
Mt. Baker	**Gradient Resources**		**100**	**100**	**CH (Unproduced)**	**WA**	**Phase 1**

Source: GEA

Future Geothermal Development in Leading States

This section consists of a brief side by side comparison of the four leading states in geothermal development, California, Nevada, Oregon, and Utah. **It's important to note before reading this section that "Estimated PCA by Jan. 2016" is derived from companies reporting when they expect their projects to become operational and is not a GEA forecast.**

CA	NV	UT	OR
2013 Installed Capacity [MW]			
2732	518	48	33
Estimated PCA by Jan. 2016 [MW]			
160	316	25	47
Estimated Installed Capacity by Jan. 2016 [MW]			
2892	834	73	80

Source: GEA

[12] Database of State Incentives for Renewables & Efficiency 2013d

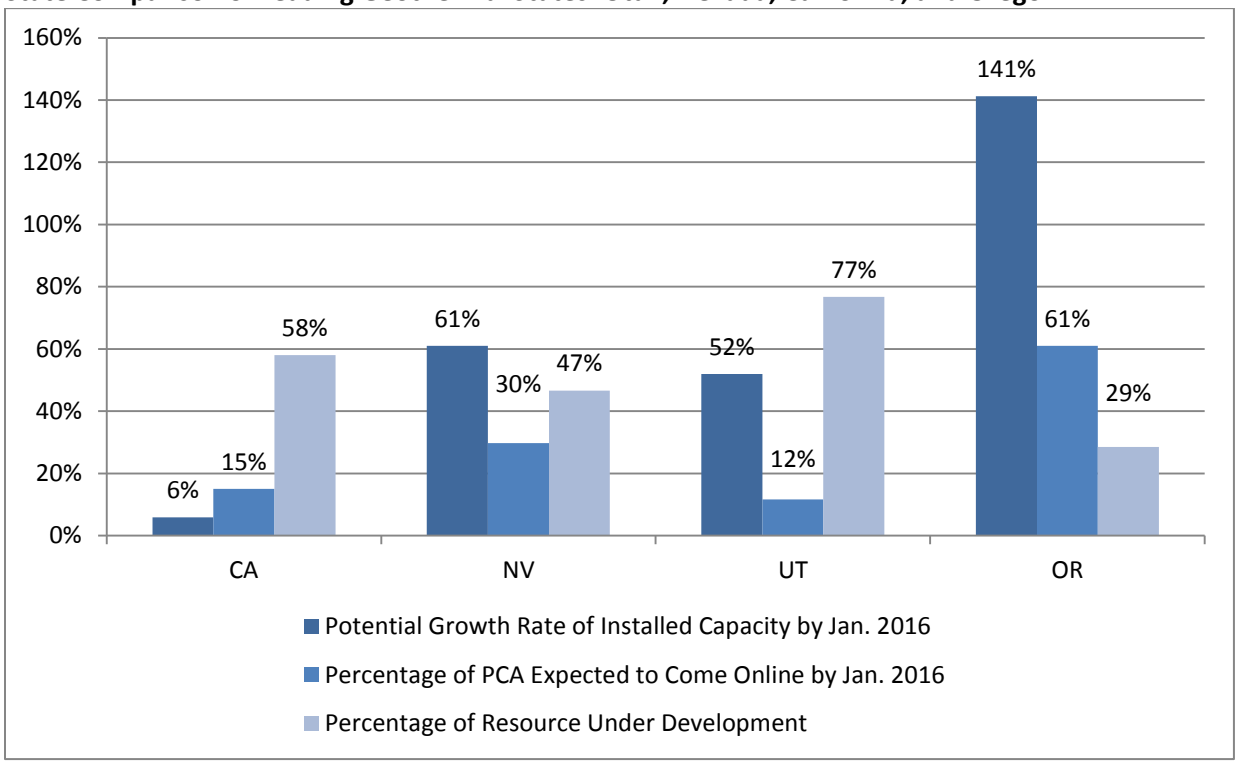
The chart above briefly shows the current installed capacity at the start of 2013 for the four leading states in geothermal development, California, Nevada, Utah and Oregon and the Expected Installed Capacity by January of 2016. California, is by far the leader in geothermal installed capacity, with Nevada coming in distant second and Utah and Oregon just beginning to grow their young geothermal industries.

Some definitions before reading the chart on the next page. . .
Potential Growth Rate of Installed Capacity by Jan. 2016 – This percentage represents the potential growth rate of installed capacity over the period of Jan. 2013 - Jan. 2016 derived from data companies reported to GEA expectations for developing plants to come online. For example, in Nevada 834 MW could become operational by 2016 and there is currently 518 MW of installed capacity leaving a growth rate of 61%.

Percent of PCA Expected to Come Online by Jan. 2016 – Of the total PCA under development how many megawatts reporting companies report they expect to come online by 2016. For example, of Nevada's 1,061 MW of PCA GEA was informed 316 MW are expected to come online by 2016 or 30%.

Percentage of Resource Under Development – This is the PCA over estimated Geothermal Resource as reported by participating companies. For example, Nevada has 1061 MW of PCA under development and 2,275 MW of estimated Resource or roughly 47% under development.

State Comparison of Leading Geothermal States: Utah, Nevada, California, and Oregon



Source: GEA

California has the second highest amount of Resource currently under development (58%) but a tiny growth rate compared to the other states, mainly because so much resource is already developed in California.

Nevada's installed capacity could grow substantially since their growth rate is 61%. Additionally, Nevada growth could remain steady after 2016 since only30% of the state's geothermal megawatts are expected to come online before 2016. Lastly, about half of the current resource is under development leaving large opportunities for future development.

In Utah, a significant portion of their resource, three quarters (77%), is under development but not a lot of this development is expected to come online by 2016. Only a tenth of installed capacity is expected to be completed in the next three years (12%). However, since so little current capacity is installed in Utah, this (12%) still gives Utah a high growth rate of (52%).

Oregon is in a differing position than its neighbor Nevada and Utah. It has the highest potential growth rate at (141%) and the highest percent of megawatts (61%) expected to come online in the immediate future. In Oregon there seems to be a lot of potential for growth in geothermal in the short term. However, less megawatt (29%) of their resource is under development hinting that 71% of their resource might not be developed in the immediate future.

EMERGING TECHNOLOGY

SIGNIFICANT DEVELOPMENTS IN EGS AND CO-PRODUCTION

In 2006, MIT published a study that found that EGS technology could create 100 gigawatts (GW) of electricity by 2050.[13] One example of a developing EGS project is Davenport Newberry Holdings LLC's Newberry Geothermal Project in Bend, Oregon. This past year they have significantly progressed on their EGS demonstration funded by $26 million from Google, Kleiner Perkins, Khosla Ventures and Vulcan Capital, as well as funds from the US Department of Energy (DOE). If successful, EGS technology development could make significant progress toward cutting geothermal costs and eliminate significant risks in geothermal development. For example, EGS will allow developers to create multiple stimulated geothermal areas from a single well.[14]

The Newberry project is still in the testing and research phase. However, Altarock has stimulated multiple geothermal zones at the site, it still needs to run injection tests and test the heat exchange areas in addition to drilling a production well in the stimulated zones. After this testing phase, AltaRock Energy intends to build a demonstration power plant, and eventually a utility-scale power plant on-site.

Other groundbreaking milestones in co-production were reached this year as the first co-production generator became operational at ElectraTherm's Florida Canyon Mine and other important research projects at University of North Dakota (UND) progressed.

ElectraTherm's project at Florida Canyon Mine turns waste heat to power by using co-produced fluids. Low temperature geothermal brine produced in the mining, oil and gas industries is considered a nuisance. However, ElectraTherm's technology, known as the 'Green Machine', uses a cleanable heat exchanger to generate a power output of 75kW. This standardized unit is easy to transport, install, and can produce fuel-free, emission-free power.

UND is in the early stages of research demonstrating the technical and economic feasibility of generating electricity from non-conventional low temperature (150° to 300°F) geothermal resources using binary ORC technology. This research will demonstrate that the technology can be replicated within a wider range of physical parameters including geothermal fluid temperatures, flow rates, and the price of electricity sales. The success of this research will be

[13] Tester et al. 2006
[14] Fehrenbacher 2013

a significant milestone for co-production and could further prove the technologies economic feasibility and expand the utilization of co-production across the US.[15]

DEPARTMENT OF ENERGY GRANT RECIPIENTS

The DOE Geothermal Technologies Office (GTO) works to advance the broader deployment of geothermal energy in the United States. The DOE reports in their 2012 Annual Update that through research, development and portfolio of over 200 projects under development in the fiscal year 2012, DOE investments yielded approximately 25 MW of additional nameplate capacity and identified an additional 57 MW of new resources.[16]

For more information please visit the GTO online database at http://www4.eere.energy.gov/geothermal/projects.

APPENDIX: GLOSSARY OF TERMS USED IN THIS REPORT

CEC	California Energy Commission
CH Unproduced	Conventional Hydrothermal (Unproduced Resource)
CH Produced	Conventional Hydrothermal (Produced Resource)
CH Expansion	Conventional Hydrothermal (Expansion)
Co-production	Geothermal Energy and Hydrocarbon Coproduction
DOE	US Department of Energy
EGS	Enhanced Geothermal System
GEA	Geothermal Energy Association
GTO	Geothermal Technologies Office
IOU	Investor Owned Utilities
MW	Megawatts
N/A	Not Available
PCA	Planned Capacity Addition
RES	Renewable Energy Standard
UND	University of North Dakota

[15] Gosnold et al. 2011, Gosnold 2013
[16] US Department of Energy: Geothermal Technologies Program 2012

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