University of Nevada, Reno

**Nevada Bureau of Mines and Geology Open-File Report 12-3**

# Data Tables and Graphs of Geothermal Power Production in Nevada, 1985-2011

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## 2012

This report summarizes statistics on geothermal power production in Nevada from initial plant construction in 1985 through 2011. Data are compiled on nameplate capacity, gross production, and net production by producing geothermal area. Graphs illustrate trends for individual areas and for Nevada overall. The data and graphs are in an Excel spreadsheet, which is also available online with this document, at http://www.nbmg.unr.edu and http://www.nbmg.unr.edu/Geothermal/AdditionalResources.html.

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The Nevada Bureau of Mines and Geology (NBMG) is a research and public service unit of the University of Nevada, Reno and is the State geological survey. Established by the Nevada Legislature as a department within the public service division of the Nevada System of Higher Education, NBMG is part of the Mackay School of Earth Sciences and Engineering within the College of Science and one of the Statewide Programs at the University of Nevada, Reno. NBMG's mission, to provide the State's needs for geological and mineral-resource information and research, is defined in its enabling legislation. NBMG scientists conduct research and publish reports that focus on the economic development, public safety, and quality of life in urban and rural areas of Nevada.

## Introduction

This report summarizes annual statistics on electrical power production at Nevada geothermal sites (Table 1). Net production is the amount of electricity sold. Gross production includes net production plus electricity needed to operate the power plants. Nameplate capacity is the manufacturer's rating of output capacity of the equipment installed at the power plants; it does not necessarily reflect the capability of the currently developed geothermal resource.

Table 1. Nevada geothermal power production, 1984-2011.

| Geothermal area | First year online | Nameplate capacity 2011 | Cumulative production (MWh) Gross | Net |
|---|---|---|---|---|
| Beowawe | 1985 | 16.6 | 3,271,638 | 2,694,457 |
| Blue Mountain | 2009 | 49.5 | 800,142 | 617,030 |
| Bradys Hot Springs | 1992 | 26.1 | 3,130,139 | 2,108,978 |
| Desert Peak | 1985 | 23.0 | 2,145,656 | 1,776,940 |
| Dixie Valley | 1988 | 64.7 | 12,108,862 | 10,916,348 |
| Empire | 1987 | 4.8 | 567,715 | 418,041 |
| Jersey Valley | 2010 | 22.5 | 62,100 | 46,777 |
| Salt Wells | 2009 | 23.6 | 399,154 | 297,038 |
| Soda Lake | 1987 | 23.1 | 2,326,390 | 1,691,165 |
| Steamboat Hot Springs | 1986 | 123.7 | 9,608,561 | 7,266,130 |
| Steamboat Hills | 1988 | 13.2 | 1,650,101 | 1,442,796 |
| Stillwater | 1989 | 47.2 | 2,224,883 | 1,498,102 |
| Tuscarora | 2011 | 32.0 | 11,252 | 8,152 |
| Wabuska | 1984 | 5.6 | 146,735 | 106,610 |
| Statewide totals | | 475.6 | 35,928,896 | 31,149,647 |

Since 1979 the Nevada Bureau of Mines and Geology has been publishing annual reports on the *Nevada Mineral Industry*, which are available online at http://www.nbmg.unr.edu/dox/mi/XX.pdf, where XX is the publication year. The first geothermal power plant brought on line in Nevada was the Wabuska plant in 1984 (Garside, 1985). It is still the smallest plant and the one producing from the lowest temperature resource (107°C). It was followed by the Beowawe, Desert Peak, and Steamboat Hot Springs power plants, which were brought on line in 1985 (Garside, 1986). Production data prior to 1991 are from a variety of sources and are incomplete. Most data from 1991 through 2011 are from the Nevada Division of Minerals and the U.S. Bureau of Land Management. The 2009-2011 production data were provided by the Nevada Division of Minerals. A production capacity field, in megawatts, is included for most years in the Excel spreadsheet that accompanies this report. These capacity values are inconsistent in that sometimes they represent two types of capacity—either nameplate capacity (which may not always be from the same machinery from year to year) or a best estimate of generation capacity from the existing developed resource, and in some years the type of capacity was not specified. Recent data on average annual price (cents per kilowatt-hour of power sold) are derived by dividing total gross proceeds reported by the Nevada Department of Taxation by kilowatt hours of net power production reported to the Nevada Division of Minerals.

**Data Tables and Graphs**

One master data table and several additional tables derived from it are provided in the Excel spreadsheet that accompanies this report. For making graphs, assumptions made about incomplete or apparently inaccurate data are listed in the spreadsheet. Graphs were created from these tables and can be copied from the Excel file and pasted into documents and PowerPoint presentations. The following graphs are presented below, each beginning in the year that the particular plant was commissioned, or the first year that data were available.

Figure

1. Price and net production of geothermal power in Nevada, 1985-2011.
2. Nameplate capacity and net production of geothermal power in Nevada, 1985-2011.
3. Net production geothermal power in Nevada as a percentage of nameplate capacity and as a percentage of gross production, 1985-2011.
4. Annual net production and nameplate capacity at the Beowawe geothermal area, Lander County.
5. Annual net production and nameplate capacity at the Blue Mountain geothermal area, Humboldt County.
6. Annual net production and nameplate capacity at the Bradys geothermal area, Churchill County.
7. Annual net production and nameplate capacity at the Desert Peak geothermal area, Churchill County.
8. Annual net production and nameplate capacity at the Dixie Valley geothermal area, Churchill County.
9. Annual net production and nameplate capacity at the Empire geothermal area, Washoe County.
10. Annual net production and nameplate capacity at the Jersey Valley geothermal area, Pershing County.
11. Annual net production and nameplate capacity at the Salt Wells geothermal area, Churchill County.
12. Annual net production and nameplate capacity at the Soda Lake geothermal area, Churchill County.
13. Annual net production and nameplate capacity at the Steamboat Hot Springs (lower) geothermal area, Washoe County.
14. Annual net production and nameplate capacity at the Steamboat Hills (upper) geothermal area, Washoe County.
15. Annual net production and nameplate capacity at the Stillwater geothermal area, Churchill County.
16. Annual net production and nameplate capacity at the Wabuska geothermal area, Lyon County.

Production at the Tuscarora geothermal area in Elko County began in 2011; with only one year's production, no graph was created for this area.

Caution should be used in comparing nameplate capacity with net production (Figures 2 and 4 through 16). Net production can be considerably lower than nameplate capacity for many reasons, including design and efficiency of various components of the power plant (turbines, generators, pumps, heat exchangers, cooling towers, etc.), limitations of the geothermal resource, operating conditions (e.g., the difference between ambient temperature and temperature of the produced fluid), downtime for maintenance and repairs, and amount of electricity needed to

operate the power plant (parasitic load or difference between gross and net production). Net production (for all plants combined) is compared with both nameplate capacity and gross production in Figure 3.

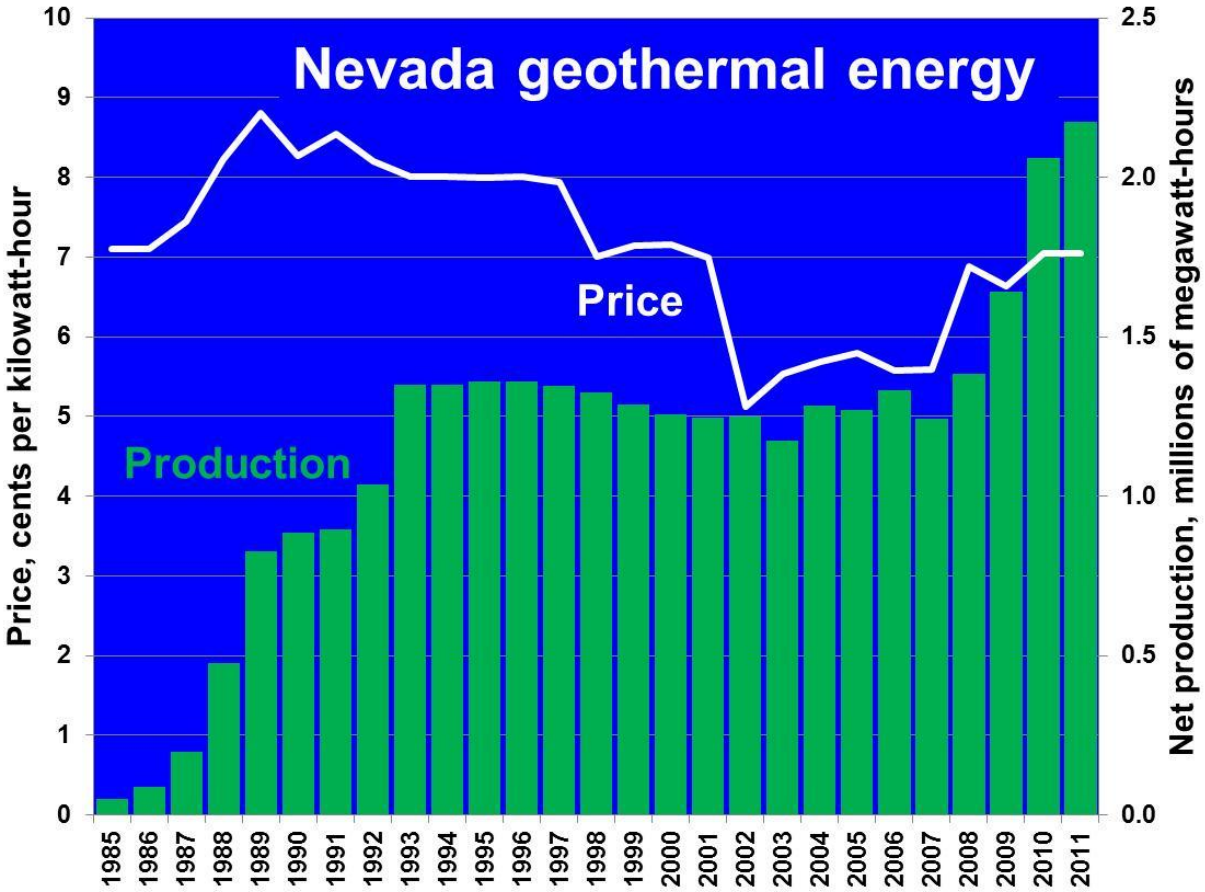


Figure 1. Price and net production of geothermal power in Nevada, 1985-2011. The price for 2011, which was not available at the time of writing, is assumed to be the same as that for 2010; this figure will be updated when data on price are available.

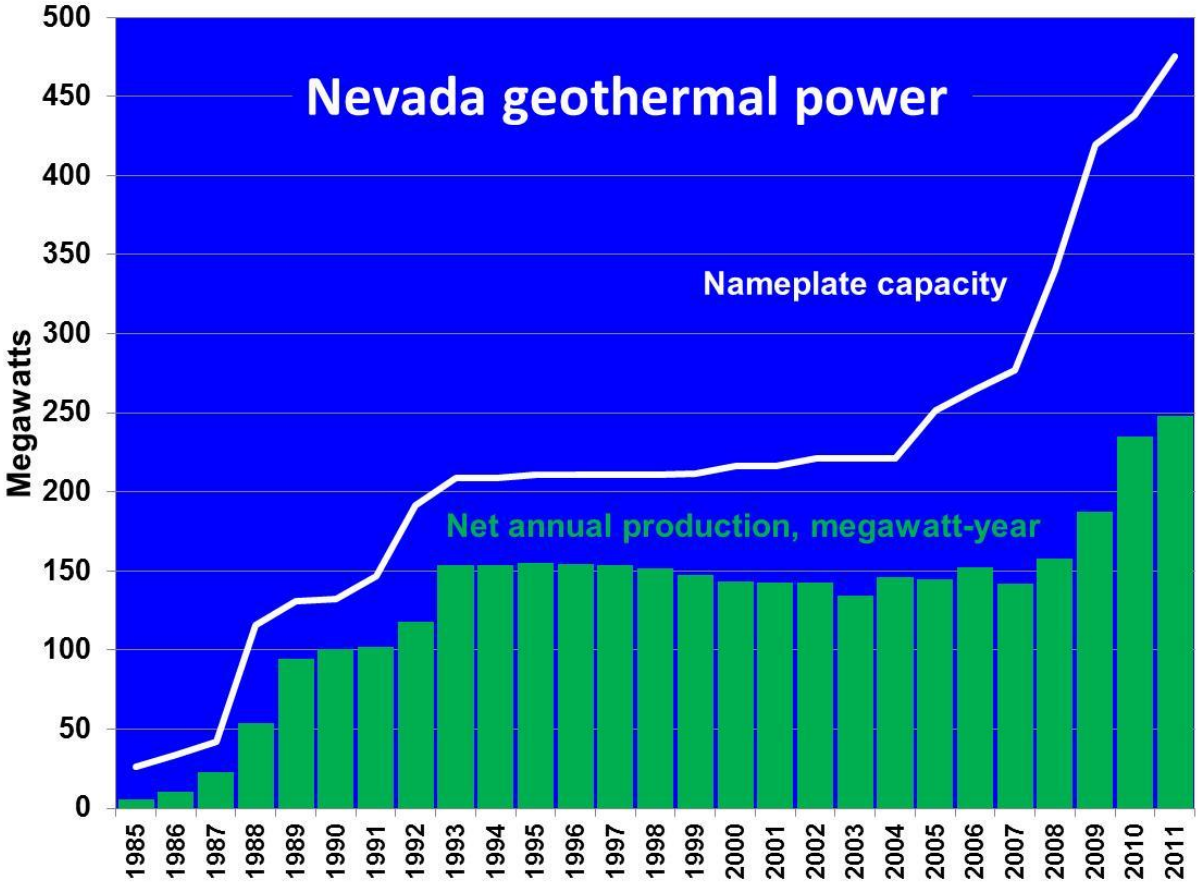


Figure 2. Nameplate capacity and net production of geothermal power in Nevada, 1985-2011. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

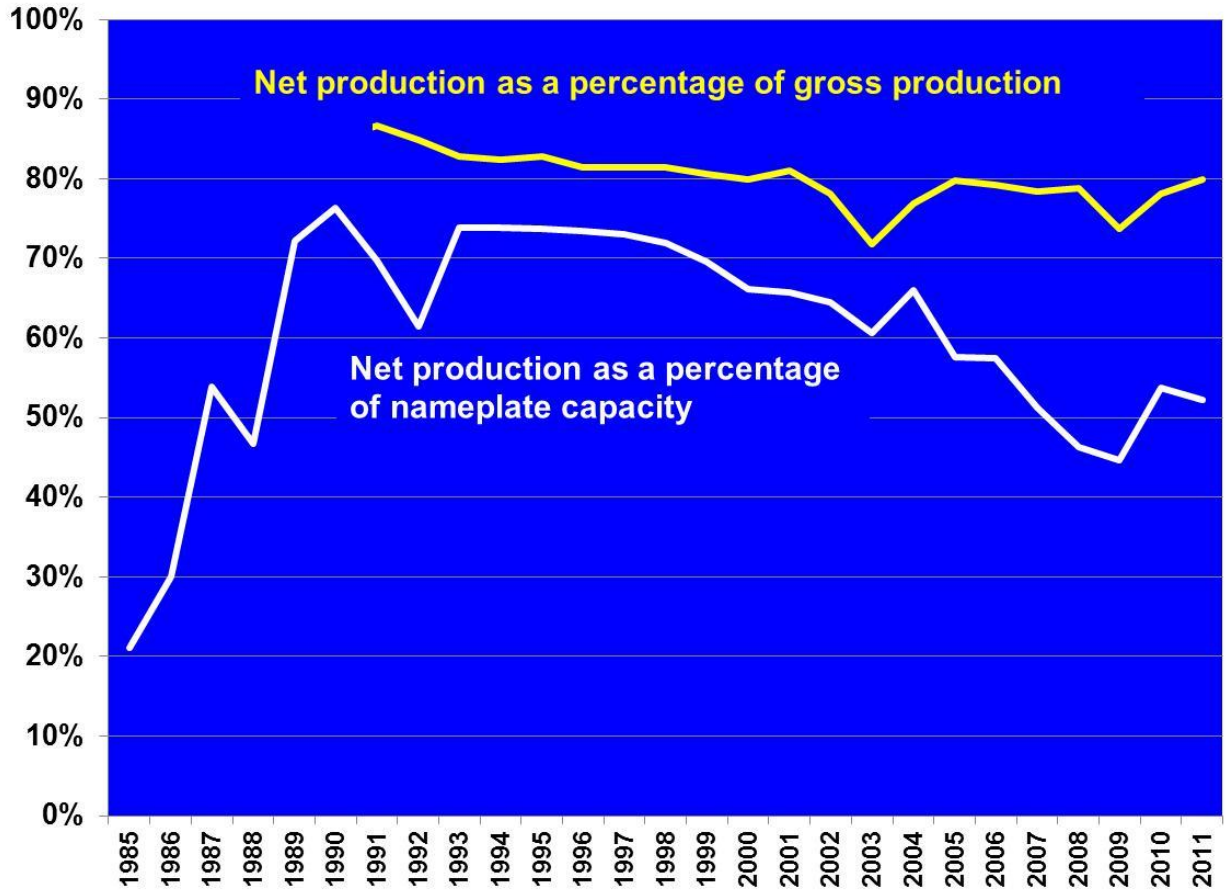


Figure 3. Net production geothermal power in Nevada as a percentage of nameplate capacity and as a percentage of gross production, 1985-2011.

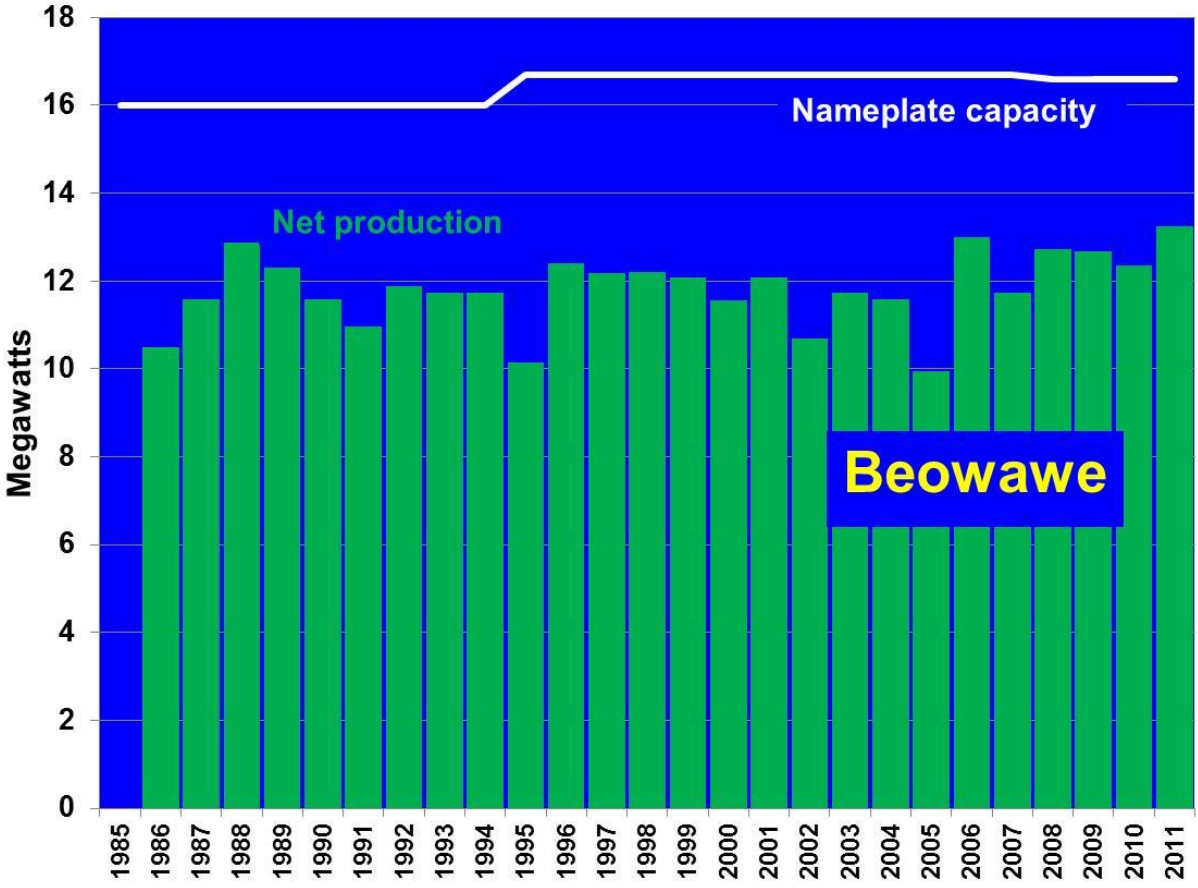


Figure 4.Annual net production and nameplate capacity at the Beowawe geothermal area, Lander County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

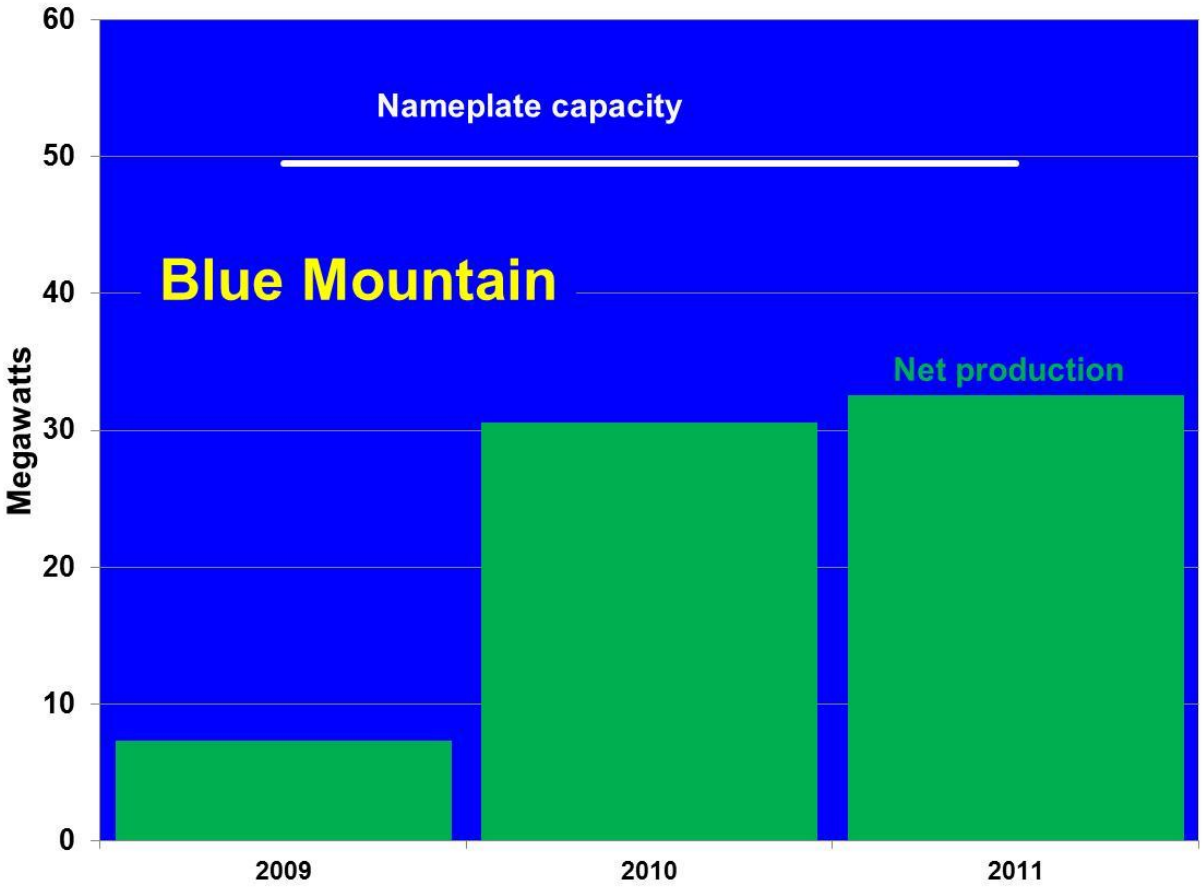


Figure 5. Annual net production and nameplate capacity at the Blue Mountain geothermal area, Humboldt County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

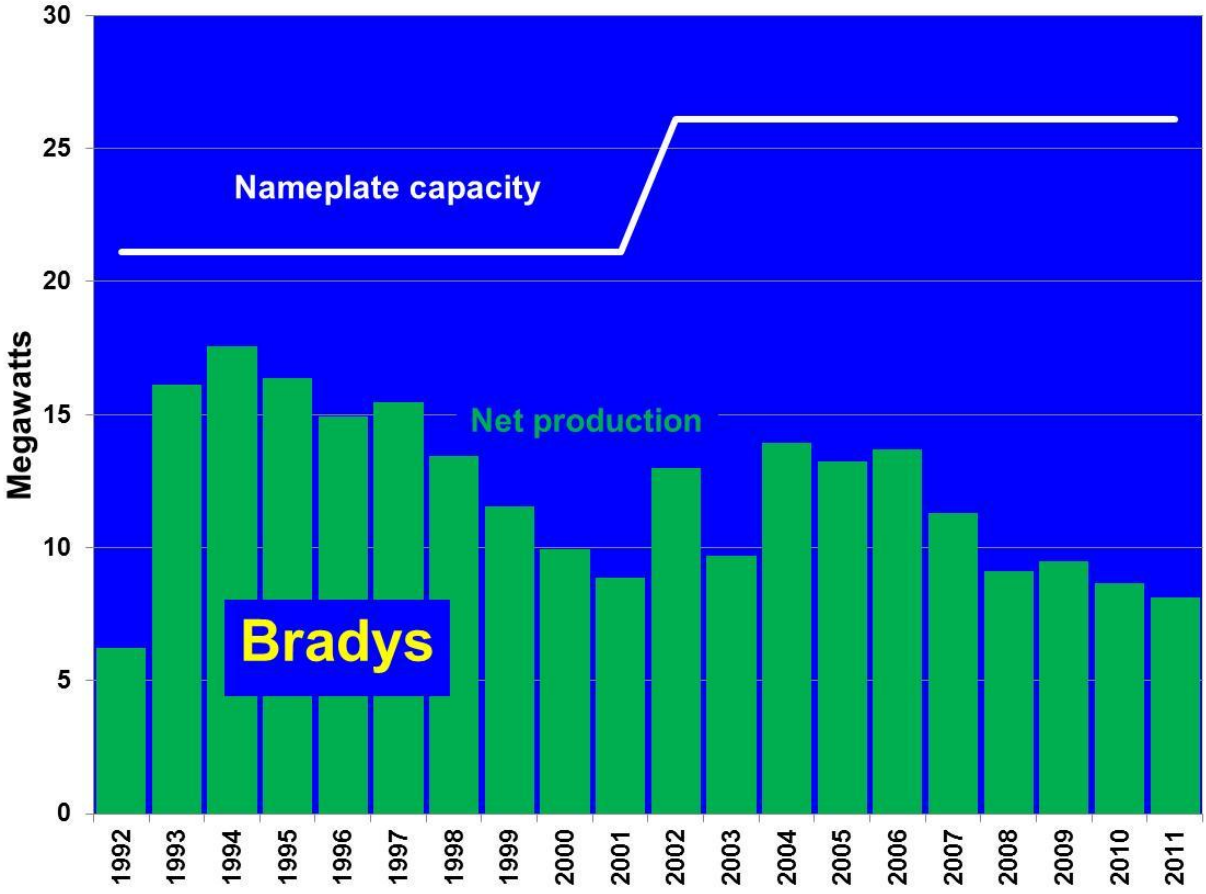


Figure 6. Annual net production and nameplate capacity at the Bradys geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

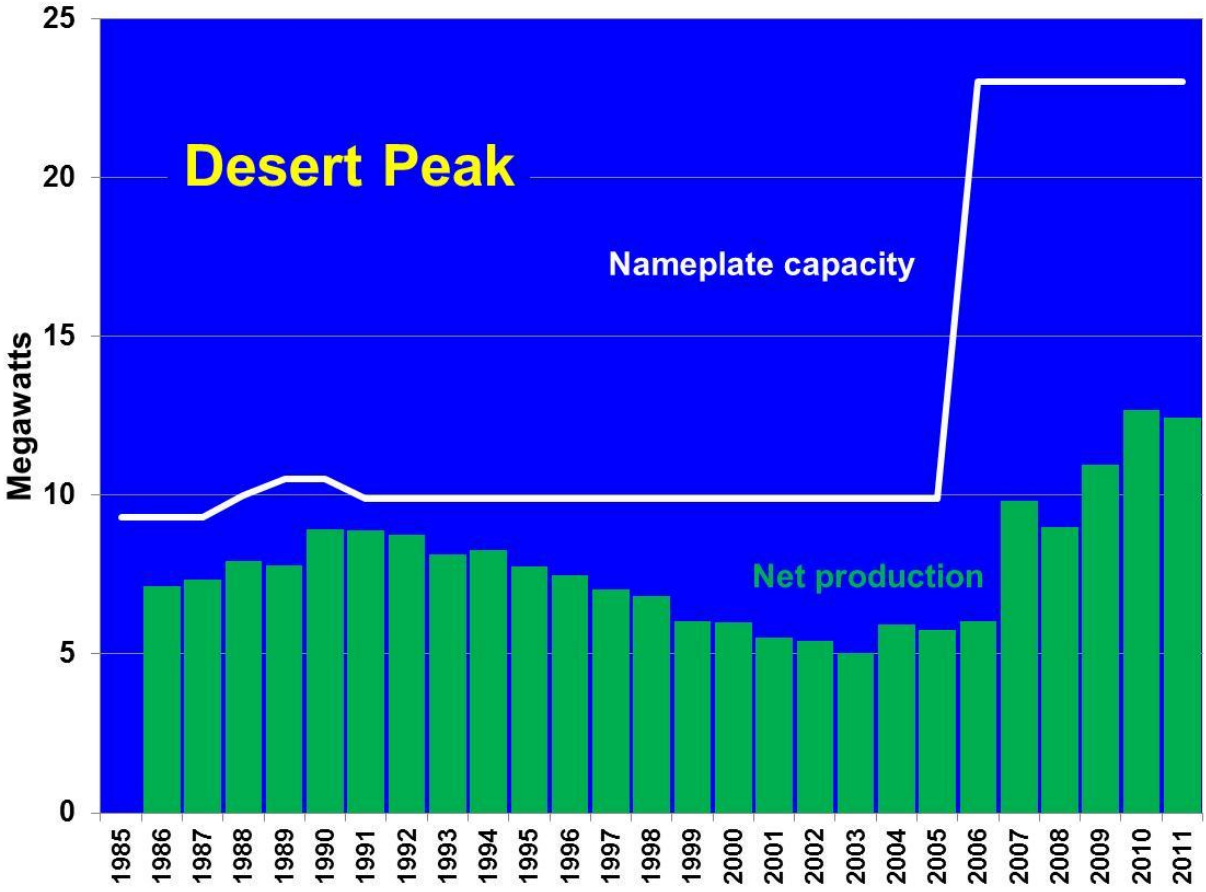


Figure 7. Annual net production and nameplate capacity at the Desert Peak geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

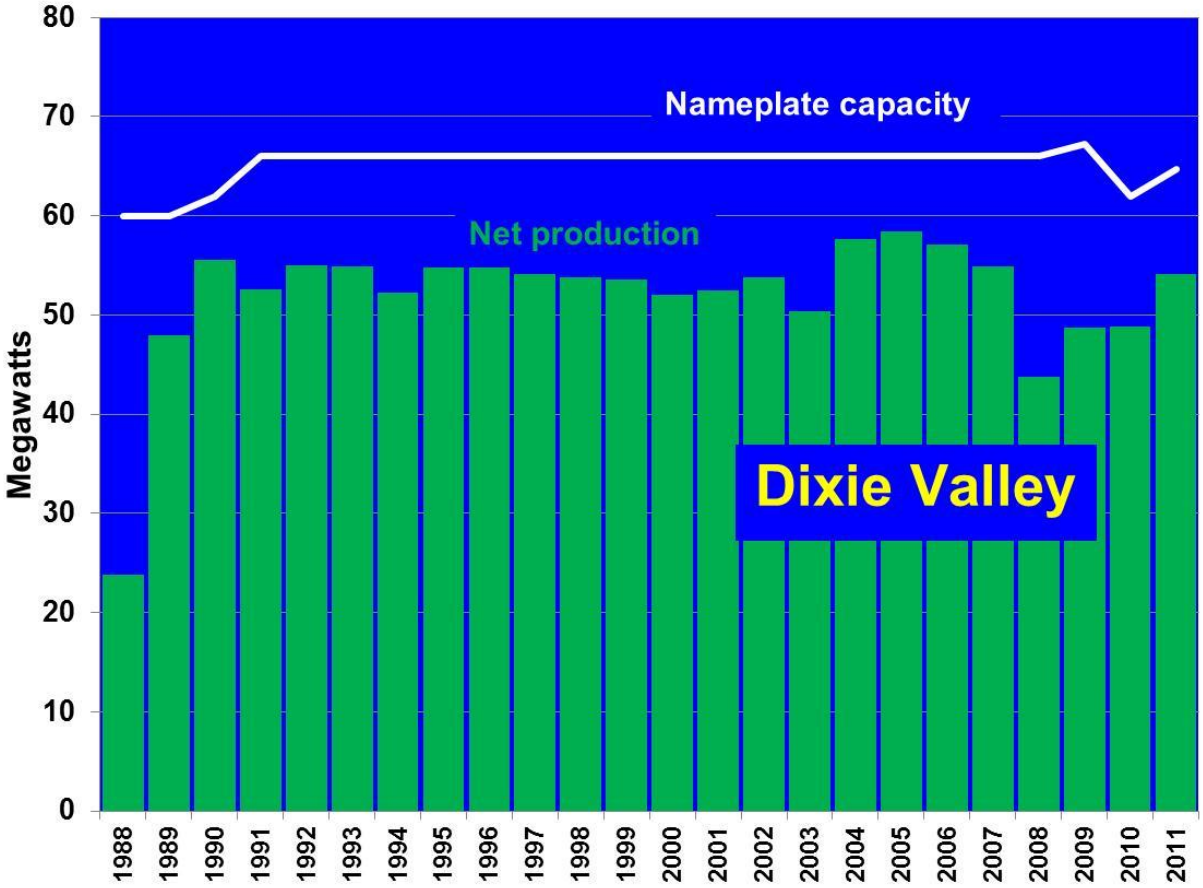


Figure 8. Annual net production and nameplate capacity at the Dixie Valley geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

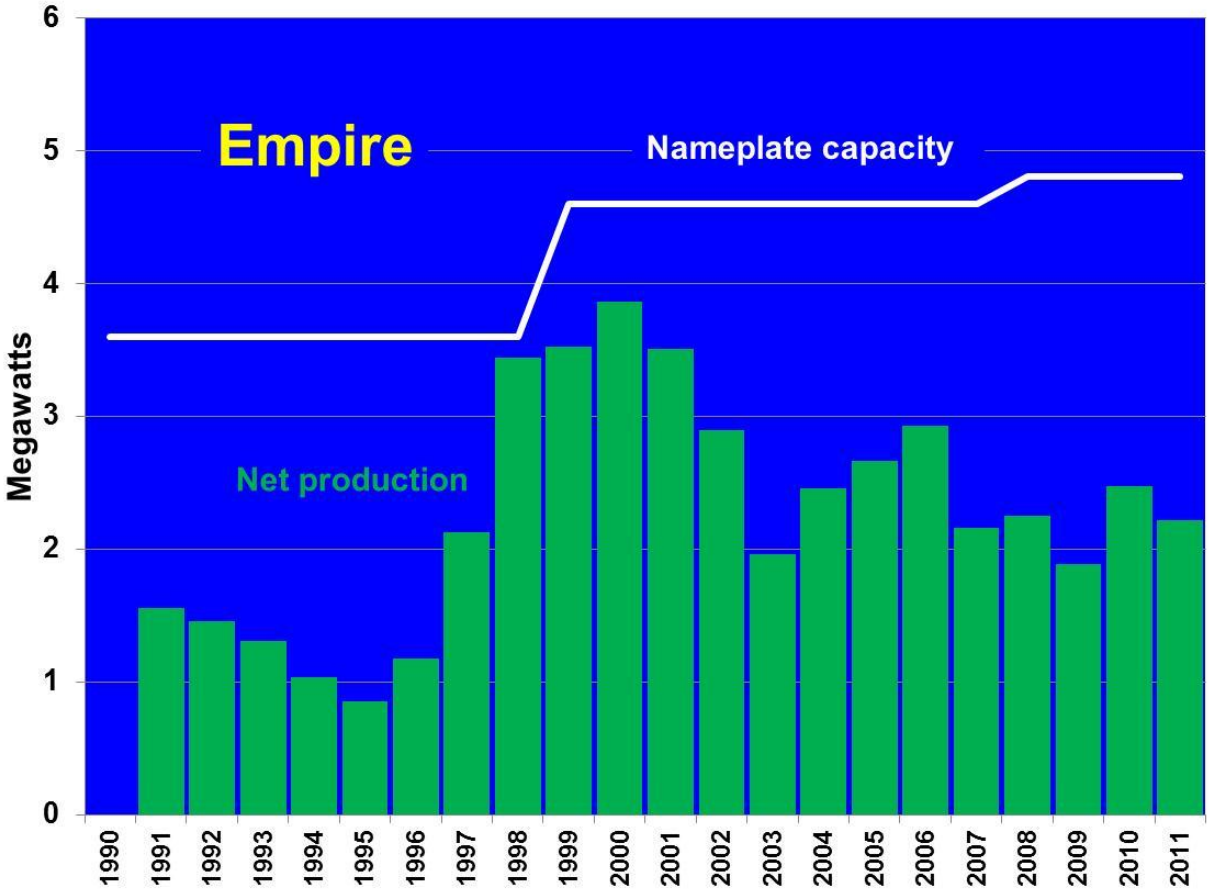


Figure 9. Annual net production and nameplate capacity at the Empire geothermal area, Washoe County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

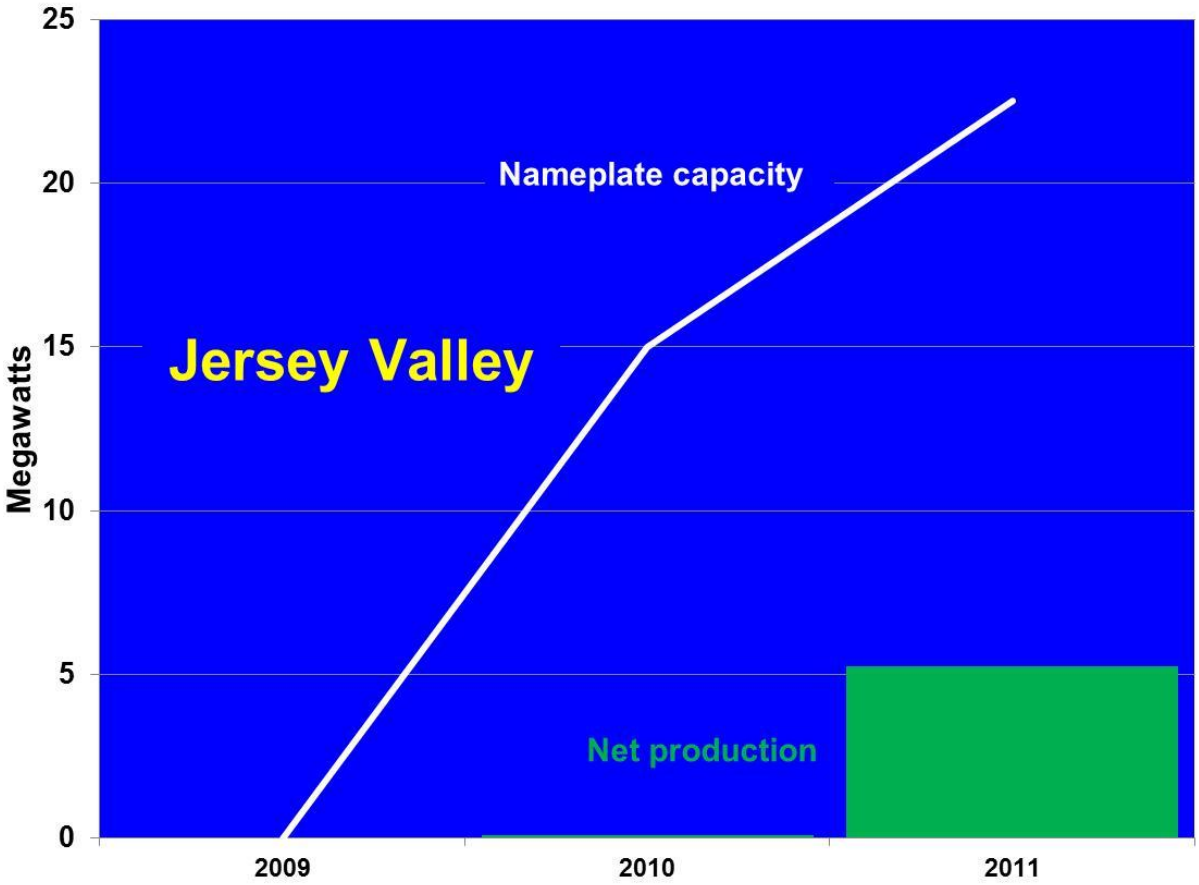


Figure 10. Annual net production and nameplate capacity at the Jersey Valley geothermal area, Pershing County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

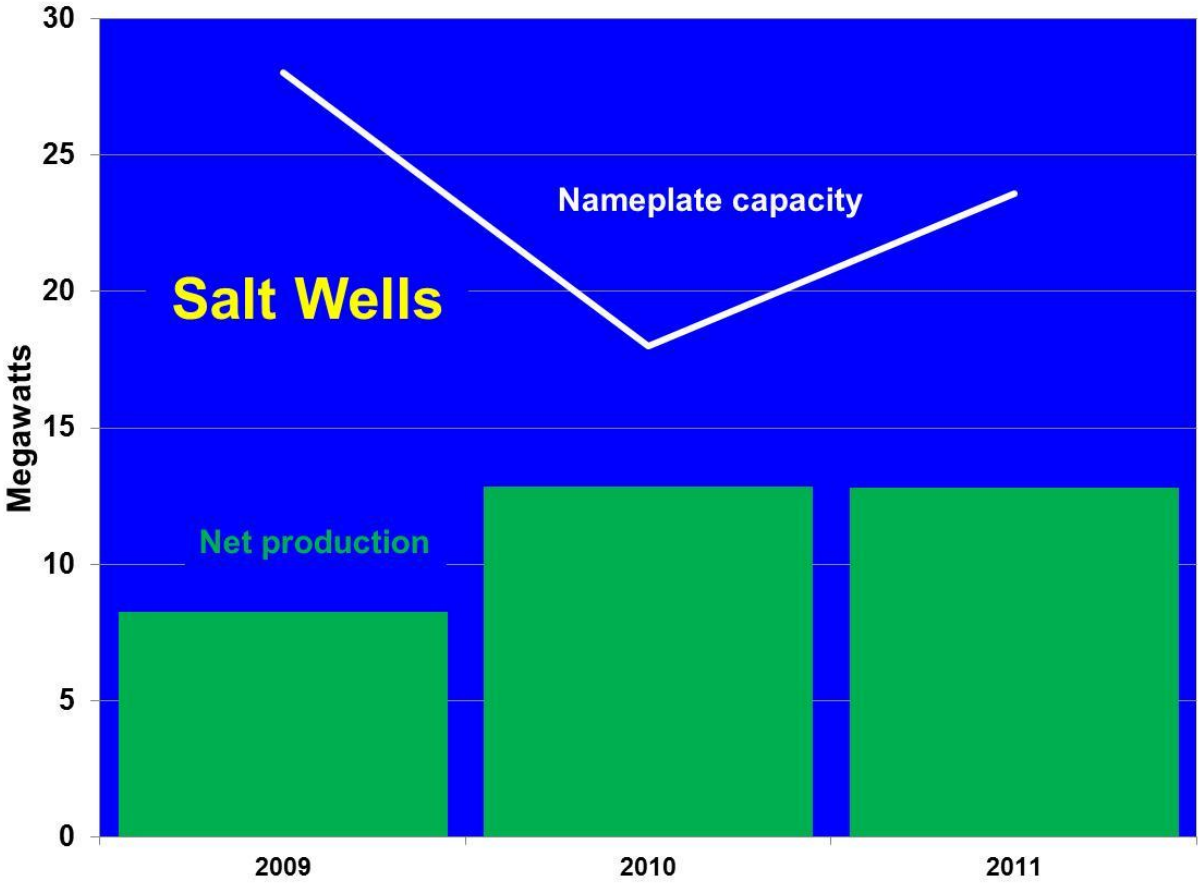


Figure 11. Annual net production and nameplate capacity at the Salt Wells geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

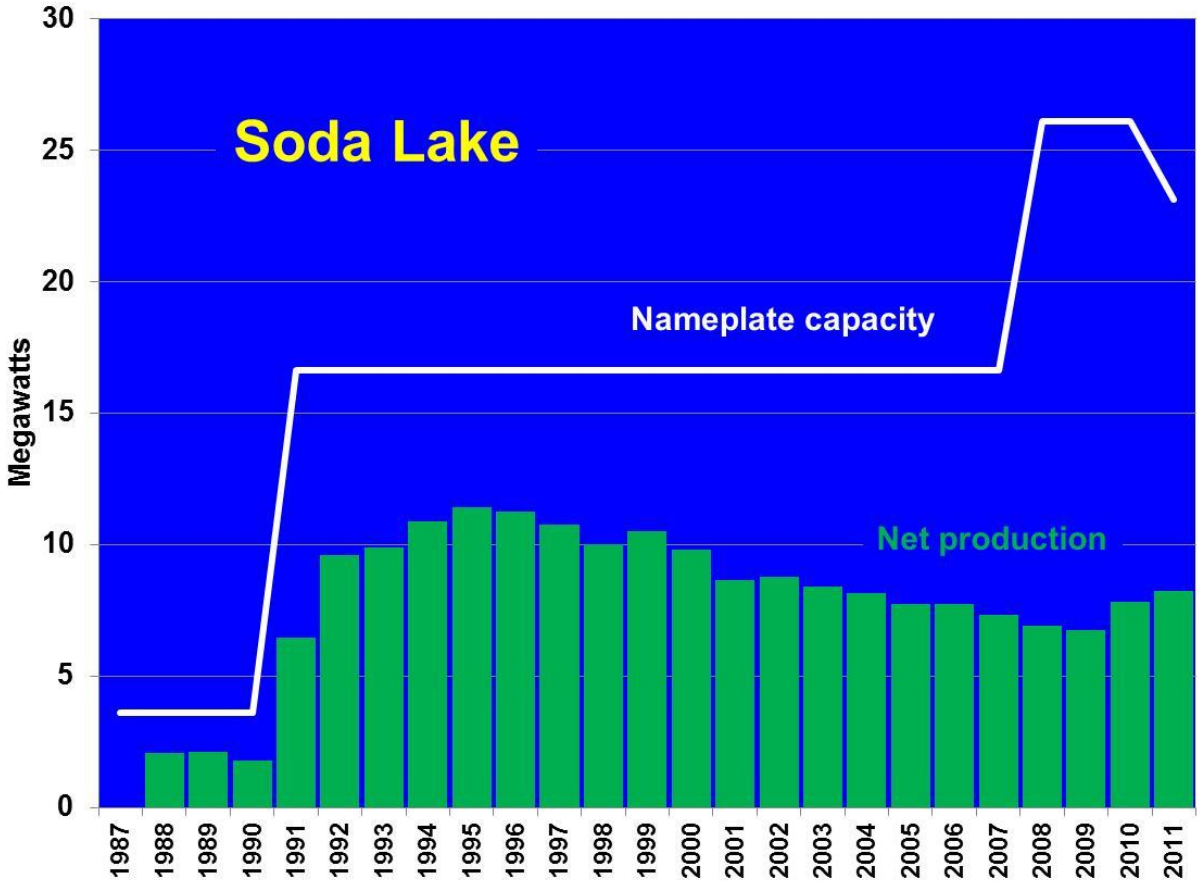


Figure 12. Annual net production and nameplate capacity at the Soda Lake geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

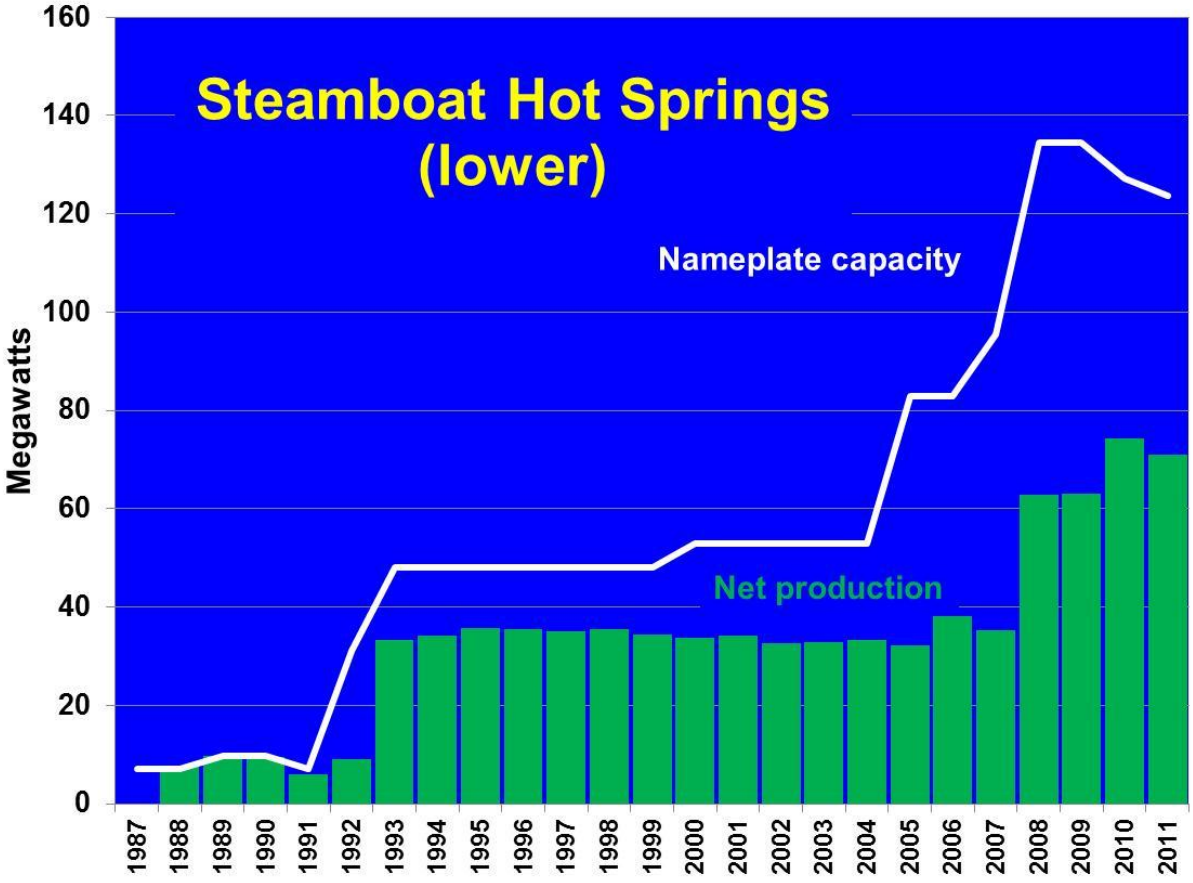


Figure 13. Annual net production and nameplate capacity at the Steamboat Hot Springs (lower, binary power plants) geothermal area, Washoe County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

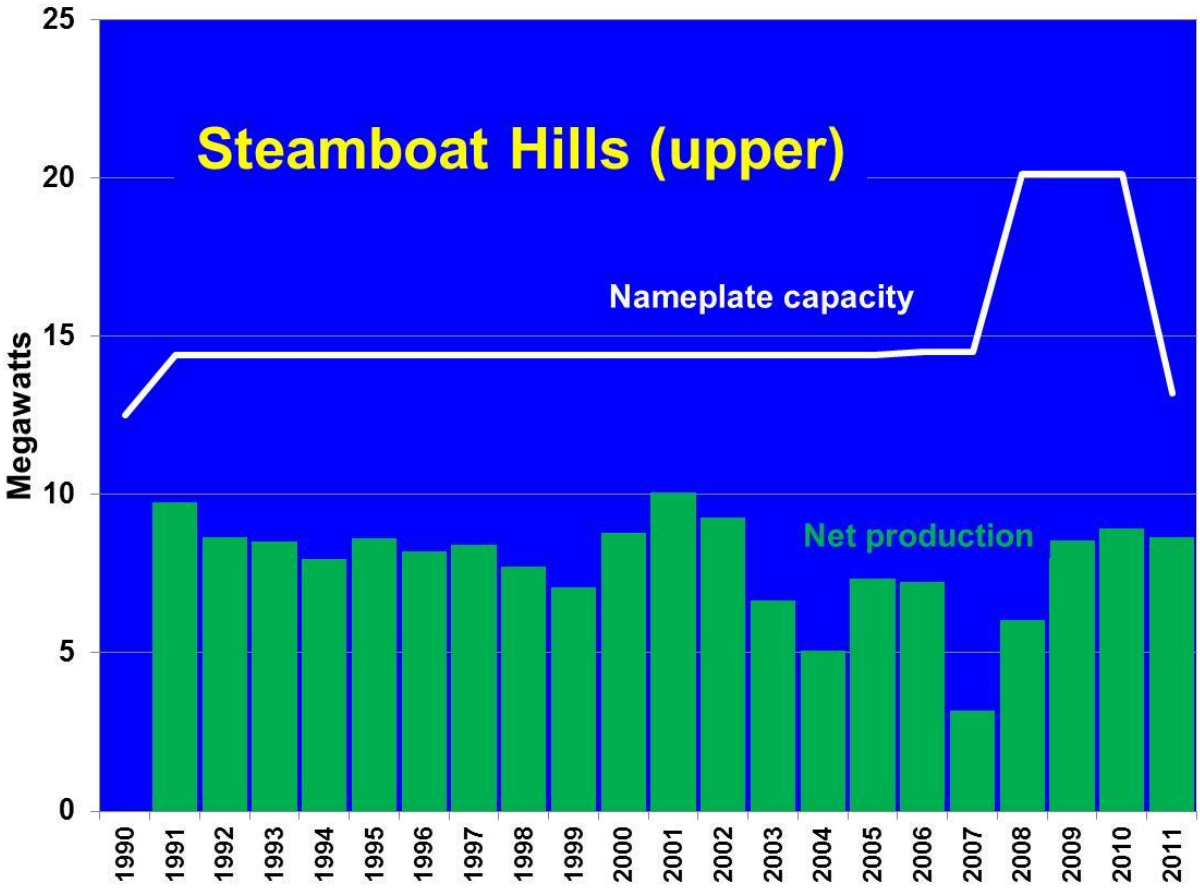


Figure 14. Annual net production and nameplate capacity at the Steamboat Hills (upper, flash power plant) geothermal area, Washoe County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

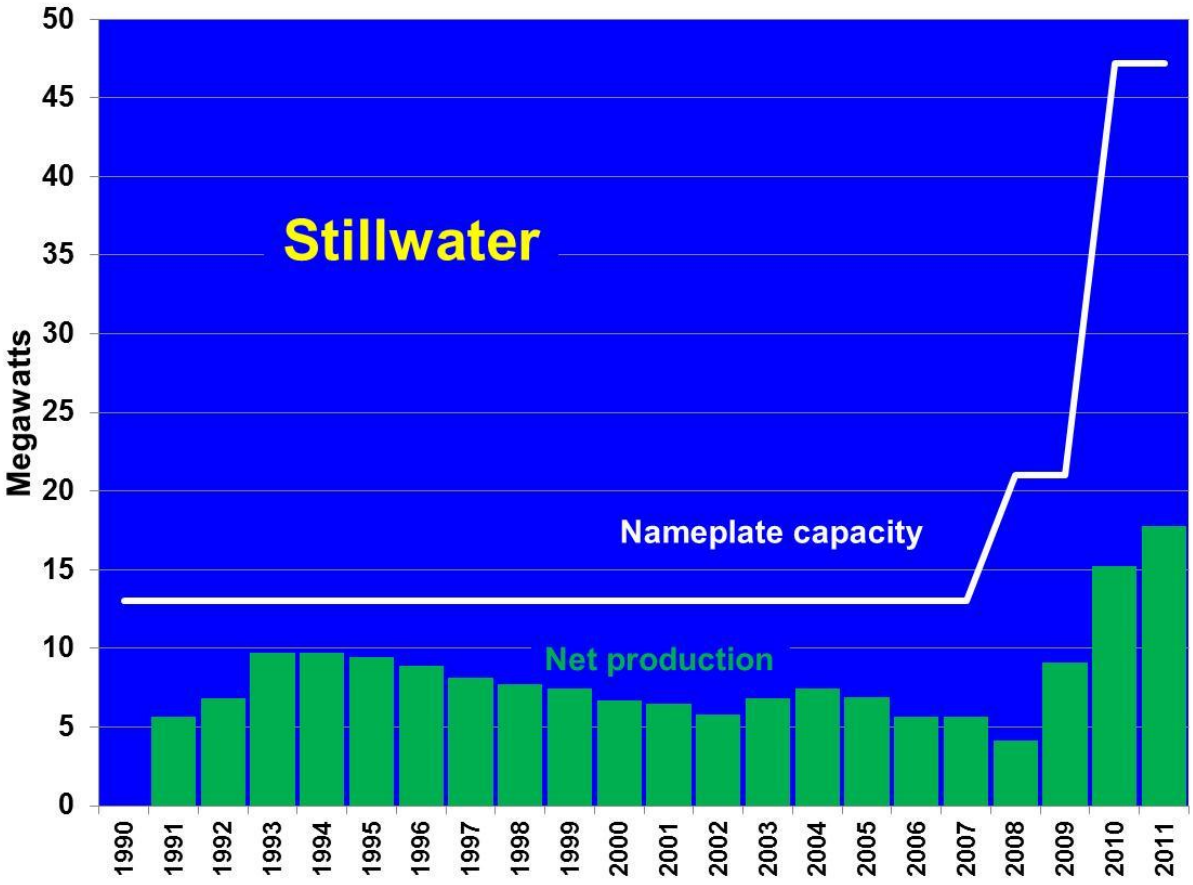


Figure 15. Annual net production and nameplate capacity at the Stillwater geothermal area, Churchill County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

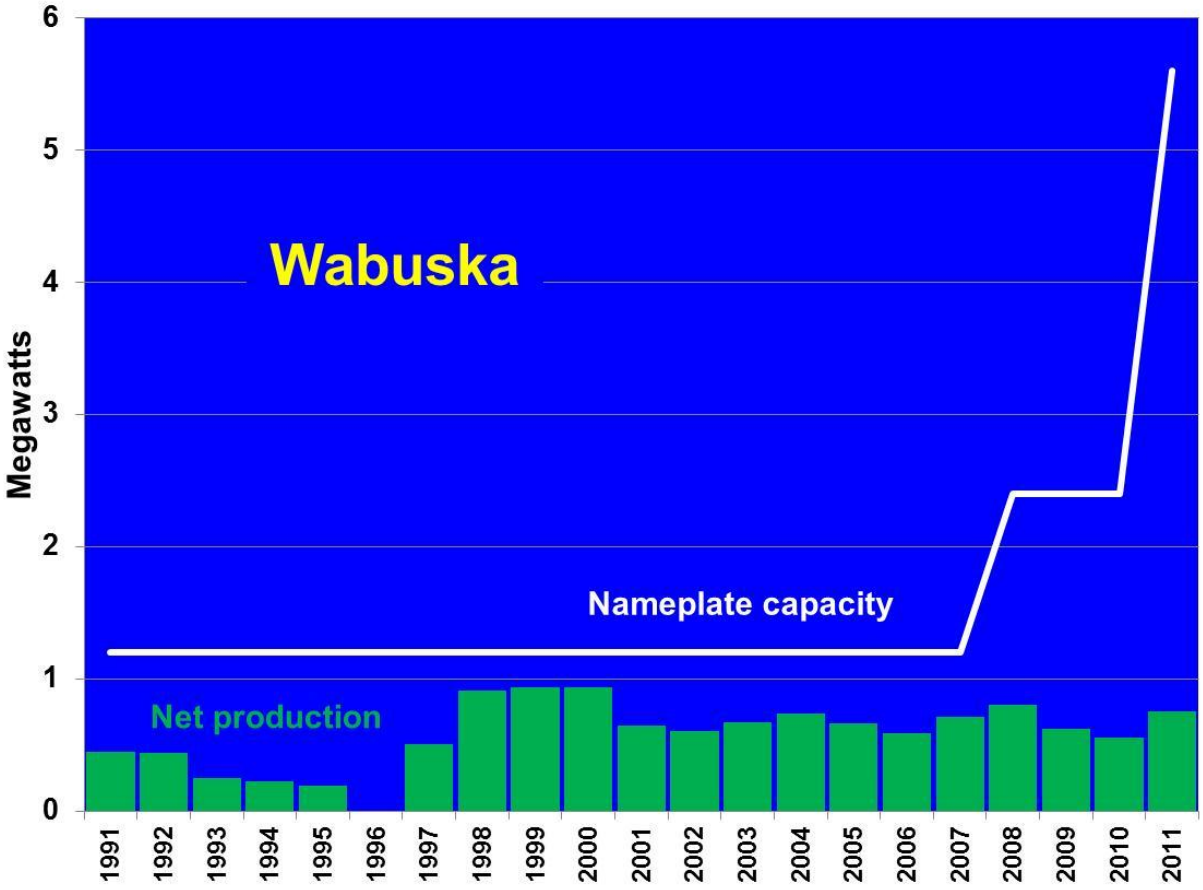


Figure 16. Annual net production and nameplate capacity at the Wabuska geothermal area, Lyon County. To compare with nameplate capacity, net production is shown in megawatt-years (megawatt-hours of net production divided by the number of hours in the year (8,760 in a normal year, 8,784 in a leap year).

**Acknowledgments**

This work was supported by the Nevada Bureau of Mines and Geology, the Nevada Division of Minerals, and the U.S. Department of Energy.

**Disclaimer**

The information in this report should be considered preliminary. It has not been thoroughly edited or peer reviewed.

**References**

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