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April 29, 2009

MEMORANDUM

TO: Power Committee

FROM: Jeff King, Senior Resource Analyst

SUBJECT: Revised assessment of geothermal generating resource potential

In its assessment of geothermal resource potential, staff proposed that the Council assume that 800 megawatts of geothermal capacity, yielding 720 average megawatts of energy, be considered available for development over the period of the 6th Plan. This estimate was based on a maximum annual development rate of 40 MW per year over the planning period, rather than on total resource availability (estimated to be 1,200 average MW). At the April Power Committee meeting, Council members questioned the assumed maximum development rate as too optimistic given the limited geothermal development to date in the Northwest. Similar comments were received from the Council's Generating Resources Advisory Committee (GRAC) at its March meeting.

Staff has reassessed Northwest geothermal development potential based on historic geothermal development rates in Nevada, a state with similar geothermal resources to the promising resources of the Northwest. Based on annual development rates in Nevada during the geothermal "gold rush" of the 1980s, staff is recommending that the maximum rate of geothermal development be reduced to 14 MW per year from 2011 through 2014 and 24 MW per year from 2015 through the remainder of the planning period. At maximum build out, this assumption could yield 424 MW of capacity and 382 MWa of energy by the end of the planning period (90% capacity factor).

Proposed Annual Geothermal Development Rate for Draft Sixth Power Plan

	MWh/year	Period	Geothermal Capacity
Original	40 MW	20 years	800 MW/720 MWa
	MWh/year	Period	Geothermal Capacity
Revised	14 MW	4 years	56 MW/50 MWa
	24 MW	15 years	360 MW/324 MWa
			Total Revised: 416 MW/374 MWa

The derivation of this recommendation is described in the attached PowerPoint, and will be discussed at the May 7 Power Committee webinar.

Sixth Northwest Conservation & Electric Power Plan

Reassessment of Geothermal Resource Availability

Jeff King

Northwest Power and Conservation Council

May 7, 2009



Background

- Earlier, staff proposed that a developable geothermal resource potential of 800 MW (720 aMW) over the 20-yr planning period be assumed for the 6th Plan.
- This estimate was based on a technical potential of 1,200 aMW, limited by an assumed maximum annual development rate of 40 MW/yr.
- These assumptions were criticized as over-optimistic in view of historical Northwest geothermal development both by members of the Power Committee and by the Council's Generating Resources Advisory Committee.



Proposed revision - Technical potential

- Staff proposes to adjust the estimate of technical potential based on the 95% confidence level of the 2008 USGS estimate of discovered + undiscovered Northwest geothermal resources¹.
- Overall technical potential increases from 1200 to 1370 (266 + 1103) aMW.

	Identified F95	Identified Mean	Identified F5	Undiscovered F95	Undiscovered Mean	Undiscovered F5
ID	81	333	760	427	1872	4937
MT	15	59	130	176	771	2033
OR	163	540	1107	432	1893	4991
WA	7	23	47	68	300	790
Totals	266	955	2044	1103	4836	12751



1) U.S. Geological Survey. Assessment of Moderate and High-Temperature Geothermal Resources of the United States. 2008.

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Proposed revisions - Maximum build rate

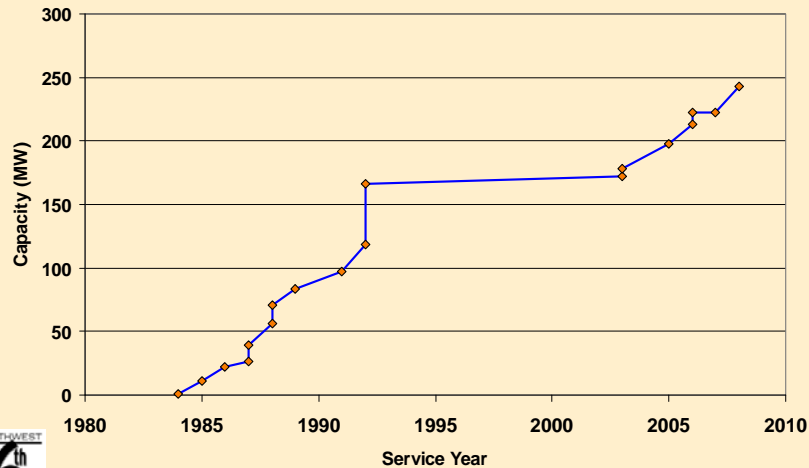
- Staff proposes to revise the maximum build rate assumption using historical geothermal experience in Nevada
 - The Nevada resource (Basin and Range) is similar to the Northwest resource holding the greatest near-term promise
 - The areal extent of promising geology in Nevada is very roughly equivalent to the areal extent in of promising geology in the Northwest
- Nevada build rates during the first geothermal "gold rush" prompted by PURPA, reservoir depletion allowances, intangible drilling cost deduction, investment tax credit, loan guarantees, etc.:
 - 14 MW/yr average during the initial five years of development (1984-88)
 - 24 MW/yr average through the first wave of development (1984-1992)
- We assume that these rates could be duplicated in the Northwest under expected incentives.



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Historical geothermal development in Nevada



Proposed revisions - Earliest availability

- Several new Northwest projects are in development, with announced service as early as 2010. But, given construction period constraints it is unlikely that any of these could be in-service prior to 2011.
- In conclusion, we propose the estimated supply of geothermal resource be limited by earliest completion year and maximum build rate. A maximum of 14 MW (13 MWa)/year from 2011-14 and 24 MW (22 MWa)/yr from 2015-29 yields a total of 416 MW (374 MWa) of available geothermal energy.
- We believe this to be a conservative estimate that should be revisited at the biennial assessment of the Plan.