

Financing Geothermal Development: *Challenges & Opportunities*

OR-WA Working Group Workshop
GeoPowering the West Kick-off Meeting

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20 June 2002

Outline

- Types of Geothermal Projects
- Direct Use Costs
- Electricity Generation Costs
- Financing Challenges
- Sources of Financing
- State and Federal Incentives
- Conclusion
- Geothermal-biz.com

Types of Geothermal Projects

- Direct use
 - Aquaculture
 - Greenhouses
 - Industrial or agricultural processes
 - Resorts or spas
 - Space or district heating

- Electricity generation
 - From 100 kWe to 1 MWe

Direct Use Costs

■ Wells

- Well depths and drilling costs vary widely
- Wells in Klamath Falls, OR are 200-2000 ft
- 90% of direct use wells are < 1800 ft
- Well drilling costs range from \$30-200/ft
- Most likely well drilling costs are \$50-100/ft

Direct Use Costs

- Geothermal Greenhouse
 - Capital costs vary with location
 - Total greenhouse costs (includes greenhouse and operating equipment) are \$12.32-15.47/ft² of greenhouse, with an average cost of \$13.75/ft².
 - A “backyard” 1,000ft² greenhouse would cost approximately \$13,750
 - 1-acre greenhouse would cost about \$600,000 (excludes economies of scale)



Direct Use Costs

■ District Heating Retrofit



“Source: Rafferty, “The Economics of Connecting of Small Buildings to Geothermal District Heating Systems,” 2001

- An automotive repair shop with 3 unit heaters would have a retrofit cost of \$12,600-\$14,390 to retrofit a heating system for the use of a hot water heating medium.
- A small office with two roof top heat pumps would incur a retrofit cost of approximately \$9,013.

Electricity Generation Costs

- The initial cost for a field and small (< 1 MWe) power plant is about \$3000-5000/installed kWe.
- Excludes soft costs, e.g., permitting, engineering, legal, financing, and interest during construction.
- Larger plants cost approximately \$1500-\$2500/kWe, depending on the resource temperature and chemistry.
- Wholesale rates for electricity in the western U.S. are low:
 - 3.5-4.0¢/kWh
 - 5¢/kWh for greenfield
 - 5-6.5¢/kWh with Production Tax Credit
- Electricity generation costs for small plants are high:
 - > over 10¢/kW (Rafferty, 2000).

Small Geothermal Power Plants

■ *250 kWe plant*

- Not a free standing business
- Could be profitable if linked to another project, e.g., fish farming, greenhouse, dehydration, etc., that has a constant cash flow
- Approx. cost is \$350,000-450,000

■ *1 MWe plant*

- Look at potential for commercial sale
- Assume can sell power at 5¢/kWh and 90% capacity
- Annual revenues are approx. \$450,000
- Approx. cost is \$3-4 million

250 kWe – Rogner Spa Hotel



Ormat 250 kW air-cooled Geothermal CHP Plant

Capital and O&M Costs for Small Binary Geothermal Plants

Net Power (kW)	Resource Temperature, °C			Total O&M Cost (\$/year)
	100	120	140	
	Capital Cost, \$/kW			
100	3,073	2,679	2,443	23,156
200	2,837	2,473	2,255	29,885
500	2,600	2,267	2,067	36,862
1,000	2,364	2,061	1,879	53,344

Source: DiPippo, 1999 (adjusted to 2001 \$)

Financing Challenges

- Financing challenges common to any small business:
 - Getting outside funding is difficult during the early years of any business
 - Banks demand tangible assets or evidence of significant revenue to secure a loan
 - Banks are unlikely to grant an unsecured loan to a startup business

Financing Challenges (cont'd)

- How much money do I need?
 - Ranges from several thousand dollars for direct use projects to millions for power plants
- Impossible to obtain non-recourse financing for small geothermal power projects
- Issues:
 - Is there a Power Sales Agreement?
 - Is there more than one producing well?
- Where can I get financing?
- Are there State and Federal incentives?

Financing Challenges (cont'd)

- Financing for smaller plants should be similar to leasing large agricultural equipment...
- But banks and leasing companies are inexperienced with geothermal equipment...
- So issue then becomes cash flow to cover leasing payments...
- And need to educate leasing companies
- Easier to finance a cascaded project

Sources of Financing

- Sources depend on size of project and amount of financing needed
- Personal assets, credit cards, home equity line
- “Insider” financing, e.g., friends, family
- Bank credit line
- Leasing companies
- Small Business Administration (SBA) Programs
- State & Federal programs and incentives

SBA Basic Financing Programs – I

- Microloan Program for Entrepreneurs
 - SBA makes funds available to qualified nonprofit organizations which act as intermediary lenders
 - Interest rates vary and collateral requirements depend upon intermediary lender (SBA
 - May be used for working capital or to purchase inventory, supplies, furniture, fixtures, machinery and equipment; may not be used for real estate
 - Term is up to 6 years
 - Up to \$35,000
 - <http://www.sba.gov/opc/pubs/fs68.html>

SBA Basic Financing Programs – II

- Section 7(a) Loan Guaranty Program
 - To small businesses unable to secure financing on reasonable terms through normal lending channels
 - SBA guarantees loans
 - Small loans (< \$150,000) have a maximum guaranty of 85%; 75% for loans over \$150,000
 - SBA can guaranty up to \$1 million
 - <http://www.sba.gov/financing/fr7aloan.html#general>

SBA Basic Financing Programs – III

■ SBA LowDoc Loan Program

- Streamlined process
- SBA guarantees 85%
- Interest rates negotiated between the borrower and lender; tied to the prime rate
- Loans are not declined when inadequate collateral is the only unfavorable factor.
- Term is 5-25 years
- Up to \$150,000
- <http://www.sba.gov/financing/frlowdoc.html>

SBA Basic Financing Programs – IV

- Section 504 Certified Development Company Program
 - Provides long-term, fixed rate financing for investment in fixed assets (e.g., land, buildings)
 - 10% equity required from borrower
 - Extended through SBA-approved Certified Development Companies (CDCs)
 - Maximum SBA debenture is \$1 million for meeting the job creation criteria or a community development goal.
 - <http://www.sba.gov/financing/frcdc504.html>

Local SBA Web Sites

- Portland, OR district office
 - <http://www.sba.gov/or/>
- Seattle, WA district office
 - <http://www.sba.gov/wa/seattle/>
- Spokane, WA district office
 - <http://www.sba.gov/wa/spokane/>
- CDCs for SBA 504 Program
 - <http://www.sba.gov/gopher/Local-Information/Certified-Development-Companies/cdcor.txt>
 - <http://www.sba.gov/gopher/Local-Information/Certified-Development-Companies/cdcwa.txt>

Oregon Incentives for Geothermal Energy – I

- Business Energy Tax Credit
 - Corporate Tax Credit
 - Geothermal electric
 - 35% tax credit is taken over five years: 10% the first and second years and 5% for each year thereafter.
 - Unused credit can be carried forward up to 8 years.
 - Contact: Oregon Office of Energy
 - <http://www.energy.state.or.us/bus/tax/taxcdt.htm>

Oregon Incentives for Geothermal Energy – II

- Renewable Energy Systems Exemption
 - Property Tax Exemption
 - Geothermal electric
 - Oregon's property tax exemption states that the added value to any property from the installation of a qualifying renewable energy system is not be included in the assessment of the property's value for property tax purposes.
 - <http://www.energy.state.or.us/renew/Solar/Support.htm>

Oregon Incentives for Geothermal Energy – III

- Residential Energy Tax Credit
 - Personal Tax Credit
 - Homeowners and renters who pay Oregon income taxes are eligible for the Residential Energy Tax Credit.
 - Closed-loop geothermal systems for space or water heating are eligible for a credit of 60¢/kWh saved during the first year, up to \$1,500.
 - Spa and pool heating systems are eligible for a tax credit of 15¢/kWh saved, up to 50% of the cost, with a maximum tax credit of \$1,500.
 - <http://www.energy.state.or.us/res/tax/taxcdt.htm>

Oregon Incentives for Geothermal Energy – IV

- Small Scale Energy Loan Program (SELP)
 - State Loan Program
 - Low-interest loans are available to individuals, businesses, schools, cities, counties, special districts, state and federal agencies, public corporations, cooperatives, tribes, and non-profits.
 - Residential – 6.5% interest
 - Commercial – 5.5%-6.0%
 - No legal maximum loan; loans range from \$20,000 to \$16.8 million.
 - Loan terms vary, up to 20 years.
 - <http://www.energy.state.or.us/loan/selphme.htm>

Oregon Incentives for Geothermal Energy – V

- Energy Trust of Oregon
 - Launched March 2002
 - Created by electric industry restructuring bill of 1999
 - The independent, nonprofit organization is seeking to invest in clean energy over the next 10 years on behalf of most of Oregon's electric power consumers.
 - The Energy Trust will fund energy efficiency, conservation and renewable energy technologies that help stimulate the economy and help businesses and residents lower their electricity bills.
 - <http://www.energytrust.org/>

Washington Incentives for Geothermal Energy – I

- High Technology Product Manufacturers Excise Tax Exemption
 - Industry Recruitment
 - This statute exempts qualifying high technology manufacturers from the state corporate excise tax.
 - High technology includes geothermal electric.
 - Exemption is 100% with no limit.
 - Expires 1 July 2004.
 - <http://www.dsireusa.org/library/docs/incentives/WA01F.htm>

Washington Incentives for Geothermal Energy – II

- Seattle Green Power Program
 - Green Pricing Program
 - Seattle City Light customers can make voluntary payments that will go toward building and acquiring a wider range of new renewable energy sources.
 - 60% of the money will be invested in renewable resources including geothermal.
 - <http://www.cityofseattle.net/light/green/greenpower/>

Federal Incentives – I

- Renewable Energy Production Incentive (REPI)
 - REPI provides financial incentive payments for electricity produced and sold by new qualifying renewable energy generation facilities.
 - Eligible electric production facilities are those owned by State and local government entities (such as municipal utilities) and not-for-profit electric cooperatives that start operations between 1 October 1993 and 30 September 2003.
 - Qualifying facilities are eligible for annual incentive payments of 1.5¢/kWh (1993 dollars and indexed for inflation) for the first ten year period of their operation, subject to the availability of annual appropriations in each Federal fiscal year of operation.
 - Eligible geothermal generation facilities must “generate electricity using naturally occurring underground heat”

Federal Incentives – II

- Solar and Geothermal Business Energy Tax Credit
 - Corporate Tax Credit
 - Geothermal Electric
 - The federal business energy tax credit is a 10% tax credit available to commercial businesses that invest in or purchase geothermal energy property in the United States.
 - Tax credit limited to \$25,000 per year, plus 25% of the total tax remaining after the credit is taken.
 - IRS Form 3468

Federal Incentives – III

- Solar and Geothermal Modified Accelerated Cost Recovery System (MACRS)
 - Corporate Depreciation
 - Geothermal Electric
 - Businesses can recover investments in geothermal electric property through depreciation deductions.
 - For geothermal property placed in service after 1986, the current MACRS property class is five years.
 - IRS Publication 946, IRS Form 4562

Federal Incentives – *in the works*

- National Energy Bill (H.R. 4)
 - Senate bill
 - Has an RPS of 10% by 2019-2020, up from 1.0% in 2005-2006 (Section 264)
 - Adds a production tax credit (PTC) for electricity produced from geothermal energy (Section 1903)
 - House bill
 - No RPS or PTC for geothermal
 - Exemption from royalties for direct use facilities (Title III, Section 6302)
 - Both bills reauthorize Renewable Energy Production Incentive (REPI)
 - Bill next goes to House-Senate Conference Committee – probably after August

Conclusion

- Challenges exist to financing geothermal development, as for any small business
- Financing challenges differ based on size of project and amount of financing needed
- Smaller direct use projects could be self-financed
- Opportunity to educate leasing companies on the benefits of financing small geothermal power plants and direct use projects through equipment leases
- Issue still remains source of cash flow
- Cascaded projects easier to finance

Geothermal-biz.com

- Geothermal biz.com is part of the U.S. Department of Energy-led GeoPowering the West (GPW) effort to dramatically increase the use of geothermal energy in the western United States, Alaska, and Hawaii.
- Geothermal biz.com was created to help geothermal entrepreneurs—small businesses, Native American tribes, homeowners, and individuals—develop geothermal direct use and small power generation projects by providing information.
- <http://www.geothermal-biz.com/>