Warner Creek Correctional Facility
Geothermal Heating System

presented by
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Warner Creek Correctional Facility near Lakeview, Oregon

WCCF Facts:

- Opened September 2005
- Employs 110 staff on average
- 400 bed Minimum Security Facility
- The facility occupies less than 15 acres of the 91 acre DOC site.

Lakeview Facts:

- 14.3 inches average yearly precipitation
- Often referred to as “Tallest Town in Oregon” with an elevation of ~4800ft.
- 166.6 average number of days below 32 degrees F

Recognizing the Resource Potential

Old Perpetual Geyser

Project Management Team and Consultants

- Department of Corrections
- Town of Lakeview
- Anderson Engineering & Surveying
- Balzhiser & Hubbard Engineers
- Stantec Consulting Services (formerly Eco:Logic)

Developing the Resource

Steps

- IGA with Town of Lakeview (Infrastructure)- 2001
- Consulting with Oregon Institute of Technology (OIT) Geo-Heat Center – 2001-2005
- Hydro geological study (EcoLogic) - 2002
- Permitting (water rights) - 2004
- IGA with Town of Lakeview (Geothermal Services)- 2004

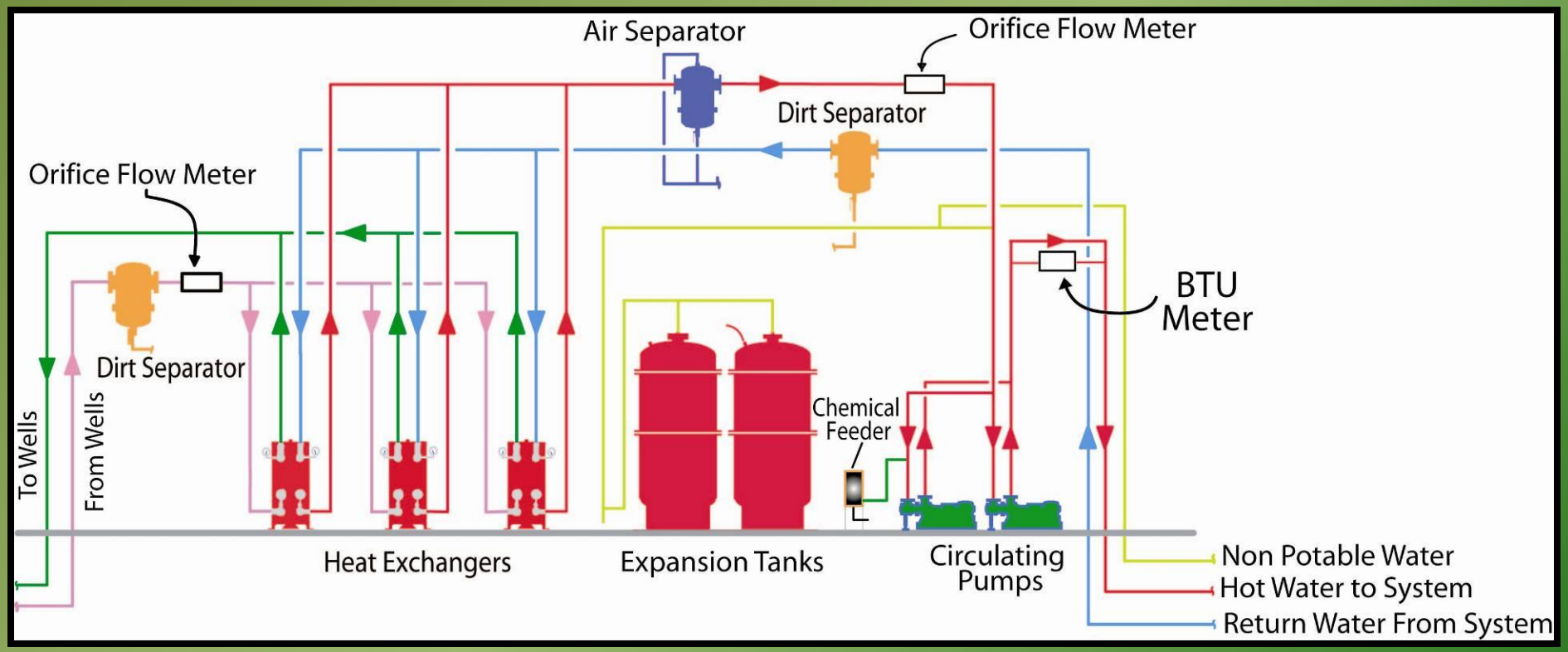
Well Development

The Geothermal production well extracts 208°F water from a depth of 150 to 600ft and re-injects at Re-injection well site 110°F water at a depth of 210ft.

Infrastructure

Heat Exchanger Building

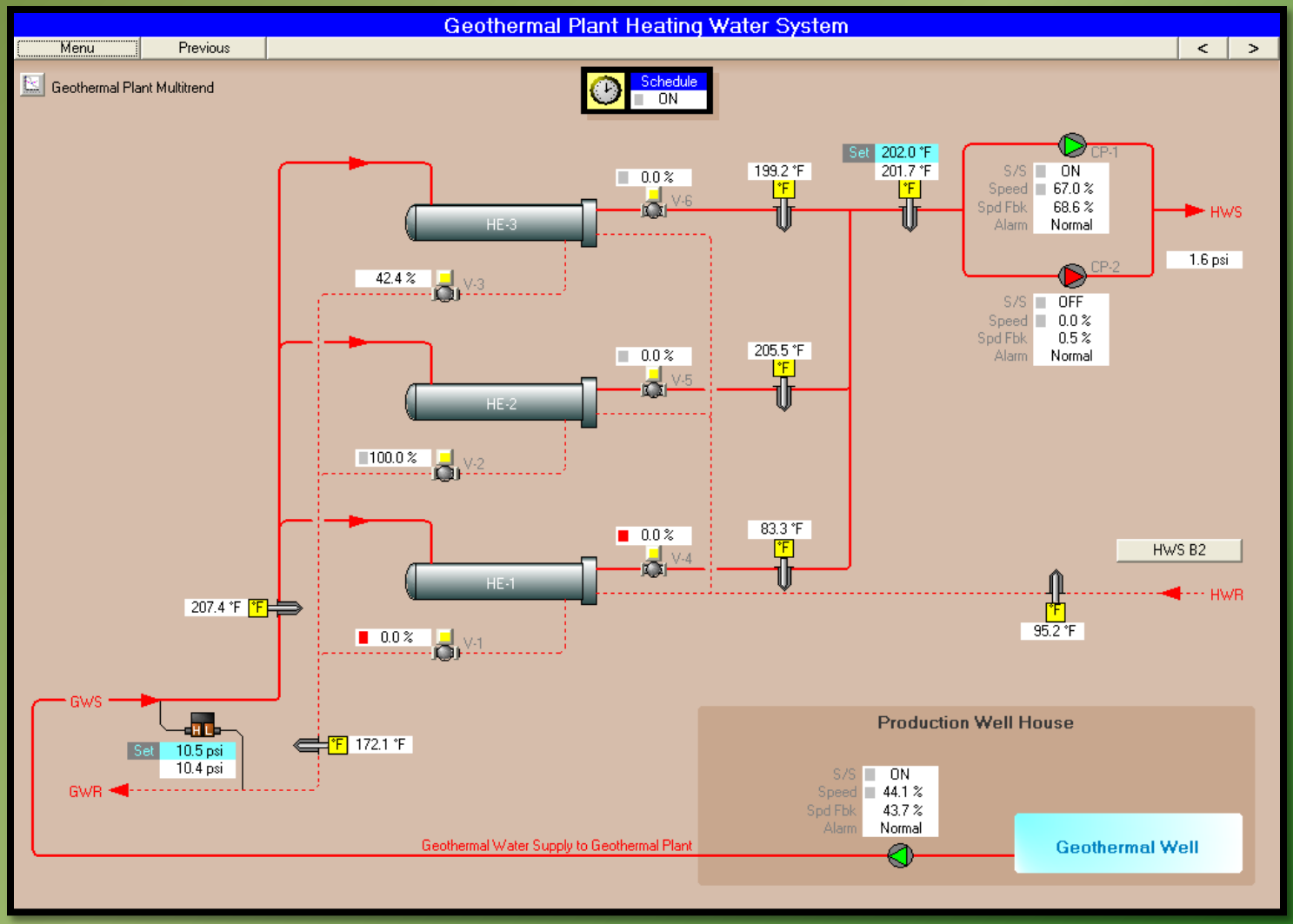
Heat Exchanger Building System Schematic



Backup Power

Production and Reinjection Well

Geothermal Plant Heating Water System



Boiler Room at Warner Creek Correctional Facility

Cost and Capacity

Geothermal Cost

- $1.4M including design, construction, future repair and maintenance

Geothermal Capacity

- Delivers 150GPM of 198°F water to WCCF, which equates to approximately 5M - 8M Btu/hr, depending on the temperature differential and flow rate
- Most used to date est. @ 4.2M Btu/hour

Cost and Capacity

Delivery

- DOC portion of system can deliver enough hot water to keep up with 400+ inmate's showering, laundry needs, kitchen demands for hot water and also heat an 117,000 square foot facility to comfortable levels when the outside temperature is below zero. Design Temperature -4F, Proven Temperatures below -20F

Cost and Capacity

Geothermal Cost Per Square Foot

- 2.7 cents per month/sq ft.
- Equivalent cost for a family of six living in a 2000 square foot home would be $54 per month for all heating and hot water.

Cost and Capacity
Proof by Failure

Geothermal vs. Propane Costs

- Average savings of $19,000/month by using geothermal heating vs. propane. This equates to a total savings of $228,000/year in heating costs alone!

Cost and Capacity

Savings

- In ~5 years the system paid for itself.
- Geothermal Plant was completed fall 2005.

Cost and Capacity

Additional Capacity

- Lakeview developed oversized Geothermal Facilities in conjunction with WCCF
- This source could provide the opportunity for Lakeview or other entities to utilize the already constructed geothermal resources

Cost and Capacity

Tax Credit Incentives

- Department of Corrections and the city Lakeview took advantage of Business Energy Tax Credit (BETC) incentives through the Oregon Department of Energy

State Energy Efficiency Design (SEED) Award

- With the geothermal heating system, WCCF is performing 52 percent better than an equivalent building constructed to Oregon building code standards.
- The Warner Creek Project was recognized with the 2008 SEED Award
- The New Prison Construction Team was honored with the 2009 DOC Sustainability Award.

A Campfire Conversation

- Networking
- Fly fishing

- Geothermal Discussions

LAKE COUNTY
School District # 7 - Lakeview
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LCSD#7 Geothermal Project

Lakeview High School, 1962

Daly Middle School, 1910

LHS Ag Shop, 1930

Fremont Elem, 1929/51/58

A.D. Hay Elem, 1952

Heating Sources

- District Heating Sources are currently a combination of steam and hot water boilers
- Boilers are all diesel powered
- Boilers are same age as buildings

Current Estimated Heating Cost

- A total of 163,795 square feet are heated annually by burning an average of 55,000 gallons of diesel fuel
- @$3/gallon = $165,000
- @$4/gallon = $220,000

The Process

- Energy efficiency commitment 2007-08
- Grant opportunities were sought
- Geothermal Feasibility - Oregon Economic & Community Development Department
  - Partnership with Town of Lakeview
  - Anderson Engineering – Lakeview
  - Consultants:
    - Dave Bugenig – Reno
    - Kevin Rafferty – Klamath Falls

Estimated Savings

- Cost of project = $2.4M
- Savings varies based upon amount financed
  - $12K @ 5% over 30 years @$2.86/gal
  - Breakeven = $3.13/gal
- Additional savings could be incurred if grant/stimulus funding were obtained

Funding Obtained

- $1M stimulus funds to retrofit all school buildings to accept geothermal heat
- ~$350K BETC credits
- Remaining -> USDA loan @~4% over 40 years
- Est. annual heating cost = ~$85K
- Est. savings @$2.86/gal = ~$75K
- Est. Breakeven Point = ~$2.16/gal

Next Steps

- Project Manager – Anderson Engineering
- Complete contractual agreement(s) with town, LCSD#7, Hospital, County
- Break ground spring 2011
- Coordinate with other energy efficiency projects
- Geothermal Heat delivered by fall of 2011
- Enjoy the wonderful geothermal heat ☺

Lessons Learned

- Tracking Energy Usage
- Determining Point-of-Connection
- Division of Maintenance Responsibilities
- Fine Tuning Operations
  - Cost Savings by reducing the need for unnecessary make-up water usage. (~$1,800/month)
  - Cost Savings by using the geothermal system more efficiently resulted in a substantial cost savings by reducing cost associated with backup heating system. (~$16,500/year)


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Q & A