BRAZIL MILLSITE

Brownfield to Brightfield Renewable Energy Engineering Design Project

U.S. EPA
Hard Rock Mining Conference 2012: Advancing Solutions for a New Legacy
April 3 - 5, 2012
1983—Clear Creek/Central City Superfund Study Area designated

1990—Clear Creek Watershed Forum established, creating a “culture of cooperation”

1991—Upper Clear Creek Watershed Association (UCCWA) formed

1995—Clear Creek Watershed Advisory Group (WAG) formed

1997—Clear Creek Watershed Foundation incorporated as a 501(c)3 non-profit organization
The USGS estimates that there are 1,343 inactive or abandoned mines in the Clear Creek Watershed.

As a “Good Samaritan” entity per a 2003 EPA Action Memo, CCWF has been working with numerous stakeholders to facilitate cleanup of orphan mine and mill sites not covered by the Clear Creek/Central City Superfund program:

- General Herkimer
- Little 6’s
- Minnesota Mine
- McClellan Mill
- Doctor Mine
- Gem Site
- Dibbins, Sydney, and more
CCWF AWARDED
EPA REGIONAL PRIORITIES GRANT

2007 CLEAR CREEK WATERSHED REPORT
Exploring Watershed Sustainability

Broadening our focus from cleaner water through mine remediation by adding seven additional market areas to our portfolio:

1. Orphan Mine Remediation
2. Natural Resource Management
3. Water/Wastewater Management
4. Preservation/Promotion of Historical Mine Sites
5. Alternative Energy/Transportation
6. Waste Stream Reduction
7. Subsurface Rights and Uses
8. Outreach/Education
LOCATION, LOCATION, LOCATION!

- Major Transportation Artery
- Major Water Conveyance
- Major Transmission Artery
- Heart of the Mineral Belt
- Proximity to Load Centers
CLEAR CREEK COUNTY
“NEW ENERGY ECONOMY”

Assessed Valuation (2010) $525,220,630

- Natural Resource Extraction: 66%
- Residential: 25%
- Commercial: 6%
- Public Utilities: 3%

Underground natural resource supply is finite.
Clear Creek County should diversify their economy in preparation for the potential decommission of Henderson Mine.
Road To Clear Creek County’s RE Goal
1000MW by 2018

ADVANCED GUIDEWAY POWER REQUIREMENTS:
Assuming 44 trains are operating on the guideway between DIA and Eagle County Airport, the nominal load is:
204,170 kW or 205 MW
(4,640 kW x 44 trains = 204,170 kW)

• Elevation 9,600 feet

• Trail Creek area was a very productive mining center through the Late 1800s to mid 1900s.

• Trail Creek is a steep mountain stream with an average channel gradient of 11 percent.
In June 2011 this was the Brazil Millsite as it stood as a Brownfield.
This is the Brazil Millsite 3 months later as a Greenfield.

What would it look as a Brightfield and how much energy could this Brightfield produce?
RESULTS/CONCLUSIONS

- Engineering and chemical analysis of mine waste piles as a resource instead of a liability.

- Reusing waste for productive purposes such as general site fill, foundation pads, and soil cement base.

- Added benefit of removing waste piles that negatively affect waterways.
HOW MIGHT CLEAR CREEK COUNTY MAKE HIGHEST AND BEST USE OF A BROWNFIELD PROPERTY AS A RENEWABLE ENERGY SOURCE?
CSM Department of Engineering:
Senior Design Course

- Two semesters of design education and application
- Provides a basis on engineering design and project planning
- Provides professional experience
- Site characterized by CSM students from the Environmental Science & Engineering Department working under the direction of Professors Jonathan Sharp and Tom Wildeman, who supervised reclamation design recommendations

CSM CAPSTONE PROGRAM
TEAM:
Jeff Babbit
Electrical
Matt Beach
Electrical
David Branath
Mechanical
Paul Franklin
Environmental
Jeannette Hartman
Environmental
Megan Shirley
Environmental
### PROJECTED TIMELINE

<table>
<thead>
<tr>
<th>Phase</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permit &amp; Decision Period</td>
<td>4 months (120 days) - 7 months (196 days)</td>
</tr>
<tr>
<td>Turbine Construction Phase</td>
<td>1 Month (30 days)</td>
</tr>
<tr>
<td>Solar Construction Phase</td>
<td>3 weeks (21 days)</td>
</tr>
</tbody>
</table>
LOCAL CAPACITY
Preferred Transportation Route

Legend
- 2616 Tax Sale
- Weather Stations
- Sections
- Townships
- Towns
- CENTRAL CITY
- ENGLEHV
- GEORGETOWN
- GUGGENHEIM
- SILVER PLUME
- Federal Roads
- State Roads
- Primary Roads
- Other Roads
- Rivers/Lakes
- Streams
- Background

Map center: 36° 44' 44" N, 105° 34' 45" W
Scale: 1:49,245

Notes: Preferred Transportation Route in Green

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Map Created on: Mar 20, 2012
ENVIRONMENTAL ANALYSIS
CONCLUSION: STUDIES TO BE CONDUCTED

Remediation met all the environmental considerations.

Development consideration examined all 1041 Matters of State Interest requirements and found adequate data to support permit submittal.
TECHNICAL FEASIBILITY

Considerations
**Alstom Eco 110 Wind Turbine:**

- 3 MW power output
- 100m rotor diameter
- IEC IIA Classification for this altitude

**Suntech Vd Solar Panels:**

- 280 W per module
- 14.4% efficiencies
- Strong wind and snow loading capabilities
FINANCIAL FEASIBILITY
Environmentally the installation of wind and solar combined is best

- utilizes land to its highest & best use
- economy of scale

If merged with other projects proposed in the area the financial model would improve
The final document is formatted to conform with the County’s 1041 Matters of State Interest regulations permit requirements to demonstrate technical, financial, and environmental feasibility.

- The process is reasonable
- The data is readily available
FOR MORE INFORMATION

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