Wind Energy Development on Reclaimed Mining Sites

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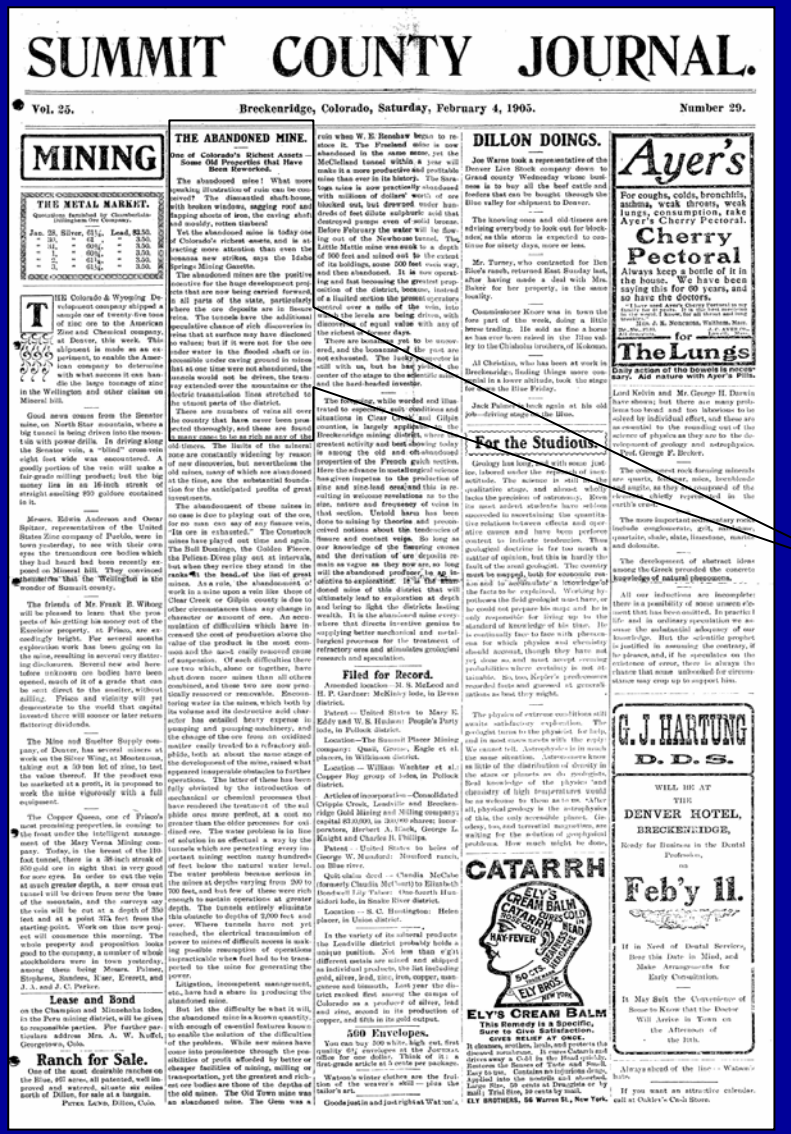
Interwest Energy Alliance

NMA/NRC Uranium Recovery Workshop

Denver, Colorado

25 May 2005

Mine redevelopment is not a *new* idea...



SUMMIT COUNTY JOURNAL.

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MINING

THE METAL MARKET.

Quotations furnished by Chamberlain-Dillingham Ore Company.

Jan. 29, Silver, 61¼, Lead, $3.50.
" 30, " 61 " 3.50.
" 31, " 60¾, " 3.50.
Feb. 1, " 60¾, " 3.50.
" 2, " 61¼, " 3.50.
" 3, " 61¼, " 3.50.

THE Colorado & Wyoming Development company shipped a sample car of twenty-five tons of zinc ore to the American Zinc and Chemical company, at Denver, this week. This shipment is made as an experiment, to enable the American company to determine with what success it can handle the large tonnage of zinc in the Wellington and other claims on Mineral hill.

Good news comes from the Bentzer mine, on North Star mountain, where a big tunnel is being driven into the mountain with power drills. In driving along the Bentzer vein, a "blind" cross-vein eight feet wide was encountered. A goodly portion of the vein will make a fair-grade milling product; but the big money lies in an 18-inch streak of straight smelting $60 galena contained in it.

Messrs. Edwin Anderson and Oscar Spitzer, representatives of the United States Zinc company of Pueblo, were in town yesterday, to see with their own eyes the tremendous ore bodies which they had heard had been encountered on Mineral hill. They convinced themselves that the Wellington is the wonder of Summit county.

The friends of Mr. Frank B. Wilcox will be pleased to learn that the prospects of his getting his money out of the Excelsior property, at Frisco, are exceedingly bright. For several months exploration work has been going on in the mine, resulting in several very flattering disclosures. Several new and heretofore unknown ore bodies have been opened, much of it of a grade that can be sent direct to the smelter, without sulking. Frisco and vicinity will yet demonstrate to the world that capital invested there will sooner or later return flattering dividends.

The Mine and Smelter Supply company, of Denver, has several miners at work on the Silver Wing, at Montezuma, taking out a 50 ton lot of zinc, to test the value thereof. If the product can be marketed at a profit, it is proposed to work the mine vigorously with a full equipment.

The Copper Queen, one of Frisco's most promising properties, is coming to the front under the intelligent management of the Mary Verna Mining company. Today, in the breast of the 110-foot tunnel, there is a 36-inch streak of 800 gold ore in sight that is very good for now eyes. In order to cut the vein at much greater depth, a new cross cut tunnel will be driven from near the base of the mountain, and the surveys say the vein will be cut at a depth of 350 feet and at a point 375 feet from the starting point. Work on this new project will commence this morning. The whole property and proposition looks good to the company, a number of whose stockholders were in town yesterday, among these being Messrs. Palmer, Stephens, Sanders, Kiser, Everett, and J. A. and J. C. Parker.

Lease and Bond

on the Champion and Minnehaha lodes, in the Peru mining district, will be given to responsible parties. For further particulars address Mrs. A. W. Ruffel, Georgetown, Colo.

Ranch for Sale.

One of the most desirable ranches on the Blue, 267 acres, all patented, well improved and watered, situate six miles north of Dillon, for sale at a bargain.

PETER LOVE, Dillon, Colo.

THE ABANDONED MINE.

One of Colorado's Richest Assets — Some Old Properties that Have Been Reworked.

The abandoned mine! What more speaking illustration of ruin can be conceived? The dismantled shaft-house, with broken windows, sagging roof and flapping sheets of iron, the caving shaft and mouldy, rotten timbers!

Yet the abandoned mine is today one of Colorado's richest assets, and is attracting more attention than even the bonanza new strikes, says the Idaho Springs Mining Gazette.

The abandoned mines are the positive incentive for the huge development projects that are now being carried forward, in all parts of the state, particularly where the ore deposits are in fissure veins. The tunnels have the additional possibilities of profit afforded by better or cheaper facilities of mining, milling or transportation, yet the greatest and richest ore bodies are those of the depths of the old mines. The Old Town mine was an abandoned mine. The Gem was a ruin when W. E. Renshaw began to restore it. The Freeland mine is now abandoned in the same sense, yet the McClelland tunnel within a year will make it a more productive and profitable mine than ever in its history. The Standard was is now generally considered with millions of dollars' worth of ore blocked out, but drowned under hundreds of feet dilute sulphuric acid that destroyed pumps even of solid bronze. Before February the water will be flowing out of the Newhouse tunnel. The Little Mattie mine was sunk to a depth of 500 feet and mined out to the extent of its holdings, some 500 feet each way, and then abandoned. It is now operating and fast becoming the greatest producer of the district, because, instead of a limited section the property contains over a mile of the vein, into which the levels are being driven, with dimensions of equal value with any of the richest developed ore.

There are many mines yet to be uncovered, and the bonanza of the past are not exhausted. The Jacky Bowker is still with us, but he has yet to find the center of the traps in the scientific sense and the hard-headed investor.

The Breckenridge district, while worked and illustrated by superior geological conditions and situations in Clear Creek and Gilpin counties, is largely applicable to the Breckenridge mining district, where the greatest activity and best showing today is among the old and oft-abandoned properties of the French gulch section. Here the advance in metallurgical science has given impetus to the production of zinc and zinc-lead ores, and this is resulting in such welcome revelations as to the size, nature and frequency of veins in that section. Untold hard has been done to mining by theories and preconceived notions about the tendencies of fissure and contact veins. So long as our knowledge of the bearing veins and the derivation of ore deposits remain as vague as they now are, so long will the abandoned producer, as an incentive to exploration, is at the standpoint of the districts having wealth. It is the abandoned mine everywhere that directs inventive genius to supplying better mechanical and metallurgical processes for the treatment of refractory ores and stimulates geological research and speculation.

Filed for Record.

Amended location—M. S. McLeod and H. P. Gardner: McKinley lode, in Breckenridge district.

Patent — United States to Mary E. Eddy and W. S. Hudson: People's Party lode, in Tolland district.

Location—The Summit Placer Mining company: Quail, Grouse, Eagle et al placers, in Williams district.

Location — William Wachter et al: Copper Bay group of lodes, in Pollock district.

Articles of incorporation—Consolidated Ophyr, Creek, Louisville and Breckenridge Gold Mining and Milling company; capital $3,000,000, in 300,000 shares; incorporators, Herbert A. Black, George L. Knight and Charles H. Phillips.

Patent — United States to heirs of George W. Mumford: Mumford ranch, on Blue river.

Quit claim deed — Claudia McCole (formerly Claudia McCourt) to Elizabeth Bonduel Lily Fulton: One-fourth Humboldt lode, in Swan River district.

Location — S. C. Huntington: Helen placer, in Union district.

In the variety of its mineral products the Leadville district probably holds a unique position. Not less than eight different metals are mined and shipped as individual products, the list including gold, silver, lead, zinc, iron, copper, manganese and bismuth. Last year the district ranked first among the camps of Colorado as a producer of silver, lead and zinc, second in its production of copper, and fifth in its gold output.

500 Envelopes.

You can buy 500 white, high cut, first quality 6¾ envelopes at the Journal office for one dollar. Think of it: a first-grade article at a cut-price package.

Watson's winter clothes are the fruition of the weaver's skill — plus the tailor's art.

Goods just in and just right at Wat son's.

DILLON DOINGS.

Jos Warne took a representative of the Denver Live Stock company down to Grand county Wednesday whose business is to buy all the beef cattle and feeders that can be bought through the Blue valley for shipment to Denver.

The knowing ones and old-timers are advising everybody to look out for blockades, as this storm is expected to continue for ninety days, more or less.

Mr. Turney, who contracted for Ben Elder's ranch, returned East Sunday last, after having made a deal with Mrs. Baker for her property, in the same locality.

Commissioner Knorr was in town the fore part of the week, doing a little horse trading. He sold as fine a horse as has ever been raised in the Dillon valley to the Chisholm brothers, of Kokomo.

Al Christian, who has been at work in Breckenridge, finding things more congenial in a lower altitude, took the stage for the Blue Friday.

Jack Palmer took again at his old job—driving stage for the Blue.

For the Studious.

Geology has lately, with some justice, labored under the reproach of inexactitude. The science is still in the qualitative stage, and almost wholly lacks the precision of astronomy. Even its most ardent students have seldom succeeded in ascertaining the quantitative relations between effects and operative causes and have been perforce content to indicate tendencies. The geological doctrine is far too much a matter of opinion, but this is hardly the fault of the sound geologist. The country must be mapped, both for economic reasons and to accumulate a knowledge of the data to be explained. Working hypotheses the field geologist must have, or he could not prepare his maps and he is only responsible for living up to the standard of knowledge of his time. He is continually face to face with phenomena for which physics and chemistry should account, though they have not yet done so, and must accept the best probabilities where certainty is not attainable. So, too, Kepler's predecessors recorded facts and guessed at general relations as best they might.

The physics of extreme conditions still awaits satisfactory exploration. The geologist turns to the physicist for help and in most cases meets with the reply: We cannot tell. Astronomers in much the same situation. Astronomers know as little of the distribution of density in the stars or planets as do geologists. Real knowledge of the physics and chemistry of high temperatures would be as welcome to them as to us. After all, physical geology is the astrophysics of this, the only accessible planet. Geodesy, too, and terrestrial magnetism, are waiting for the solution of geophysical problems. How much might be done

Summit County Journal, Breckenridge, Colo., 4 February 1905

…but an *excellent* idea for today.

Somerset Windfarm, Pennsylvania

Advantages of mine redevelopment with wind energy

- Good transmission often in place
- Reduced environmental sensitivity
- Mines often located near good wind resources
- Strip and deep mines both good for wind redevelopment

Buffalo Mountain windfarm, Tennessee

Challenges in redeveloping mine sites with wind

- Biggest obstacle: foundation system
  - Wind turbine foundations are designed to handle enormous foundation loads
    - Wind turbine foundation systems are not capable of tolerating differential settlements induced from mine subsidence
    - Need to work on conditioning of soil and improving foundations
    - Sites often require a ground improvement technique such as deep dynamic compaction (DDC)
- Estimated added cost: 10% of foundation costs

Other matters relating to mine redevelopment

Somerset windfarm, Pennsylvania

- Mines located at depths of 200 or more feet are generally considered deep mines.
- Wind turbine foundations have little or no impact over mines greater than 200’ below the surface

Other matters relating to mine redevelopment, con't.

- Biggest concern with wind turbines over mines (surface or deep) is due to the potential influence of the mine (i.e. subsidence) on the wind turbine
- Records kept by mining companies of subsurface activities often prove to be valuable development tools

Kilronan windfarm, Ireland

Clipper Wind Power's New Argonaut Project

- 51 MW facility located in Needles, Calif.
- Cooperative relationship with Molycorp -- the turbines will built in areas where Molycorp has existing mining claims
- Permitting is easier because land use has already been appropriately zoned/designated
- Concerns: no transfer of liability to wind farm from pollution/spill/environmental claims

Who is the Interwest Energy Alliance?

- American Wind Energy Association
- Coalition for Clean, Affordable Energy
- Colorado Farm Bureau
- Environment Colorado
- enXco
- Foresight Energy
- FPL Energy
- GE Wind Energy
- Grand Canyon Trust
- PPM Energy
- SeaWest Windpower
- Stoel Rives LLP
- Utah Clean Energy
- Vestas-American Wind Technology
- Western Resource Advocates

Interwest's approach…

The Interwest Energy Alliance brings together a unique mix of industry and non-governmental advocacy groups to help facilitate a consensus-based approach to project development throughout the West.

Good communications

- Involve local communities, stakeholder groups, advocacy organizations, utilities, governmental bodies and other players
  - Identify champions
- Try to resolve issues of concern before they make headlines
- Learn from success of other redevelopment projects

Wind energy is cost-competitive and market-ready

- In a 2001 decision, the Colorado Public Utilities Commission declared that the 162MW Lamar windpower facility will "likely lower the cost of electricity for Colorado's ratepayers."
  - Ancillary services deemed not to be a major cost; wind received fair capacity value; new wind energy predicted to cost less than natural gas when gas is above >$3.50 MMBTu

From NREL/CP-500-30551, "Colorado Public Utility Commission's Xcel Wind Decision

Xcel Energy Says Wind Energy Will Save Consumers $4.6 Million

- The new wind farm that Xcel Energy is building near Lamar will save consumers $4.6 million in their power bills.

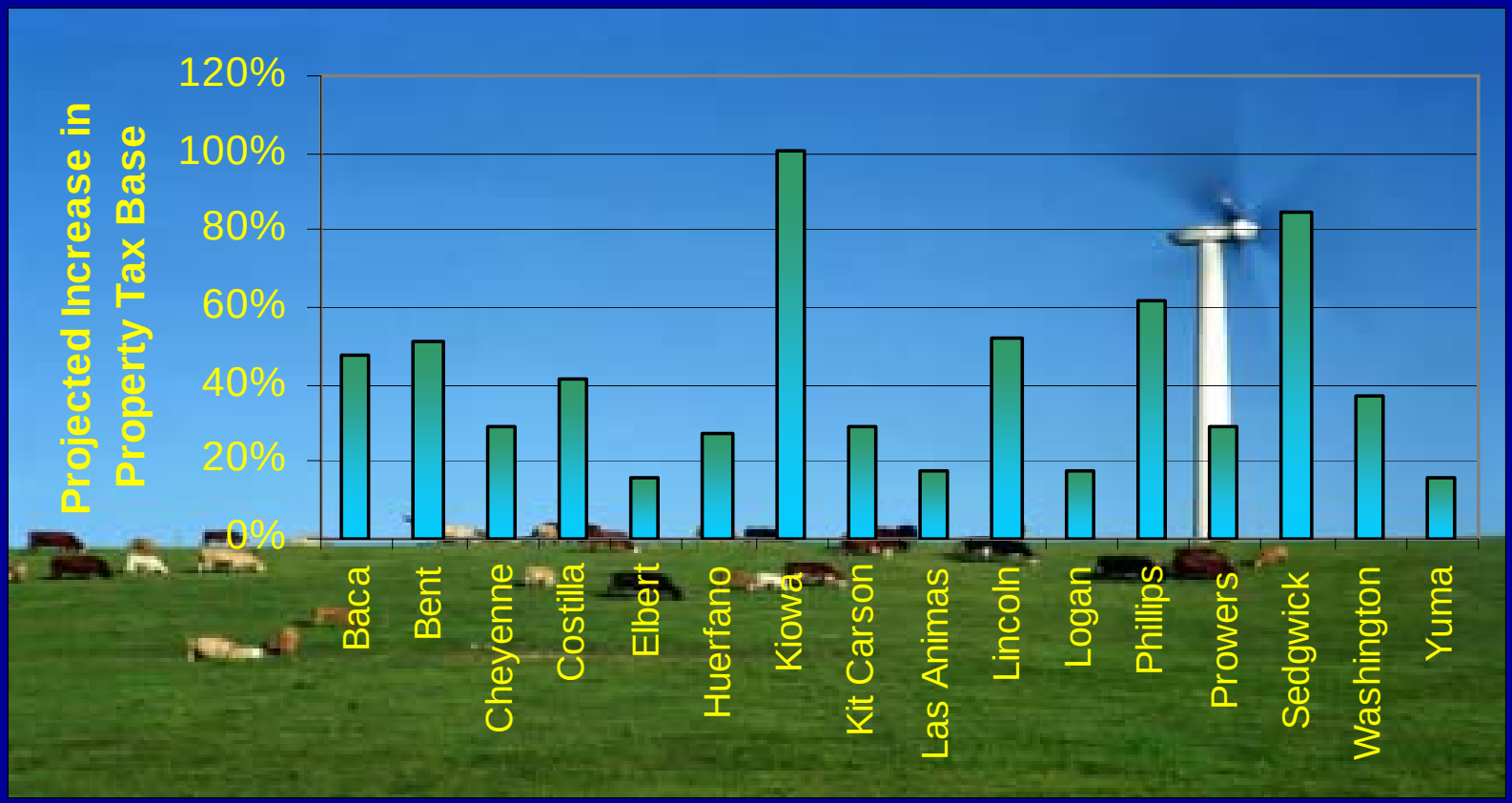
–From Xcel Energy testimony by Ronald Darnell to FERC, 16 June 2003

Site Services for a Typical 100MW Windfarm

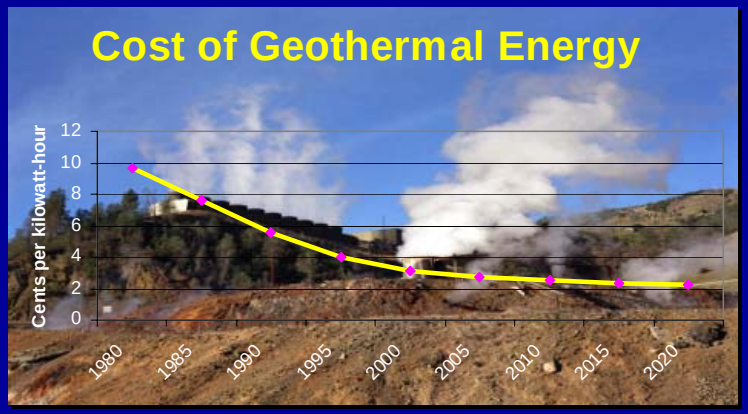
	Man-hours
Turbine & Tower Installation Svcs.	121,080
Concrete Construction Services	72,000
Equipment Transportation Services	42,650
Project Management Services	36,775
Engineering & Surveying Services	25,300
Vendor Field Services	20,535
Road Building Services	18,940
Underground Cable Installation Svc.	17,250
General Labor Services	15,000
Local Material Delivery Services	12,500
Electrical Installation Services	8,770
Concrete Services	6,800
Equipment Repair & Fueling Svc.	6,000
Inspection & Testing Services	5,000
Food Preparation & Delivery Svcs.	3,500
Housing & Lodging Services	3,000
Real Estate & Legal Services	2,800
Communication System Services	1,120
	419,020

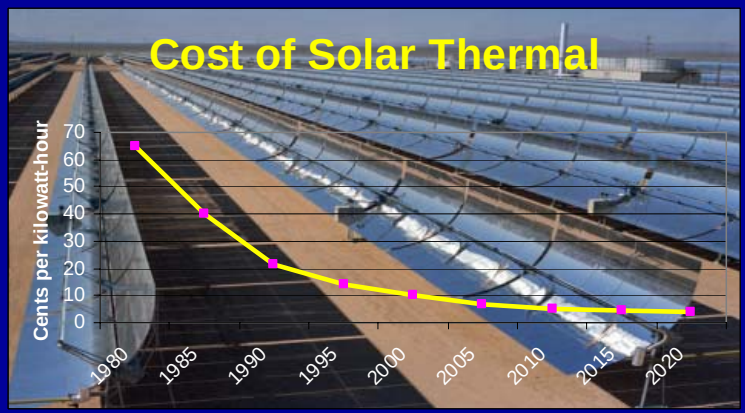
The total site services required for construction of a typical 100MW windfarm is about 419,020 man-hours —equivalent to approximately 53,377 days of work at the site.

Projected Tax-base Increases of a 162MW Windfarm in Some Colorado Counties



Other renewable technologies also experiencing plunges in cost





Source: NREL Energy Analysis Office. These graphs are reflections of historical cost trends, not precise annual historical data.

Thank you!

Craig Cox

Interwest Energy Alliance

www.interwest.org

303-679-9331

Buffalo Mountain windfarm, Tennessee