



Why Your “Apps” Need Minerals

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Why Your “Apps” Need Minerals

- Cell Phone and Tablet Construction
- What is “The Cloud”?
- Energy Types
- Coal and Mineral Discussion
- Summary
- Coal Mining Video



Cell Phone and Tablet Construction



Do you own a cell phone or a tablet?

Cell Phone and Tablet Construction

- Minerals used in construction
 - Arsenic and gallium (gallium arsenide in the amplifier and receiver)
 - Copper, gold, palladium, platinum, silver and tungsten (circuitry)
 - Magnesium compounds (phone case)
 - Barioperovskite (heart of phone)
 - Rare earth elements or REE (magnetic switches)
- Source of minerals – Australia, Belgium, Canada, China, Chile, Morocco, North Korea, Peru, Kazakhstan, Poland, Portugal, Russia, Spain, Mexico, Turkey, USA and many more countries

Cell Phone and Tablet Construction

Mining methods

Surface bench wall

What does sand
and gravel have
to do with
anything



Cell Phone and Tablet Construction

Mining methods

Underground hardrock



Cell Phone and Tablet Construction

Mining methods

Underground coal (soft rock)



Cell Phone and Tablet Construction

Mining methods

Open cut

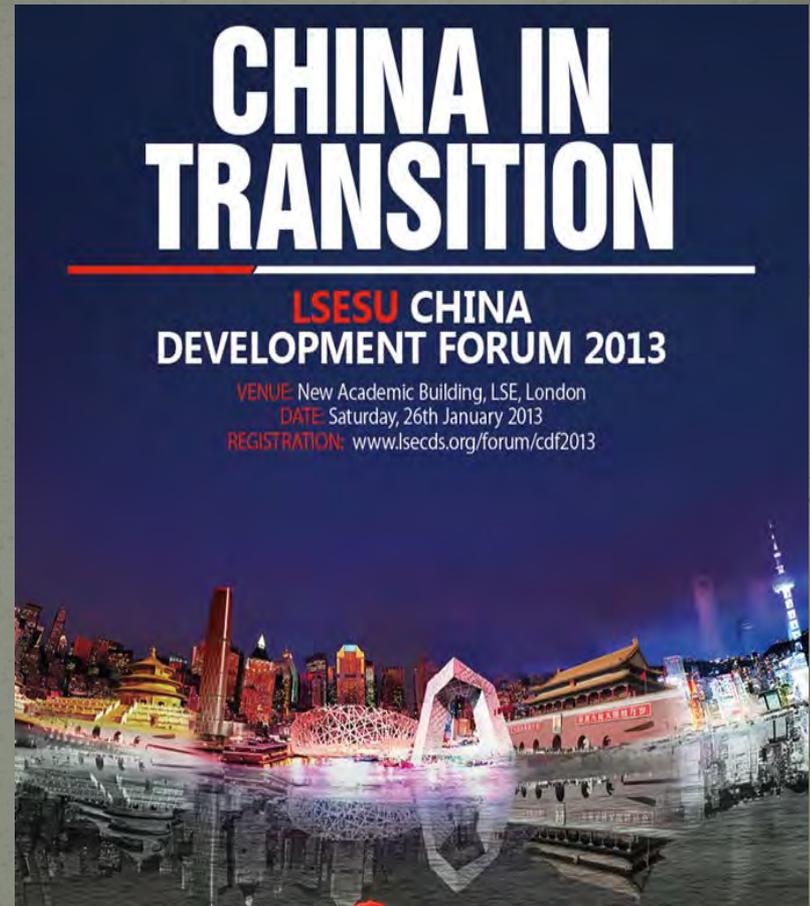


Cell Phone and Tablet Construction

Do minerals help set the cost of your phone?

- World based markets
- Supply and demand
- China example (2006)
 - Size similar to USA
 - Population six times USA
 - Top three world producer of 15 strategic raw material
 - Not enough as of mid-1990s
 - Recently cut exports of REE

**As mineral supplies diminish and world demand increases
– what happens to material costs?**



What is “The Cloud”?



What is “The Cloud”?

In today’s times, “The Cloud” takes on a whole new meaning...



- Cloud computing – sharing resources over a network
- A set of many computers – provides more storage
- Microsoft finishing construction of data center (“The Cloud”) in Cheyenne, Wyoming.

In addition to the energy already required to power infrastructure, “The Cloud” also needs energy to function!

WHY WYOMING??

Low electricity cost

Cooler climate

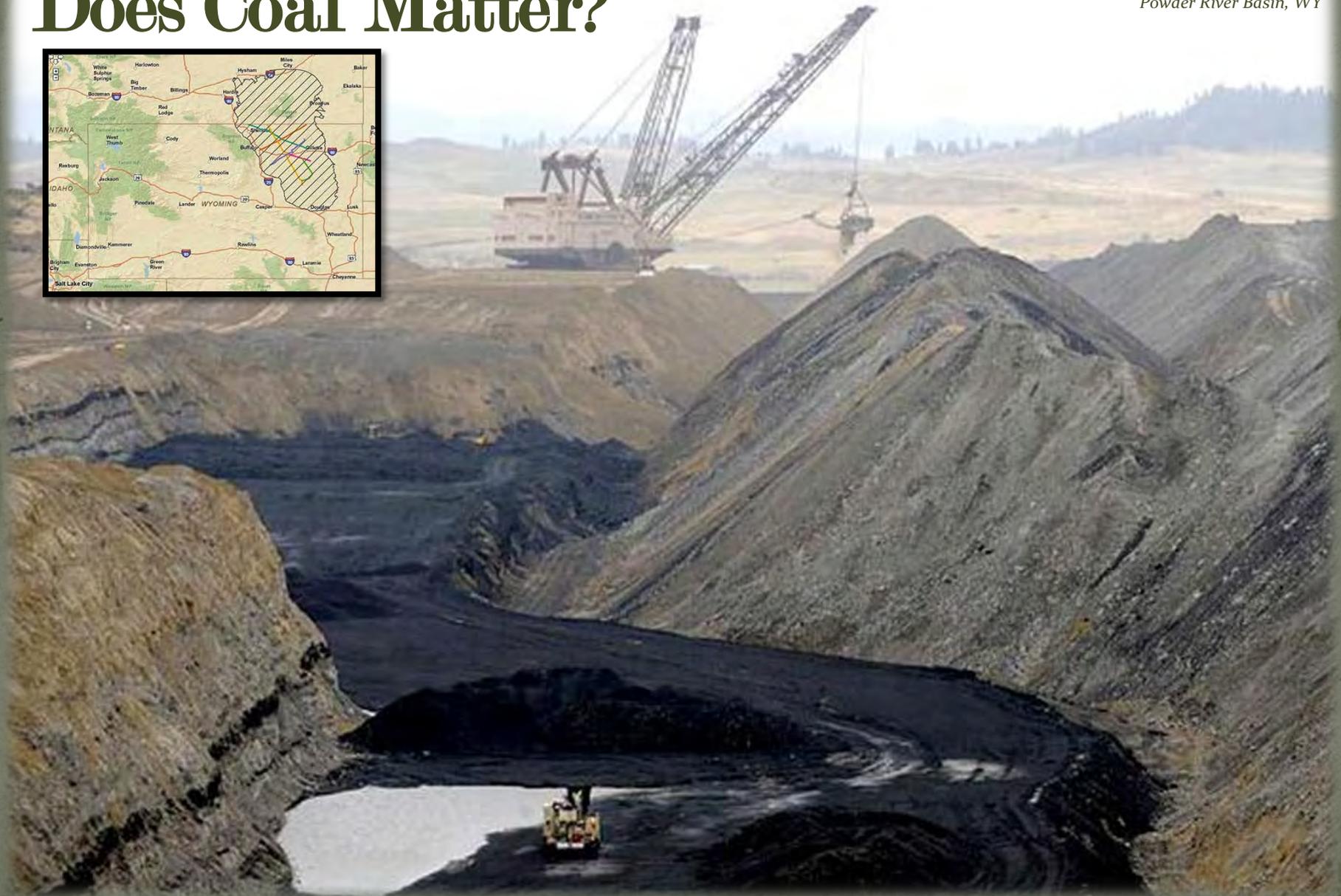
Close to fiber optic clusters

Off grid

State incentives

Does Coal Matter?

Powder River Basin, WY



Energy Types

- Coal
- Oil and gas
- Solar
- Wind
- Hydro
- Nuclear
- Geothermal
- Methane
- Combustibles – such as wood, pellets, etc.
- Bio Fuels – such as diesel, ethanol, etc.

Coal and Minerals Discussion

Why the bad reputation for coal?

- “Old way” of doing things
- Pre-regulation issues at mine sites
- Burning coal is “dirty” and pollutes the air
- Runoff from mine sites pollutes water
- Scars the landscape

Coal and Minerals Discussion

Why the bad GOOD reputation?

- New technology and methodology is cutting edge
- Coal industry initiated a lot of the mining regulation today that governs worker safety, impacts to environment and final reclamation practices
- Power plants under significant regulation to control emissions and waste related to mercury, sulfur and fly ash
- Water discharge permits require extensive sampling and monitoring
- Extensive bonding and reclamation required

Coal and Minerals Discussion

Other energies better? Other considerations?

- Energy cannot be “harvested” without infrastructure – equipment, roads, processing plant, delivery methods, etc.
- Materials source?
- What makes sense for needs and site specific situations? One size might not fit all.
- Need energy portfolio to accommodate site specific needs, mineral availability, energy availability, etc.
- Regulations in America the same elsewhere?

All forms of energy development construction are reliant on minerals!

Summary

- Modern day lifestyles depend on apps
- Apps need cell phones and tablets to work
- Cell phones and tablets require energy to be manufactured and operated
- Energy “harvesting”, manufacturing processes and our modern day lifestyles could not occur without.....

MINERALS!

References

- Google images: Colowyo mine, Powder River Basin, Twentymile Coal mine, New Zealand mine
- Minerals Education Coalition:
<http://www.mineralseducationcoalition.org/>
- Colorado Geological Survey:
<http://geosurvey.state.co.us/Pages/CGSHome.aspx>