

## Meeting minutes: 9/12/2018

Present:

Jakob, Emily, Ray, Dr. Rezaie, Austin

End Tasks:

Jake and Emily: Research on Geothermal energy plants (various working temps for different types of systems)

Jake and Emily: Come up with a few ideas for heating CO<sub>2</sub>

Ra- Can we move sunlight?

↳ J- 2 options:

- Fresnel lens
- Copy Ivan Pah

Major problems

- Concentrate Sunlight ← fresnel lenses concentrate sunlight. 5in to 2 in.
- Avoid thermal Shock

Ray-high temperature is bad. Instead of shining sunlight off mirror then move around. Heat CO<sub>2</sub> Up top then move down- Then the mine can be back filled W/ co<sub>2</sub> b/c the ground is porous)

- no expectation for the temp.
- co<sub>2</sub> b/c it has better heat capacity and b/c of CCUS (carbon capture use and storage)

Re-This is more focused and Simple

A- There is a lot of research being done on this project

Ra-Siemens owns Dresser Rand who owns McIntosh CAES who might be willing to help  
Adaption of Ivan Pah → the top tower has essentially upside down Hershey kiss to focus the sunlight

J- heating the CO<sub>2</sub> seems to solve quite a few of the problems

We can keep the spot light on the plate and keep heating it w/o having to worry about keeping the angle of incidence

Action: Need to do quick Study on efficiency of moving sunlight or moving heated gas?

Ra-We will need to line the pit with clay (b/c it's impermeable), then we can figure out how to move the gas to be more efficient

The-Is there another pipe for it to go out for the flow?

Ra-

- dirt has 20% empty spaces
- Re-We need pump to move gas (Ra-McIntosh moves gas for e. storage)
- E. Will it be sustainable over the summer?

Re- Get extra Sunlight during the summer to sustain project during the winter

E- Kalina powerplant as low as 100C

- look up Organic Rankine Cycles (use fluid that boils@lower temp)

Ra- mined waste rock has heat capacity of 800 J/kgK

Ja- What are the current Sites?

- Ra-Rosebud mine near Col strip MT is the first location. They move 50 million tons /yr  
↳ Depth: 50M upper area: presumably infinite

Top priority is to use this for Coal plants b/c the image of coal needs to be fixed

↳ eventually when the mine closes, there will be an e. plant underneath W/ greenhouses from lost heat

Possible permeable layer, (channels) W/ ceramics and different grain sizes to allow gas flow  
Coal ash abundant in the US → might as well make ceramics out of it  
Re-Need to calculate difference between closed loop or Open loop when pumping down .  
the gas. Where the best location for in (hot side) is?