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Lost Power Production from Temperature Degradation

Planned Power Plant uses 232°F Geothermal Water & produces 1,000 kW

Mixing of Water is predicted to degrade the temperature of the resource by 20°F to 212°F

This **will**

(1) reduce the Power Plant thermal efficiency from 7.05 to 5.29%
(2) reduce the net power from 1,000 kW to 750 kW
(3) increase the cost of the new power plant by 25%

Harm

Immediate **$1.0 Million** (Power Plant more expensive by 25% -- Requires larger heat exchangers and turbines because less temperature and pressure) $5 Million dollar cost versus $4 Million

Long Term **$11.2 Million** (Power Costs at $0.10493/kWH, 3.2% escalation, 30 years)

Total Harm: $12.2 Million (Plus potential Fuel Cost Adder by the Electric Utility)

Lost Power Production from Temperature Degradation

Reduction of Efficiency Based on Temperature is well known:

Carnot Heat Engine Law

Other Power Plants (@ 195°F resource efficiency is 3.8%)

By Linear Interpolation a 212°F yields an efficiency of 5.3%, which causes a 25%

reduction in net power.

Cost of Power in the Region is $0.10493/kWH for Agriculture Operations, Columbus Electric Cooperative, there is also a fuel cost adder and poses an unknown risk passed on from the utility to the businesses

Average Electric Power Increase for per year for the last 12 years is 3.2%

Using $0.10493/kWH escalating at 3.2% per year the loss of 250 kW requires $11.2 Million more expenditures over the 30 year life of a typical power plant.

Quantifiable Harm

Immediate **$1.0 Million** (Power Plant more expensive by 25% -- Requires larger heat exchangers and turbines because less temperature and pressure) $5 Million dollar cost versus $4 Million

Long Term **$11.2 Million** (Power Costs at $0.12/kWH and 30 years (Plant life))

Total Harm: $12.2 Million