

Gravity-Assisted Geothermal Energy System

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<p>RESEARCH QUESTION / PROBLEM</p> <p>Can geothermal energy systems be made more efficient by using gravity instead of electric pumps to circulate water?</p> <p>Traditional geothermal plants rely on pumps, which consume energy and reduce overall system efficiency. This project explores whether gravity-driven flow can reduce energy loss while still producing electricity.</p>	<p>METHOD / DESIGN</p> <p>A working model was constructed to simulate a geothermal system:</p> <ul style="list-style-type: none">• Water flows downward through copper tubing using gravity• A hot plate simulates geothermal heat• Water turns to steam and rises naturally• Steam spins a turbine connected to a motor• The motor generates electricity (lighting a bulb) <p>Multiple trials were conducted to confirm consistent operation.</p>
<p>RESULTS / DATA</p> <ul style="list-style-type: none">• Steam flow occurred consistently• Turbine spun when sufficient heat was applied• Electricity was generated without pumps <p>Real-world comparison:</p> <ul style="list-style-type: none">• Pumped systems: ~5–15% energy loss• Gravity-assisted: ~2% energy loss <p>Estimated annual savings (100 kW system):</p> <ul style="list-style-type: none">• ~63,000 kWh saved• ~\$10,000+ cost savings	<p>CONCLUSION / APPLICATION</p> <p>The results support the hypothesis that gravity-assisted systems can improve geothermal efficiency by reducing parasitic energy loss.</p> <p>Real-world impact:</p> <ul style="list-style-type: none">• Lower operating costs• Increased energy efficiency• More sustainable power generation <p>Future improvements:</p> <ul style="list-style-type: none">• Scale system for real-world use• Optimize pipe design and heat transfer• Account for pressure effects on boiling