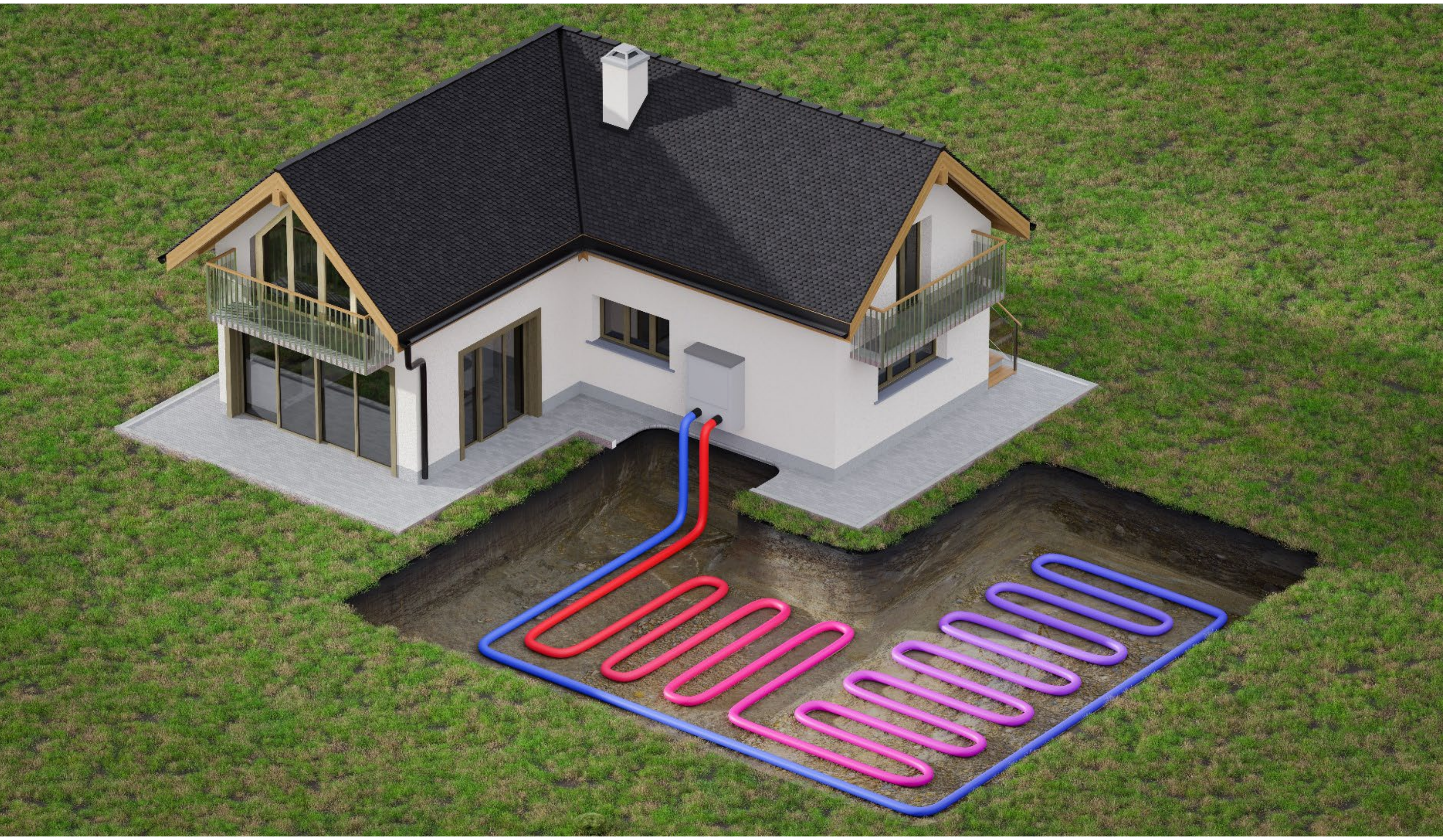

Ground-Source Heat Pumps Cost Reduction Opportunities and Strategies

Market Characterization

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Prepared By
Dunsky Energy + Climate Advisors

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Executive Summary

Illinois has adopted some of the most ambitious climate and decarbonization policies in the United States, creating the potential for electrification pathways that extend well beyond current market driven forecasts. As heating electrification accelerates, ComEd could transition toward a dual peaking or winter peaking utility within the next 10 to 15 years, fundamentally changing how peak demand is managed and creating new grid planning challenges and opportunities.

Despite favorable ground conditions and climate for ground source heat pump (GSHP) performance, adoption through ComEd programs remains limited. High upfront costs and an uncompetitive customer business case relative to gas heating and air source heat pumps remain the primary barriers. Without intervention, the GSHP market is expected to slow further as the Inflation Reduction Act residential incentives are phased out at the end of 2025. GSHP adoption among income eligible and affordable housing segments is also unlikely to scale in the near term, as more immediate housing and energy needs take priority.

This paper explores options and pathways to improve the business case, and thus the adoption, of GSHPs as an energy efficient beneficial electrification solution in Illinois. It finds that optimization can reduce GSHP installation costs but are unlikely to make systems fully competitive under current market conditions and incentive levels. The greatest cost reduction potential lies in right-sizing system designs and optimal drilling techniques, with additional savings possible where site specific conditions allow for lower cost heat exchanger configurations such as horizontal loops, standing well columns, or open loop systems.

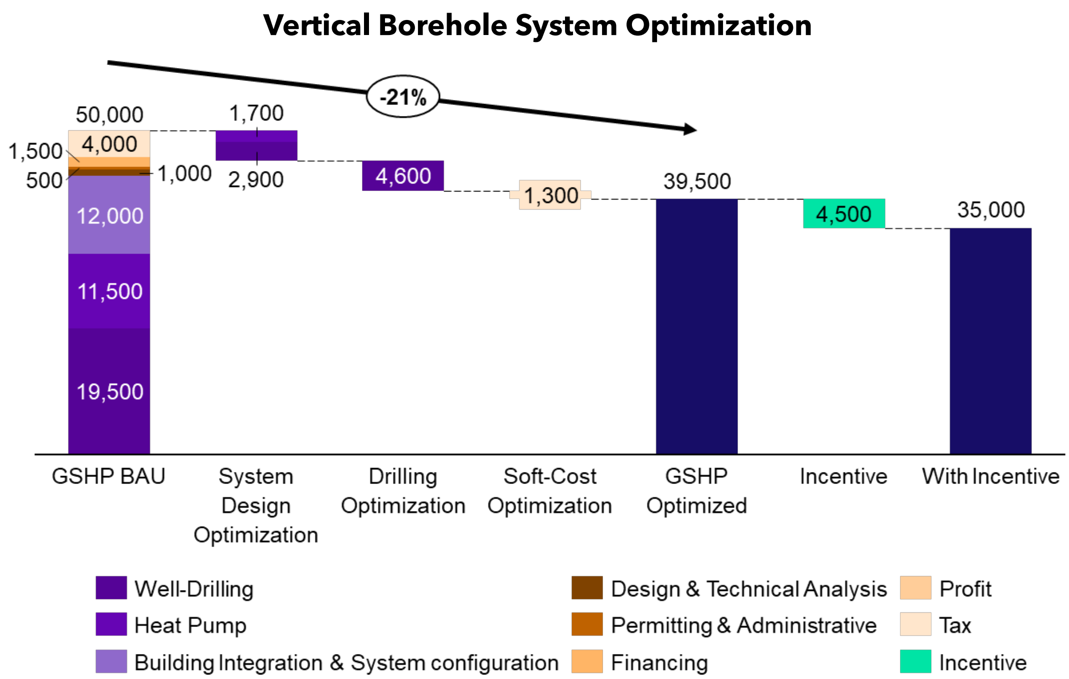

Figure 1 - Vertical Borehole GSHP Cost-Optimization Results – New Construction Single-Family Home

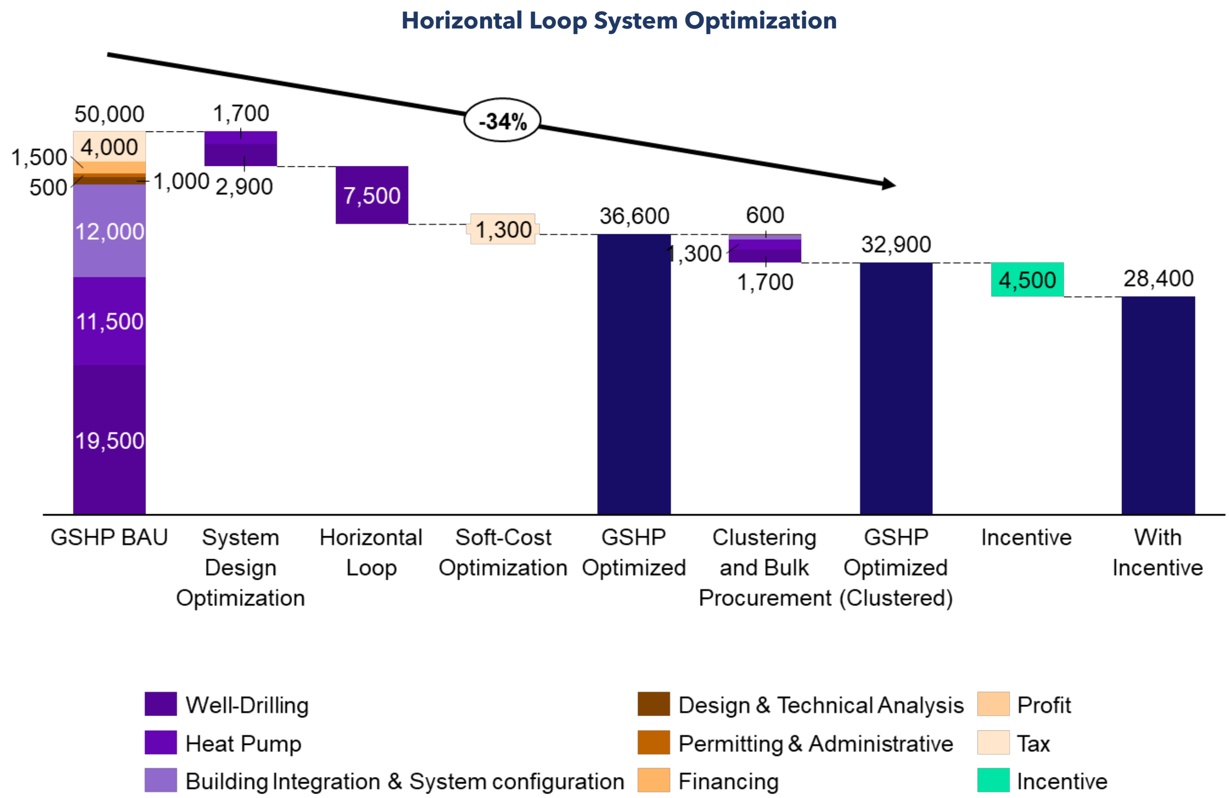

Figure 2 – Horizontal Loop GSHP Cost-Optimization Results – New Construction Single-Family Home

Beyond cost optimization, experience from other jurisdictions demonstrates that sustained policy and utility engagement can drive meaningful GSHP market transformation, leading to broader uptake. Switzerland offers a particularly relevant example, where long term, consistent strategies have enabled adoption to scale significantly. Utilities have played a central role by aligning incentives with grid and decarbonization benefits, offering heat pump friendly rates, and combining financing with incentives to level the playing field with gas and air-source heat pumps (ASHP) systems.

From a grid perspective, GSHP deployment can deliver significant value to ComEd by reducing electricity consumption, and peak demand. Under current conditions, the benefits of the avoided capacity could reach approximately $4,900 per installation in summer and nearly $12,800 in a winter peaking regime, however, too few of these benefits are passed on to customers considering a GSHP system to make a compelling business case.

Customer Benefits < Utility Benefits

Acting now would allow ComEd to use the next 10 to 15 years to deliberately scale a mature and resilient GSHP industry, aligning customer adoption with the long-term grid value that these systems offer under winter-peaking future. The report concludes with a recommended market approach grounded in stakeholder input, state policy direction, and current market realities.

Recommended Approach to GSHP Market

1. **Determine the role GSHPs can play in ComEd's electrification strategy.** Whether electrification is market-driven by economics and regulations or commercially driven by business growth ambitions, ComEd needs to carefully assess peak-demand pathways to understand the opportunities and value proposition GSHPs could unlock under various scenarios. The results should clarify GSHPs' "true" grid value and guide GSHP incentives over the next decades to mitigate grid investments and risks.

   Increasing heating electrification adoption will impact ComEd's GSHP strategy. For instance, projections that lead ComEd to become a dual- or winter-peaking utility, such as the heating electrification levels that align with Illinois' stipulated statewide decarbonization targets under CEJA, underscores the importance of accounting for winter peak mitigation benefits. In contrast, in a low electrification scenario, mitigating summer peak demand remains the primary focus, particularly by addressing cooling and domestic hot water needs.

2. **Build the GSHP industry where scaling is easiest, starting with new construction and major retrofits.** New construction projects improve the overall economics of GSHPs by enabling higher installation volumes and simpler on-site integration. Focusing on large developments — such as subdivisions of single-family homes or sizable multifamily buildings — offers an opportunity to scale GSHP adoption to levels that are largely unattainable in the existing building stock. Concentrated demand would create a strong, predictable pipeline for installers, drillers, and contractors, helping to reduce costs, streamline deployment, and improve system performance.

   Prioritizing GSHP deployment in new construction does not imply slowing or abandoning heating electrification in other market segments. Instead, it allows the industry to build GSHP capacity while more carefully evaluating where GSHPs are best suited in existing buildings relative to alternatives such as gas heating systems, dual-fuel systems, and ASHPs. In the interim, given the significant mismatch between summer and winter demand peaks, ComEd should continue advancing heating electrification by supporting ASHP installations in existing buildings until a more sustainable long-term GSHP strategy for the existing building market is established.

3. **Actively support the development of the GHSP industry.** Once ComEd identifies the value proposition of GSHPs and priority market segments, ComEd should engage leading construction firms and GSHP industry stakeholders to better understand the key barriers to widespread adoption and to identify the most effective drivers for implementation.

   Aligning GSHP programming with industry needs — through adequate incentive levels and streamlined program design — is likely the most critical element of ComEd's GSHP strategy. In particular, programs should focus on leveling the playing field with gas heating systems and ASHPs while also de-risking GSHP investments by improving cost and performance certainty and aligning financing with actual energy savings.

   As a secondary, but still important, priority, ComEd can further support market development by encouraging innovation and ensuring system quality through robust yet inclusive program requirements. For example, supporting and participating in geothermal network pilot projects could be a high-impact activity that advances multiple strategic objectives simultaneously.