

# Case Study: Diesel-Powered Excavators Compared to Alternative-Fuel Hybrid Excavators

Corey McGrillen, and Jason Hailer, PhD.

California Polytechnic State University - San Luis Obispo  
San Luis Obispo, CA

The construction industry is constantly evolving and developing equipment that is more efficient, materials that promote sustainability and practices that emphasize lean construction principles to enhance productivity on projects. Modern day construction projects have become heavily reliant on these ideals due to the highly competitive nature of the industry. In regards to heavy civil construction, specifically the underground utilities market, equipment costs count for a large percentage of overall project costs. Reducing these costs allows a contractor to be more competitive. As the focus on infrastructure construction continues to grow and expand, many heavy civil contractors are turning to an alternative fuel option for heavy equipment to reduce operating costs and emissions. As a result, many heavy equipment manufacturers have invested into the production of hybrid heavy equipment for these purposes. Conversions from conventional diesel equipment to hybrid equipment have proven savings in operating costs, but for some contractors the more expensive ownership costs do not result in a more efficient machine.

The objective of this study is to (1) Provide new knowledge to underground utility contractors in regard to purchasing hydraulic excavators; (2) Analyze the financial and environmental aspects of purchasing either type of equipment, hybrid powered in lieu of diesel powered; and (3) Provide information about the feasibility of implementing a hybrid power hydraulic excavator into the fleet of underground utility contractors. A comparative analysis of the Kobelco SK210 diesel power hydraulic excavator to the Komatsu HB215 LC-1 hybrid powered hydraulic excavator to determine operational effectiveness and return-on-investment.

Preliminary results are pending based on in-person interviews with organizations that are utilizing and/or researching the hybrid options, to be conducted prior to the end of the academic quarter Fall 2017. However, anticipated results will be that the current hybrid hydraulic excavators will not meet the overall effectiveness of the diesel-powered versions but that companies will still invest due to their commitment to the triple-bottom line effects. Relaying the experience and the industry reaction of hybrid hydraulic excavators from an academic, rather than sales perspective. The intention is to reach a wider audience of practitioners with “real-world” applications and current data regarding equipment efficiency, productivity and environmental impact.

**Keywords:** Underground Utilities, Hybrid Hydraulic Excavators, Equipment Costs