Author(s): Morvarid Farid

Title: Operationalization of Aerial-Based Methane Detection Technology at Utility Companies

Term: Fall 2020

Department: Industrial and Manufacturing Engineering

Abstract: California Public Utilities Commission (CPUC) passed Senate Bill 1371 in 2014 with an overall goal to reduce methane emissions by 40% by 2030. Utilities are mandated to implement mandatory best practices and report on their annual emissions to avoid penalties. As a part of this initiative utilities are actively looking for opportunities to enhance their systems and implement new technologies in response to Senate Bill 1371.

There are aerial-based technologies available for utilities to proactively find methane plumes. The aerial-based technology presented in this report uses LiDAR technology mounted to a helicopter. It identifies leaks on systems sized 10 CFH or larger and detects emissions on customer-owned facilities from houseline leaks and incomplete combustion from gas-fired equipment. However, this method does not replace the traditional walking survey as it does not detect small leaks.

This report intends to help utilities operationalize this type of technology efficiently. There are three main problems identified. One is the scheduling part of these flight operations in a way that don’t overload the operational groups. The second is how the plans are effectively communicated with these operational groups. Third, how leadership can be more effective and efficient in this implementation. Lastly, how much does this technology cost and how can it be reduced.

To solve problem one, a linear programming model is introduced to best sequence flight areas and schedule resources. The model minimizes the number of days flown consecutively for all districts, allowing time between flight operations in any district. This way, the impacted districts can handle and complete work orders before receiving the next batch of data. Following this methodology will allow utilities to reduce their costs. The second problem is addressed by implementing project management tools and techniques to develop a communication strategy for external and internal communications. Followed by recommendations for leadership and a cost analysis.

Keywords: leadership, communication, linear optimization, cost estimates/forecasts

Committee Chair: Dr. Kamran Abedini

Committee Member(s): Donna Ghalambor, Dr. Javad Seif