IEA Task 37 on System Engineering in Wind Energy The Wind Farm Optimization Only Case Study

Nicholas F. Baker*, Andrew P. J. Stanley†, Jared Thomas‡, and Andrew Ning§

May 2018

1 Introduction

This document defines a simple wind farm layout optimization competition. Participants are directed to use whichever computational optimization strategies they choose, with the goal of obtaining the maximum Annual Energy Production (AEP) from the defined turbine field. Participants will adjust resultant AEP exclusively by manipulating turbine locations. In this case study the wind farm boundaries, wind turbine attributes, and wake model physics are fixed - turbine locations are the only design variable participants are permitted to alter.

In order to measure scalability of the methods utilized, three wind farm scenarios of increasing size are presented. They grow in both number of turbines and overall farm area. The goal of this competition is to compare participant results when using different optimization strategies under a single wake model, in order to determine a set of best computing practices for the field.

While this wind farm scenario is very simple, we expect the results to assist researchers in understanding the differences that occur due to optimizing wind farms with various numerical methods. A greater understanding of this simplified problem is expected to aid in solving and interpreting the results of more complex and realistic problems.

*Masters Student, Brigham Young University Department of Mechanical Engineering
†Ph.D. Candidate, Brigham Young University Department of Mechanical Engineering
‡Ph.D. Student, Brigham Young University Department of Mechanical Engineering
§Assistant Professor, Brigham Young University Department of Mechanical Engineering