Supplementary Material

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1   Overview

This document provides supplementary material for the paper *Imporace subsampling: improving power system planning under climate-based uncertainty* (2019). The demand timeseries used in the paper's test case is based on a regression and, when obtaining 36 years of demand data, the error term in the regression is truncated. This has the effect of reducing variability.

In order to check that *importance subsampling* also works for a demand timeseries for which this is not the case, metered UK-wide demand data is obtained from the *National Grid Data Explorer* for each hour in 2006-2015. Long-term anthropogenic demand trends are removed using a linear detrending function with the same slope as that used in the paper. However, no other adjustments are made, and the demand timeseries is not based on a regression.

Plots of the optimal capacities, *hours of unmet demand* and *extra system cost* in exact correspondence with the paper are shown below. The results are broadly the same as those found in the paper. Hence, *importance subsampling* also "works" when applied to a demand timeseries not based on a regression.
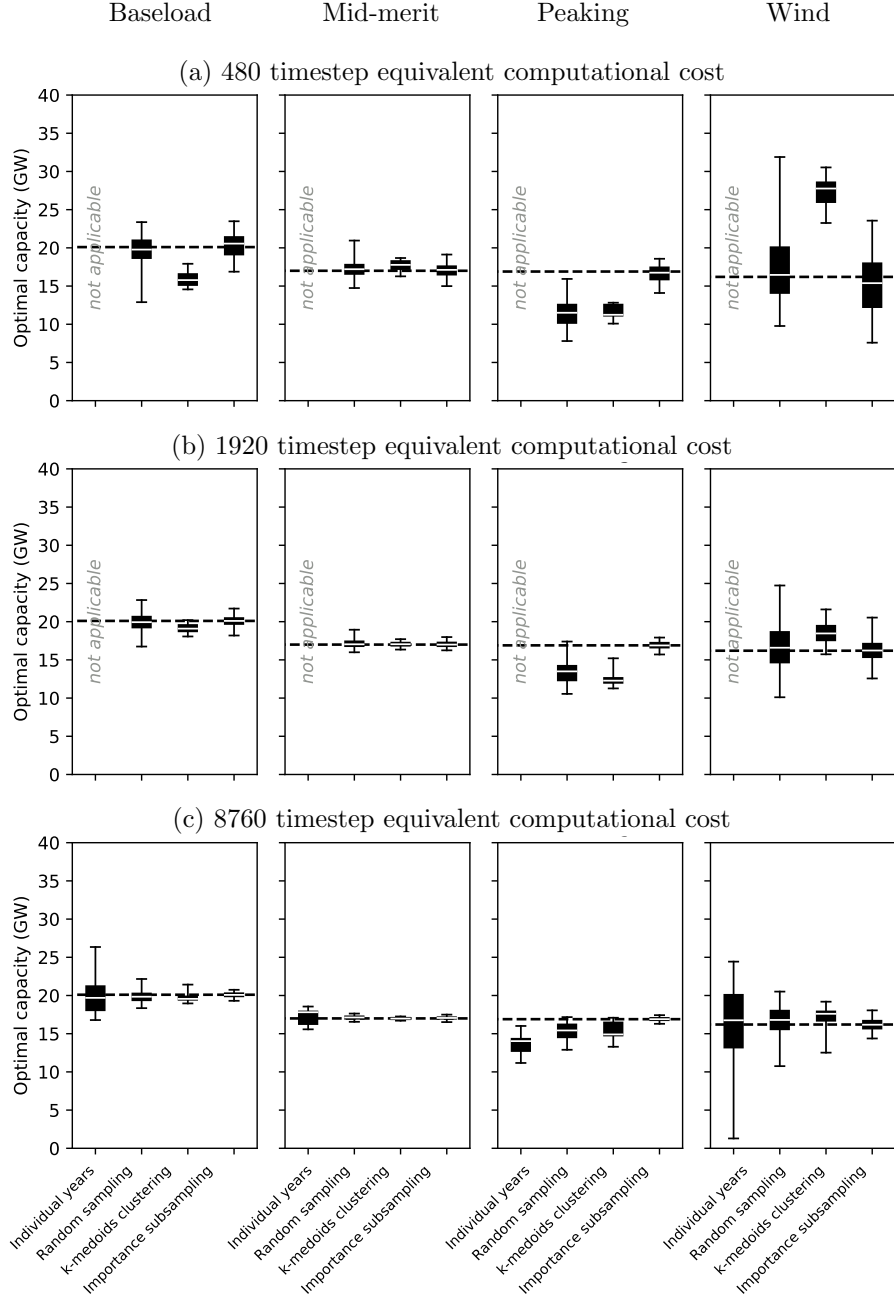
2   Results

Figure 1: Distribution of optimal capacities for different subsampling methodologies. The box shows the 25th, 50th (median) and 75th percentiles, while the whiskers show the 2.5th and 97.5th. The dashed line indicates the optimal capacities across all 10 years of data: the best estimate of the "true" optima and the target under subsampling.

Hours of unmet demand

Extra system cost

(a) 480 timestep equivalent computational cost

(b) 1920 timestep equivalent computational cost

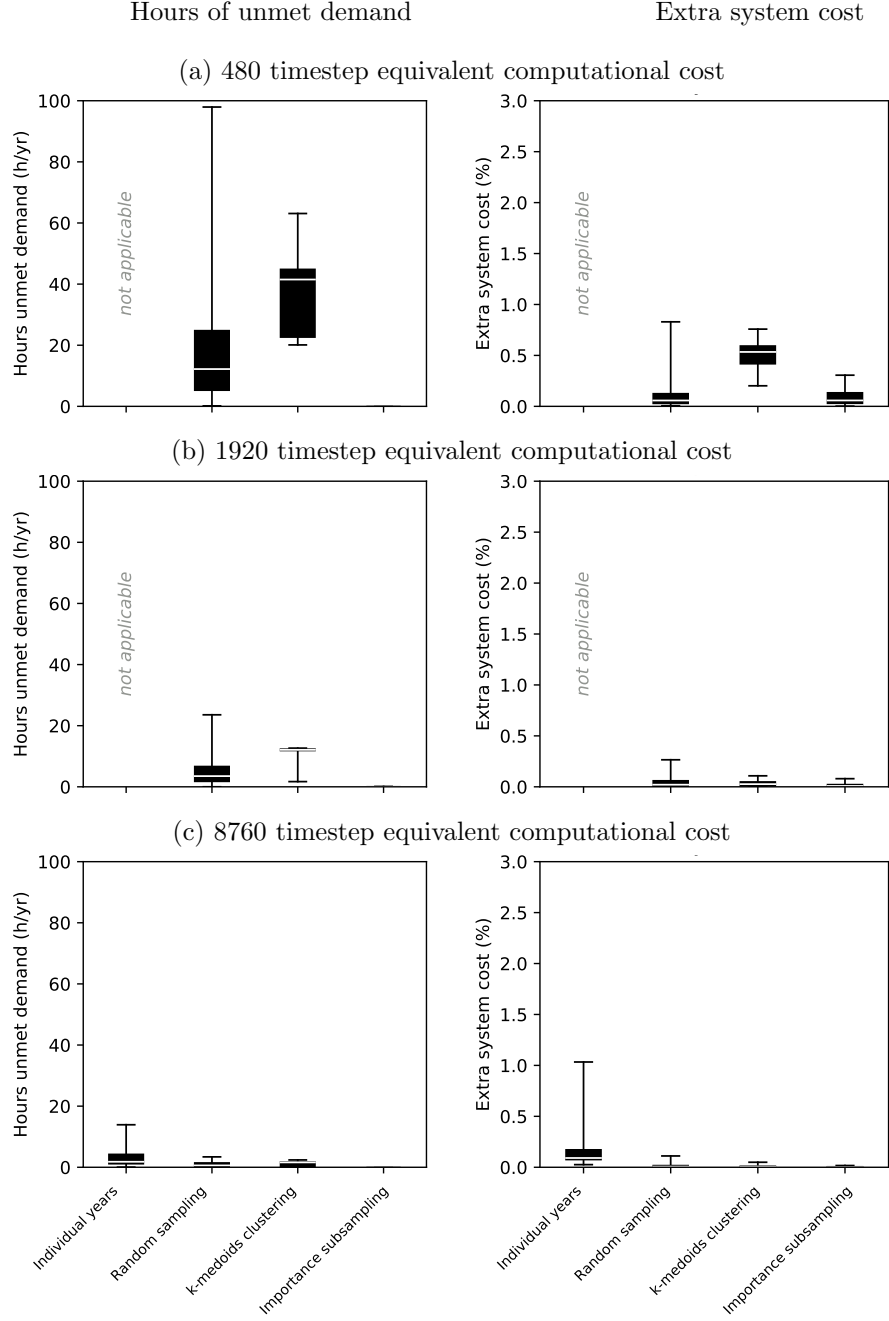(c) 8760 timestep equivalent computational cost

Figure 2: Distribution of *hours of unmet demand* and *extra system cost* for different subsampling methodologies. The box shows the 25th, 50th (median) and 75th percentiles, while the whiskers show the 2.5th and 97.5th.

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