The Water Utility Energy Challenge
The Water Utility Energy Challenge aims to reduce the emissions that result from generating the electricity used by water utilities. Six water utilities selected from a pool of applicants in the Great Lakes area were provided with tools for timing their electric loads for low emission rate times. The following focuses on the project’s methods for benchmarking the competitors’ performance before and after implementing the Locational Emissions Estimation Methodology (LEEM) tool.

Electric Load Optimization
- Spatially optimizing electric loads has shown emission reductions of 3-6%.
- Optimized timing of household appliances has shown emission reductions of 21-35%.
- Water utilities make up 2% of the USA's annual electricity usage.

Approach
The Great Lakes Water Association and Ann Arbor water utilities’ backwash schedules were used to determine the effect of optimizing the timing of massive pumps used to wash filters that clean the water they distribute. This was accomplished through a process I developed:

1. Gather water utility operation data.
2. Gather LEEM data for operation time period and location.
3. Combine operation times with corresponding emission rates (lbs/MWh).
4. Develop benchmark from previous performance.
5. Determine effect of LEEM.

Results

<table>
<thead>
<tr>
<th>Emissions Type</th>
<th>Benchmark lbs</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hg</td>
<td></td>
<td></td>
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<tr>
<td>Pb</td>
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<tr>
<td>NOx</td>
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</tbody>
</table>

The method developed produced results showing emission reductions from optimized operation timing, accomplished without compromising service quality or customer satisfaction. Baseline construction being a confounding aspect of determining competition winners, it is essential to next design a way of accounting for size, resources, and available generator types.

Conclusions

Acknowledgments
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