

Process Improvement Project - Problem Definition

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A. Problem Statement

How can I lower my electric bill?

The average electric bill for Falls Church, VA is \$124 per month on average, with each household using 1,117 kWh/month on average (*Electricity Local*).

However, even the cheaper monthly bills received at this residence are above \$180. This is likely due to our above-average power usage of 1383 kWh/month. That is about 24% above the average for this area.

This is despite the fact that the household is likely unoccupied for over 6 hours a day, and is a modern townhouse with new appliances situated between two other townhouses, all factors of which should provide lower-than-average heating and cooling expenses. This above-average bill is a problem for myself and the other tenants, who wish to save money and who see conserving energy as a benefit.

B. Business Impact

This problem should be fixed because it is costing the tenants money unnecessarily. Benefits from identifying the causes of the above-average bills go beyond saved money on the bills directly, as it could improve appliance lifespans by reducing their workload, and have a positive environmental impact.

The key impact in this case is money. Money is also the primary output in the equation to reduce costs. Energy (kWh/mo) and money are directly related in this case, as the rates charged for power used is also directly related to the amount of energy used. Appliance wear can also play into this equation, but may be difficult to measure and is beyond the scope of this project.

Rates charged per kWh vary from quarter to quarter, but in general, fewer kWh used means less money. This is true on a yearly basis, and prices from past years can be compared as long as the comparisons are drawn between quarters with the same billing rates.

C. Goals

There are two goals outlined for this project. The first would be a reduction in the electric bill by **12%**, which halves the difference between the average electricity use in the Falls Church area, and our own current average use. The second goal is like it, and is for a **24%** reduction in energy use. This would place the bill at the same cost/energy-use as the average for households in the area. The final numbers for these are:

Year average:

0% reduction (current state) - 1,383 kWh/mo

12% reduction (goal) - 1,217 kWh/mo

24% reduction (stretch goal) - 1,117 kWh/mo

Month of November, which was also the cheapest month on record from last year:

0% reduction (current state) - 834 kWh/mo

12% reduction (goal) - 734 kWh/mo

24% reduction (stretch goal) - 634 kWh/mo

Month of December:

0% reduction (current state) - 1,268 kWh/mo

12% reduction (goal) - 1,116 kWh/mo

24% reduction (stretch goal) - 964 kWh/mo

D. Project Scope

This project shall encompass the tenant's use of major appliances and their settings within the household. Replacement of appliances, and major house repairs/renovations will not be in this scope. This is due to the nature of the tenant arrangement, where the tenants are only renting, and so cannot directly change out major appliances or make large house renovations for the purpose of a data analysis project. However, the findings in this project may be put forth to the landlord to then make changes, which could lead to further data analysis. External factors will also be tracked to determine their effect upon the process. This will include things like weather, including (but not limited to) temperature. The amount of wear on an appliance may also play a part in the benefits of reducing electricity usage, but is outside of the scope of this project because it is difficult to measure at the scales and small population we are working with.

This scope will begin with the decisions of the tenants, as well as the external factors affecting the house that each results in a use of electricity. The scope concludes with the amount of electricity used, to include the finances that then result from the use of this electricity.

E. Team

The process owner for the electric bill is comprised of four tenants. Each of these tenants make decisions affecting the amount of electricity used on any given day. Some tenants have different

preferences or unique situations within the process. For example, some tenants live on higher floors than others, and have different heating and cooling concerns because of this. One of these tenants (the one typing these project details) is the champion of this process and the owner of the electric bill responsibilities. He is taking the lead on the analysis of the problem, and will be working with each of the other three tenants to identify current preferences and process details.

F. Project Plan

Define - By Oct 5, 2019

Identification of problem, customers, scope, goals, and resources

Measure - By Oct 12, 2019

Identification of system inputs. Development of definitions, data collection plans, validation of measurement system, and collection of a data baseline.

Analyze - By Nov 16, 2019

Creation of null and alternative hypothesis statements, and identification of relationships between identified inputs and outputs.

Improve - By Nov 23, 2019

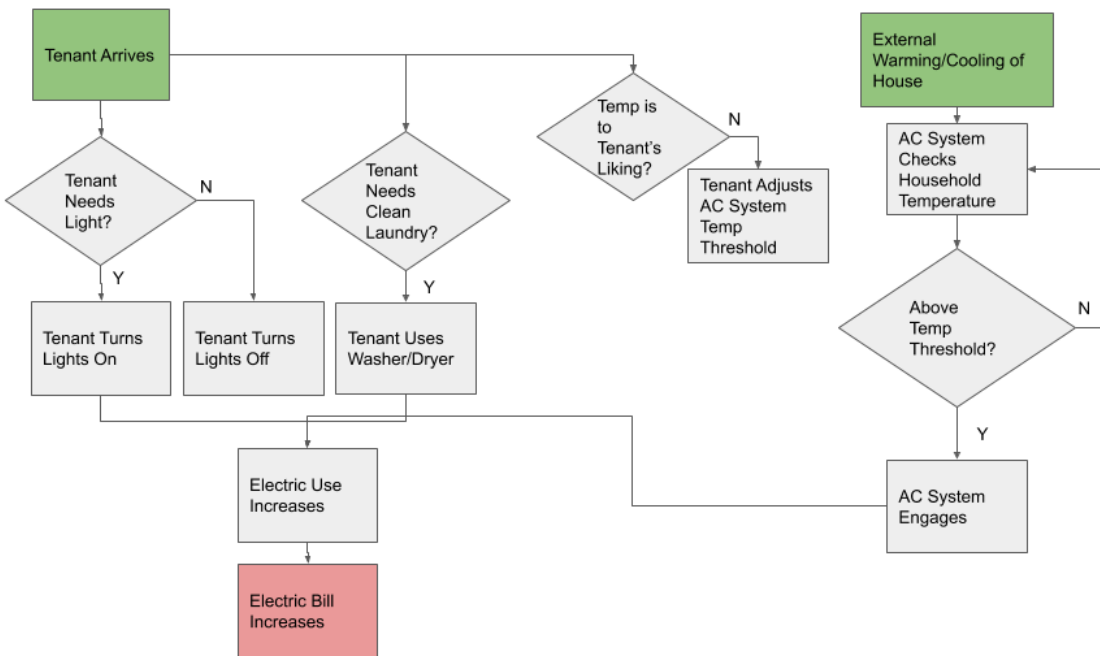
Solution implementation, evaluation of pilot results, and completion of hypothesis test

Control - By Nov 30, 2019

Verification that expected performance was achieved. Monitoring of performance.

G. Process Map

This Process Map outlines (at a high level) the process that needs addressing. It is this process wherein electricity is used in the household, that is then used to formulate an electric bill. The green/red colors indicate major process starting and ending point(s), respectively.



Citations

"Falls Church Electricity Rates." *Electricity Local*, 4 Oct 2019,
<https://www.electricitylocal.com/states/virginia/falls-church/>