Individual Household Electric Power Consumption
Sceaux, France

Trend Analysis

INTRODUCTION

- A law firm "J.J. Partners" needs help analyzing archived data records for one of their clients. The client claims to have not been occupying a specific residence at the time of an undisclosed event during the Summer of 2008.
- The lead attorney is compiling several evidentiary proof points to support the client's claim. As part of this effort, IOT Analytics have been asked to obtain and analyze the residential electrical power usage data from 2007 to 2010.

AGENDA

- Define questions to investigate
- Describe data records
- Present the analysis plan
- Provide insights
- Present hypotheses
- Provide recommendations

QUESTIONS TO INVESTIGATE

- What information is contained within the data records?
- Is the data complete? Is anything missing?
- What are the typical power usage patterns for this residence?
- Are these “typical” patterns true for the Summer of 2008?
- If not, what, if anything, can be used to help support the client’s claims?
- Are there any recommendations for questions to be raised with the client?

DATA RECORDS

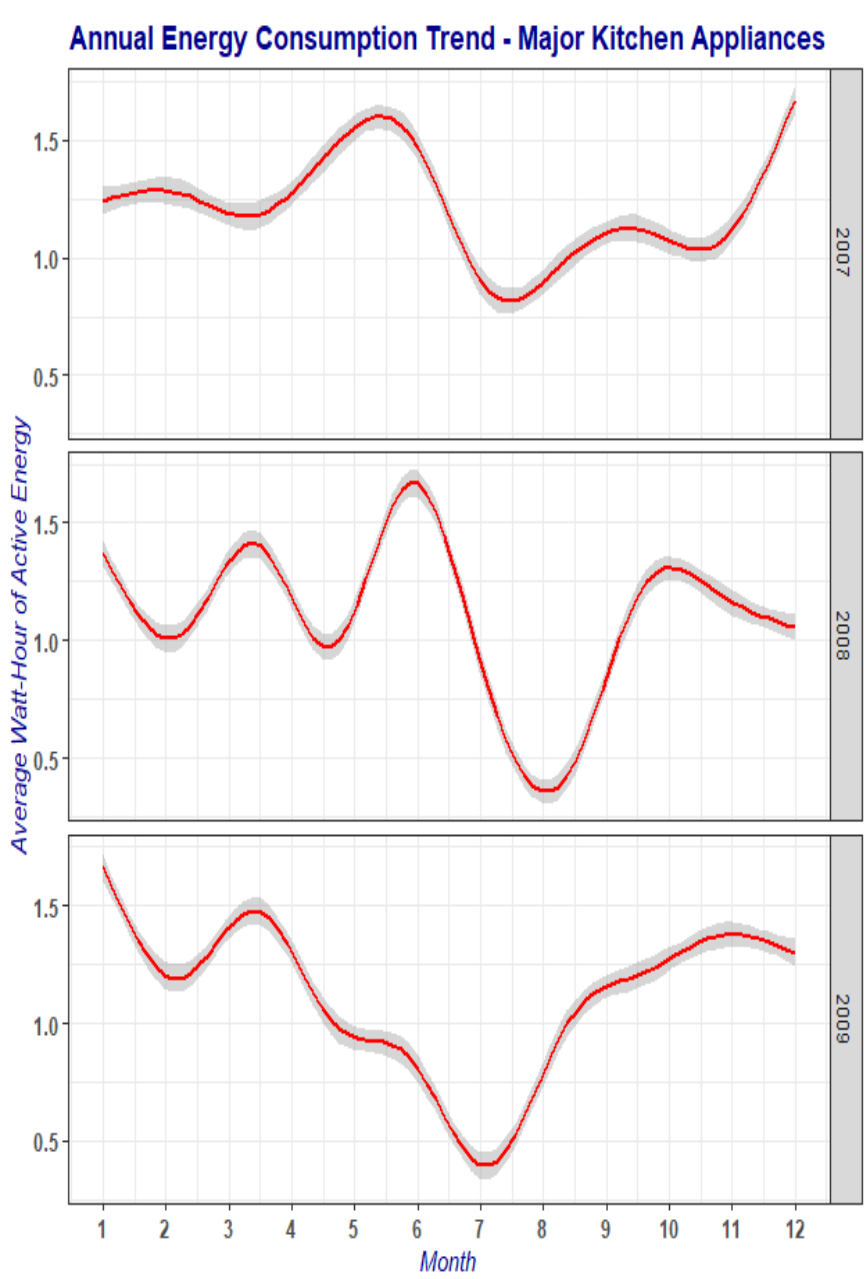
- Represent large dataset comprised of readings from 3 submeters at 1-minute increment and other metrics.
- Consist of incomplete years of 2006 and 2010, and complete years of 2007, 2008, and 2009. There is immaterial number of missing values in measurements (approx. 1,25% of the rows). No missing values were detected during the Summer of 2008.

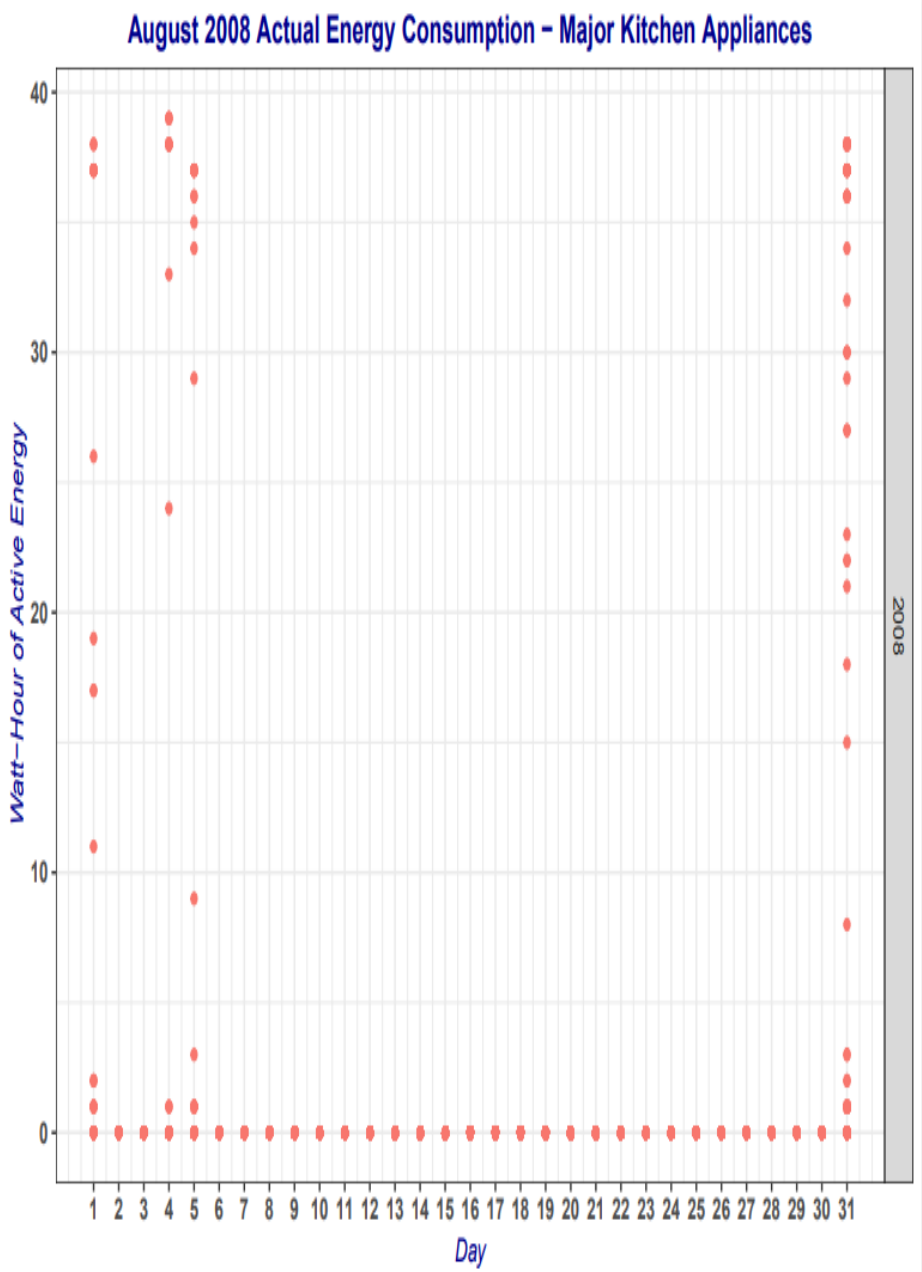
ANALYSIS PLAN

- **Use years 2007, 2008, and 2009 to observe annual active energy consumption trends. Actual active energy consumption during the Summer of 2008 will be investigated based on the trend analysis.**
- **Use readings from 3 submeters to analyze the trends.**

3 submeters provide the active energy readings for the following areas:

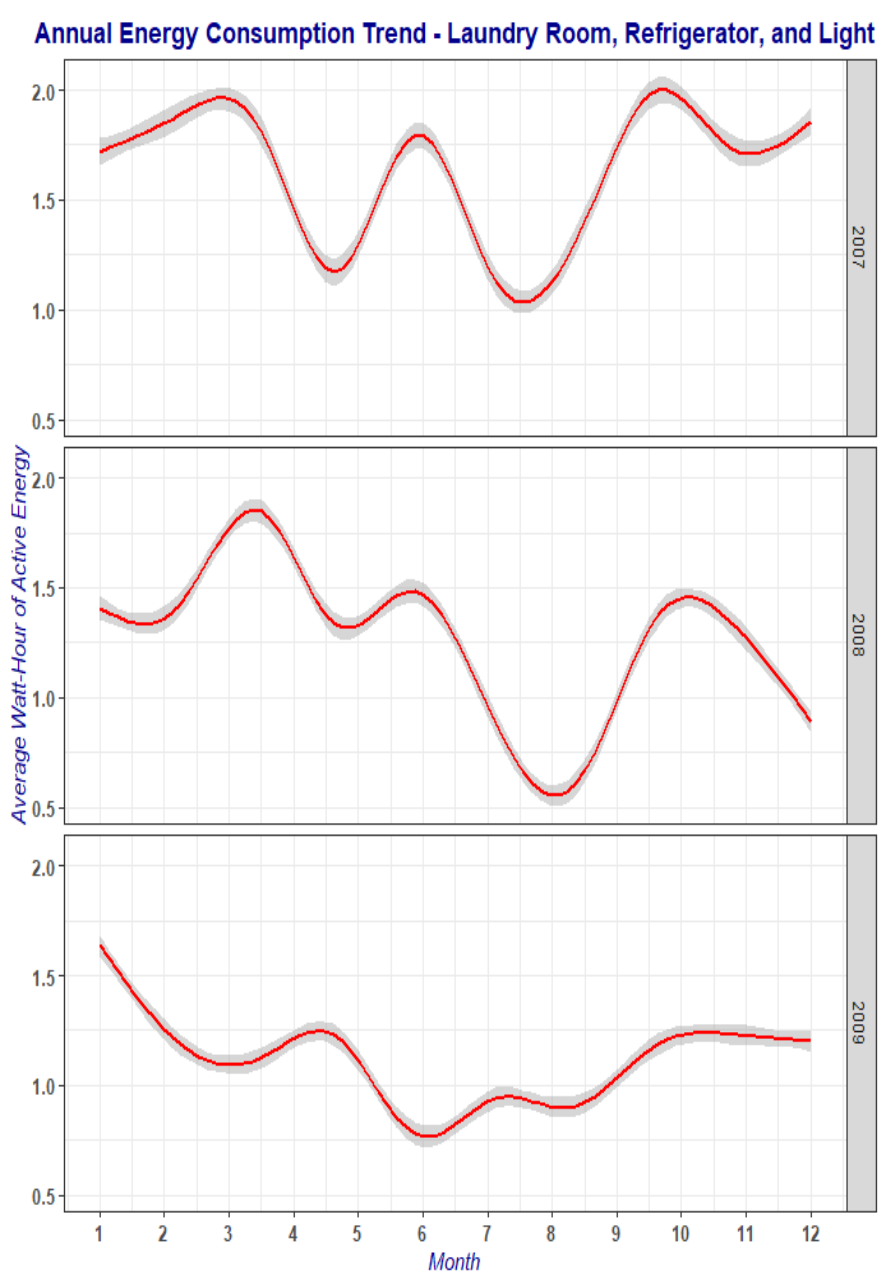
- **Submeter 1 – major kitchen appliances, containing mainly a dishwasher, an oven and a microwave (hot plates are not electric, but gas powered).**
- **Submeter 2 - laundry room, containing a washing-machine, a tumble-drier, a refrigerator and a light.**
- **Submeter 3 - electric water-heater and an air-conditioner.**

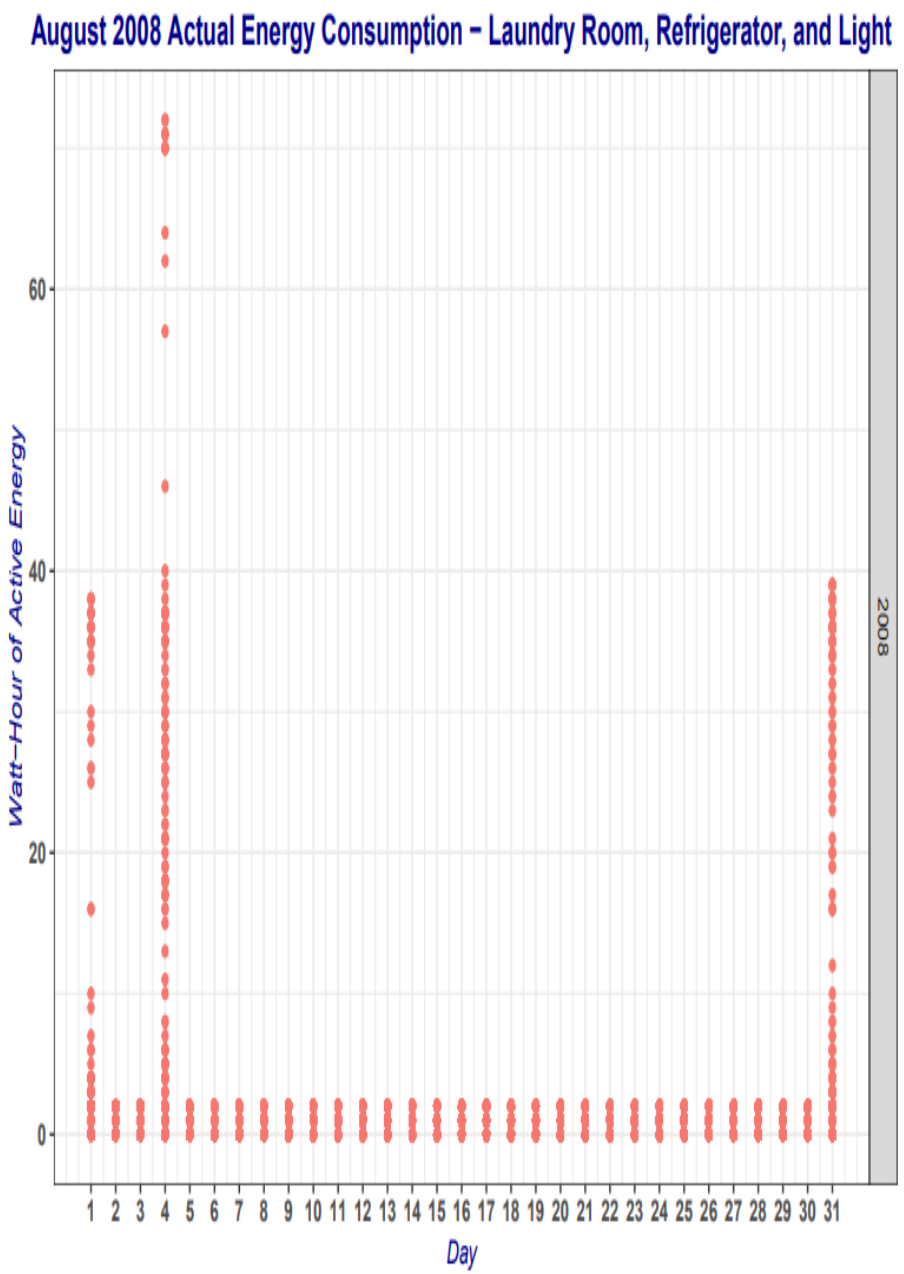




MAJOR KITCHEN APPLIANCES

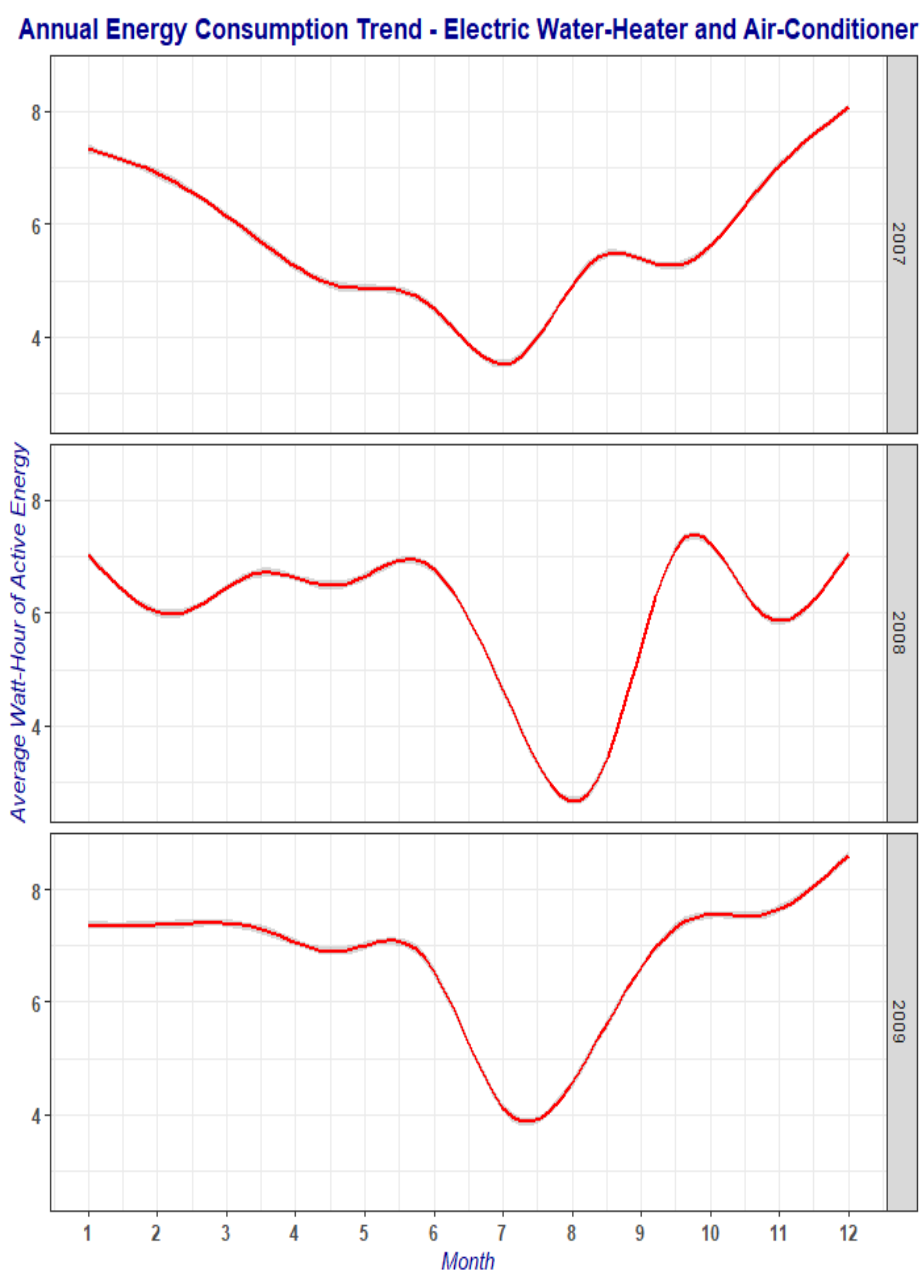
- The overall trend shows the drop in average active energy consumption for major kitchen appliances during summer months.
- August 2008 had the most decline during the summer months of 2008. The readings for the periods from August 2 to August 3 and August 6 to August 30 showed no active energy consumption.

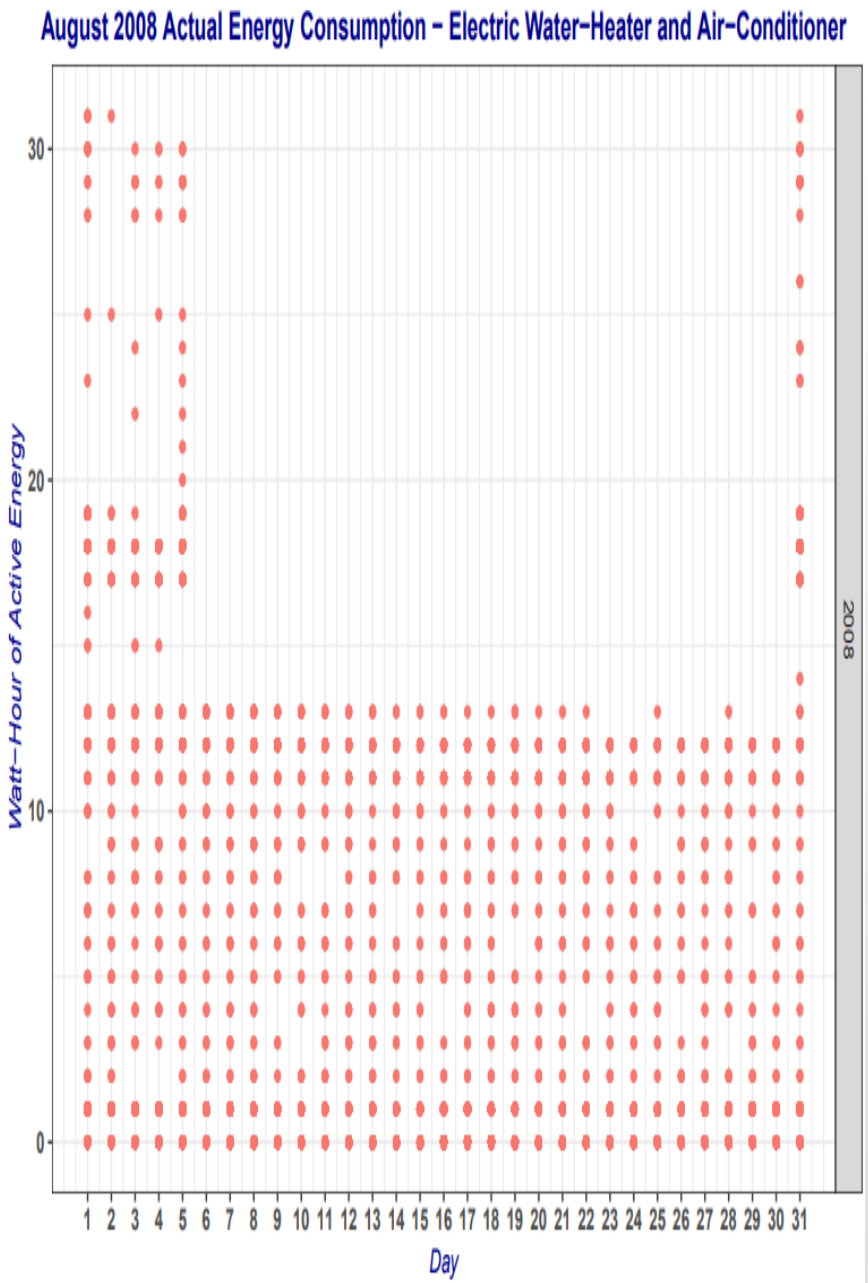




LAUNDRY ROOM, REFRIGERATOR, LIGHT

- Again, the overall trend shows the drop in average active energy consumption for laundry room, refrigerator, and light during summer months.
- August 2008 had the most decline during the summer months of 2008. The readings for the periods from August 2 to August 3 and from August 5 to August 30 showed the active energy consumption at constant rate of approx. 3 watt-hour.





ELECTRIC WATER-HEATER AND AC

- Once again, the overall trend shows the drop in average active energy consumption for electric water-heater and air-conditioner during summer months.
- August 2008 had the most decline during the summer months of 2008. The readings for the period from August 6 to August 30 showed the active energy consumption in the range of approx. 13-14 watt-hours, flat.

HYPOTHESES

- **During the period from August 6, 2008 to August 30, 2008, the following electric appliances/equipment have not been used:**

  Dishwasher Oven Microwave Washing-machine

  Tumble-drier Light

- **During the above period, the refrigerator, the electric water-heater in the idle mode, and the air-conditioner with the "minimum required temperature" settings continued to operate at the constant rate of active energy consumption.**
- **Active energy consumption patterns for August 2008 differ significantly from the rest of 2008. It appears the residence was not used.**

RECOMMENDATIONS

To validate the hypotheses the following information is required:

- **Technical documentation for the refrigerator, the electric water-heater, and the air-conditioner to confirm the energy consumption patterns (active/idle)**
- **Gas consumption readings for hot plates for the Summer of 2008**

The following information needs to be investigated:

- **Presence of surveillance cameras in the building**
- **Electronic keys to enter the building and the apartment**

Q&A