

# A Proposal to Investigate and Produce Solutions to the Electricity Waste in Bilkent Dormitory 78

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# Overview

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# Introduction

- Dorm 78
  - 586 students, 236 rooms [1]
  - Approximately 4000 lightbulbs
  - Consuming 1582 kWh / day energy
- Average Turkish household: 2.07 kWh / day for each person [2]
- Dormitory 78: 2.69 kWh / day for each person
  - ~30% more electricity used by the average dormitory resident

# Problem Definition

- Excessive electrical energy consumption inside Dormitory 78
- Root cause 1:
  - Human error (negligence)
- Root cause 2:
  - Out-dated and worn-out lightbulbs
- Root cause 3:
  - Unplanned design and installation of the building's lighting

# Proposed Solutions

- Solution 1:
  - Installing sensors
- Solution 2:
  - Increasing the cost-effectiveness of the light bulbs
    - (Replacing with more efficient LED light bulbs)
- Solution 3:
  - Optimizing the layout of the building's lighting

# Optimizing the lighting layout



# Taking into account:

- The lighting intensity of LED lights should they be installed
- Positioning the bulbs closer to walls to benefit from the reflection
- Efficiently spacing the distance between two light sources for maximum effectiveness for the minimum amount of light bulbs

# Criteria for Assessing Solutions

- Cost-effectiveness
  - There should be a reasonably satisfactory value (savings) returned from the implemented solutions in relation to the monetary cost of realizing such systems (Return on investment)
- Acceptability
  - The proposed solutions need to be easy for the students to adapt to, and they should not interfere with the students' day-to-day life (e.g. eye strain originating from the LED bulbs)
- Feasibility
  - The solutions should be technically rational and suitable for the building's status (e.g. redesign of the light bulb layout should be possible given the building's construction)

<b>Cost-effectiveness</b>	Installing sensors	Calculations of the installment cost, reviewing other institutes who use sensors
	Increase cost-effectiveness of bulbs (LEDs)	Calculations and comparisons between fluorescent and LED bulbs
	Layout optimization	Interview with building manager, calculations
<b>Acceptability</b>	Installing sensors	Survey for students, building management interview
	Increase cost-effectiveness of bulbs (LEDs)	Survey for students, building management interview
	Layout optimization	Survey and interview for students, building management interview
<b>Feasibility</b>	Installing sensors	Interview with engineers and architects
	Increase cost-effectiveness of bulbs (LEDs)	Examining previous similar work, interviews
	Layout optimization	Design will be presented to architects and engineers to test its viability

# References

- [1] Bilkent University, 'Hizmet ve Olanaklar', 2013. [Online]. Available: <http://www.yurt.bilkent.edu.tr/78a.html> [Accessed: 26-Jun-2017]
- [2] Gazelektrik.com, 'Türkiye'de Hane Başına Düşen Ortalama Elektrik Tüketimi Ne Kadar?', 2016. [Online]. Available: <http://gazelektrik.com/faydalı-bilgiler/elektrik-tuketimitml> [Accessed: 29-Jun-2017]