

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
ELECTRICAL ENGINEERING DEPARTMENT
EE 360 (Semester 142)

Design of an E-Bus System at KFUPM

KFUPM is considering turning the existing bus system into an electric bus (e-bus) system. The objectives of this assignment are to provide the best possible technical advice to the university decision makers with regards to:

- 1- Designing the e-bus system
- 2- Assessing the economic impact of the e-bus project
- 3- Assessing the environmental impact of the e-bus project

Assume that the way this will be done is by retrofitting the existing traditional buses so that they are turned into e-buses. You need to estimate the retrofitting cost, including parts costs, labor cost, etc. Hint: One major part for an e-bus is the battery pack, whose cost is a function of its energy capacity (in kWh). Therefore, in the design, you will need to decide on a proper battery type and size. Another major part is the motor. You will need to decide on the motor type (DC, synchronous, or induction) and specifications (power capacity, and other rating information)

In addition to the battery pack and the motor, you need to take into account all the major components and auxiliaries that the e-bus system will need. This includes the modifications/additions that are needed in the university's electric power grid that will be used to charge the e-buses. For example, e-bus charging requires charging stations. You need to select a suitable charging station from those available in the market [Hint: the most important feature of a charging station is the maximum charging rate (in kW)]. Also, this newly added electric load – e-buses – will most likely require the installation of a new transformer. Thus, select a proper transformer.

KFUPM bus fleet consists of (20 + your two digit serial number) buses, each of which travels around (25 + your section number) km daily. In your design, assume that the e-buses are required to operate during day time. When they are not operating, they are all parked in a large parking lot, and that is where they are charged for the next day of operation. No charging is performed during operational hours.

The deliverables of this assignment are:

- 1- A design for the e-buses. This includes selecting proper battery packs and motors.
- 2- Modifications/additions on the existing KFUPM electric power infrastructure. This includes, but is not limited to, selecting a proper charging station and transformer.
- 3- A cost analysis for the proposed design. This analysis should include part costs, labor costs, and other major related factors.
- 4- An environmental impact study that assesses the impact of the new system on the environment.

Date Due: May 11th, 2015.