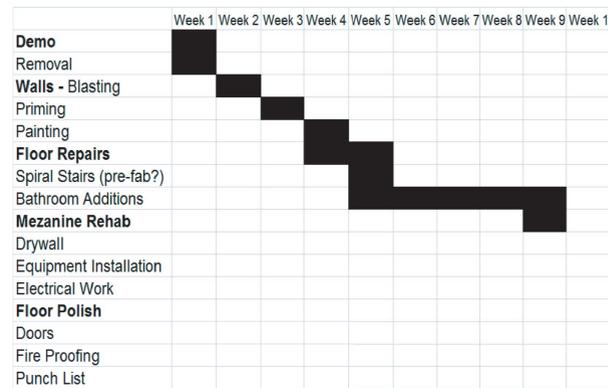


## TIME FRAME FOR RENOVATION

ITEM	TIME
DEMO & REMOVAL	1 WEEK
CLEAN/PRIME/PAINT WALLS	3 WEEKS
FLOOR REPAIRS	1 WEEK
PRE FAB SPIRAL STAIRS	2 DAYS
BATHROOM ADDITIONS	5 WEEKS
MEZANINE REHAB	1 WEEK
ELECTRICAL WORK	1-3 DAYS
FLOOR POLISH	1 WEEK
DOORS	1-3 DAYS
FIRE PROFFING	1-3 DAYS
PUNCH LIST	1-3 DAYS

## CRITICAL PATH OF WORK



# ZERO ENERGY LAB

## OBJECTIVES



Research office utilities that consume low amounts of energy, and investigate how to improve the efficiency of current utilities.



Research and test various energy efficient lighting solutions.

Research environmentally friendly floor, wall, and ceiling finishes along with necessary office furniture.



Develop a website to display the development progress of the Zero-Energy Lab and provide information regarding "green technology"



Develop a rating system that can be used by consumers and industry to compare the embodied energy of products

## ZEL RATING SYSTEM

### WHAT IS ZEL RATING?

ZEL RATING IS A RATING SYSTEM WHICH ENABLES US TO COMPARE DIFFERENT PRODUCTS BASED ON HOWENERGY FRIENDLY THEY ARE. IT IS OBTAINED THROUGH THE EQUATION BELOW.

$$\text{ZEL RATING} = \frac{\text{TRANSPORTATION}_{\text{BTU UNIT}} + \text{CREATION}_{\text{BTU UNIT}} + \text{YEARLY CONSUMPTION}_{\text{BTU UNIT}}}{\text{LIFETIME}_{\text{YEARS UNIT}}}$$

### TRANSPORTATION COMPONENT

= TRANSPORTATION ENERGY

$$= \text{MILES}_{\text{MILES}} \times \text{CONSUMPTION RATE}_{\text{GALLONS MILE}} \times \text{EFFICIENCY}_{\%} \times \text{ENERGY CONTENT}_{\text{BTU GALLONS}}$$

THIS COMPONENT TAKES INTO ACCOUNT THE DIFFERNT MODES OF TRANSPORTATION USED, THE DISTANCE TRAVELLED AND THE NUMBER OF UNITS THAT ARE SHIPPED AT ONE TIME WHICH SHARE THE ENERGY COSTS.

#### REQUIRED DATA:

- METHOD OF TRANSPORTATION
- DISTANCE TRAVELLED
- NUMBER OF UNITS BEING TRANSPORTED

THERE ARE FOUR MAIN COMPONENTS IN ZEL RATING WHICH ARE CREATION AND TRANSPORTATION ENERGY, ITS YEARLY NEW CONSUMPTION AND ITS EXPECTED LIFETIME. SINCE THE FORMULA IS CONCERNING STRICTLY WITH ENERGY CONSUMPTION, THE NON-ENERGY RELATED ENVIRONMENTAL OR HEALTH IMPACTS OF A "GREEN" VS. NON-GREEN PRODUCT IS NOT CONSIDERED.

AN OBJECT CAN GET FROM ITS CREATION POINT TO THE FINAL DESTINATION BY MANY MEANS. THE ENERGY REQUIRED TO TRANSPORT AN OBJECT WILL THUS DEPEND ON ITS ROUTE FROM ITS CREATION POINT TO ITS FINAL DESTINATION. THE FIGURE TO THE RIGHT SHOWS TWO DIFFERENT ROUTES. ROUTE A SHOWS AN OBJECT BEING TRANSPORTED BY MEANS OF AIRPLANE (A1) THEN BY MEANS OF TRUCK (A2). ROUTE B SHOWS AN OBJECT BEING TRANSPORTED BY MEANS OF BOAT (B1) THEN BY MEANS OF TRAIN (B2). ALL THESE ARE TAKEN INTO ACCOUNT WHILE CALCULATING THE TRANSPORTATION ENERGY USING THE FORMULA GIVEN ABOVE.

### CREATION COMPONENT

$$= \text{CREATION ENERGY}_{\text{BTU UNIT}} = \frac{[\text{ENERGY CONSUMPTION OF FACTORY}_{\text{BTU}}] + [\text{ENERGY CONSUMPTION OF EMPLOYEES}_{\text{BTU}}]}{[\text{NUMBER OF PRODUCTS CREATED IN A MONTH}_{\text{UNIT}}]}$$

$$= \frac{[(\text{ENERGY ELECTRICAL}_{\text{KWH}} \times 3413 \text{ BTU}) + \text{GAS}_{\text{BTU}}] + [\text{EMPLOYEES}_{\text{PEOPLE}} \times \text{ENERGY CONSUMPTION PER CAPITA}_{\text{BTU}}]}{[\text{NUMBER OF PRODUCTS CREATED IN A MONTH}_{\text{UNIT}}]}$$

#### REQUIRED DATA:

- MONTHLY ELECTRICAL USAGE
- MONTHLY NATURAL GAS USAGE
- OTHER MONTHLY ENERGY USE
- NUMBER OF EMPLOYEES AND THEIR LOCATION
- NUMBER OF UNITS PRODUCED IN A MONTH

IN CREATING A PRODUCT, A MANUFACTURER HAS ENERGY COSTS IN PHYSICAL PRODUCTION WHICH IS DIRECTLY LINKED TO CREATION ENERGY AS WELL AS THE ENERGY REQUIRED TO DESIGN, MARKET AND OTHER INDIRECTLY LINKED ASPECTS. THIS PART OF ZEL RATINGS CAN BE USED MORE THAN ONCE TO TAKE INTO ACCOUNT FOR THE CREATION OF THE SUB-COMPONENTS OF THE FINISHED PRODUCT AND THE ASSEMBLY OF THE THE FINISHED PRODUCT.

## EXAMPLE

SHENZHEN GREENWAY TECHNOLOGY CO., LTD  
(NOTEBOOK BATTERY MANUFACTURER)

### GIVEN:

- MONTHLY ENERGY USAGE = 187.5 KWH
- NUMBER OF EMPLOYEES = 300 PEOPLE
- LOCATION = MAINLAND CHINA
- NUMBER OF UNITS PRODUCED IN ONE MONTH = 30,000
- LIFETIME = 1 YEAR

$$\text{CREATION ENERGY} = \frac{[(187.5 \times 3413) + (300 \times 2,250,000)]}{30,000} = 22,520 \text{ BTU/UNIT}$$

### GIVEN:

- MODE OF TRANSPORTATION = AIRPLANE
- DISTANCE TRAVELLED = 6,500 MILES
- NUMBER OF UNITS TRANSPORTED = 30,000

$$\text{TRANSPORTATION ENERGY}_{\text{PLANE}} = \frac{[(6,500/6.6) \times (0.6 \times 135,000)]}{30,000} = 2,660 \text{ BTU/UNIT}$$

### GIVEN:

- MODE OF TRANSPORTATION = DIESEL TRUCK
- DISTANCE TRAVELLED = 106 MILES
- NUMBER OF UNITS TRANSPORTED = 30,000

$$\text{TRANSPORTATION ENERGY}_{\text{TRUCK}} = \frac{[(106/6.6) \times (0.45 \times 138,700)]}{30,000} = 33 \text{ BTU/UNIT}$$

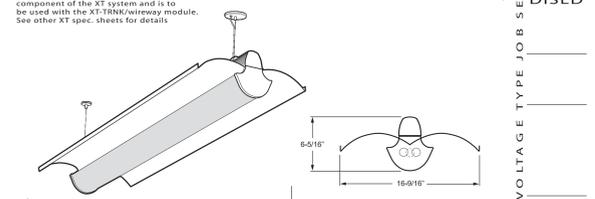
TOTAL TRANSPORTATION ENERGY = 2693 BTU/UNIT

$$\text{ZEL RATING} = \frac{(2,693 + 22,520 + 0)}{1}$$

$$= 25,213 \text{ BTU/YEAR}$$

## DIRECT/INDIRECT SOLID REFLECTOR

The optical/electrical module is a component of the XT system and is to be used with the XT-TRNK/wireway module. See other XT spec. sheets for details.



### SPECIFICATIONS

- HOUSING - 22 gauge die formed, welded C.R.S.
- FINISH - Highly reflective, non-glare textured matte white polyester powder coated finish with multi-stage iron/phosphate prepared metal
- REFLECTOR - 20 gauge highly reflective textured matte white powder coated perforated steel, precision formed
- SHIELDING - 20 gauge texture white powder coated steel, 50% open perforation with matte white acrylic overlay
- ELECTRICAL - Electronic ballast standard, instant start T8, programmed start T5, rated Class P
- LABELS - UL/CUL listed as fluorescent luminaire suitable for dry or damp locations
- MOUNTING - Optical/electrical module attaches to the XT-TRNK wireway which may be surface, cable, or pendant mounted

### FEATURES

- Solid reflector provides downward component when primarily direct illumination is preferred
- Direct/indirect basket provides a uniform, luminous effect and conceals the lamp at all viewing angles
- Highly reflective textured matte white paint for increased efficiency
- Die-cast aluminum end-caps secure the shielding and provide a high-end look
- Optional decorative brackets add a distinct touch to the environment
- Shielding/electrical module hinges onto trunk and snaps securely into place
- Entire system can be installed without the use of tools

## SPRING 2008

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LAB SPACE

