Engineering Sustainability
## Matthew Falcone

JACOBS®

Georgia Tech

Background: Jacobs Engineering is the top ranked international design engineering firm (Engineering News-Record) with a reputation for delivering sustainable and innovative engineering solutions to clients around the world. On client projects in the fiscal year 2018, Jacobs helped eliminate over 37 million tons of carbon and recycle over 499 thousand tons of material.

Objective: With such impressive sustainability solutions on client projects, my goal was to focus on how Jacobs could improve their internal operational carbon footprint.

Corporate Rental Car Policy
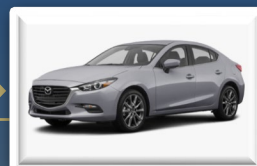
Jacob's current rental car policy allows for the selection of a vehicle in any class. By switching to a default choice of an intermediate vehicle, it would save the company money in addition to reducing its carbon footprint.

Carbon Savings

$$\frac{4.55 \ days}{year} \times \frac{29 \ miles^{1}}{day} \times \frac{.017 \ gallons}{mile} \times \frac{19.6 \ lbs \ CO_2^{2}}{gallon} \times 30,000 \ employees = 1,343,648 \ lbs \ CO_2/year$$

Cost Savings:

Rental Car Price Savings:
$$\frac{4.55 \ days}{year} \times \frac{\$6 \ savings}{day} \times 30,000 \ employees = \$819,095$$

Rental Car Gas Savings:
$$\frac{\$6.17 \ savings}{year} \times 30,000 \ employees = \$185,094$$

$$\frac{\$1,004,190}{year}$$

1. Bureau of Transportation Statistics   2. U.S. Energy Information Administration

Paper Consumption Reduction

Jacobs should explore running "lunch & learns" for technologies like Bluebeam, which allow engineers to markup technical drawings, and purchase large tablets for teams to collaborate on while in the office, instead of printing project documents.

Carbon Savings
$$\frac{3000 \ sheets^{1}}{person} \times \frac{.04 \ lbs \ CO_2^{2}}{sheet} \times 30,000 \ employees = 3,600,000 \ lbs \ CO_2/year$$

Tablet Carbon Cost: 873,000 $lbs \ CO_2$

Paper Cost Savings	Tablet Initial Investment	ROI	Payback Period	NPV
$612,000/year	$2,000,000	31 %	3.27 years	$1,629,989

1. Roadrunner Smarter Recycling   2. Sustainable Bates EcoLogic

Future Steps

All ideas were coordinated to be put into consideration as part of the company-wide rollout of the PlanBeyond initiatives. By directly aligning with Jacobs' new Global Sustainability Strategy, these ideas will have an advantage that will allow for easier potential implementation. For example, the rental car policy directly aligns with Jacob's goal to reduce travel-related carbon emissions. Additionally, the local office sustainability team is looking to pilot a program for the tablets to measure future potential.

Co-Benefits

By addressing sustainability on a company-wide (rental cars) and office (printing) level, Jacobs will further cement its reputation as a leader in sustainable innovation, as well as encourage staff-wide awareness of the carbon connections in our everyday lives.

Thank you to the CRC team and everyone at Jacobs for their guidance and help throughout the summer!

$$Carbon\ Savings: \frac{sheets}{person} \times \frac{people}{office} \times \frac{carbon}{sheet}$$

$$Paper\ Cost\ Savings: \frac{sheets}{person} \times \frac{people}{office} \times \frac{cost}{sheet}$$

$$Tablet\ Cost: \frac{tablets}{office} \times \frac{cost}{tablet}$$

$$Carbon\ Savings: (\frac{4.55\ days}{year} \times \frac{29\ miles}{day} \times \frac{(.047-.030)\ gallons}{mile} \times$$
$$\frac{19.6\ lbs\ CO_2}{gallon} = \frac{123.17\ lbs\ CO_2}{year*employee}) \times 30,000\ employees = \frac{1343648\ lbs\ CO_2}{year}$$

$$Cost\ Savings: (\frac{4.55\ days}{year} \times \frac{\$6\ savings}{day} = \frac{\$27.3}{year*employee}) \times$$
$$30,000\ employees = \frac{\$819095.74}{year}\ (rental\ car\ price\ savings) + \frac{\$185094.36}{year}$$

$$(gas\ savings) = \frac{\mathbf{\$1004190.11}}{year}$$

$$Cost\ Savings: (\frac{3000\ sheets}{person} \times \frac{.04\ lbs\ CO_2}{sheet}) \times 30,000\ employees = \frac{\mathbf{3600000}\ lbs\ CO_2}{year}$$

Return on Investment (R...

The return on investment can ...
invested, over a specified time ...
an investor obtains $20,000 pe...
is 20%.

In the specific case of energy s...
dividing the yearly savings over ...
multiplying by 100 to represen...
retrofit described above, the R...

- ROI = $99,750 / $350,000 x ...

In other words, carrying out thi...
to investing the capital in a bus...
return. The following concept, ...

Net Present Value (NPV)

The Net Present Value is the financial benefit that would result if the project was able to provide all of its savings today. In other words... the Net Present Value is the lifetime value of the project in today's dollars.

To calculate the NPV of a project, it is necessary to consider how the value of money changes over time. For example, a thousand dollars are more valuable today than in one year, since it is possible to invest that money and gain interest over the year.

What discount rate should be used to account for the change in the value of money over time? The answer is: Consider the project's opportunity cost.

For example, assume the company that is considering the $350,000 LED retrofit has the alternative of investing that money in a business venture that will provide a yearly interest of 10%. **Therefore, the discount rate can be assumed of 10% because that is the opportunity cost.**

The NPV can also be calculated from Microsoft Excel, with the following formula:

= -PV(interest rate , years , yearly savings) - Initial Investment

<u>VERY IMPORTANT: Add a negative sign before PV because Excel switches the sign automatically... you will want the savings to be positive and the initial investment to be negative.</u>

In this specific case, it would look like this:

= -PV(10% , 20 , 99750) - 350,000