Project Overview

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Major: Electrical Engineering
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Background
Throughout my summer with the Nebraska Industrial Assessment Center (NIAC) I assessed seven companies in the state of Nebraska. These companies include:

- Cleaver Brooks – Lincoln, NE: Boiler Manufacturing
- Norland – Lincoln, NE: Bottled Water & Beverage Equipment Manufacturing
- Endicott Brick – Fairbury, NE: Brick Manufacturing
- Grand Island Wastewater Treatment Plant – Grand Island, NE
- Westin Packing – Fairbury, NE: Bacon Bits Manufacturing
- Becton Dickinson – Broken Bow, NE: Medical Equipment Manufacturing
- West Pharmaceutical Services – Kearney, NE: Medical Equipment Manufacturing

Project Description
As part of these assessments, I was able to use my background in electrical engineering for these recommendations:

- *Downsize Motors*. Motors require a large amount of energy for standard operations and can account for the majority of electrical energy consumed in industrial facilities, ultimately contributing to a significant portion of a company's electric bill. Often times motors are oversized for the operations they are intended to serve and are operated at a small fraction of their full-load rated capacity. Operating motors at low partial-load levels results in efficiency reductions which can be costly depending on the size of the motor.
- *Improve Facility Power Factor*. Power factor is a measure of a system's electrical efficiency. This measure of efficiency depends on the ratio of the real and reactive power that is consumed by a load. Reactive power is dubbed as 'useless' because it gets stored in magnetic fields during operation and produces no real work. Poor power factor mostly affects electric utility companies, causing them to implement additional demand charges on electric bills that are adjusted for poor power factor.

Pollution Prevention Benefits
The benefits of my all recommendations over the summer are summarized below in Table 1:

Table 1: Recommendation Savings and Benefits

Recommendation	Energy Savings	Annual Cost Savings	Implementation Cost	Payback Period	GHG Reduction (MTCO2e/yr)
Downsize Motors	49,842 kWh	$4,391	$31,162	7.1	35.3
Improve Facility Power Factor (2)	+30% eff	$142,364	$169,000	1.2	-
Upgrade Facility Lighting (2)	361,911 kWh	$28,505	$62,002	2.2	256.6
Install Flow Restrictors	2,730,000 gal	$13,354	$1,127	0.08	-
TOTAL	**-**	**$188,614**	**$263,291**	**1.4**	**291.9**

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