

A website to promote sustainability through the transition to LED light bulbs

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Abstract/Introduction:

- Electricity usage is a significant contributor to the production of greenhouse gases which increases global climate change and negatively affects the environment..
- Energy-efficient technologies are underutilized, and that is where our solution comes in. Our solution is a calculator accessible via the bil·LED website that, based on user inputs, shows both financial and environmental benefits of switching to Light Emitting Diode bulbs (LED) from Incandescent and/or Compact Fluorescent (CFL) bulbs.
- Along with the calculator, our website will include relevant informational pages revolving around our project, and we hope that these items combined will facilitate more widespread usage of LEDs and effectively encourage sustainability electricity practices, thus benefiting the environment.



Scan To Access bil·LED Website!

Results:

- Data gathered from a life-cycle assessment of LEDs, CFLs and Incandescent show that for the five impact categories (shown in Figure 3), LEDs have less of an impact on the environment ^[2].
- Our research also led us to the results that between 24-74% less money can be spent using LEDs and CFLs rather than Incandescent^[1]. And it is well documented that LED's are more energy efficient and have longer life spans on average than CFLs and Incandescent.

Figure 3: (↓)

An example run of our environmental and financial calculator with some testing inputs.

Figure 1: (→)

A pie chart showing sources of greenhouse gas emissions^[3].

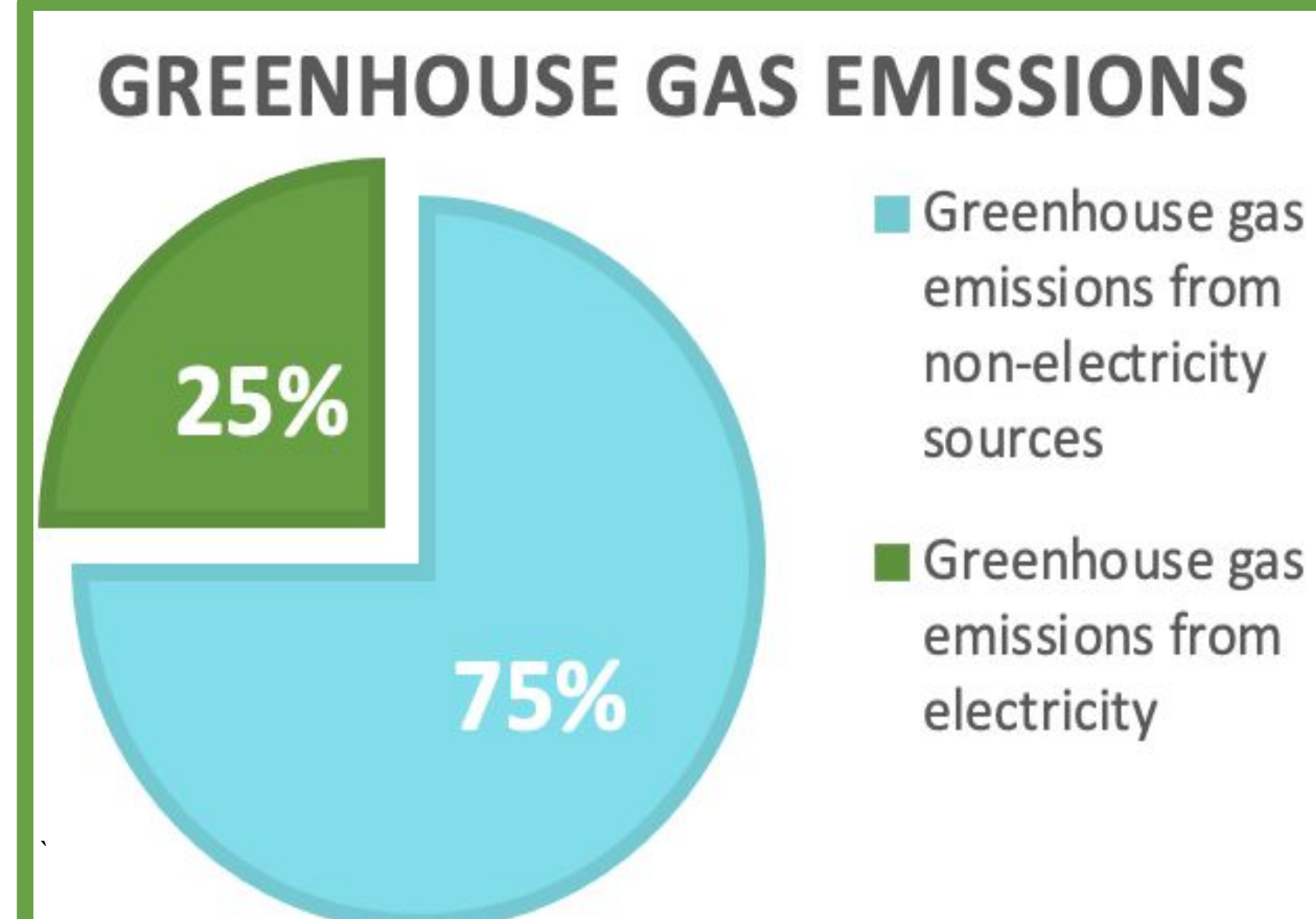
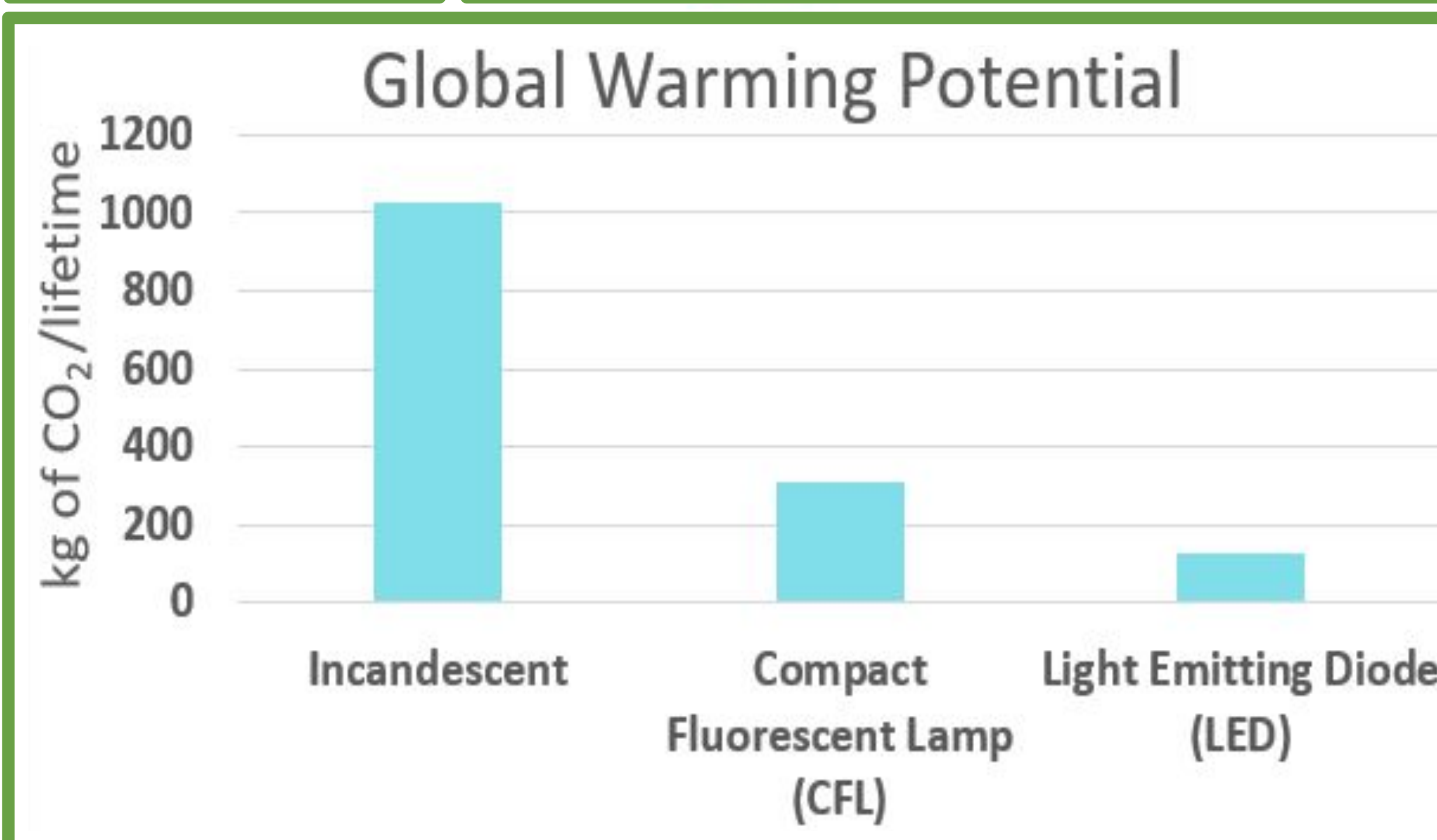
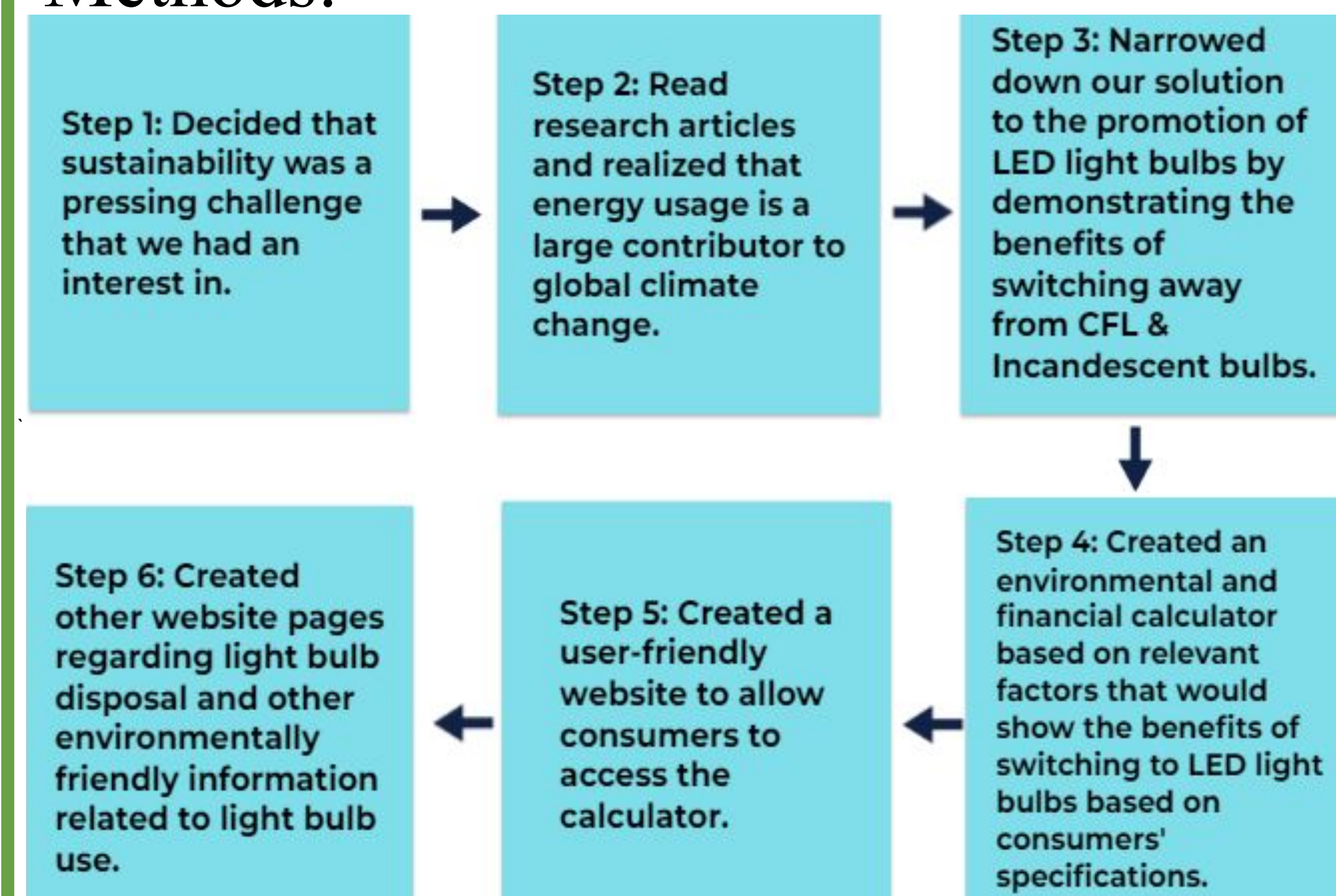


Figure 2: (↓)

Global Warming Potential bar graph comparing Incandescent, CFL, and LED bulbs^[2].



Methods:



Inputs	Environmental Impacts
Approximate Hours of Weekly Use 84	Total Energy Difference 21,403.2 Joules per year
Years of Interest 20	Houses 1.80 Houses Annual Electricity Usage
Number of CFL Bulbs 50	Smartphones 1,480,166 Smartphones Charged per year
Number of Incandescent Bulbs 50	Reduction of CO2 Emmissions 33,481.03 lbs. Annually
Cost per Watt hour 0.24	CO2 Reduction Equivalence in 10 Years 253 Trees
Financial Benefits	Reduction in 1 Year
Cost Difference \$ 6,184.32 per year	GWP Reduction (in Kg. of CO2) 1,102,367 kg. of CO2
Payback Starts in 30 Days	ODP Reduction (in kg. of CFC-11 Equivalents) 0.01190 kg. of CO2
Total Savings in 5 Years of Interest \$ 30,921.59	HTP Reduction (in kg. of 1.4-DCB equivalents) 225,638 kg. of 1.4-DCB Equivalents
Total Savings in 10 Years of Interest \$ 61,843.18	AP Reduction (in kg. of SO2 Equivalents) 8,447 kg. of SO2 Equivalents
Total Savings in X Years of Interest \$ 123,686.36	POCP Reduction (in kg. of Ozone formed) 48.995 kg. of Ozone formed

Conclusion:

- To combat and lower greenhouse gas emissions and promote the transition into a more sustainable lifestyle, our group has created a website to show the benefits of LED light bulbs when compared to Incandescent and CFLs.
- The website includes a financial and environmental calculator that allows users to see the impact that switching to LED light bulbs can have by inputting their own data. The website also provides additional information regarding LED bulbs compiled into one place.
- Our tool is easily accessible and can be used on an individual level by homeowners as well as on a large-scale level by organizations such as business and universities, as anybody can now viably promote for change among these organizations by creating proposals backed by our program's calculations about the benefits of more energy-efficient and sustainable light bulbs.

Literature Cited:

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 [3] United States Environmental Protection Agency. 2017 Jul 27. Sources of Greenhouse Gas Emissions. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

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