NACS EV Charging Calculator Overview and Instructions (version 9-25-21)

The NACS EV Charging Calculator was created to allow retailers to assess the cost and profitability of offering EV chargers at their sites. The calculator focuses on what retailer utility costs associated with EV recharging are and what the corresponding revenue must be to recover those costs after allowing for potential ancillary in-store visits and purchase profitability.

The first section of the calculator allows retailers to enter their base factor inputs. It is prepopulated with national averages but can and should be modified by actual retailer data.

- Base C-Store Energy Costs: This is the average monthly kilowatt per hour cost component of the utility bill (prior to the installation of EV chargers) for the site and can be determined by averaging the past 12 months of utility bills and entering it in this field.
- Base C-Store Demand Charges: This is the demand charge component assessed by the local utility for the store and can be obtained from the monthly utility bill.
- Total Base C-Store Utility Cost: This is a automatically calculated field and is the sum of the previous two fields.
- Base kW: This is the base kilowatt peak demand (not the kilowatt hours used) and can be obtained from the utility bill.
- Demand Cost/kW: This can be obtained from the utility bill.
- Energy Cost/kWh: This is the cost per kilowatt hour and can be obtained from the utility bill. If there are several cost per kilowatt hour tiers it might be best to enter the average by summing all kilowatt per hour charges and dividing by the total kilowatt hours consumed.

The above variables can be varied across relevant utility districts but are relatively constant for a specific store within a specific utility district.

- Number of Charges: The number of chargers to be installed. This can be changed to facilitate model sensitivity analyses based upon the number of chargers installed.
- Charges per Charger per Day: The number of estimated charges per charger per day. This can be changed to facilitate model sensitivity analyses based upon the number of charges per chargers per day.
- kW Output/Charger: The output of chargers to be installed. This should be modified if slower or faster chargers (than the default 150 kW) are being analyzed. The power of the charger has a direct impact on the subsequent Demand Charge calculations.
- Capital Cost of Each Charger: This is the actual cost including utility infrastructure upgrades of installing a charger. 150kW chargers are the model's default DCFC (Direct Current Fast Charging) but can be modified for different level of charger installation expense.
- Hurdle Rate ROI: This is the minimum pre-tax ROI expected by the company on a capital expenditure investment. It is conservatively defaulted to 15% but should be changed to reflect the company's standard.
- kWh/Charge: This is the average kilowatt hours being consumed by the average charge. The default of 22.83 kWh has been validated with a several EV automobile manufacturers as the current average and represents approximately a 25%-50% capacity recharge of a Tesla vehicle.

In the Direct Profit Modeling section of the calculator all the factor fields inputted in the previous section are locked (shaded); you will need to go back to the first section to change any of your factors.

- Number of Chargers: Default from the first section
- Charges per Charger per Day: Default from the first section
- Charges/Month: Calculated field.
- Calculated (or carried forward) fields:
    - Charges/Month
    - Incremental Month kWh Cost: Calculated as charges per month x average kWh charge.
    - Base Monthly kWh Cost: Carry forward from the first section
    - Total Monthly kWh Cost: The sum of Incremental + Base
    - Kilowatt per Hour Cost: Calculated as # Charges/Month x kWh/charge x Energy Cost/kWh + Base C-Store Energy Costs. This is sum of the store plus charges kilowatt usage costs.
    - Number of Chargers: Carry forward from the first section
    - kW/Charger: Carry forward from the first section
    - Demand kW for Chargers: Carry forward from the first section
    - Base Demand kW Before Chargers: Carry forward from the first section
    - Total Demand Kw: Calculated from the previous two fields
    - Total Demand Charge: Calculated from the previous field (Total Demand kW) x Demand Cost/kW from the first section
    - Total Costs: Calculated as sum of Total Kilowatt per Hour Cost + Total Demand Charge Cost
    - Increment Over Total Base: Calculated increase in energy cost
    - Cost per Charge: Calculated as previous field divided by number of charges per month
    - Cost per kWh: Calculated as previous field divided by energy cost per kWh.

In the Indirect and Total Profit Modeling section of the calculator potential in-store profitability, required return on the capital investment, and total profit is modeled.

- In-Store Profitability. This section models profitable in-store transactions associated with EV charging outside. All filed are locked down except:
    - Basket size: Defaulted to current inside average basket size of $7.34 but can be modified as desired to facilitate model sensitivity analyses.
    - In-Store Gross Margin: Defaulted to current inside average gross margin of 35% but can be modified as desired to facilitate model sensitivity analyses.
    - The main section defaults to the current 20% conversion from fuel purchase to in-store purchase but sensitivity analyses are presented on the side for 40%, 60% and 80% conversion factors.

- Cap Ex Modeling
    - All fields are carried forward from previous sections and are locked down. Note that this section utilizes annualized data while other sections are stated in monthly terms to facilitate inputs. The calculated fields are:
        - Hurdle Return $: The amount of profit required to produce a return on the capital investment at the specified hurdle rate.
        - Indirect GP$ per Year: The in-store profitability at a 20% conversion rate annualized.
        - Required Return Net of Indirect GP$: Calculated as the hurdle return less the indirect GP$.

    - Required Net Return per Charge: Calculated as the previous field divided by specified charges per year.
    - Required Charge to Consumer: Calculated as the previous field plus the total utility cost per charge from the previous page. This is what a consumer would need to pay for the retailer to breakeven after achieving a return on their capital investment but **without achieving any profitability on the charge itself.**
    - Cost to Consumer per kWh: Calculated as the previous field divided by the kWh/charge factor.
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- Total Profitability/Required Gross $
    - All fields in this section are locked down. The calculated fields display:
        - The specified number of chargers and charges per charger per day
        - In the four conversion blocks this is what a consumer would need to pay for a 22.83 kilowatt per hour charge at 20%, 40%, 60% and 80% charging event conversion to in-store purchase rates **for the retailer to breakeven after achieving a return on their capital investment but without achieving any profitability on the charge itself.**