Should I Leave My Laptop Plugged in All the Time?

Laptop computers offer the functionality of a desktop computer with the added perk of mobility. The battery of a laptop sets it apart from the desktop and also raises an important question: Are there advantages for your laptop and the environment if the computer is plugged in versus using the battery? We discuss a few best management practices below for how and when it is best to use your laptop on battery power versus plugged into an outlet.

The lifespan and capacity of a laptop battery is heavily influenced by how it is used. The majority of laptop batteries are lithium-based, either lithium-ion or lithium-polymer. Most lithium must be mined, which is a very energy-intensive process, and lithium-based batteries can pose a pollution threat if disposed in landfills.[1] For these reasons, we should seek to maximize the lifespan of our laptop batteries (and dispose them properly). Lithium-based batteries lose their capacity due to high temperature surroundings, maintained high voltages, large numbers of charge-discharge cycles, large depth of discharge and many other factors.[2] Due to the effect of high voltages, lithium-based batteries should spend the majority of their lifecycle at lower voltages, meaning a partially charged state. Large discharges (100% down to 0% is the largest discharge possible) should also be avoided, but must be balanced with the number of charge-discharge cycles. Keeping a laptop battery at a partially charged level for as much of its lifespan as possible will help the battery last longer.

Whether your laptop is plugged in or using battery power can also impact the environment. This largely depends on the time of day when your laptop is plugged into an outlet. Electricity produced during peak hours (generally work hours and early evening) tends to be generated less efficiently than electricity produced during off-peak hours.[3] Newer and more efficient generators are used to produce a base amount of electricity, however that amount may not be enough to satisfy electricity demands throughout the entire day. Peak hours call for more electricity, requiring the use of older and less-efficient generators, which produce comparatively more greenhouse gas emissions. Most people will need to use their laptop during peak hours, so the battery can allow charging to be delayed until off-peak hours. Charging during off-peak hours will utilize the most efficiently produced electricity.

In conclusion, a balanced approach should be used for laptops, with time spent on battery power and time spent plugged into an outlet. Keeping a battery at 100% will shorten its lifecycle, but so will repeated charge/discharge cycles and large discharges. A strategy that balances each of these conditions is to charge the battery to around 70%, use the battery down to around 30%, then repeat that cycle. The battery should be kept around room temperature and charging should be performed during off-peak hours whenever possible. The laptop battery should be kept at a medium charge level (around 40%) if it will not be used for a significant period of time. Following this strategy will help your battery last as long as possible and reduce environmental impacts!