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I understand some of these laws of thermodynamics. An alternative to this question, being inventive, is "Can an inverter power a dynamo (which is powered by an electric motor) to charge the same inverter batteries?" It may seem redundant but I am pushing the limits with a beginner knowledge.

If the dynamo has field windings then, yes it could power the dynamo"s stator windings and the main power would come from the electric motor and, that arrangement could top-up charge to the batteries. But, you might just as well not use the inverter and instead, directly attach the battery (via the appropriate circuit) to the dynamo field windings. The battery power into the dynamo field windings will be a small fraction of what could be extracted from the dynamo rotor winding to re-charge the battery.

But this then logically leads onto to the dynamo being excited by its own rotor output and, this is perfectly feasible so, a battery connection or an inverter connection is then redundant. The power from the dynamo that is left from it exciting its own windings can then charge the battery that feeds the inverter.

However, if you believe that the electric motor driving the dynamo can also be powered via the inverter from the same battery then that won"t work. It can only work if there is a different power source for the motor.

Most people understand by intuition that one can"t lift off the ground by pulling on their bootstraps, but once you add enough bells and whistles, copper coils and big iron to the exact same thing, the magic happens and it becomes believable.

It"s possible and this is how regenerative breaking works in electric cars, or how flywheels store and release their energy. An electric car going up hill will use a lot of energy from it"s batteries, but on the way down it will recharge a good chunk of it (wikipedia says up to 70% efficiency). However if you"re in that car then you"ll be on the other side of the hill, fulfilling the purpose of a car!

Asking "can I charge a battery with a charger plugged into an inverter plugged in to the same battery?" is like asking "Can I make money buying and re-selling the same books on ebay over and over again?".

Put in this most simple form, the idea is obvious nonsense; but it"s also pretty obvious that obscuring the original lossy circulation by adding more middlemen, going through different addresses and credit cards etc. will, if anything, only make matters worse.

I think this is a very fine analogy. That it doesn"t dive into the electronic details is on purpose: The laws of thermodynamics are an emergent property of complex systems and do not depend on the

"substrate" they emerge from, which gives them their universality.

Key to your understanding of this issue is that currents add at a node... so Ia from the charger and Ib to the motor will add (with different signals) at the battery. As charging will have <1 efficiency, it"s easy to see why it"s not smart to have both flows ON continuously.

But asides the net lower efficiency, if makes all the sense, if used at different times. I.e. in real world in makes no sense to attempt charging while you"re taking current from the battery to propel. The smart way is to do it at the instances when you have mechanical energy to spare. That"s EV Regenerative Braking.

The electrical machine type you are employing is also key to this question: A lot of electrical motors are easily turned into generators, which is referred to as Motor-Generator. Others are not practical (e.g. because you"d need a dedicated charger), or have very low efficiencies.

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