Loop rule: \( IR + L \frac{dI}{dt} = \mathcal{E} \) \( (I > 0, \frac{dI}{dt} > 0) \)

- \( I \mathcal{E} \): rate at which EMF source delivers energy
- \( IV_R = I^2R \): rate at which energy is dissipated in resistor
- \( IV_L = LI \frac{dI}{dt} \): rate at which energy is stored in inductor

Balance of energy transfer: \( I^2R + LI \frac{dI}{dt} = I \mathcal{E} \)