Moore's law predicts that transistor density would double every 2 years . It's not a physical law but just an observation.

Physical limitations:

- Power/Temperature problem:
  Increased power consumption due to increasing transistor density leads to **increase in temperature** . Inefficient cooling could lead to physically melting the chip.

- Voltage scaling **reduces the power consumption**.
  The dynamic power is proportional to square of voltage swing.

- Threshold voltage of transistor:
  Due to a *Threshold voltage of transistors*, reducing voltage below a certain level is not possible. Thus **voltage scaling is limited** due to threshold voltage

- Noise/Threshold problem :
  Failure to understand the noise in highs and lows due to smaller voltage swings. **Voltage scaling is limited** due to noise.

- **Leakage power loss** : Reducing size of transistors implies thinner insulators, this leads to power leakage and has been a growing concern as we scale down transistors. Voltage scaling cannot prevent leakage power loss.