

## Phase Compute OS — Energy Wall v3 (Power Density Edition)

### 1. Energy Wall: The Hard Limit

AI scaling hits physical constraints:

- rack power ceilings
- cooling non-linearity
- grid shortages
- CAPEX saturation

### 2. 2025–2030 Limits

100kW–200kW rack saturation

Cooling  $\Delta T$  inversion

Data-center megawatt shortages

### 3. Why GPUs Fail at Scale

Power density  $\uparrow$

Movement power  $\uparrow$

Cooling cost  $\uparrow$

Compute benefit  $\downarrow$

### 4. RCIRCUIT Energy Model

Resonance > switching

Locality > movement

Phase > FLOPS

### 5. Conclusion

The next compute era requires a new physics.

— HROS RME Lab (Phase Compute OS Initiative)