changes must be paid for

> energy in joules as the universal currency

changes calculated from outputs

changes calculated from inputs

energy depleted from a store

energy augmented in a store

energy shifted constrains what can happen

eight stores: each standing in for calculations that can be done

power

accumulates

energy in stores

kinetic store thermal store gravitational store

electromagnetic store

elastic store

nuclear store

vibration store

chemical store

energy resources are stores that can be depleted at rates that are useful to humans

energy found in stores: 'locations' standing for calculations that can be done

a physical description -an energy description

a lived-in world description

> a physical description a power description

power in the rate at which energy is shifted along a pathway: 'conduits' standing for calculations that can be done

always a process in progress

always a complete

process — from

snapshot to

snapshot

four pathways: each standing in for calculations that can be done

electrical working

mechanical working

heating by particles

heating by radiation