

## Electric current

- Charge flow in materials
- Amount of electricity in circuit flow

## power

- Coal-fired power plant
  - 33% eff
- Gas-fired power plant
  - higher eff(heat source higher temp)
  - more environmental friendly
- Stream turbine
  - convert energy of fluid into mechanical energy by expansion
  - stream driven rotary engine

## Transformer

- use induction
- $P=VI$
- $V_s/V_p = N_s/N_p = I_p/I_s$
- $N_s/N_p > 1$  step-up

## Voltage

- Force or push on electron
- Potential difference

## AC

- frequency 50Hz(direction 100times)
- line voltage easily up and down
- need larger diameter
- cheaper transformation between voltage
- easy to off
- less equipment, reliable
- economical
- rotating field

## Smart power grid

- reliable
  - real time info about electricity flow
  - identify, correct potential problem before occur
  - grid can respond to system and reroute
- faster power restoration
  - can auto know, no need customer call
- more info about power usage

## Resistance

- opposition to current flow

## DC

- flow in one direction
- no skin effect, low loss
- need DC-AC converter to control voltage level
- switch to high voltage is difficult
- long distance, higher power p2p transmission
  - lower loss
- undersea, underground transmission
  - no reactive power problem
- less space

## Light

- fire 1%, incandescent lamp 3.5% fluorescent lamp 20% LED 80%

