



Duurzame energie

05

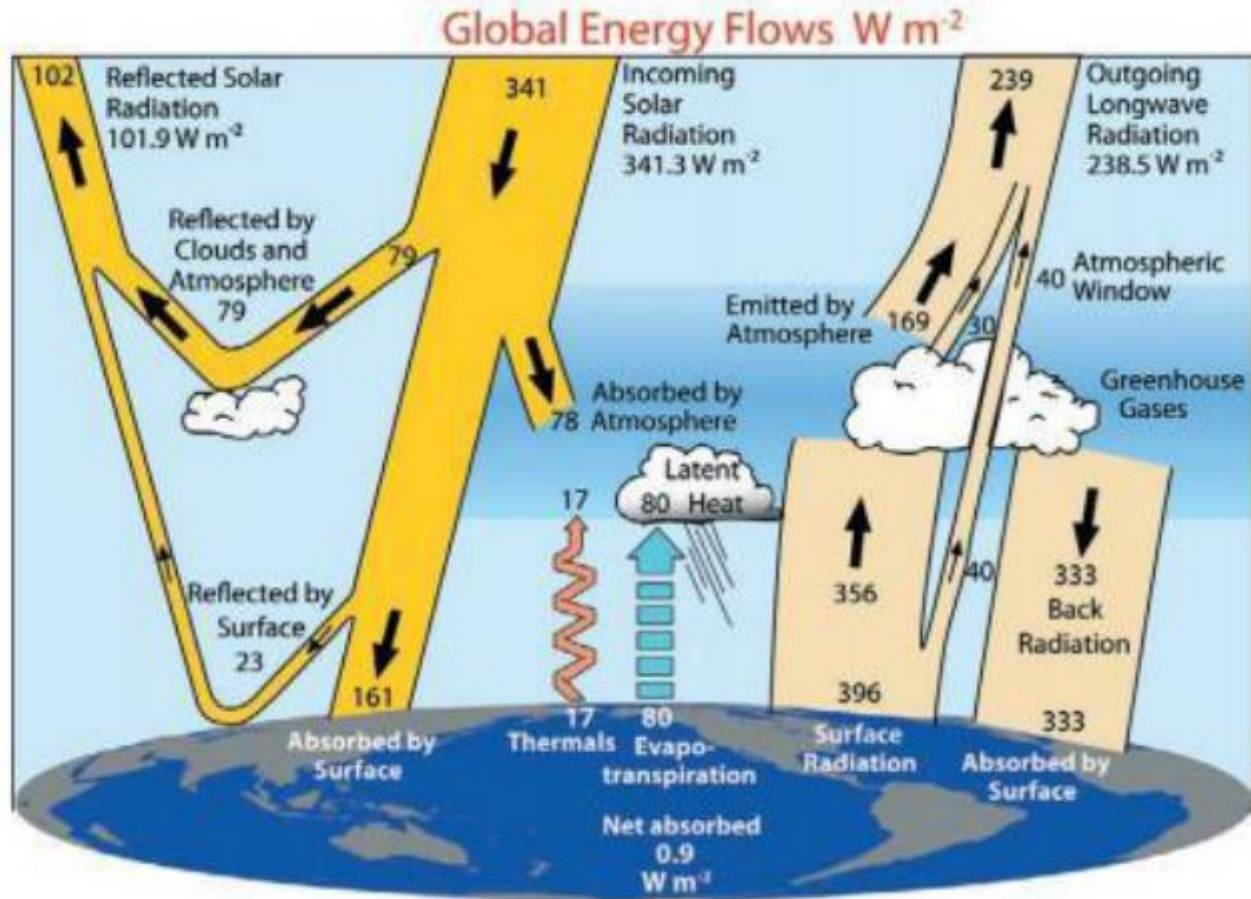
Wat gaan we doen?

- Planning
- Herhalen vorige week
- Theorie
- Verder werken aan de opdrachten

Planning

Energiebeurs

- <http://www.tertium.nl/>



Energiebalans
 Klopt de E balans?
 Bereken voor de aarde.

PV cellen

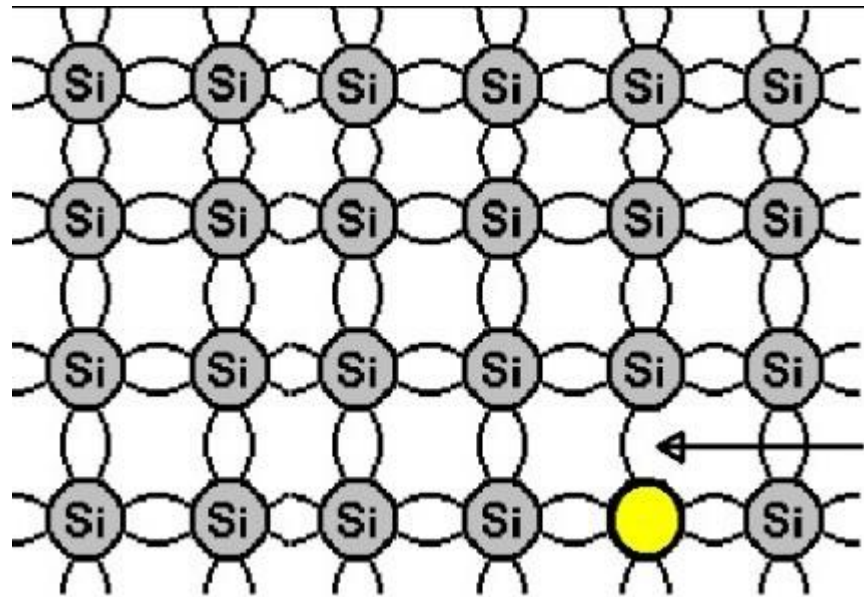
- Photo (licht)- voltaïsche cellen
- Zetten zonlicht om in elektrische energie



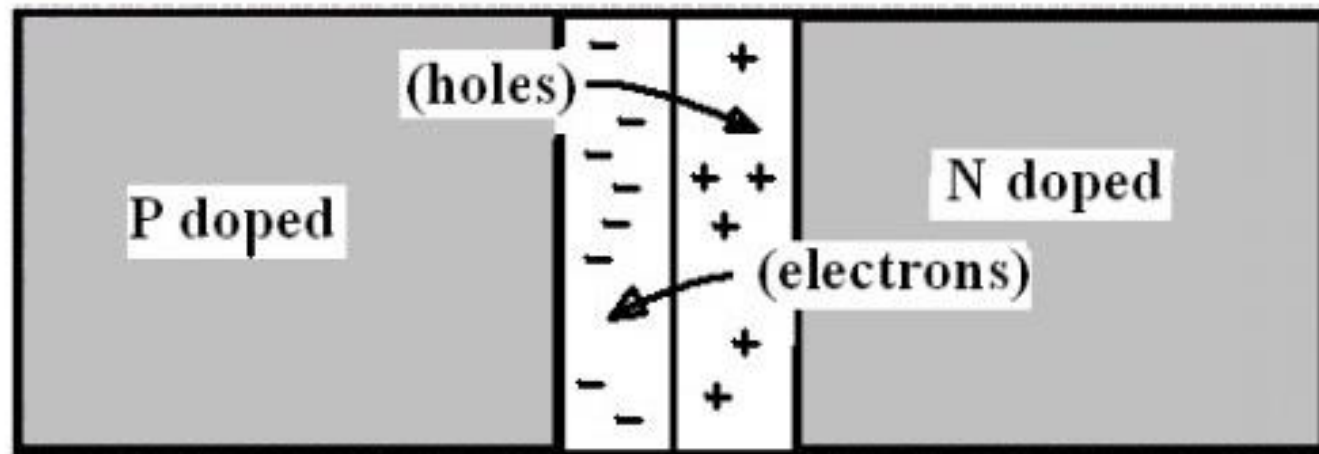
● Pyranometer

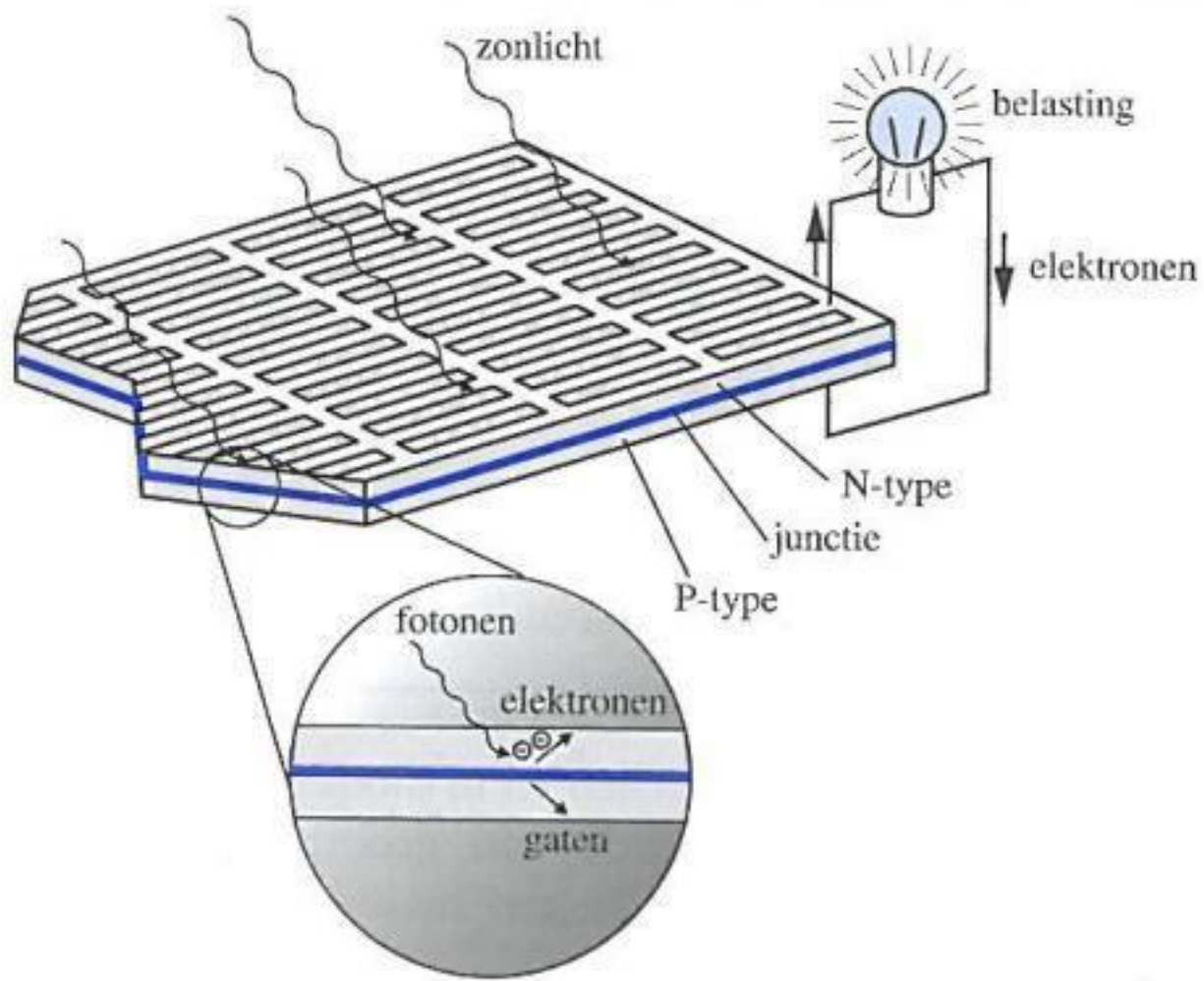
Amorf Kristallijn





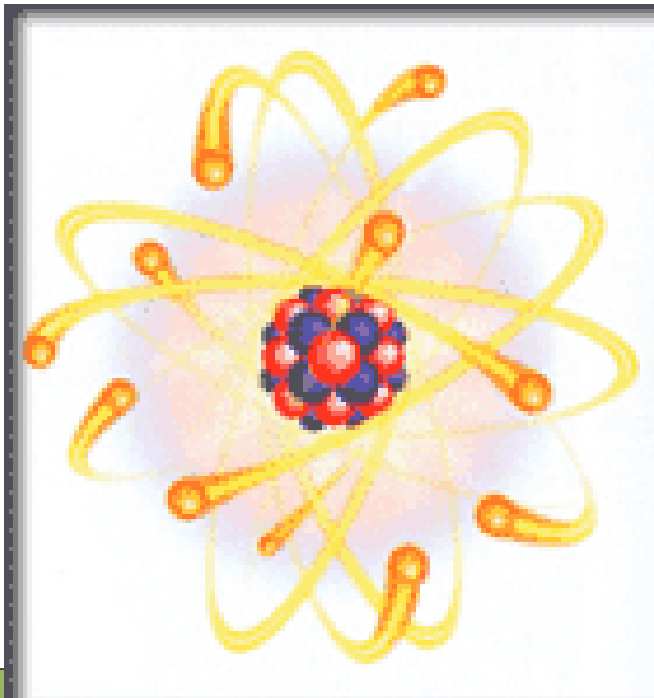
P overschot
N gaten



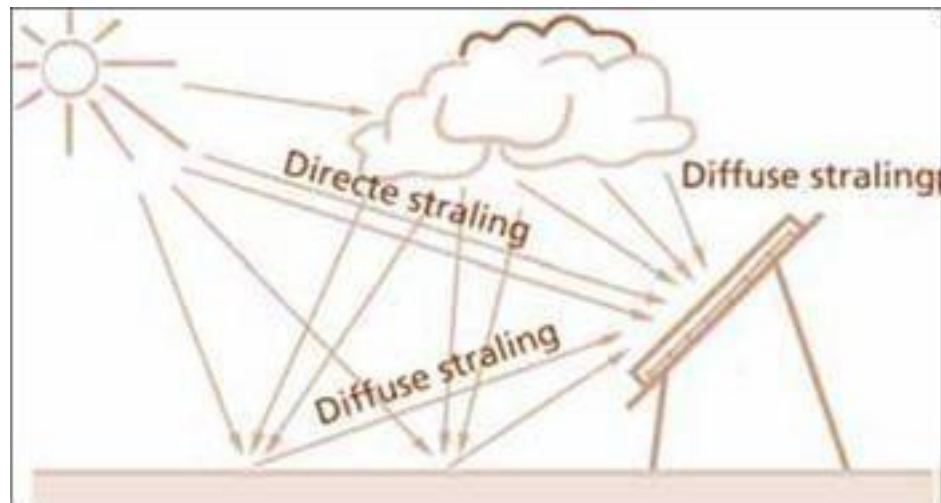


Werking

- <https://www.youtube.com/watch?v=7BI2Wp8dkmU>



Zolang er fotonen zijn is er stroom

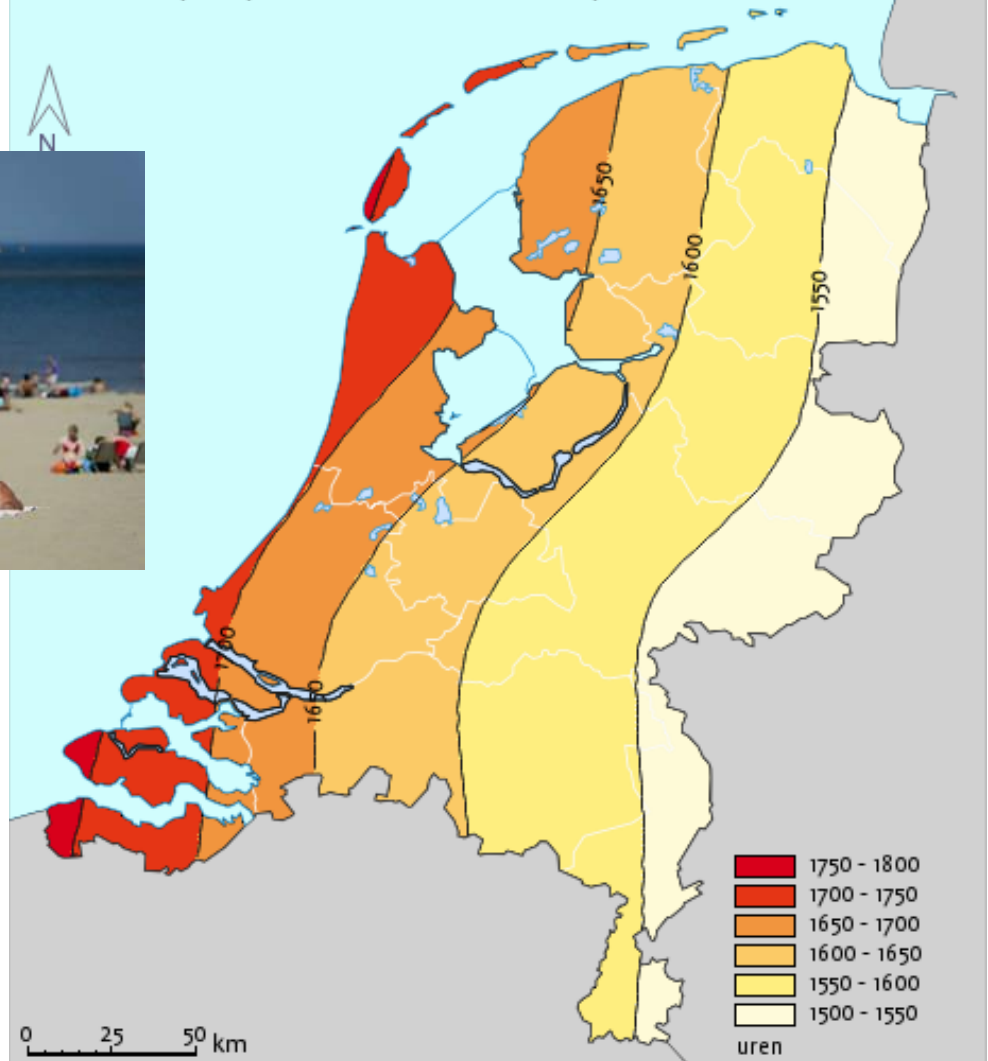


Locatie in Nederland



Langjarig gemiddelde 1981-2010

Gemiddelde jaarlijkse duur van de zonneshijn

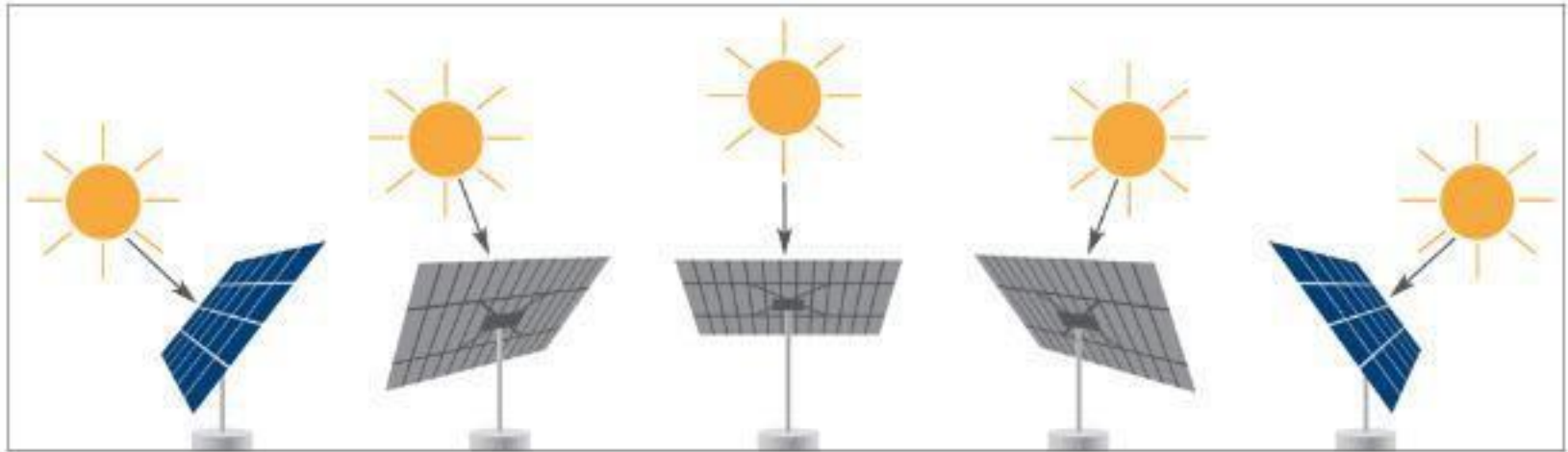


Tracking systemen

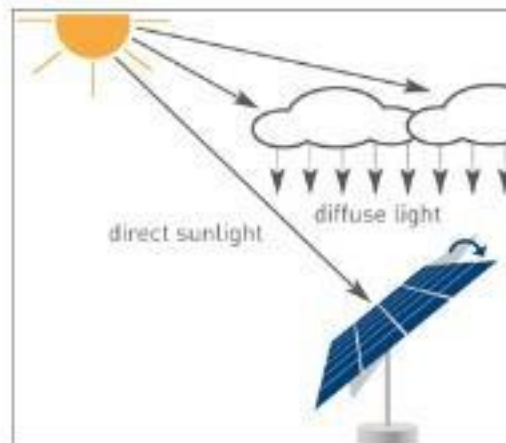
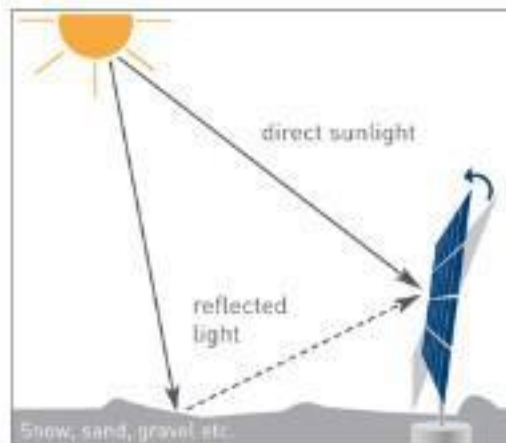
- Meedraaien met de zon (astrologisch)
- Meedraaien met de zon + winter/zomerstand
- Draaien naar de plek waar het meeste licht vandaan komt (maximum licht detectie: MLD)

- Kan 40% in de zomer/ 10% in de winter
- R verhogen

o <https://www.youtube.com/watch?v=0GU>



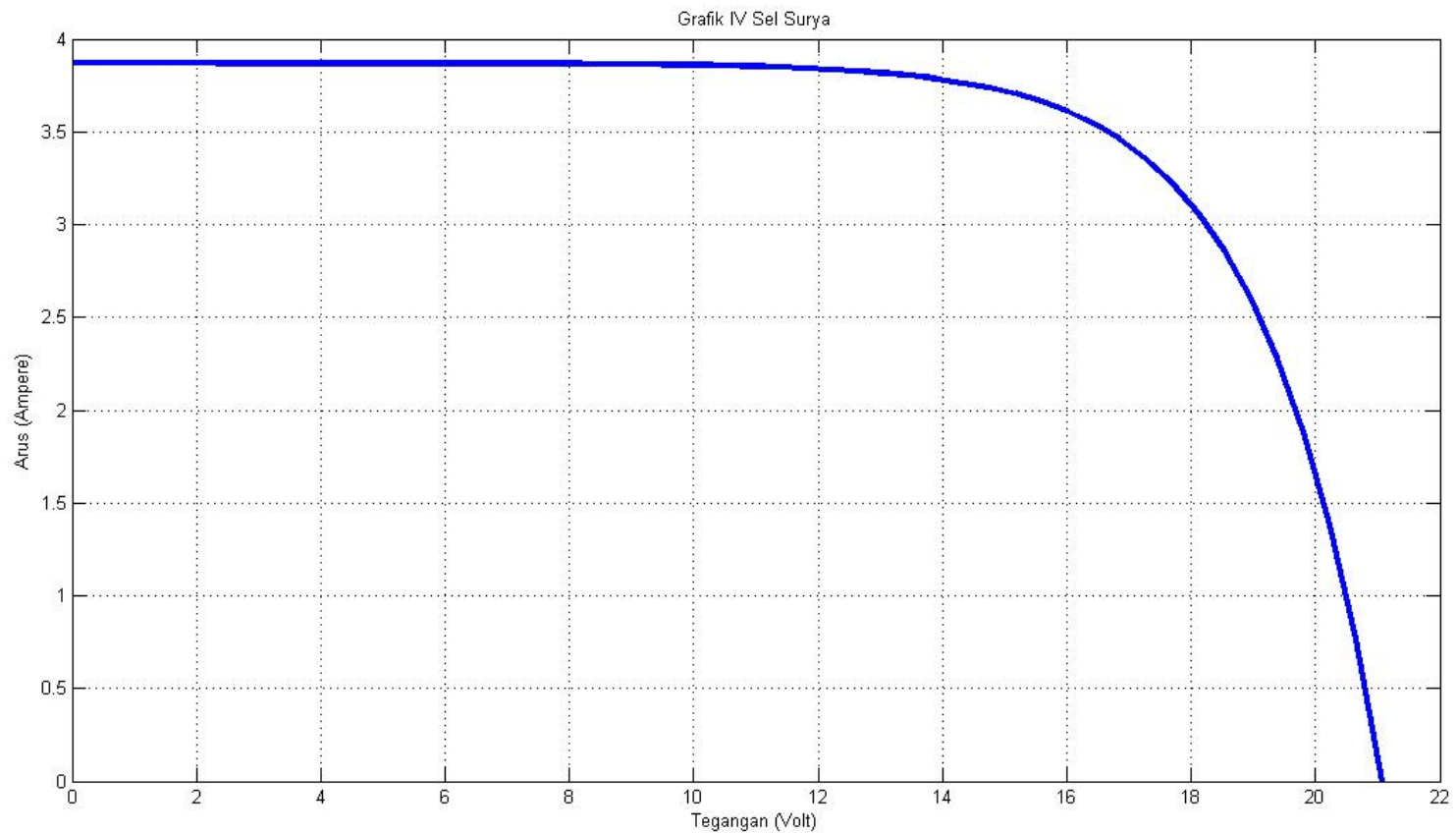
o https://www.youtube.com/watch?v=Yn0NF_cK3J0

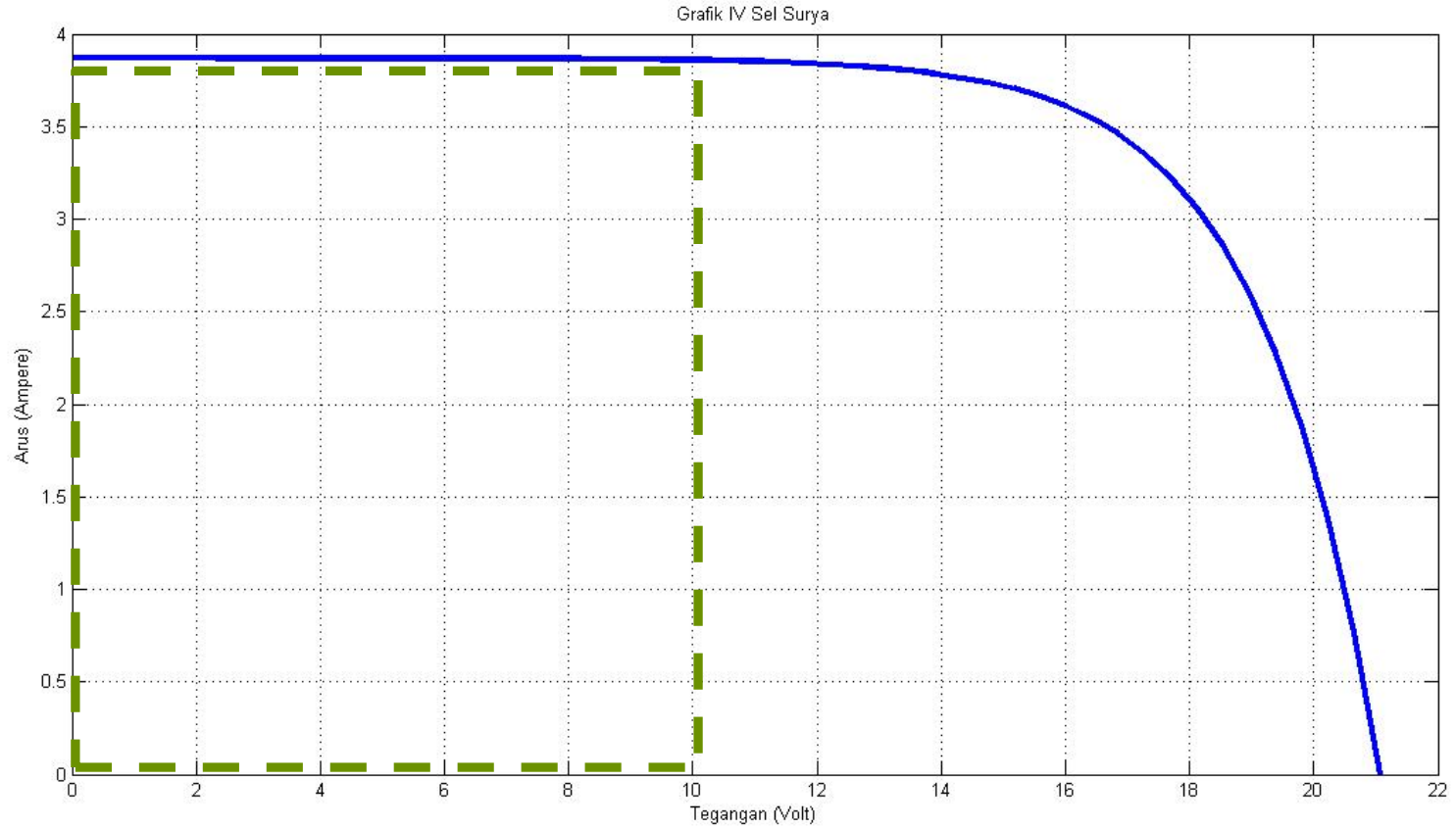


Kwaliteit van een PV paneel

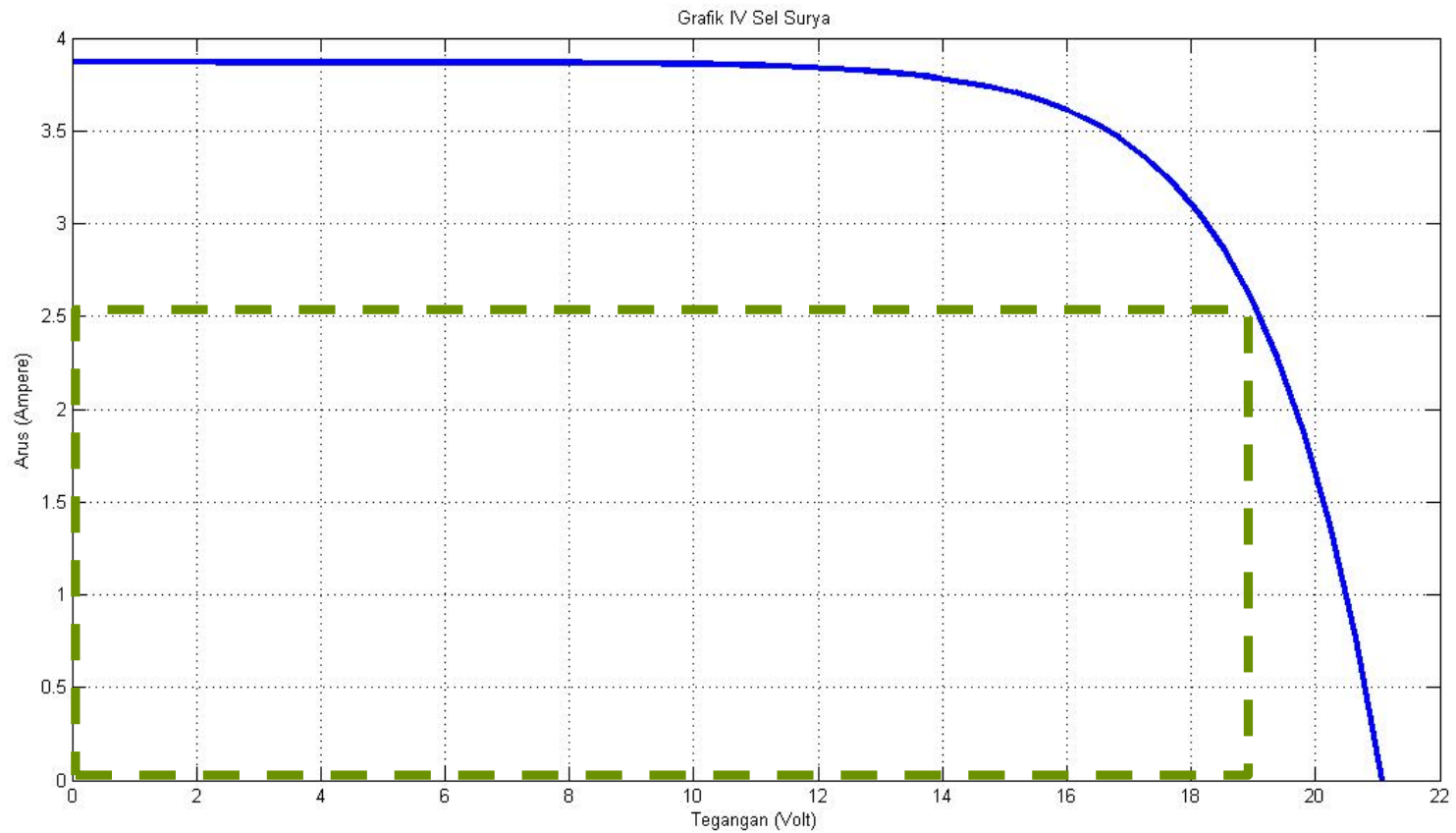
- Maximum powerpoint (watt)
- Bij een vaste temp/zonne-instraling
- $P = U \cdot I$ (VA= Watt)

Waar ligt P_{max} ?

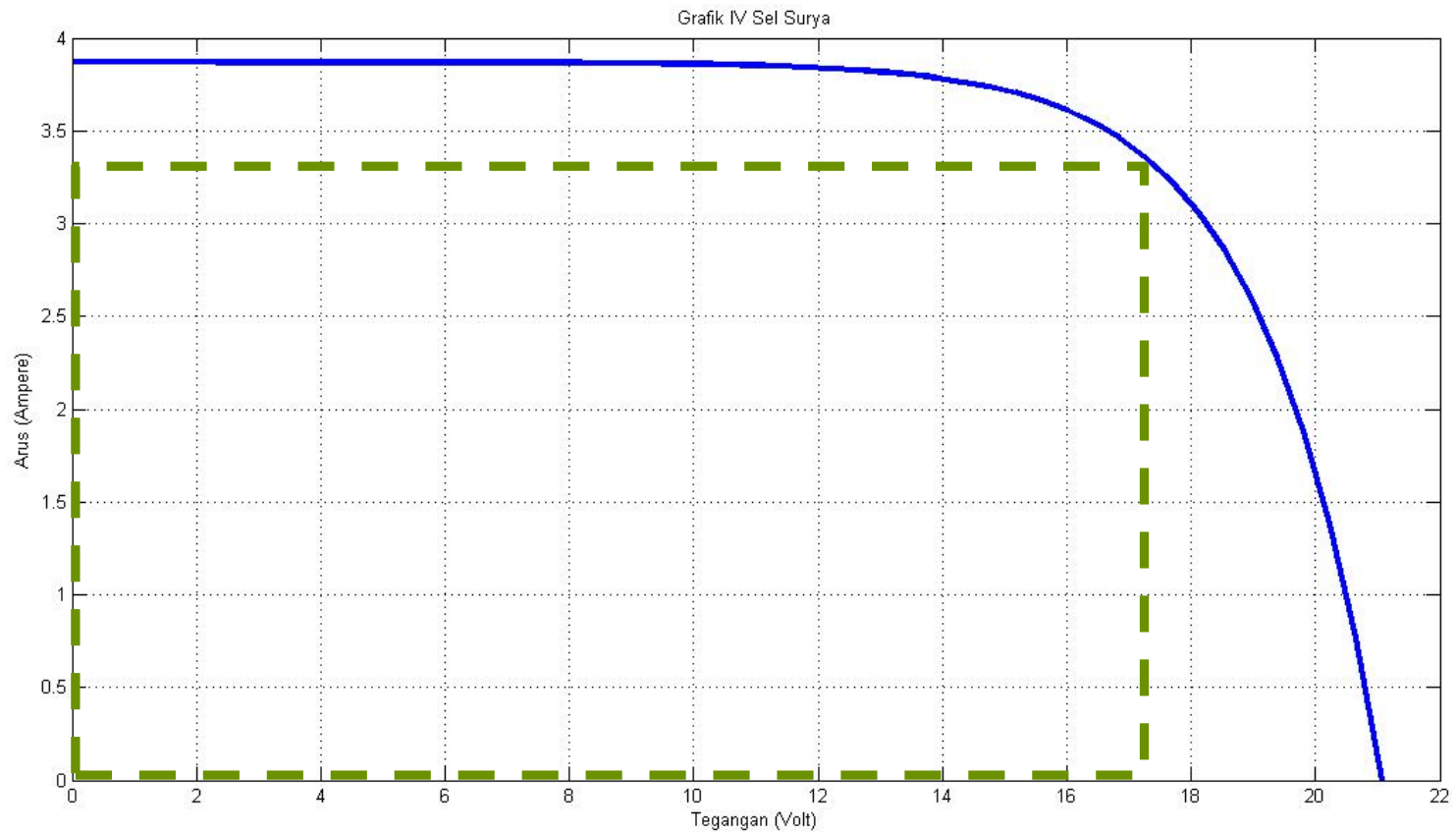




○ $P = 4,7 \text{ A} \cdot 10 \text{ V} = 47 \text{ W}$

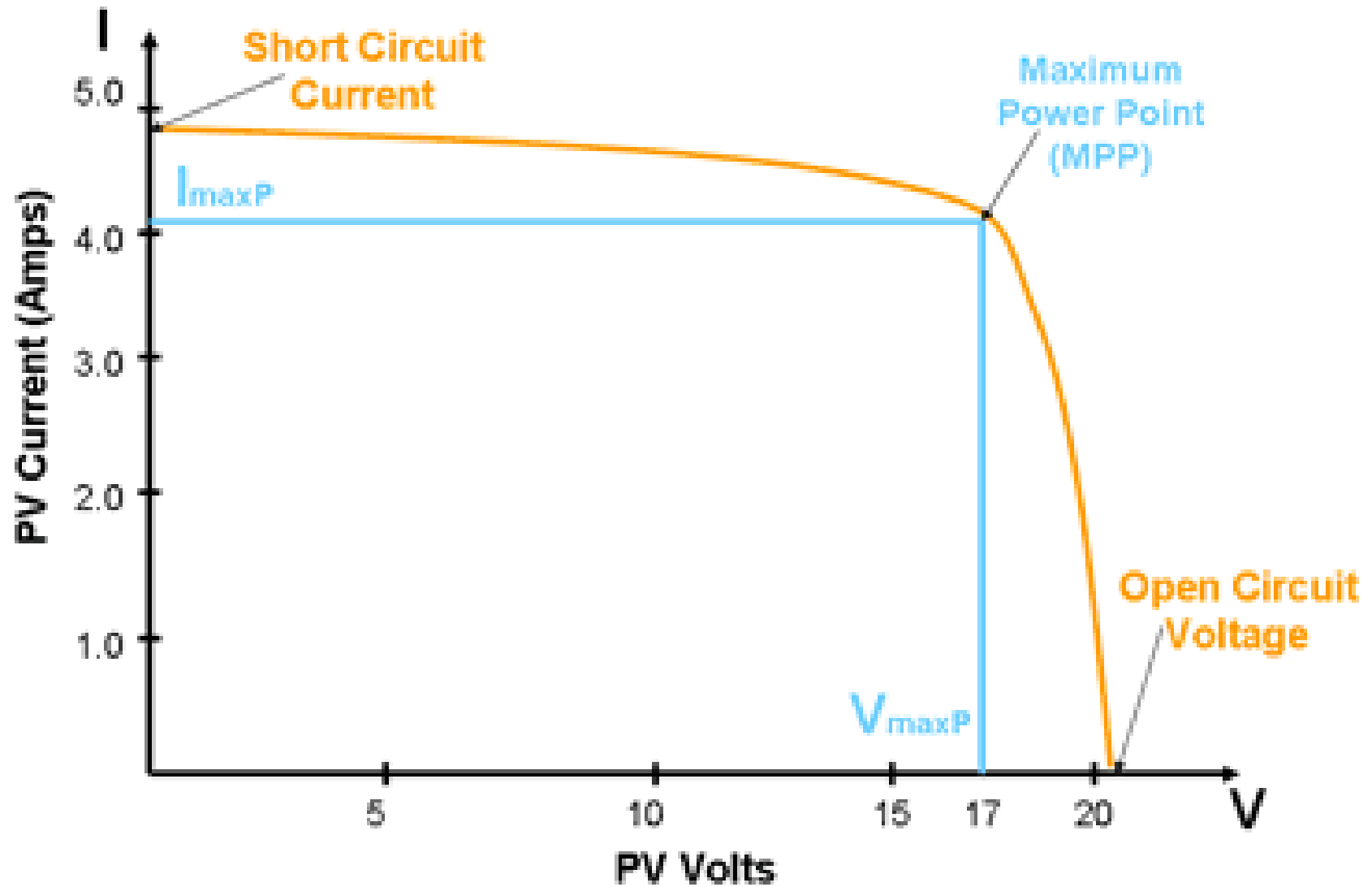


○ $P = 2,5 \text{ A} \cdot 19 \text{ V} = 47,5 \text{ Watt}$



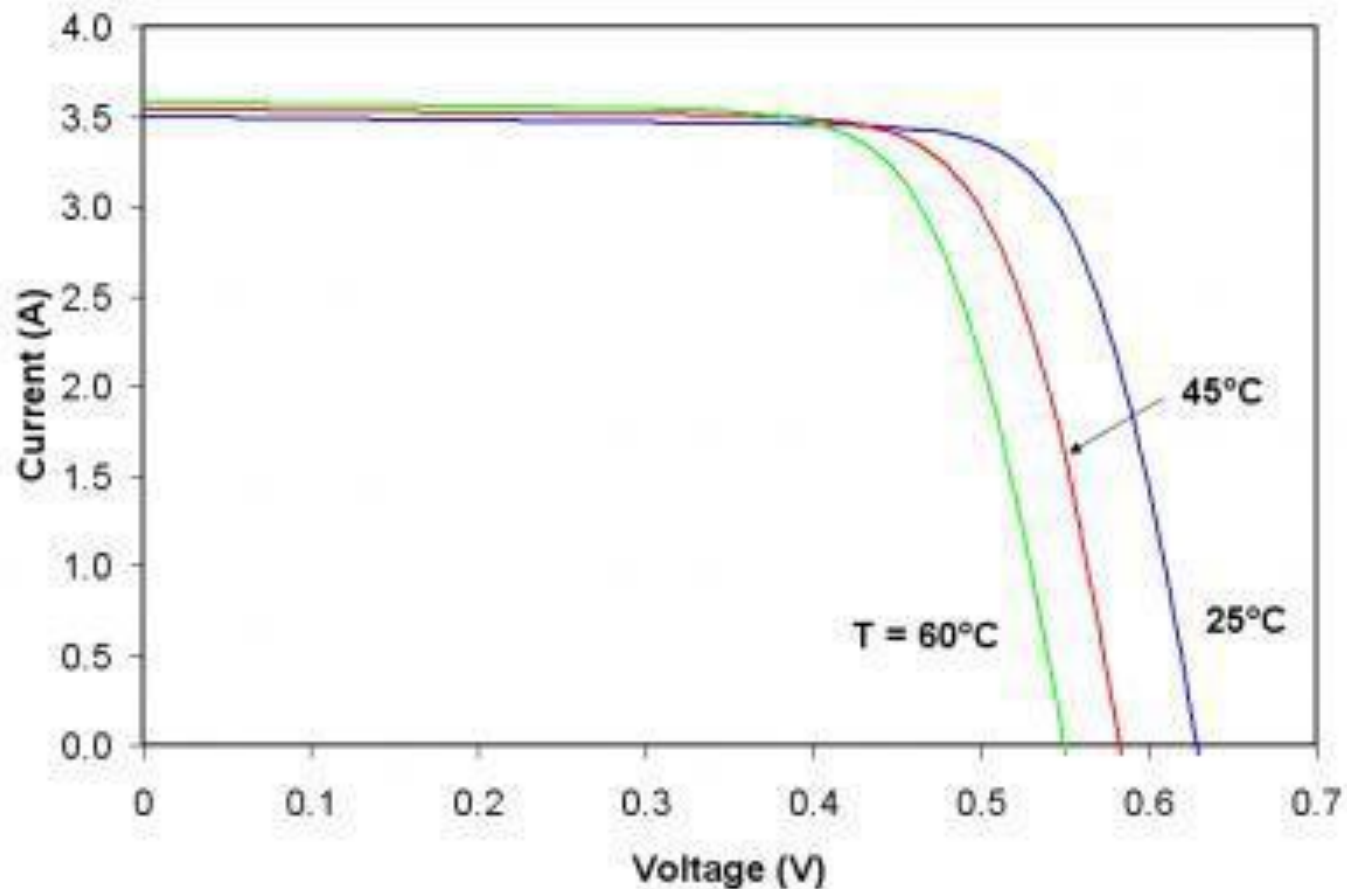
○ $P_{max} = 3,3A \cdot 17V = 56 \text{ Watt}$

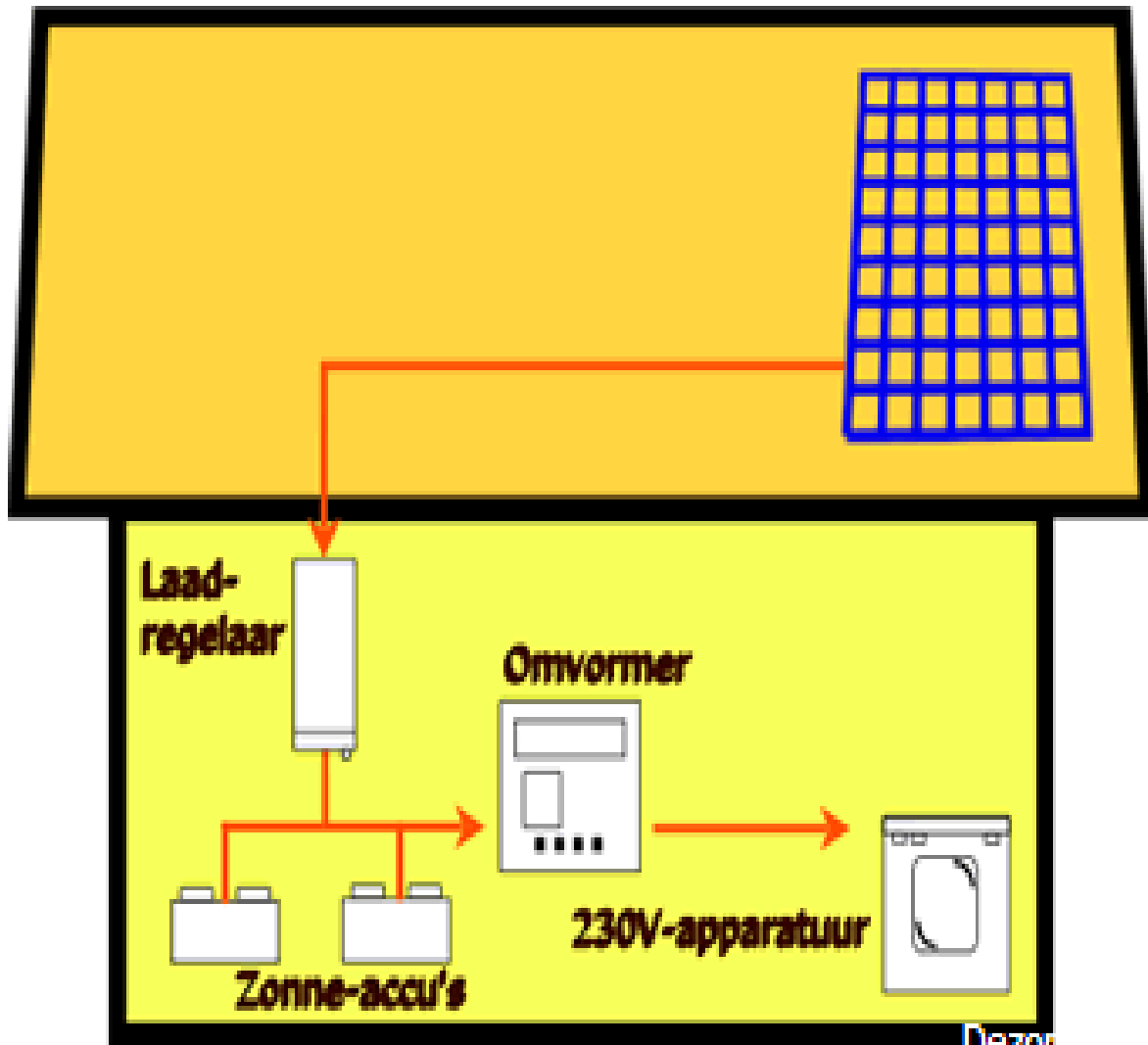
Photovoltaic Array Voltage / Current Characteristic



Temperatuurinvloed

- Hoe warmer/hoe slechter de elektrisch geleiding (zo ook bij PV-panelen)





Laadregelaar



Functie: Pieken vanuit de zonnecollector afregelen, optimale laadspanning bepalen tbv de accu's

Accu's



Functie: Buffer: Tijdelijke opslag, stabiliseren uitgaande spanning

Omvormer



- Functie: Omzetten gelijkspanning (+ en -) naar wisselspanning van het net (230V 50 Hz ~)

Zonne-energie

- Vlakke plaat collector
- Vaccuumbuis

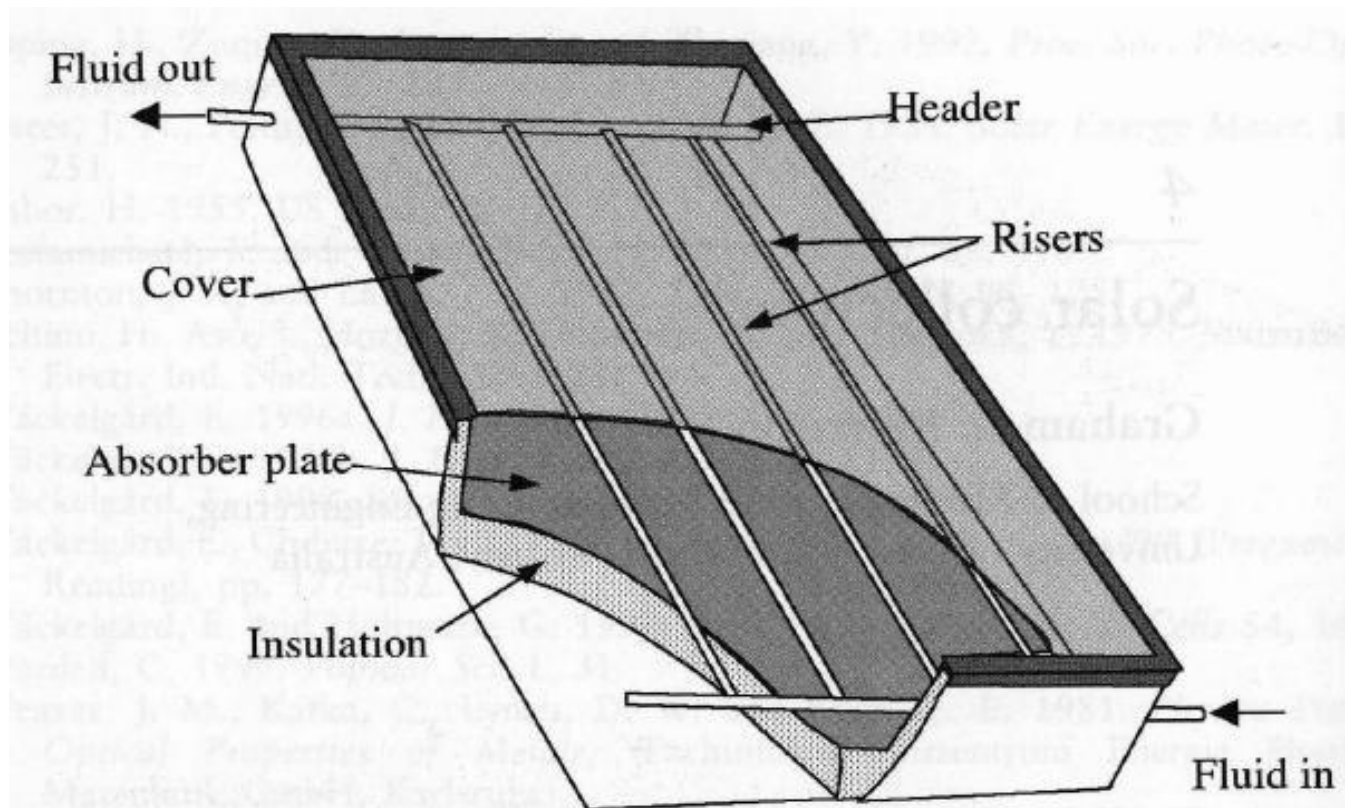
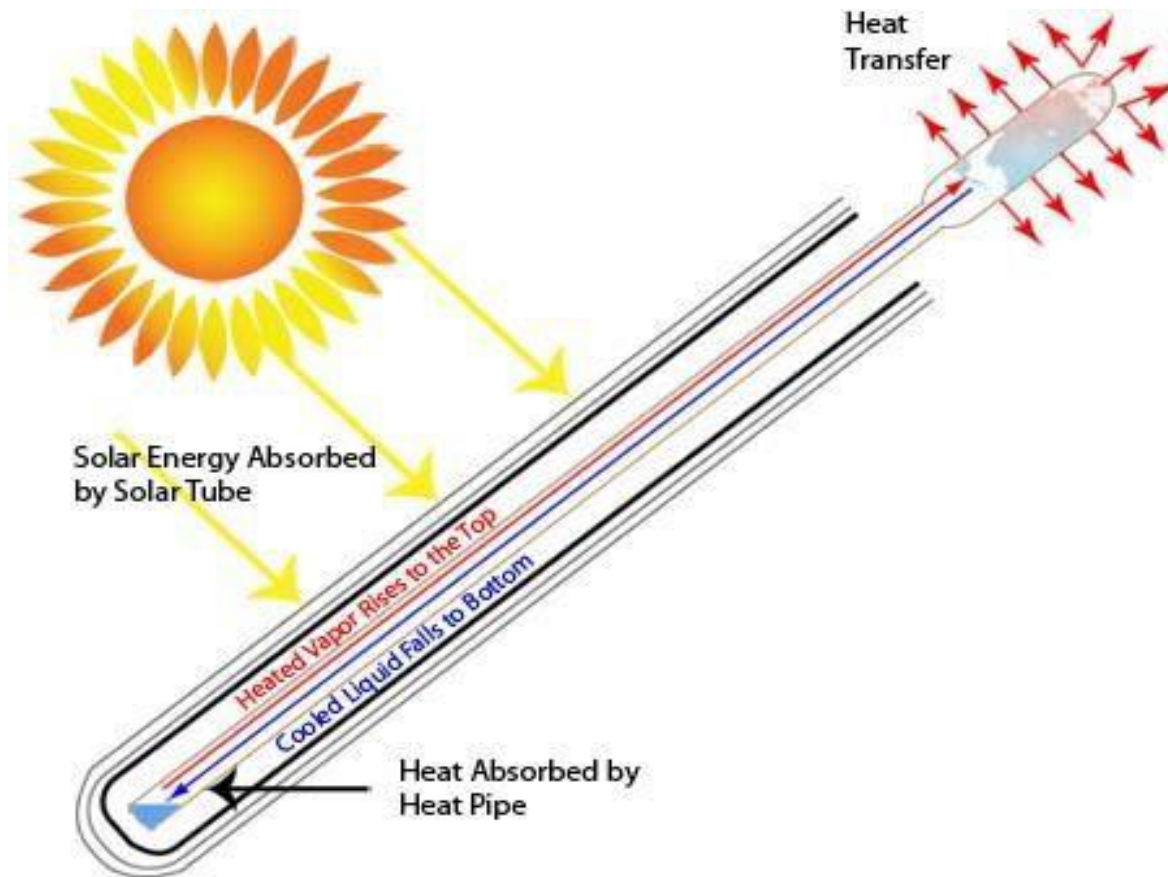
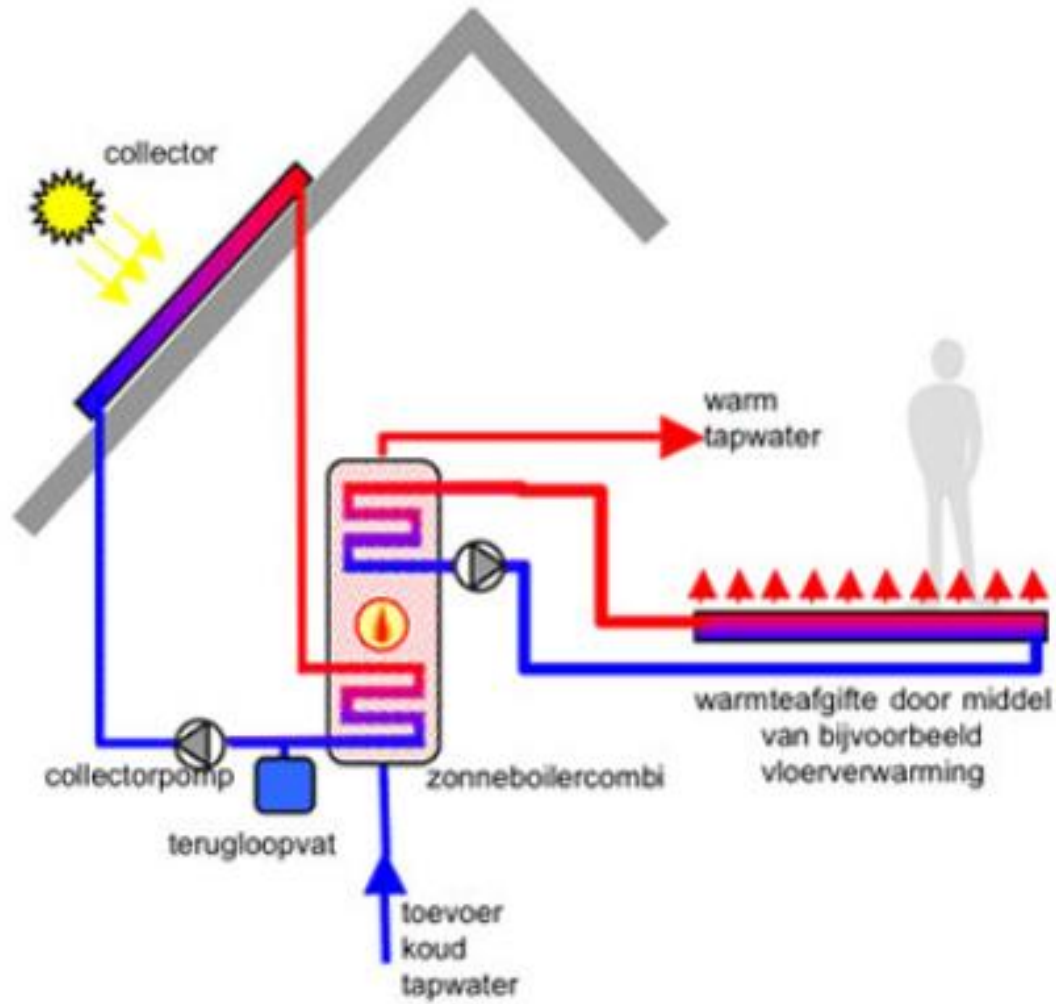


Figure 4.1 Single glazed header-riser flat-plate collector.



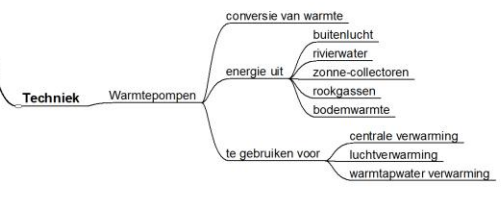
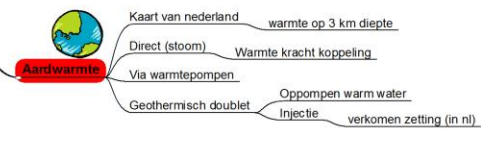
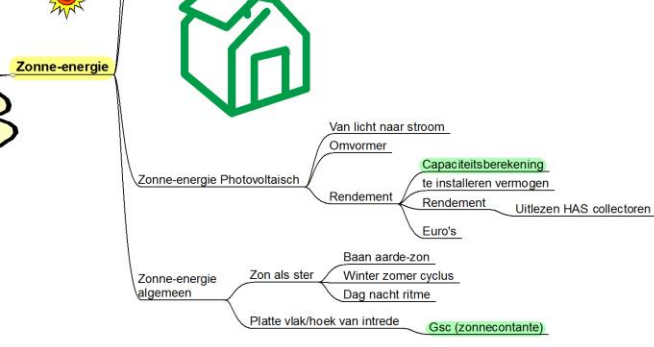
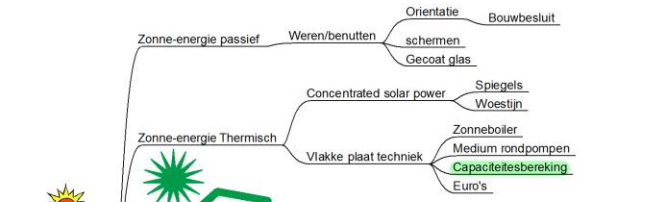
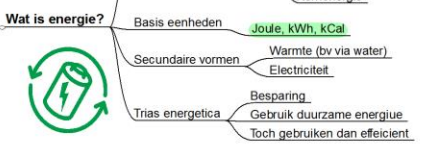
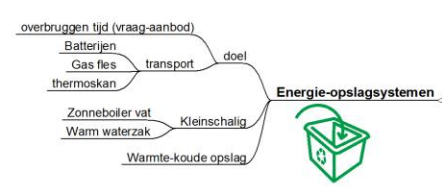
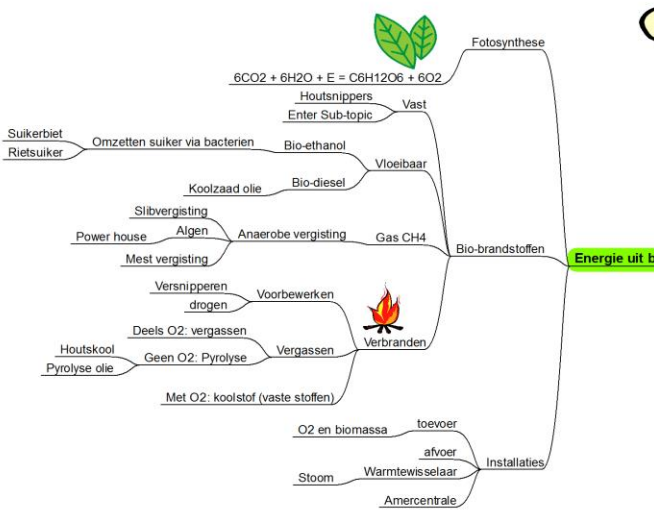
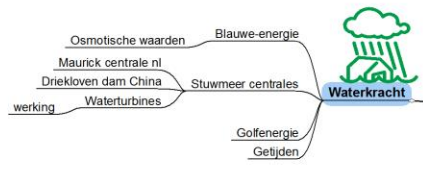
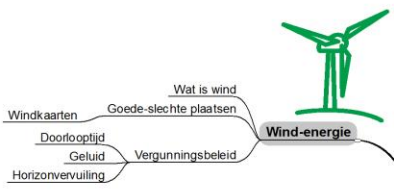
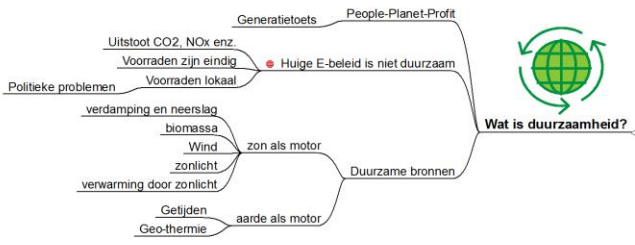




Concetrated solar power

- <https://www.youtube.com/watch?v=LMWlgwvbrcM>

Duurzame ENERGIE
Verkennen leefomgeving II



WINDENERGIE

- Wat is wind?

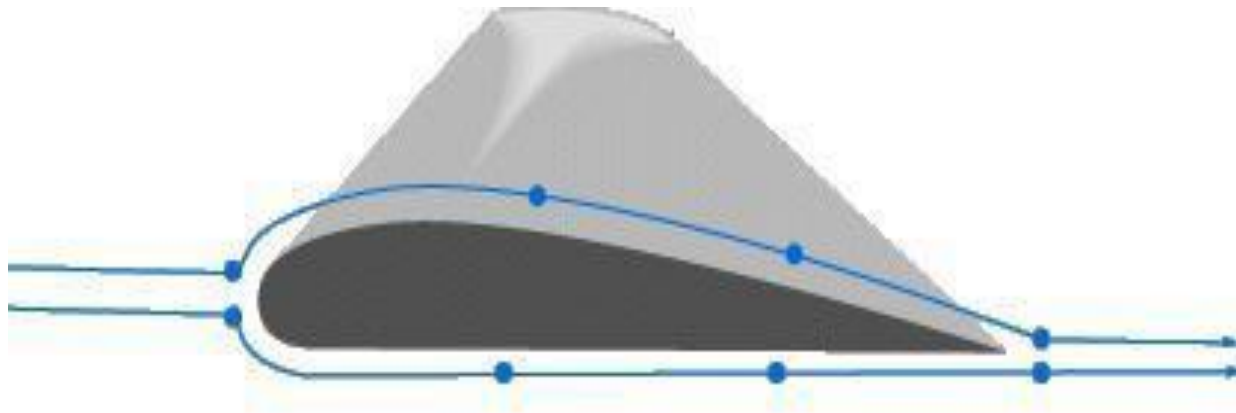


- Is zonne-energie?

Soorten windturbines

- **Turbine met tandwielkast (horizontale as windturbine)**
- **Direct drive turbine** (horizontale as windturbine)
- **Verticale:** Darrieus windturbine

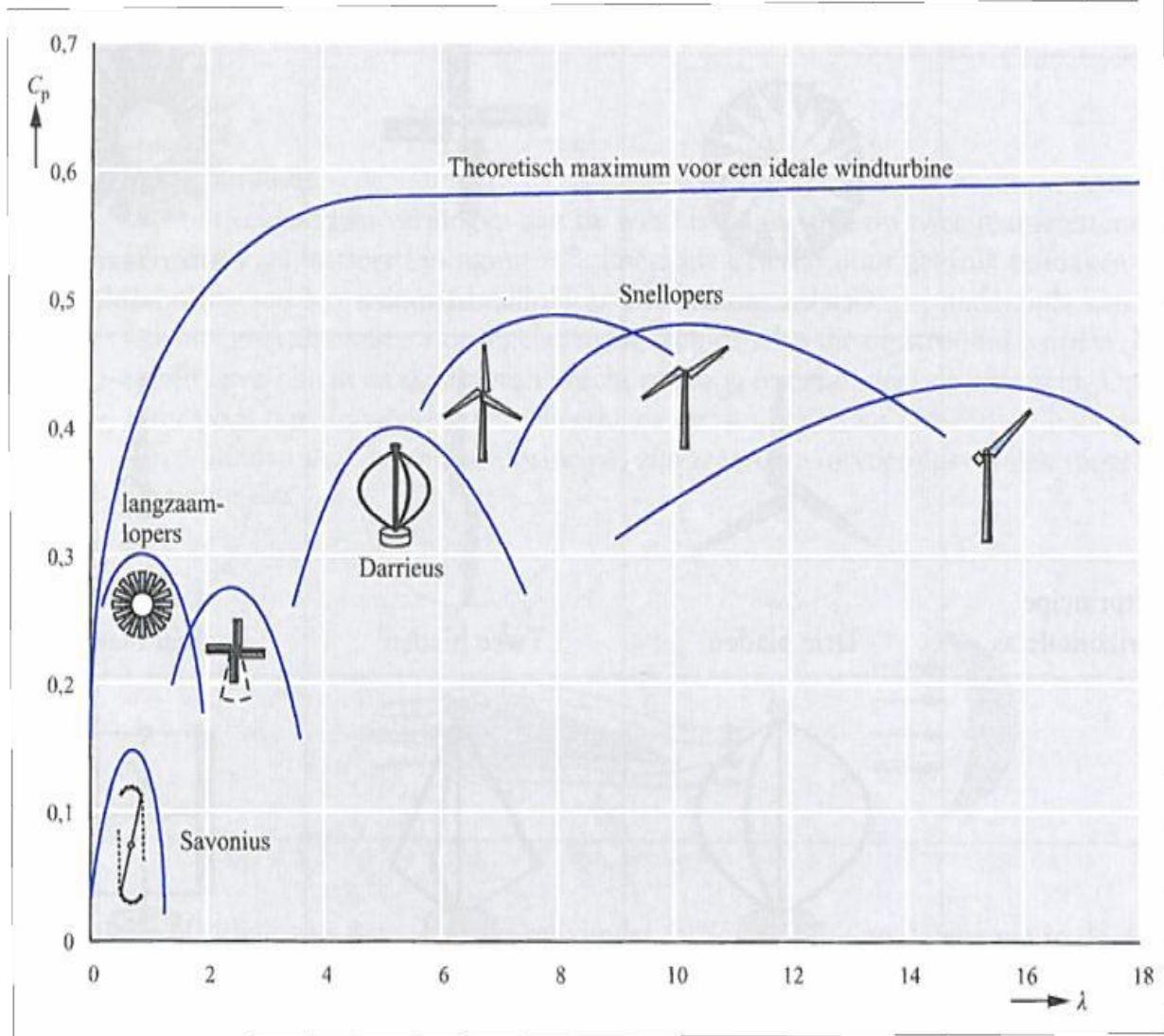
Principe



<http://designapplause.com/2009/ten-wind-turbines/2283/>

$$P_{wind} = \frac{1}{2} \rho * v^2 * A * v$$

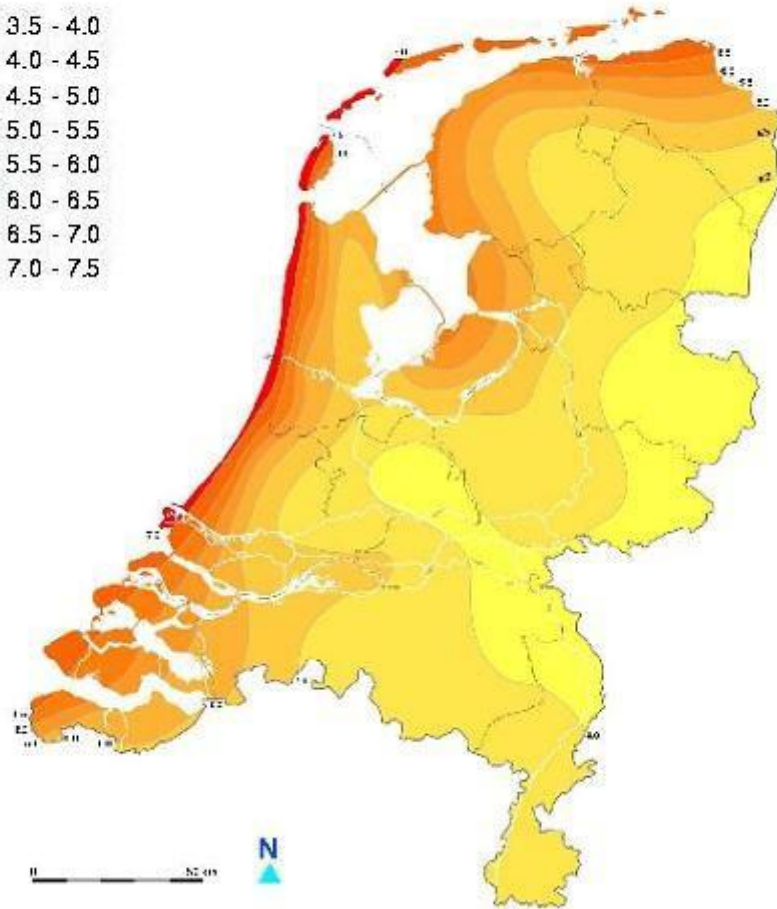
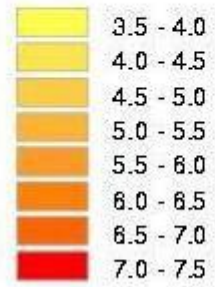
$$E = \frac{1}{2} \cdot \rho \cdot S \cdot v_1^3$$



Windkaart Nederland

Langjarig gemiddelde windsnelheid per jaar, gemeten op 10 meter hoogte

m/s



Einde

- Afronden + inleveren taken t/m 26