Introductie energielandschappen
1000 jaar co-evolutie energie & leefomgeving

Sven Stremke - Wageningen Universiteit

Veluwe energielandschap (foto: Flickr/Paul Jansen)

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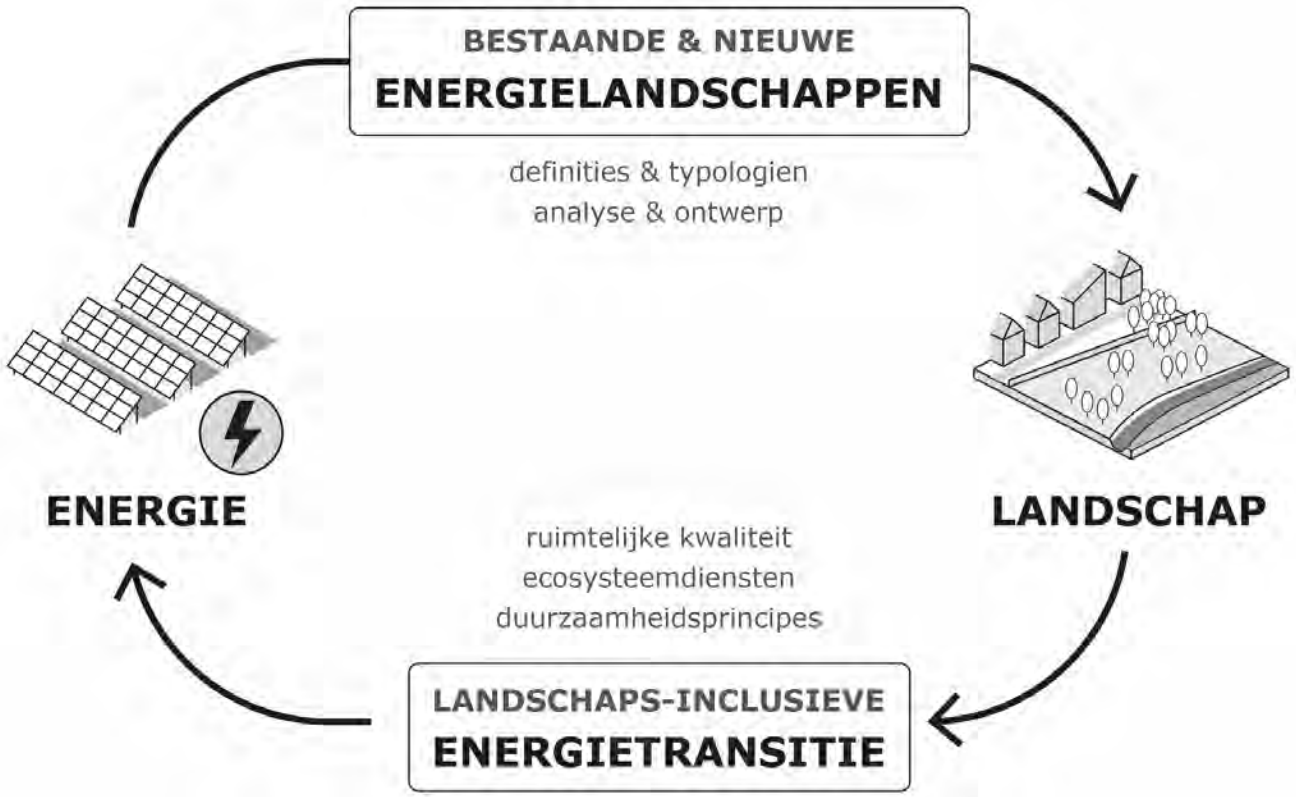
Principal Investigator for Energy
Amsterdam Institute for Advanced
Metropolitan Solutions (AMS)

Founding Director NRGlab
Laboratory for Energy Transition
part of Landscape Architecture/WUR

Miguel de Cervantes (1605)


BESTAANDE & NIEUWE
ENERGIELANDSCHAPPEN
definities & typologien
analyse & ontwerp
ENERGIE
LANDSCHAP
ruimtelijke kwaliteit
ecosysteemdiensten
duurzaamheidsprincipes
LANDSCHAPS-INCLUSIEVE
ENERGIETRANSITIE

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

Klimaat-akkoord

GELDERS ENERGIE-AKKOORD

GEMEENTE Berg en Dal

Internationaal < > Lokaal

Onderzoek, adviezen, kennisverspreiding, implementatie & monitoring

Agrivoltaic park in Babberich (foto: Dirk Oudes)

Solarpark de Kwekerij in Hengelo (foto: Sven Stremke)

Windpark Aalten, Gelderland (foto: Sven Stremke)

Nijmegen energielandschap (foto: C.W. Broere in: Holland growing greater, 1963)

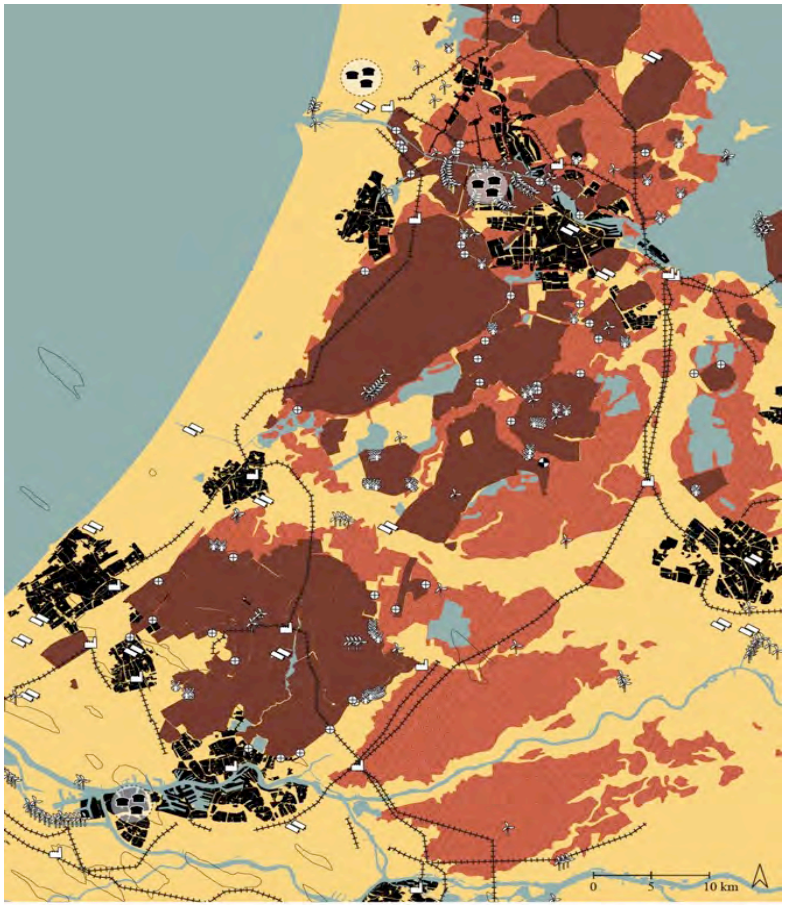
Kinderdijk energielandschap 1740/1886; foto: beeldbank RWS

Rijksdienst voor het Cultureel Erfgoed
Ministerie van Onderwijs, Cultuur en Wetenschap

THE WESTERN NETHERLANDS DURING THE FIRST ENERGY PERIOD: WOOD ENERGY

LAND USE
- Indication of habitation area
- Open water (1219 km²)
- Peat landscape (2838 km²)
- Other terrestrial area (1475 km²)

ENERGY IN THE LANDSCAPE
- Indication of areas used for
  - food for muscle power
  - fodder for draft animals
  - chopping wood (deforestation areas)



THE WESTERN NETHERLANDS DURING THE FIFTH ENERGY PERIOD: MODERN RENEWABLES

LAND USE
- Urban settlements (339 km²)
- Open water (1387 km²)
- Remnants natural peat landscape (1013 km²)
- Other terrestrial area (1918 km²)

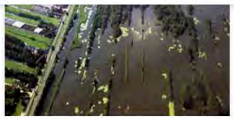
ENERGY IN THE LANDSCAPE
- Windturbine
- Solar park
- Coal driven water pumping station (partly non-functional remnants)
- Oil driven water pumping station (partly non-functional remnants)
- Electric water pumping station
- Oil fields
- Fossil fuel storage
- Power plant (150-380 kV)
- Overhead power line (50, 150 and 380kV)
- Historical windmill related to *Droogmakerijen*
- *Droogmakerijen* (929 km²)

Afbeelding: 1000 jaar co-evolutie energie & landschap in West Nederland (de Jong & Stremke, 2020)

Het energielandschap van de toekomst: "Produc...
vlm.be

Winnaars bekend Energielandschap van de Toe...
dearchitect.nl

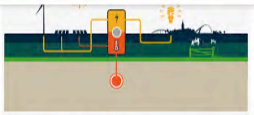
FABRICations schetst energielandschappen va...
architectenweb.nl



Energielandschap - Wikipedia
nl.wikipedia.org

Het Energielandschap | Duurzame energie van de to...
burgersgevenenergie.nl

Energietransitie in het landelijk gebied: drie visies geselecteerd ...
arch-lokaal.nl



Energielandschap De Grift bij Windpark Nijmegen-Be...
windparknijmegenbetuwe.nl

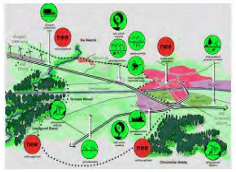
Energielandschap met windmolen en zonnepan...
waarderpolder.nl

Het Energielandschap | Duurzame energie van de toekomst - B...
burgersgevenenergie.nl

Postfossiel energielandschap - Down To Earth M...
downtoearthmagazine.nl

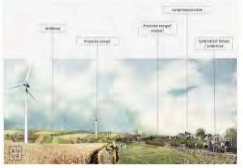
Visie Energielandschap - Gemeente 's-Hertogenbo...
s-hertogenbosch.nl

Rijne Energie en partners geselecteerd voor ont...
windenergie-nieuws.nl



Energielandschap Oirschot - Het Energie Initiatief
energie-initiatief.nl

Energietransitie in het landelijk gebied: drie vis...
arch-lokaal.nl



Energielandschap Denderland + Buur
buur.be

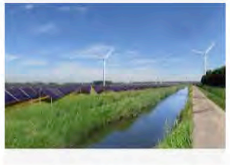
Schooltv: Het ontstaan en de inrichting van Nederla...
schooltv.nl

Open Oproep Nieuwe energie voor het la...
m.stimuleringsfonds.nl

Energietransitie dwingt tot nieuwe visie op ons landschap' |...
change.inc

Energielandschap van de toekomst
kuipercompagnons.nl

251,592 Energielandschap Foto's - gratis ...
nl.dreamstime.com



Vattenfall aan de slag met eerste hybride ener...
ggof.nl

Living Tomorrow! Hoe zal ons energielandscha...
howest.be

Meepraten over Gebieds...
heumen.nl

Winnaars Prijsvraag Energielandschap A16 beken...
brabant.nl

Gerelateerde zoekopdrachten

nieuwkoopse plassen

energielandschap **heart-math**

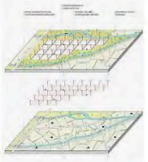
nieuwkoop feyenoord

De Rand wordt blikvanger van het energielandschap - Zon...
zonneparkdegrift.nl

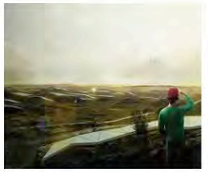
Energielandschap van de toekomst
kuipercompagnons.nl

Raad Utrecht stemt in met energielandschap Rijnenburg
energeia.nl

Bureau Verkuylen - Prijsvraag Energielan...
bureauverkuylen.nl



Energielandschap Vlaandere...
biekevanhees.com



FABRICations schetst energielandschapp...
architectenweb.nl

Energielandschap Denderland wint Vlaamse Plannings...
swecobelgium.be

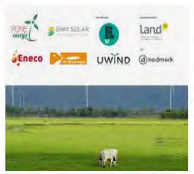
Energielandschap Wells Meer
wellaandemaas.nl

Duurzame energielandschap sto...
nl.dreamstime.com

Tekening Energielandschap de Grift - W...
windparknijmegenbetuwe.nl

Provincie Utrecht en oostelijke gemeenten ...
provincie-utrecht.nl

Duurzame energie in Rijnenb...
groenehart.info



Plan voor duurzaam en groen energiel...
pen.nl

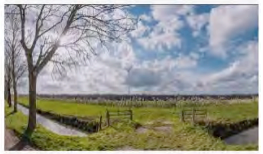
Reimerswaal neemt regie in ontwikkeling '...
pzc.nl

Limburgs energielands...
nmflimburg.nl

Bureau Verkuylen - Prijsvraag Energielan...
bureauverkuylen.nl

Een energielandschap met algen en insec...
energiewerkplaatsutrecht.nl

Lezing Hernieuwbaar energielandschap voo...
bouwenwonen.net

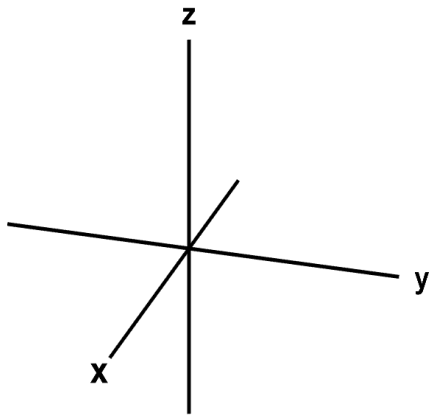


Energie-U vraagt jouw hulp bij het koppelen van het gr...
energie-u.nl

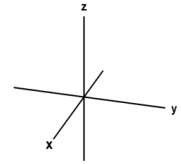
Typologie van energielandschappen

- Landschap?
  - Fysiek: elementen, patronen, processen
  - Mentaal: hoe individuen/groepen dit lezen, beleven, waarde aan toe kennen

substantive	>	type bron
spatial	>	ruimtelijke implicaties/infrastructuur *zowel fysiek als hoe dit beleefd wordt*
temporal	>	verandering door de tijd



1e dimensie energielandschap: <u>energie bron</u> (substantive qualification)

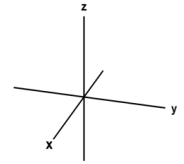


Bron: Pasqualetti & Stremke (2018) Energy landscapes in a crowded world: A first typology of origins and expressions

1e dimensie energielandschap: energie bron (substantive qualification)

Agrivoltaic park in Babberich (foto: Dirk Oudes)

2e dimensie energielandschap: technologie/infrastructuur (spatial qualification)



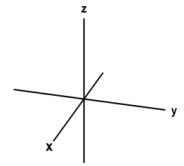
component vs. entity

Bron: Pasqualetti & Stremke (2018) Energy landscapes in a crowded world: A first typology of origins and expressions

2e dimensie energielandschap: technologie/infrastructuur (spatial qualification)

Windpark Aalten, Gelderland (foto: Sven Stremke)

3e dimensie energielandschap: mate van tijdelijkheid (temporal qualification)



dynamic vs. permanent

Bron: Pasqualetti & Stremke (2018) Energy landscapes in a crowded world: A first typology of origins and expressions

6 The Integral Landscape Design

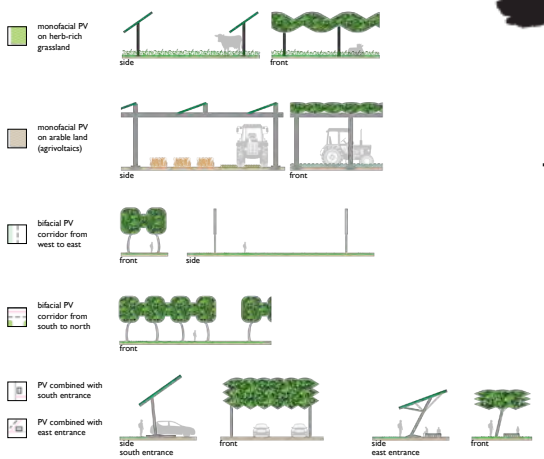
This area was barely cultivated with a few fields for grazing cattle, a handful of farmlands and some small houses dotted across. Now it becomes an area with an important USSE infrastructure that is embedded into a diver's green ecological corridor. This combination does not only serve itself but it invites residents and tourists to traverse or stay in this new park that represents the symbiosis between USSE and ecological networks. The center of this park becomes a place to rest and enjoy some hospitality, the main electrical station in the vicinity of it can also be used as a visitor center for information about USSE/new RE technologies that can go hand in hand with the local ecology. Three parts of the design beyond the sustainable energy generation and the ecological corridor are elaborated through detailed site designs, sections and visuals.

Legend

- agrivoltaic Field
- PV on grassfield
- shared road with solar corridor
- wild flower grassland
- ditch between PV fields
- recreational eco pond
- buildings for recreational, educational and facilitation use
- shared road through current settlements
- entrance to project area through new settlements
- entrance to project area through new settlements
- hawthorne hedges around PV fields
- sub stations to transform DC to AC

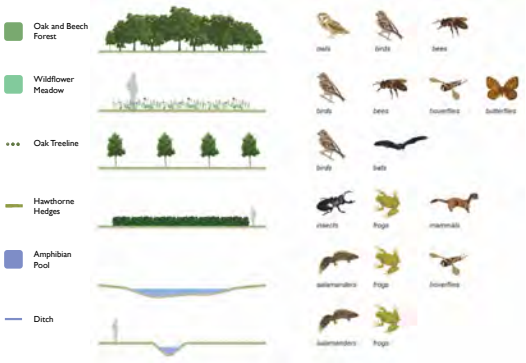
Sustainable Energy Generation

There is 13 ha of monofacial PV on herb-rich grassland, allowing maintenance with grazing cattle (cows, sheep). These fields have a density of about 2000m² of solar panels per ha and have a total capacity of about 6.5 MW. Additionally, there is 6 ha of monofacial PV on arable land (agrivoltaic). Research showed that these systems are suitable for growing crops that are shadow tolerant, like sugar beet, wheat, potato or lettuce (Loots, 2018). These fields have a density of about 3200m² of solar panels per ha and they have a total capacity of about 4.2 MW. The corridors are combined with bifacial PV elements either side by side (north to south) or behind each other (west to east). Two of the five entrances, the one to the south facing the busy Loenenseweg and the one to the east facing the recently developed neighborhood are good locations to place additional PV combined with the option to either charge cars/bikes or mobile accessories. The total capacity of the whole installation can be estimated to be about 11.5 MW.



Ecological Corridor

The northwest of Eerbeek gives the opportunity to connect the Veluwe to the Gelders Nature Network. According to the design principles the Masterplan consist of large patches of oak and beech forests, giving a home for owls, birds and bees. A handful of wildflower meadows that are not used for USSE will attract birds, bees, hoverflies and butterflies. Rows of oak trees serve as a navigation element for birds and bats. Hawthorn hedges around the PV fields will not only protect the fields from uninvited guests but will also make it easier for insects, frogs and mammals to traverse the area. An amphibian pool that doubles up as a recreational eco pond in the center of the area is a habitat for salamanders, frogs and hoverflies. Last but not least a ditch throughout the whole area connected with the pond will lead the salamanders and frogs into and out of the area.



Bron
Ruimte
Tijd

Kriska & Stremke, 2018

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