



# Resilient energy landscapes; a spatial quest

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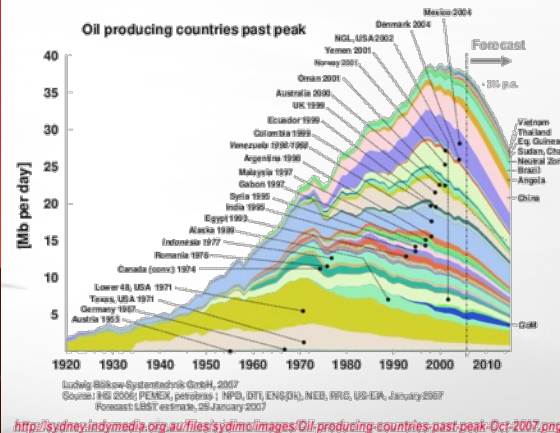
# 1 / The context; a global future?





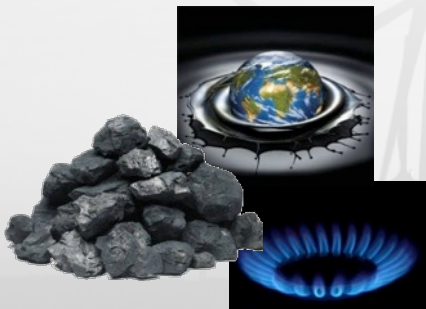
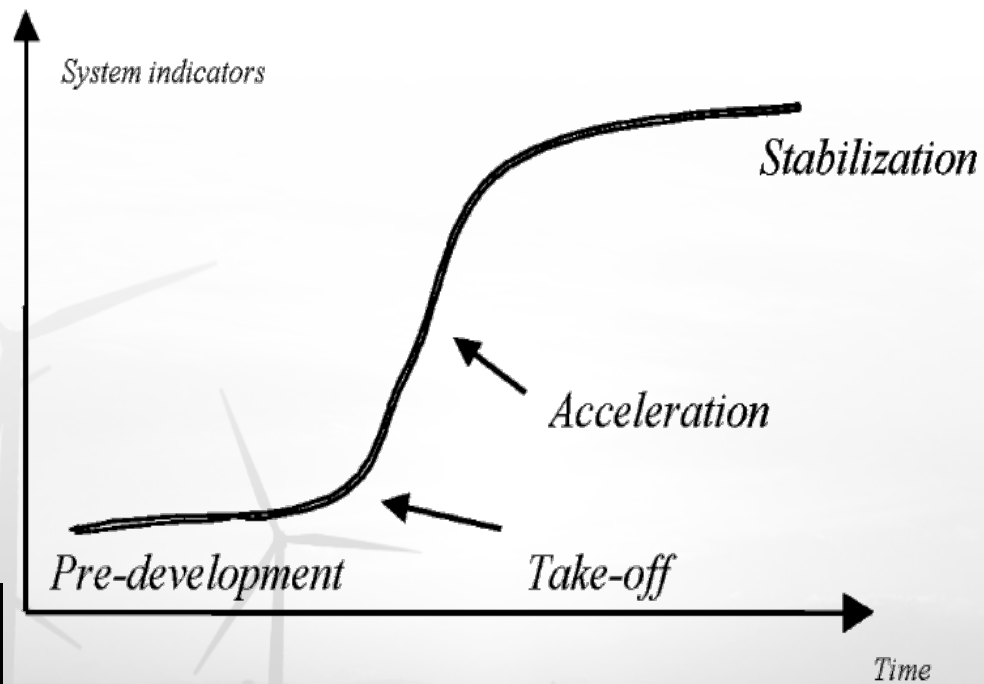
# Three issues that need attention

- 1| Fossil fuels are not renewable and limited
- 2| Climate change
- 3| Geopolitical relations



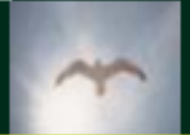


# Energy Transition

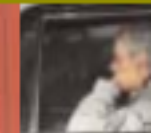


# 2 / A Dutch energy transition?

Een wereld en een wil



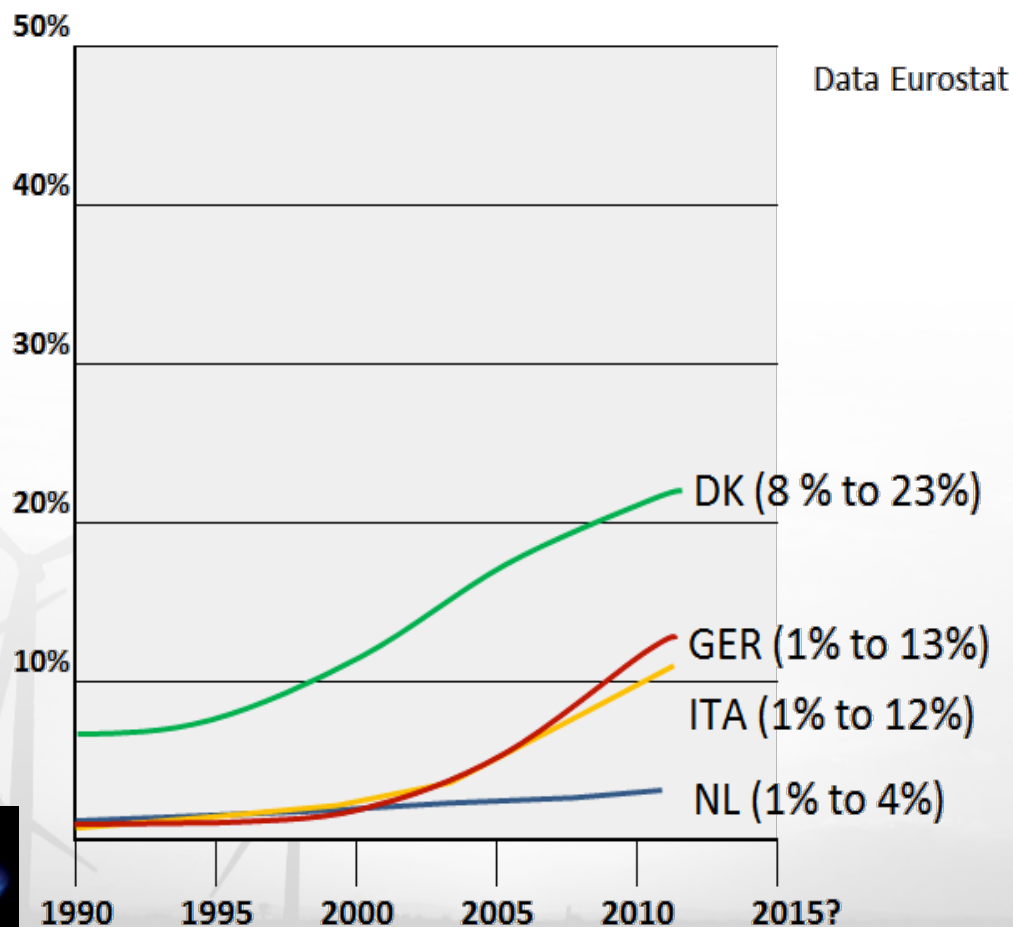
werken aan duurzaamheid



Nationaal Milieubeleidsplan 4



# The Dutch Energy Transition

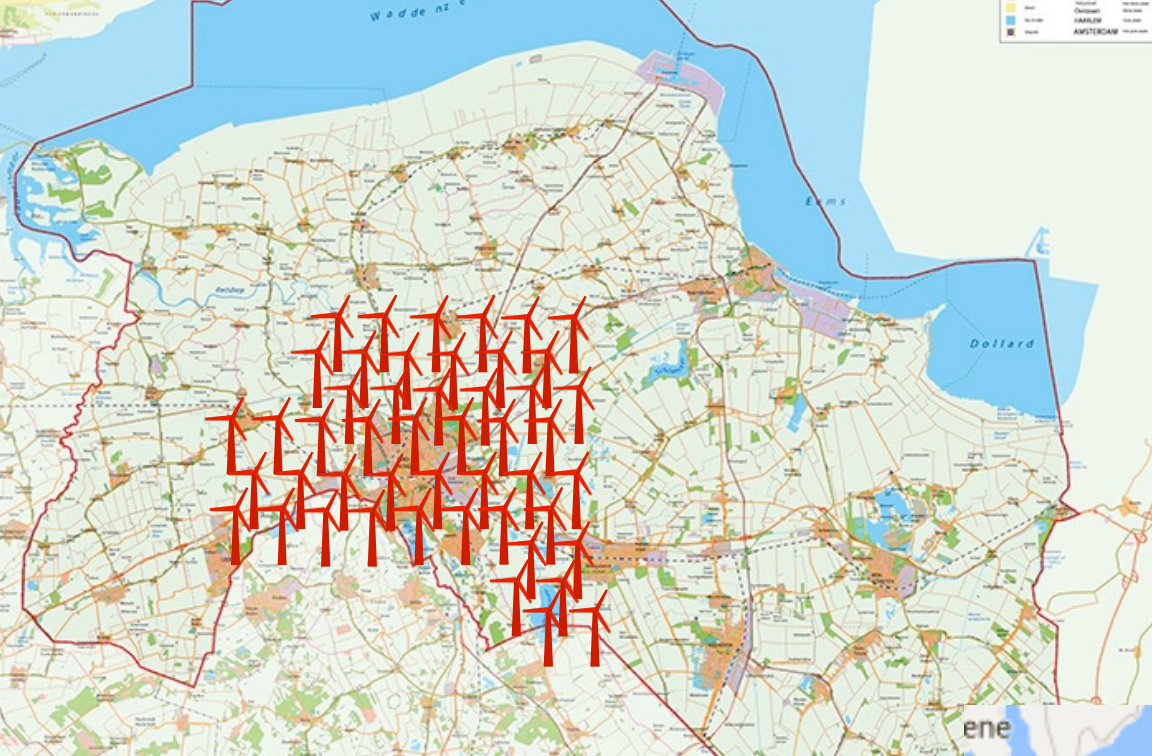


# From fossil fuel to renewables

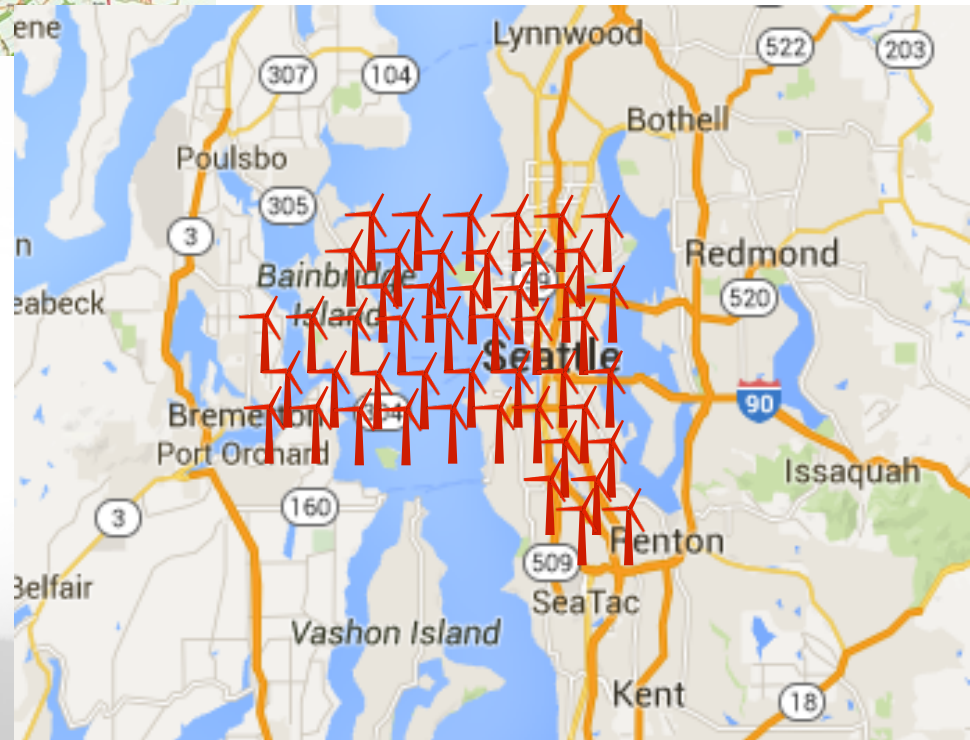
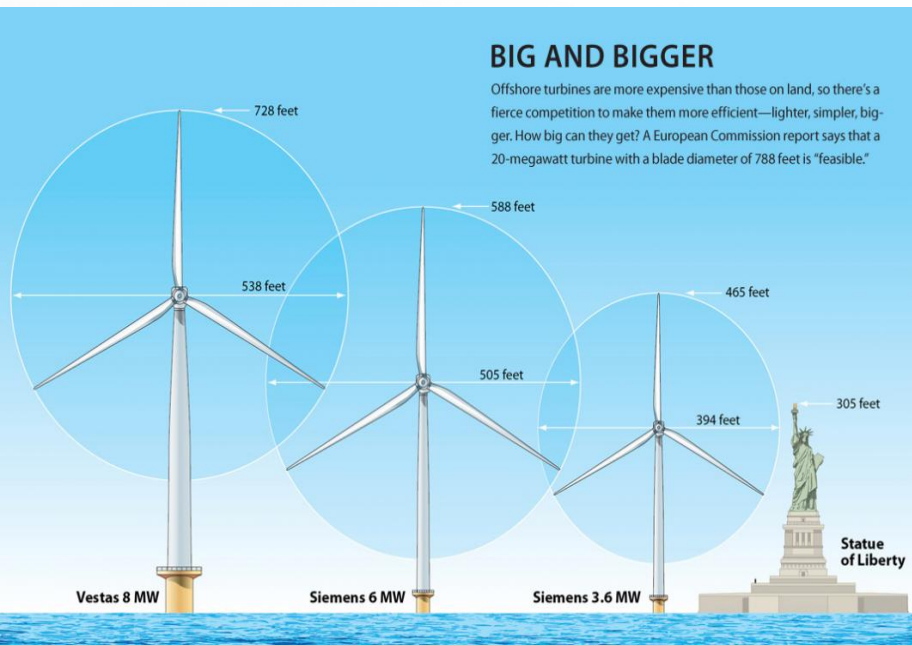
Fossil fuel	Renewables
Largely underground	Largely above the ground
High energy density	Low energy density
Secure flow of energy	Volatile flow of energy
Everywhere (footloose)	Regional systems







↑↑ 3 MW



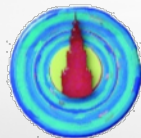




# The Netherlands



GRUNNEGER POWER



energie in eigen hand





## A Dutch state response

- › A special law to ensure swift implementation for larger projects (+100 MW) due to national urgency
- › Isolating energy projects from their context: focus on implementation!

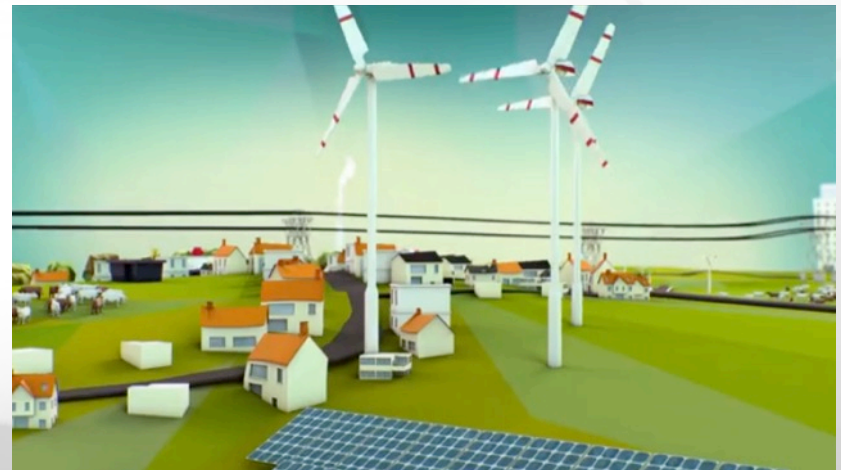
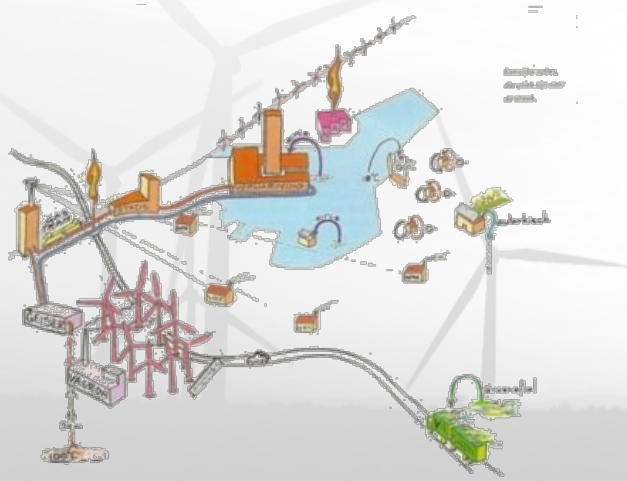


# 3 / Integrated Energy Landscapes



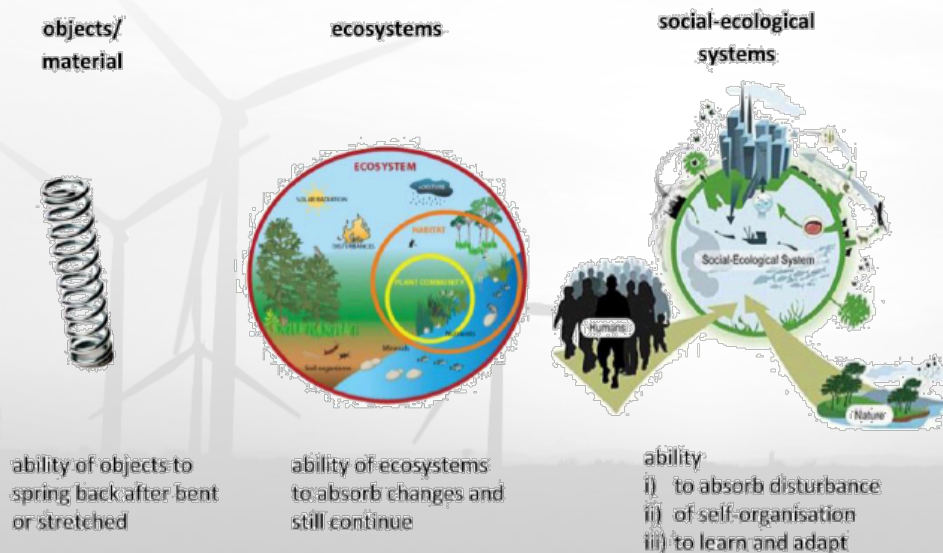
# Integrated energy landscape

- › What if we do not isolate energy from its regional or local spatial context, but instead, frame the energy system as embedded in the physical and socio-economic landscape
- › Co-aligning regional challenges with the change of the energy system; resilience as our lens?



# Evolutionary resilience

› “resilience is not conceived of as return to normality, but rather as the ability of complex socio-ecological systems to change, adapt and crucially, transform in response to stresses and strains” (Davoudi 2012; p.302).



Bounce forward;

- Increased adaptive capacity
- Altered system



## Resilience as our lens

- › *Robustness*: ability to persist, absorb disturbance or withstand shock (e.g. Holling, 1973; Godschalk, 2003, Davoudi, 2012)
- › *Adaptability*: making adjustments within the system to make it less vulnerable (e.g. Walker et al, 2004; Folke et al. 2005)
- › *Transformability*: transition to a new system when ecological, economic, or social structures make the existing system untenable (e.g. Walker et al, 2004; Folke et al. 2005)



# A new perspective?

- An integrated energy landscape:

Shifts perspective to how systems are interrelated

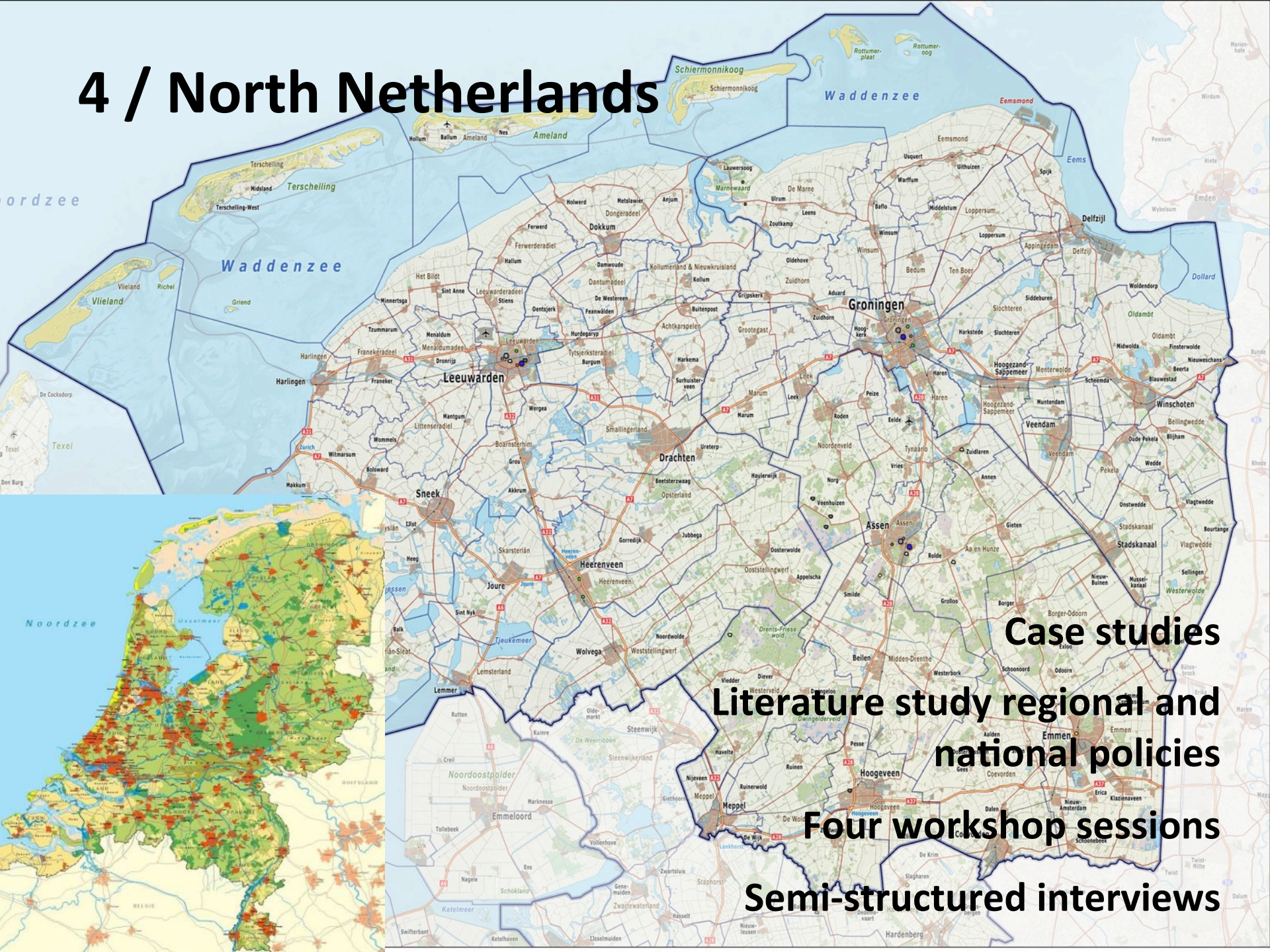
Helps us realise how space can be a conditioning context

- Resilience

Addresses how interrelated systems can cope with pressures and change

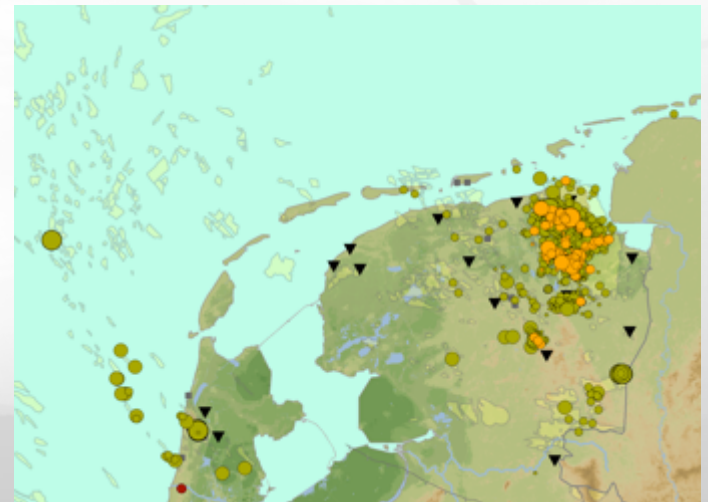
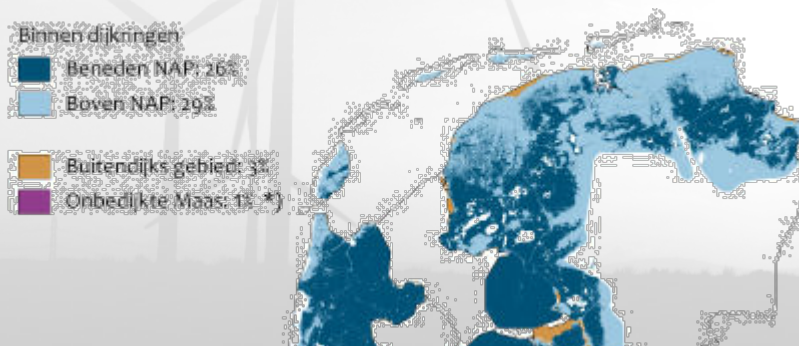
Might help us co-align desired changes in the energy system with desired regional changes

# 4 / North Netherlands



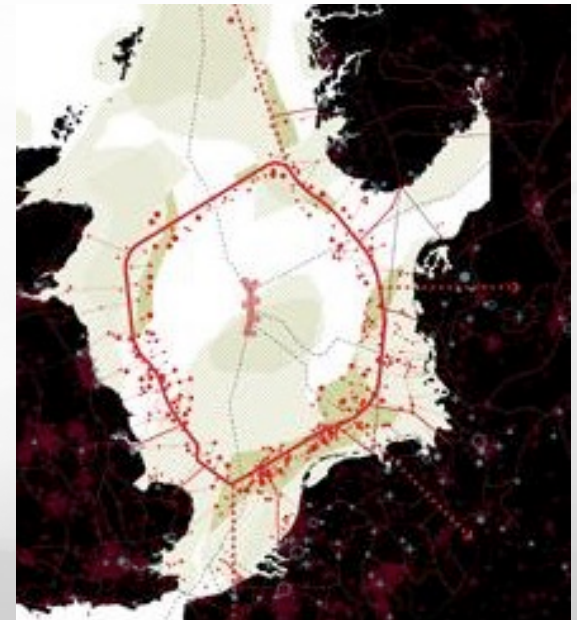
## North-Netherlands; problems

- › *Rural decline*: population decline, unemployment, aging population, decreased services and a stagnating economy
- › *Urban rural gap*: growing urban core in declining area
- › *Earthquakes*: damaged property, societal unrest
- › *Climate change*: sea level rise



# North-Netherlands; potentials

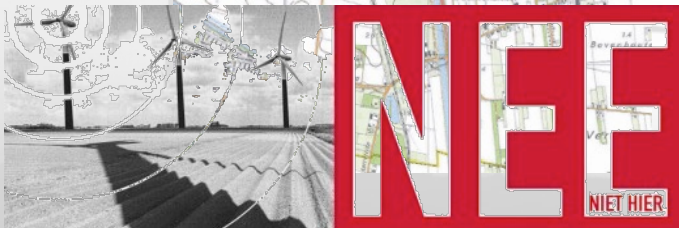
- › *Energy as new pathway?*
- › Human and institutional capital due to gas-extraction
- › Infrastructure due to gas extraction
- › Agriculture & chemical
- › Wind-port of the North Sea?





# Wind parks

- › Reluctance if without local ownership
- › Embraced if linked to local ownership



# Citizen based energy initiatives

- › In the wake of 'anti-wind' movement and corporate interests
- › But also taking charge of your own local future





# Institutional innovation in energy system

- › Social and institutional capacity building
- › New companies and cooperatives
- › New government responses



**coöperatie duurzame  
energie veenkoloniën**



**NOORDELIJK LOKAAL DUURZAAM**  
energie van eigen bodem



## Developing regional future

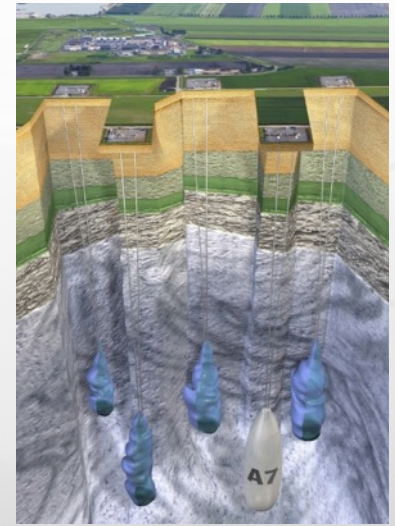
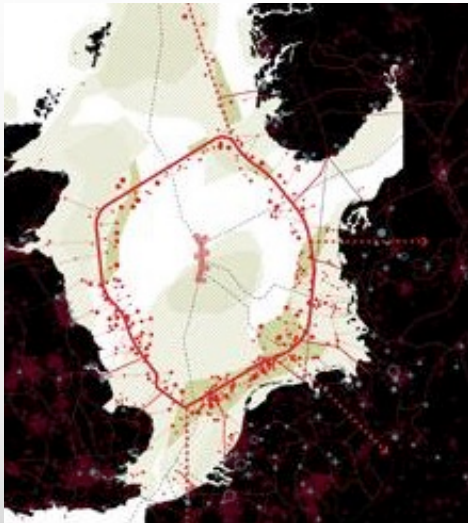
- › Earthquakes as opportunity, for residents, local construction companies and the energy transition





# Developing regional economy

- › Eemshaven as energy port: wind, biomass and conversion
- › Regional specialization





# Flexibility and robustness in energy system

- › Regional specialization creates differentiation on a higher scale
- › Regional spin-offs create societal support
- › Local integration creates more economic robustness





# Integrated energy landscapes

- › A: strengthening of regional resilience?
  - › B: pathways for resilient energy systems?
- 
- Conditioned by the active integration of energy projects in physical & socio-economic landscape
  - Resilience gains meaning if interpreted in its physical & socio-economic context

## 5 / Questions & Discussion

