



Empower the Frisian energy landscape

P5 presentation // 24th June 2016

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Storyline

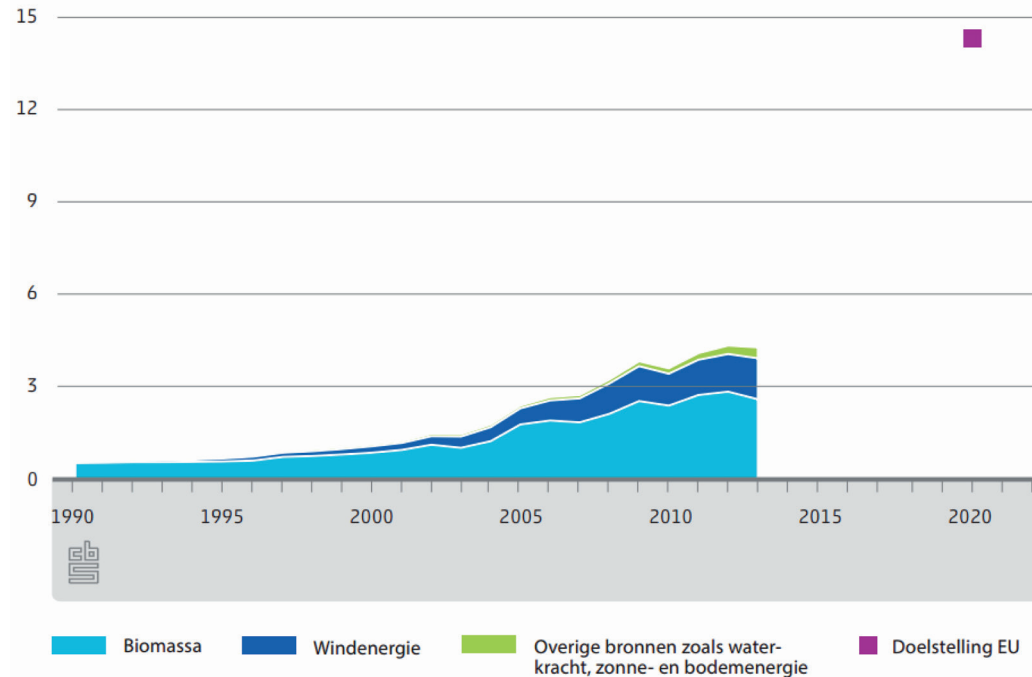
- **Intro research:** theme: renewable energy and observations
- **Framework:** location, research question, methods and relevance
- **ENERGY NEUTRAL REGION IN 2050**
 - Strategic approach**
Role for urbanist, interaction, connection bottom-up and top-down
 - Energy transition**
Energy transition goals, techniques, spatial dimensions and potentials
 - Spatial quality**
Analysis and spatial vision Friesland
- **TRYNWÂLDEN**
 - Scenario's**
 - Spatial interventions**
- **Conclusions**

Intro research | Renewable energy and observations

Intro research | Problem analysis

3.2.2 Hernieuwbare energie in Nederland

% van het totale energieverbruik



Source: (CBS, 2013)

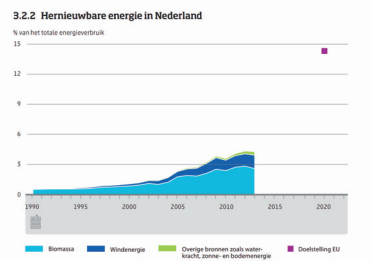
Need for energy transition

- Scarcity of fossil fuels in the future
- Fossil fuels cause geopolitical instability
- Fossil fuels accelerate global warming

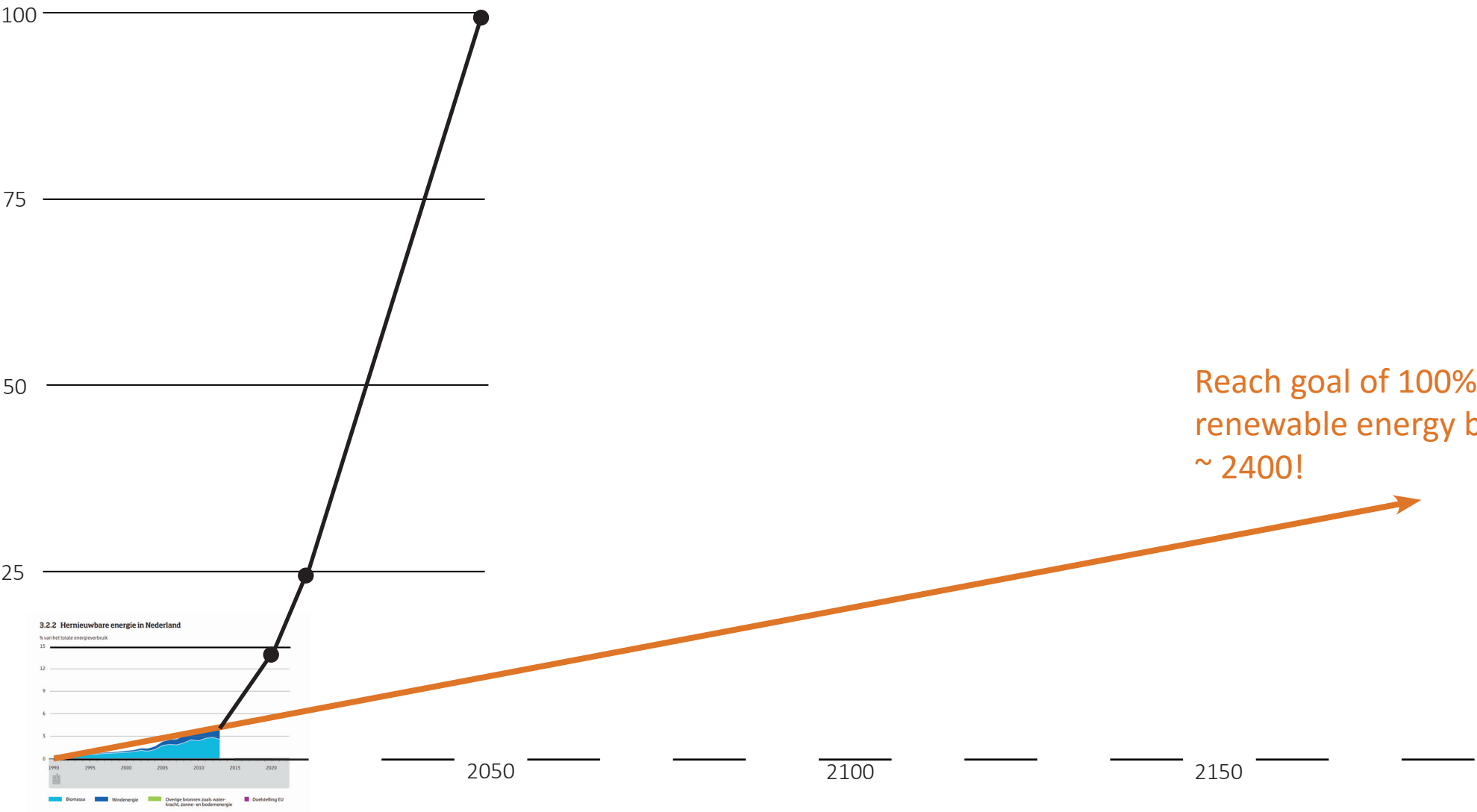
(Sijmons, 2014)

- And we promised the EU!

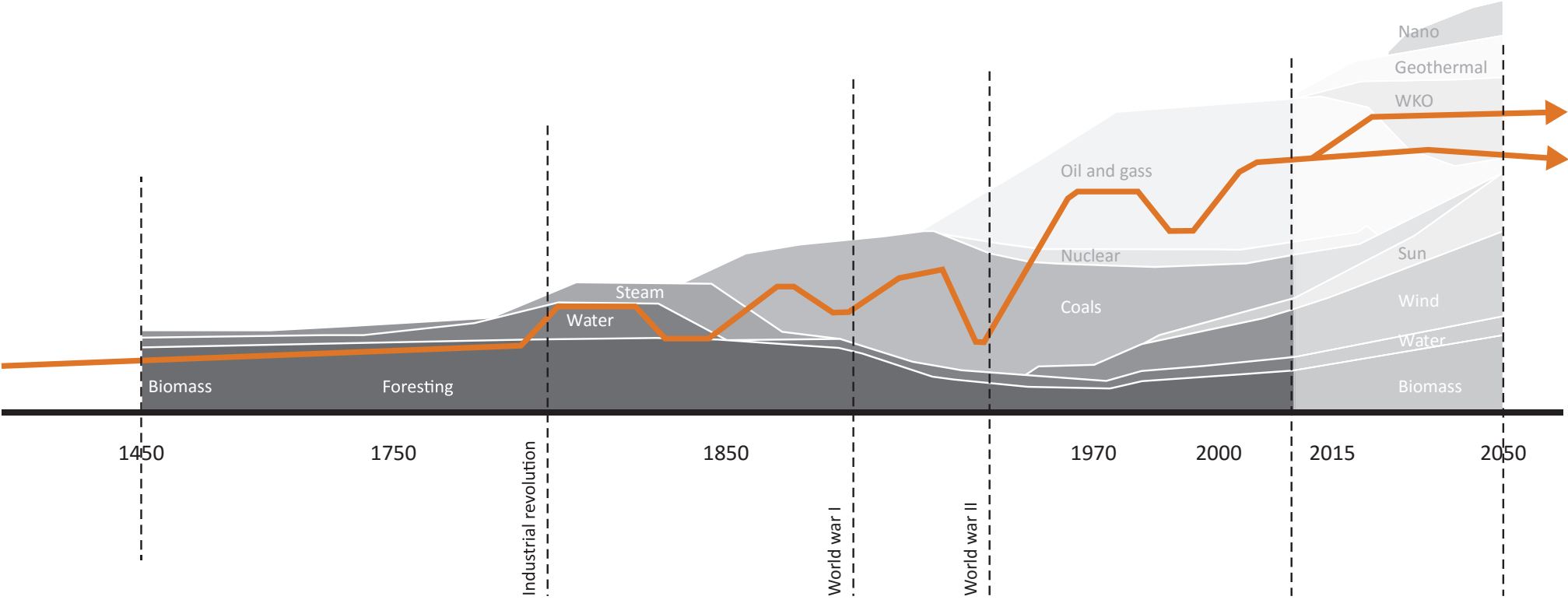
Intro research | Problem analysis



Intro research | Problem analysis



Intro research | Not the first energy transition!



Intro research | Ok, we need renewable energy



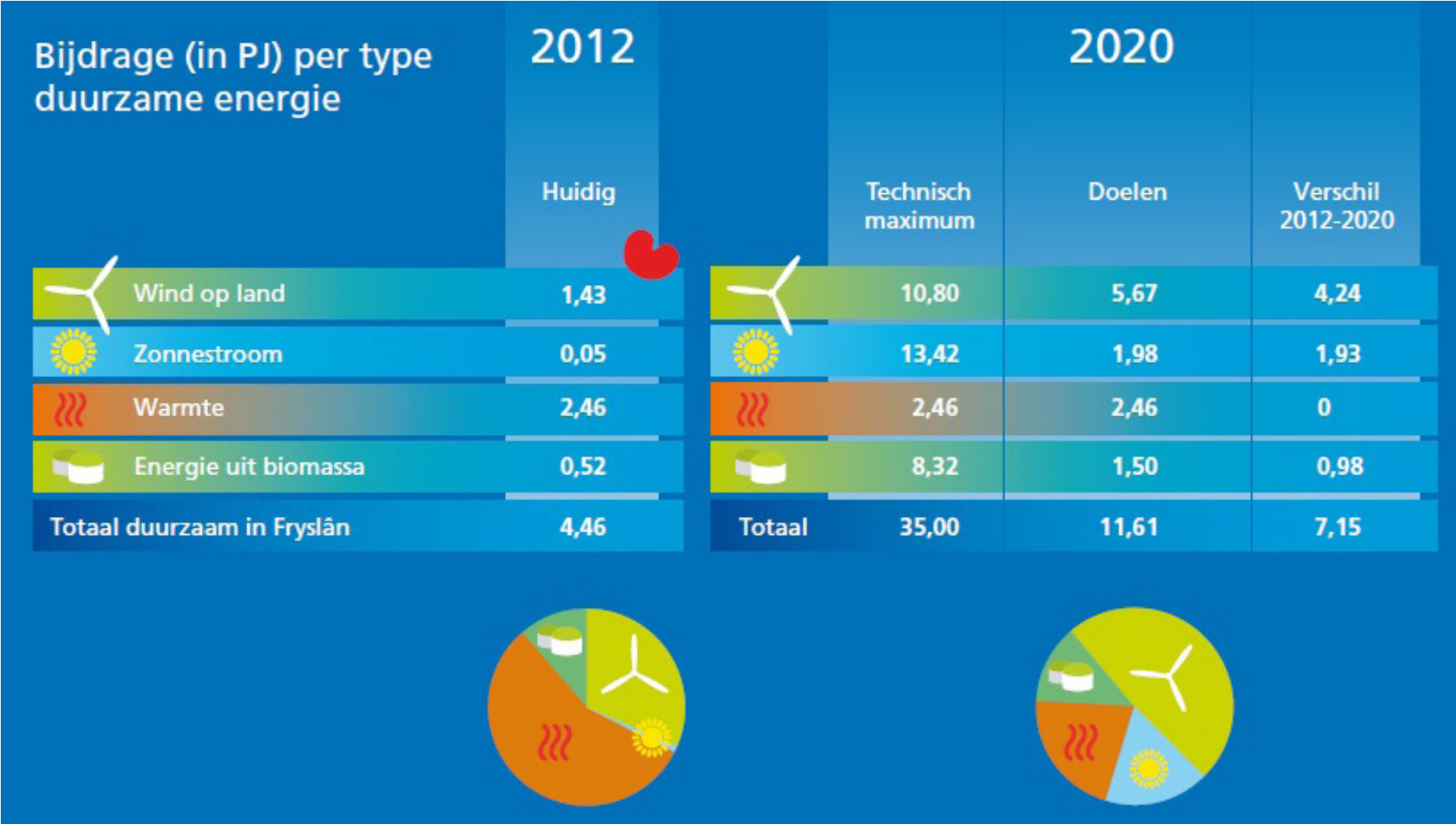
Source: <http://www.klimaatplein.com/wp-content/uploads/2013/11/windenergie.jpg>

Intro research | Wait, is this our future?



Source: http://www.umweltbundesamt.de/sites/default/files/medien/372/bilder/windpark_mit_kuehen_quel.jpg

Energy transition | Bottom up vs top down



Source: <http://www.fryslan.frl>

Energy transition | Bottom up vs top down

...n de windturbinesoap

komen. Het comité Hou Friesland Mooi heeft kans gezien veel handtekeningen te verzamelen om die dingen niet, of zo weinig mogelijk, in Noordwest-Fryslân te krijgen. De inwoners zijn tegen!

Deze club werkt nu met de Friese Milieu Federatie en Platform Duurzaam Friesland (samen de windmolenlobby) plannen uit om de windturbines over heel Fryslân te spreiden. Als motief wordt nu aangevoerd dat men wil voorkomen dat het kabinet (minister Kamp) het Noord-Koreaanse model gaat toepassen en dus zelf gaat uitmaken waar de plaatsing plaatsvindt (zie *Friesch Daghblad* 19-01-2014).

door de windmolenlobby om bewoners mee te laten 'profiteren' van de opbrengst. Handtekeningen, betaald met geld, moeten kennelijk de doorslag geven. Draagvlak dat, omkopen dus. De beseffen waarschijnlijk daarmee hun recht ver

LEEWARDER COURANT donderdag 14 april 2011

Windturbine van tweehonderd meter hoog - keer de Oldel

Reduzum verzet tegen windmolens

IM – Dorpsbelang Reduzum tegen de gemeente Boarnsterren en de provincie Fryslân tegen de bouw van het windpark langs de A32.

De meerderheid van de bewoners in Reduzum, Friens en Idsjaard tegen de komst van de windturbines tussen Idaard en Idsjaard. Dorpsbelang in een brief aan de provincie blijkt uit een enquête, waarbij 60 procent van de inwoners van zestien dorpen tegen de bouw van de windpark is. Van hen was 61 procent

centraal. Dorpsbelang Reduzum tegen de gemeente Boarnsterren en de provincie Fryslân tegen de bouw van het windpark langs de A32. De meerderheid van de bewoners in Reduzum, Friens en Idsjaard tegen de komst van de windturbines tussen Idaard en Idsjaard. Dorpsbelang in een brief aan de provincie blijkt uit een enquête, waarbij 60 procent van de inwoners van zestien dorpen tegen de bouw van de windpark is. Van hen was 61 procent



ACTUEEL > INITIATIEVEN > KENNIS > HIER OPGEWEKT >

FRIESLAND

INVENTARISATIE

Voor dit overzicht is gebruik gemaakt van o.a. de inventarisatie die de Natuur en Milieufederaties maakten in het kader van HIER opgewekt. We hebben nu bijna 500 initiatieven op de

Klik op de zwarte stippen voor meer informatie over de initiatieven in de provincie Friesland.



Problem statement

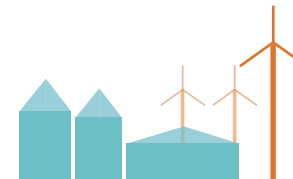
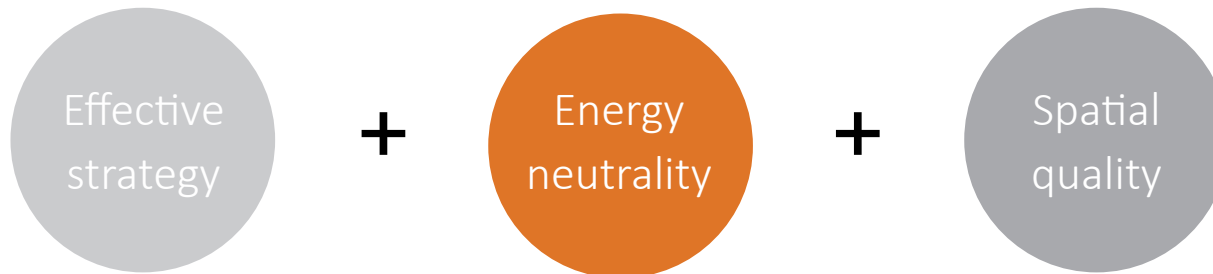
“There is not enough knowledge on the spatial impact and strategy of the energy transition and it slows down the transition towards a society that can fully rely on renewable energy resources”



Framework | Location, research question, methods and relevance

Research question

“What is an **effective strategy** for villages and its rural surroundings in Friesland to make an **energy neutral** design and improve the **spatial quality**?”



Five-step approach | S. Stremke

1. Analysing present conditions.

How does the present region function and how can it be evaluated in comparison with other regions?

2. Mapping near-future developments.

How will the region change in the near-future?

3. Illustrating possible far-futures.

What kinds of possible long-term developments are expected in the study region and at which locations?

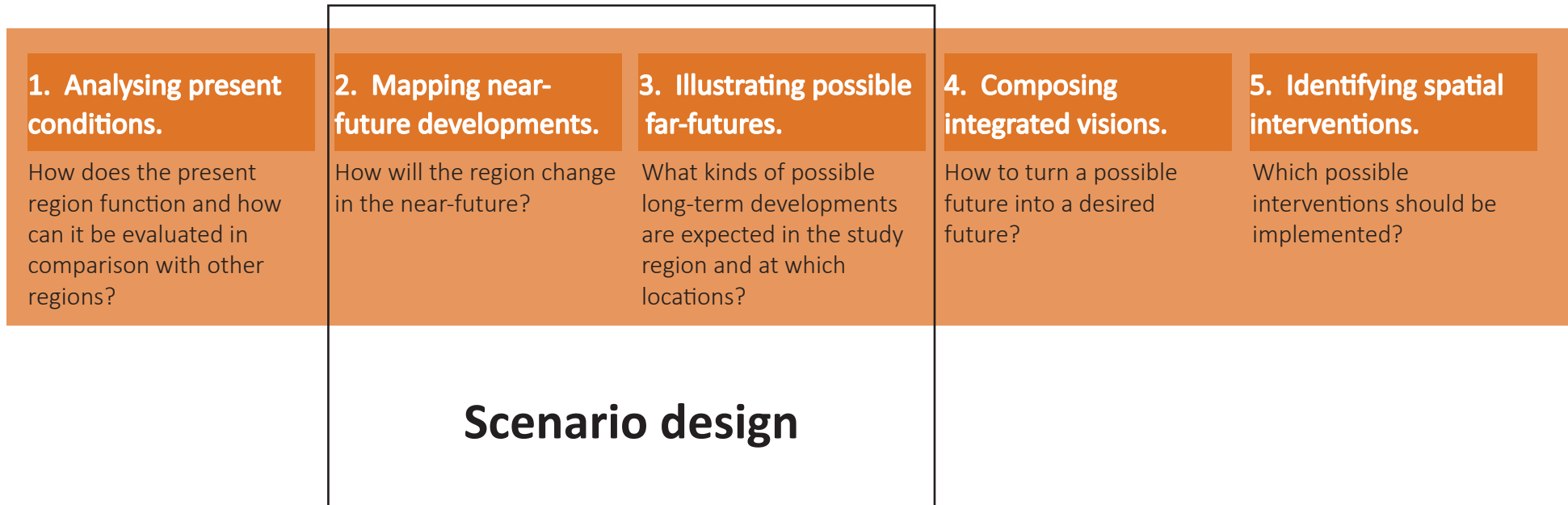
4. Composing integrated visions.

How to turn a possible future into a desired future?

5. Identifying spatial interventions.

Which possible interventions should be implemented?

Five-step approach | S. Stremke





Project
area

Project area | Trynwâlden



Project area | Trynwâlden



- Oudkerk
- Bartlehiem
- Giekerk
- Kleinegeest
- Munein
- Oenkerk
- Roodkerk
- Rijperkerk
- Tietjerk
- Wijns

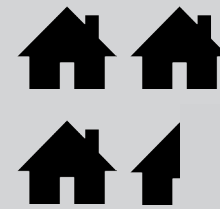
Project area | Trynwâlden



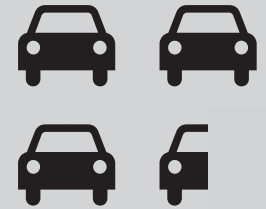
Inhabitants
8000



Families
3480



Dwellings
3500



Cars
3500

56

Km² (total)



Farms
ca. 65

Energy neutral region in 2050

Spatial
quality

Energy
neutrality

Effective
strategy

Energy neutral region in 2050

Spatial
quality

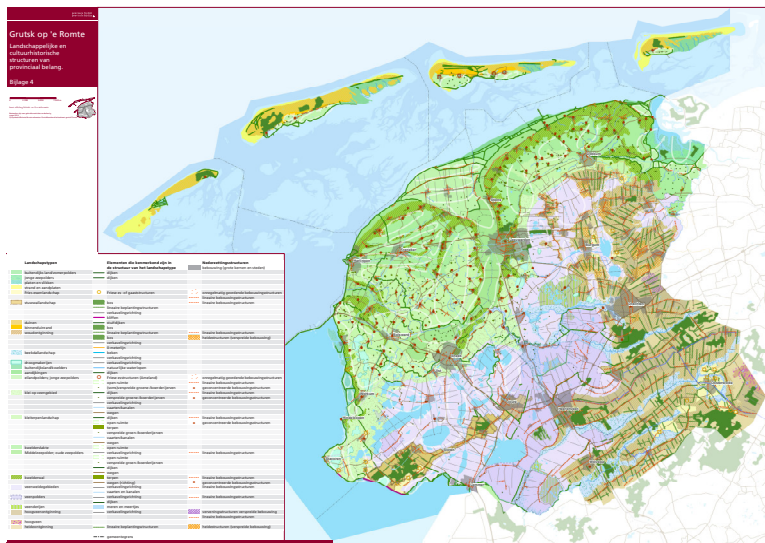
Energy
neutrality

Effective
strategy

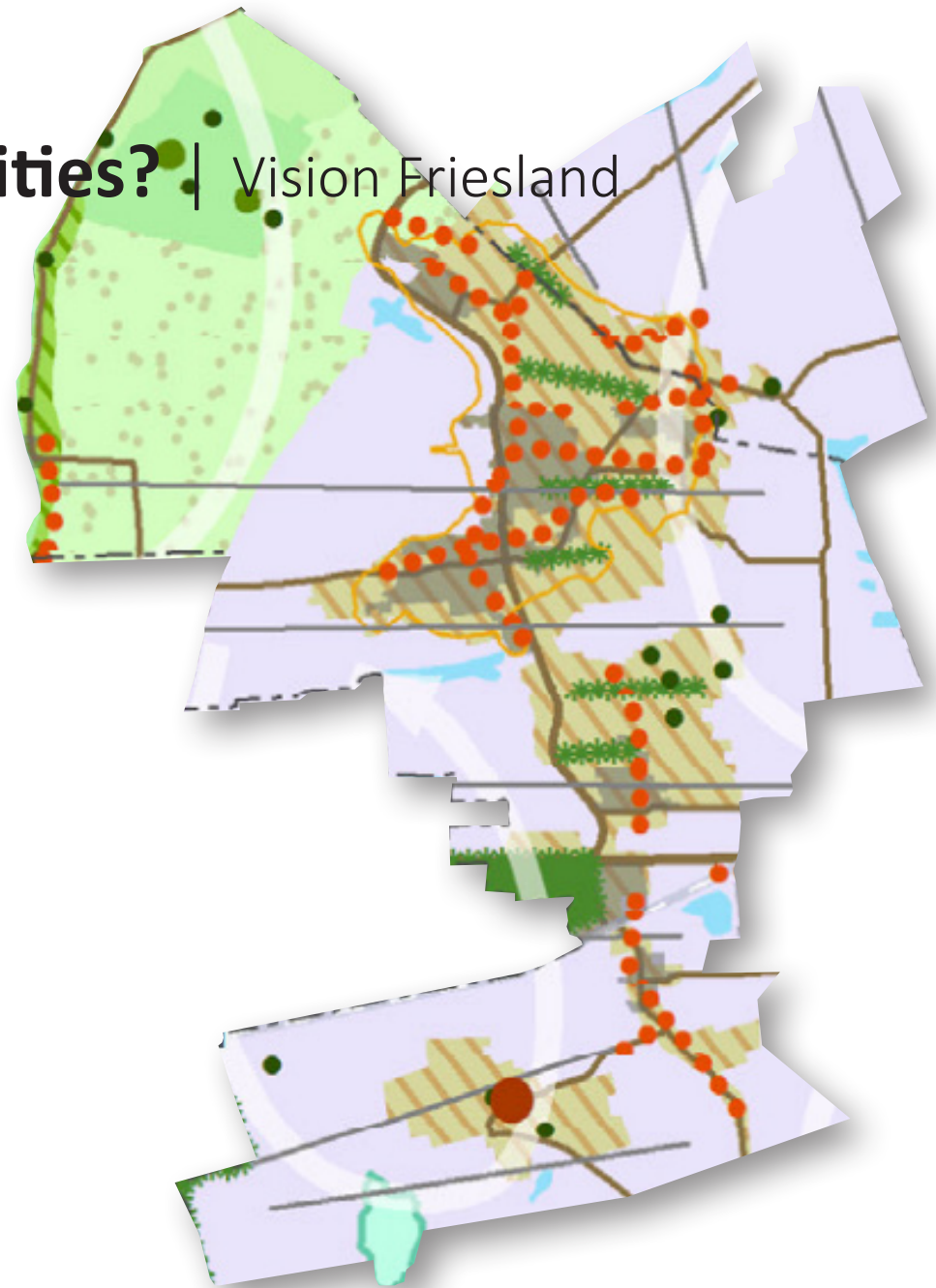
What are current spatial qualities? | Vision Friesland

Legenda

- ● ● ● ● Direction/orientation of housing
- ■ ■ ■ ■ Green lanes
- ↻ Open space
- Important directions of the landscape
- Green farms/plots



Ontwerp en structuurvisie: Grutsk op e Romte (2014), Provincie Fryslan



1. Analysing present conditions.

2. Mapping near-future developments.

3. Illustrating possible far-futures.

4. Composing integrated visions.

5. Identifying spatial interventions.



1. Analysing present conditions.

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Spatial analysis | Landscape density



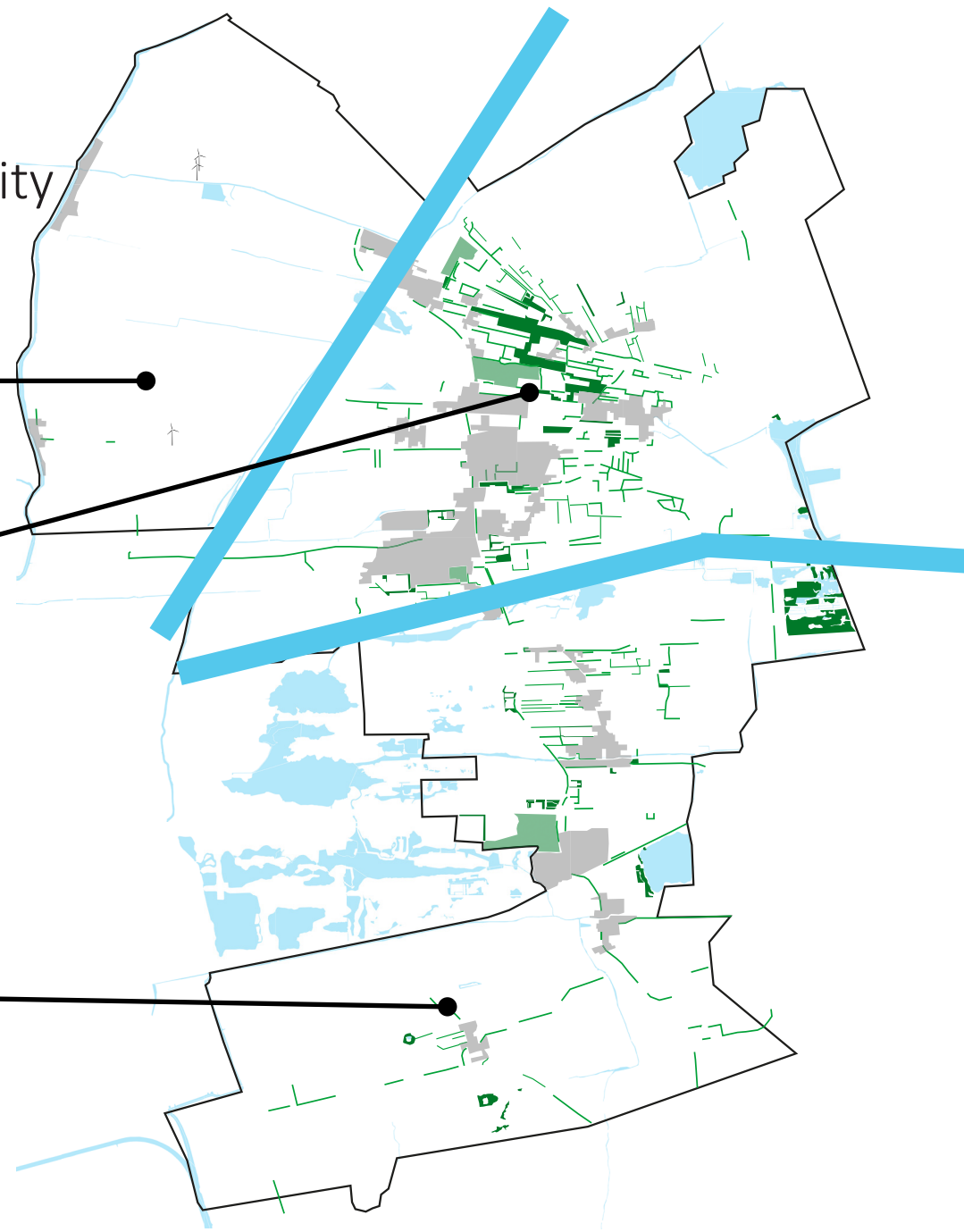
WIDE OPEN



GREEN



OPEN



1. Analysing present conditions.

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Spatial analysis | Infra



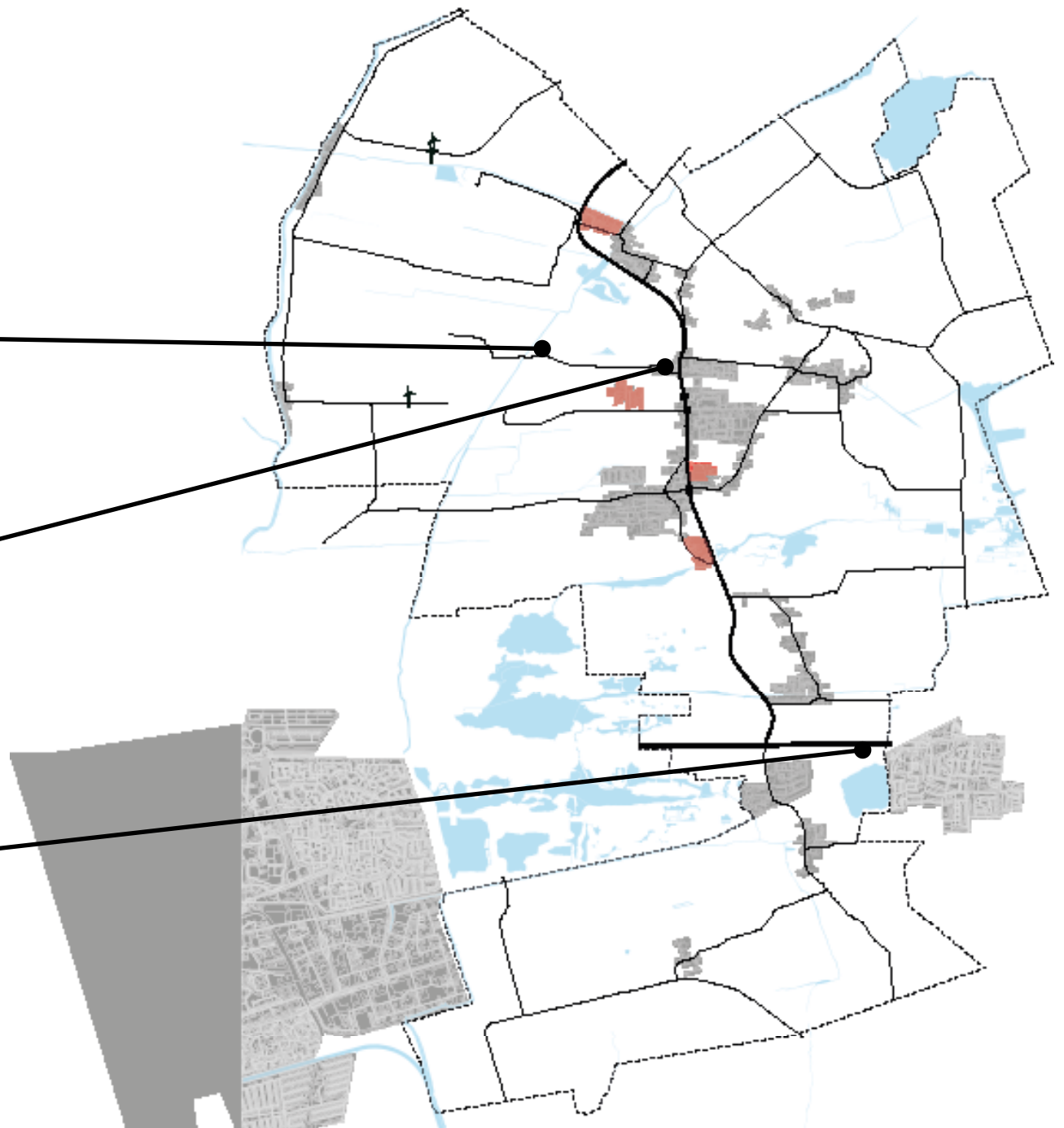
NARROW



OPEN, CLOSED



WIDE OPEN



1. Analysing present conditions.

2. Mapping near-future developments.

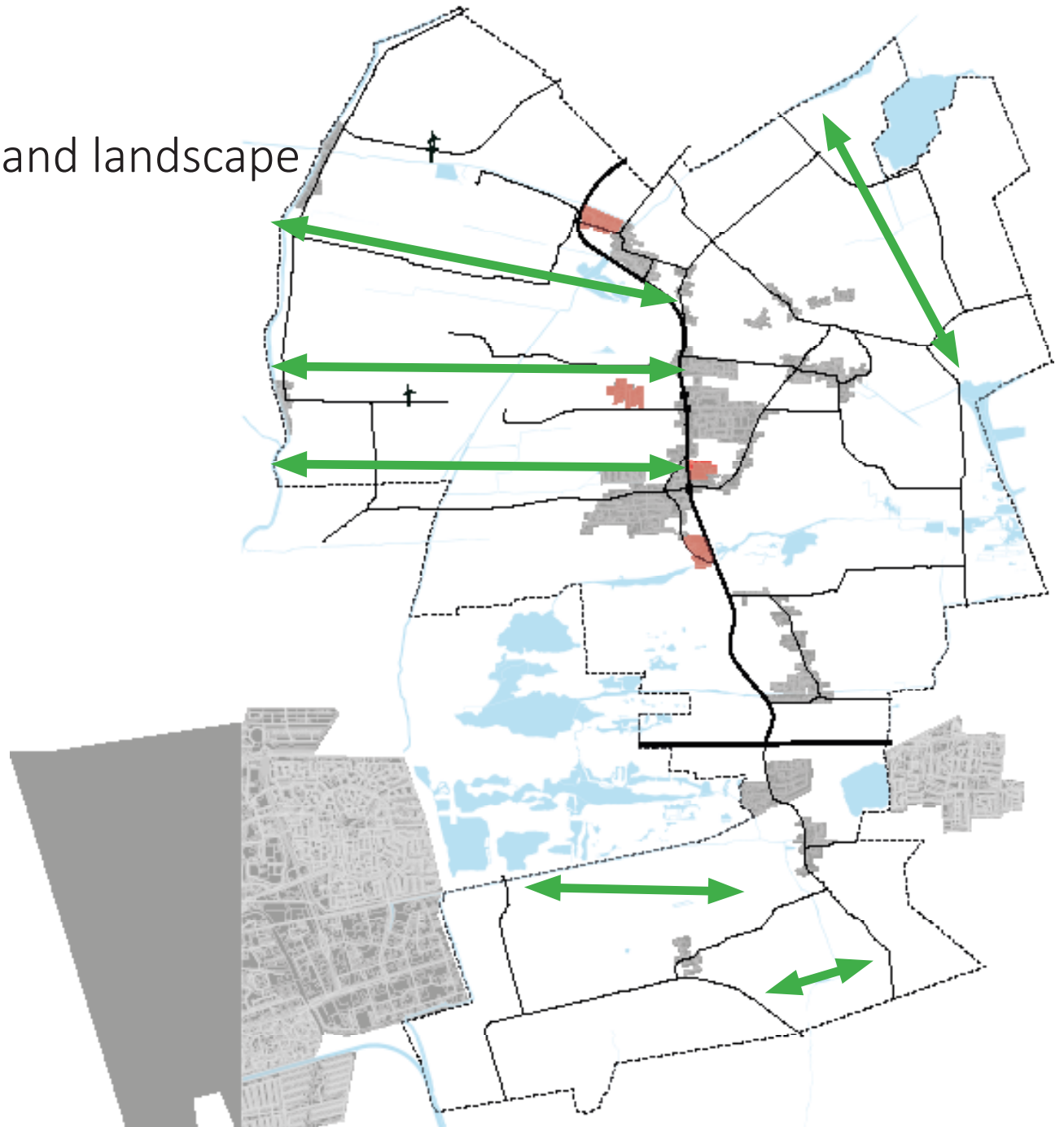
3. Illustrating possible far-futures.

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Spatial analysis | Infra and landscape

- Infra follows landscape directions



1. Analysing present conditions.

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Spatial analysis | Building age and typologies



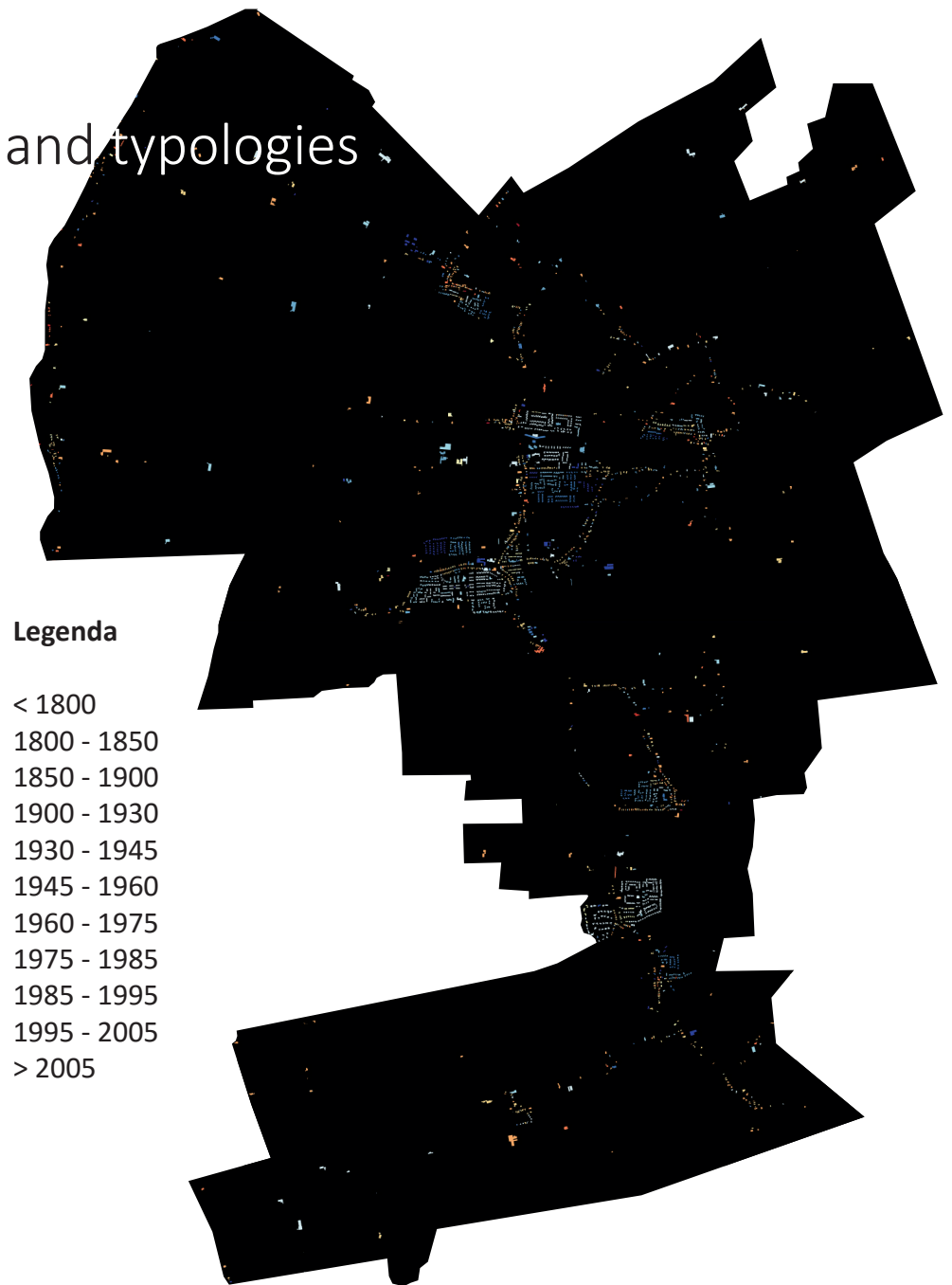
Estates 2x



Farms



'60 - '70 - '80 = most!



code.waag.org

1. Analysing present conditions.

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Energy neutral region in 2050

Spatial
quality

Energy
neutrality

Effective
strategy

What is energy neutral?

Self sufficient in energy demand for housing, industry and mobility



1. Analysing present conditions.

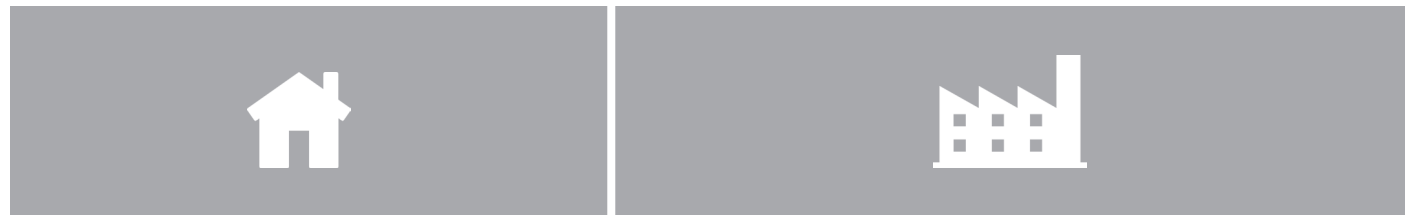
2. Mapping near-future developments.

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Future energy demand? | current energy mix



1. Analysing present conditions.

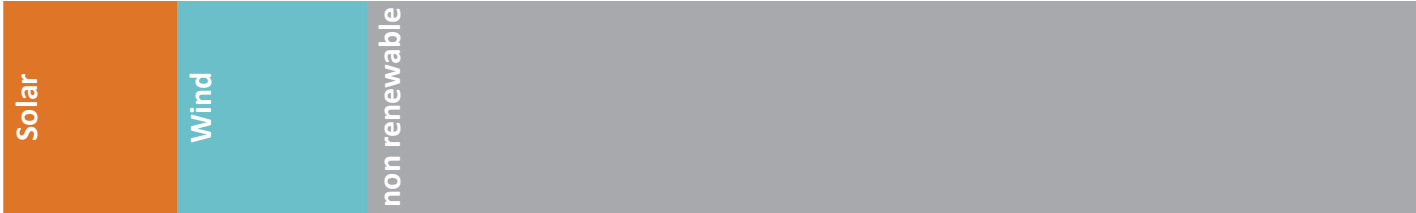
2. Mapping near-future developments.

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Future energy demand? | reduce potential



18,7 million kWh/year



30% reduce in 2050

Source: Harmelink, M., et al (2010). Potentieel voor Besparing en Efficiency van Energiegebruik in Nederland (BEEN).



18,6 million kWh/year

1. Analysing present conditions.

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Future energy demand? | reduce potential



7,5 million m³ gas/year



70% reduce (build environment)

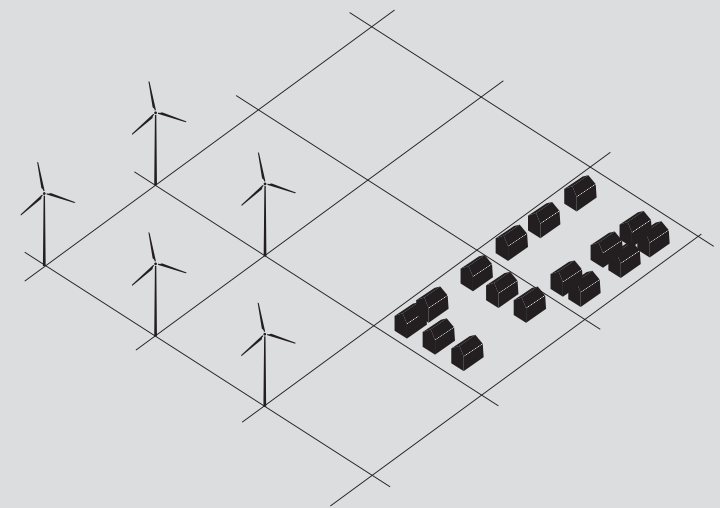
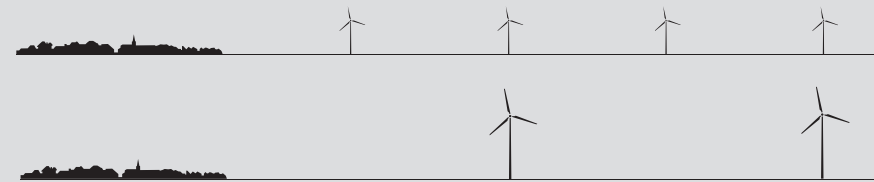
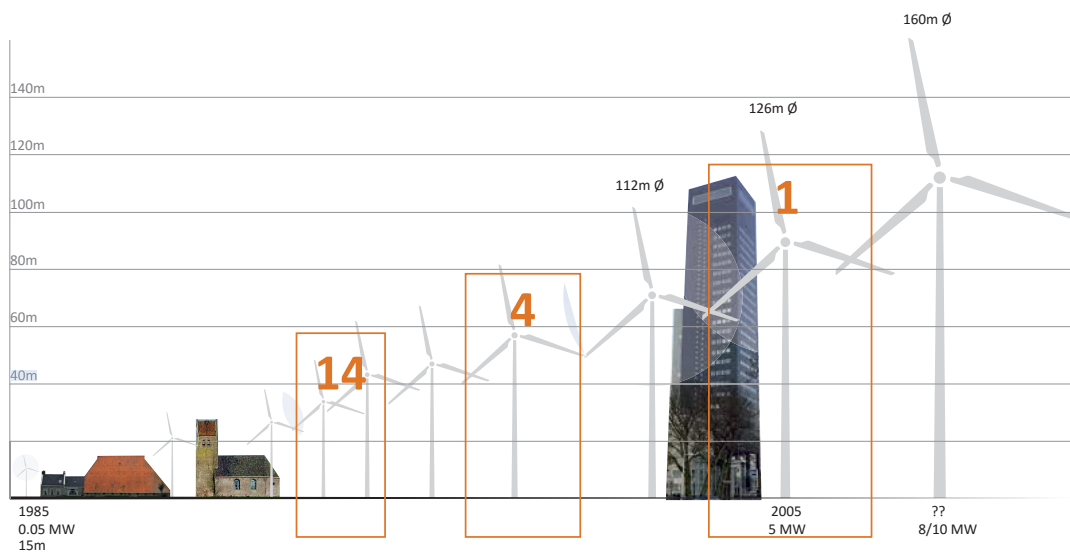
25% reduce (industry)

Source: Harmelink, M., et al (2010). Potentieel voor Besparing en Efficiency van Energiegebruik in Nederland (BEEN).



3,5 million m³ gas/year

What are the spatial dimensions? | example: wind energy



1. Analysing present conditions.

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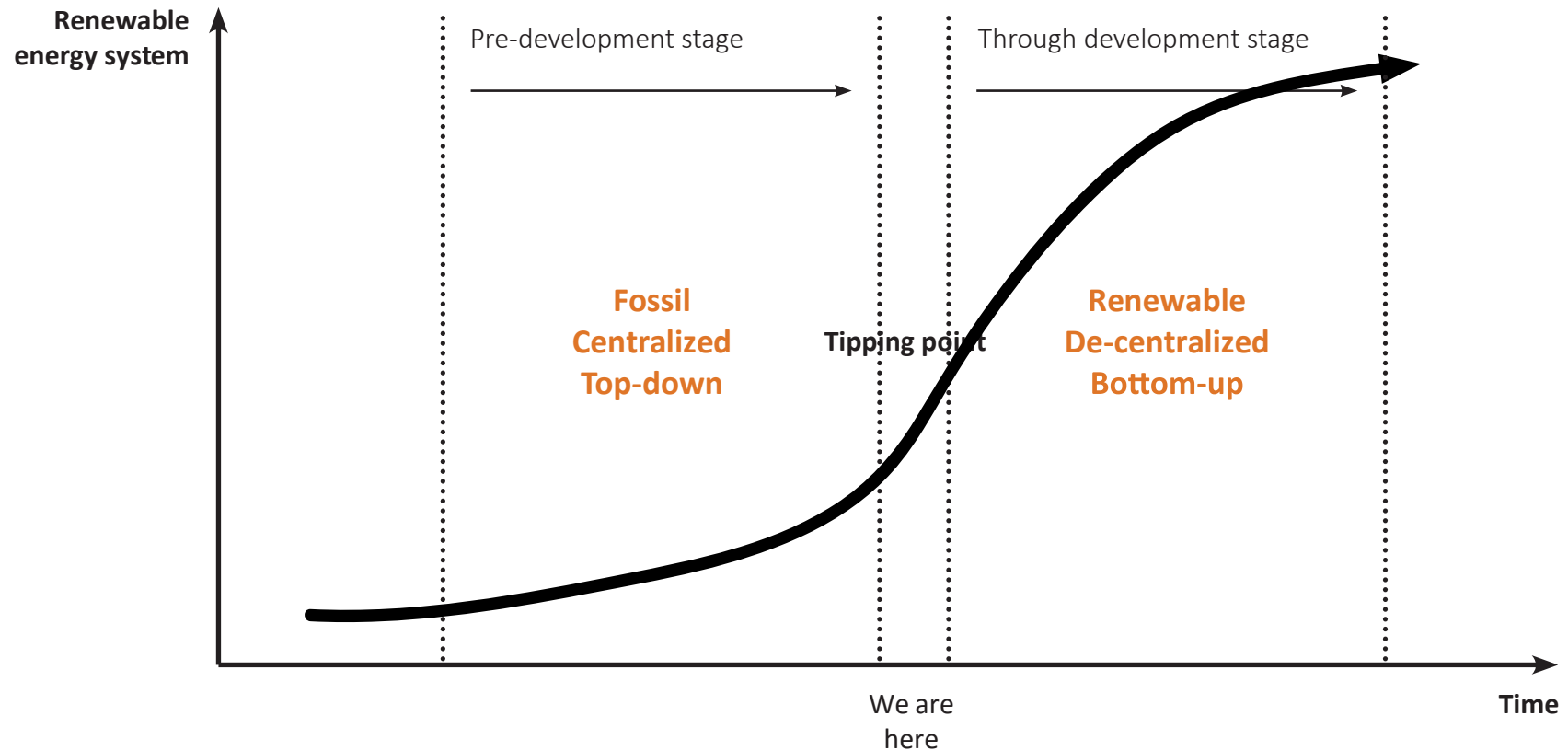
Energy neutral region in 2050

Spatial
quality

Energy
neutrality

Effective
strategy

Transition towards renewable energy | current situation



Source: Rotmans, J. (2013)

1. Analysing present conditions.

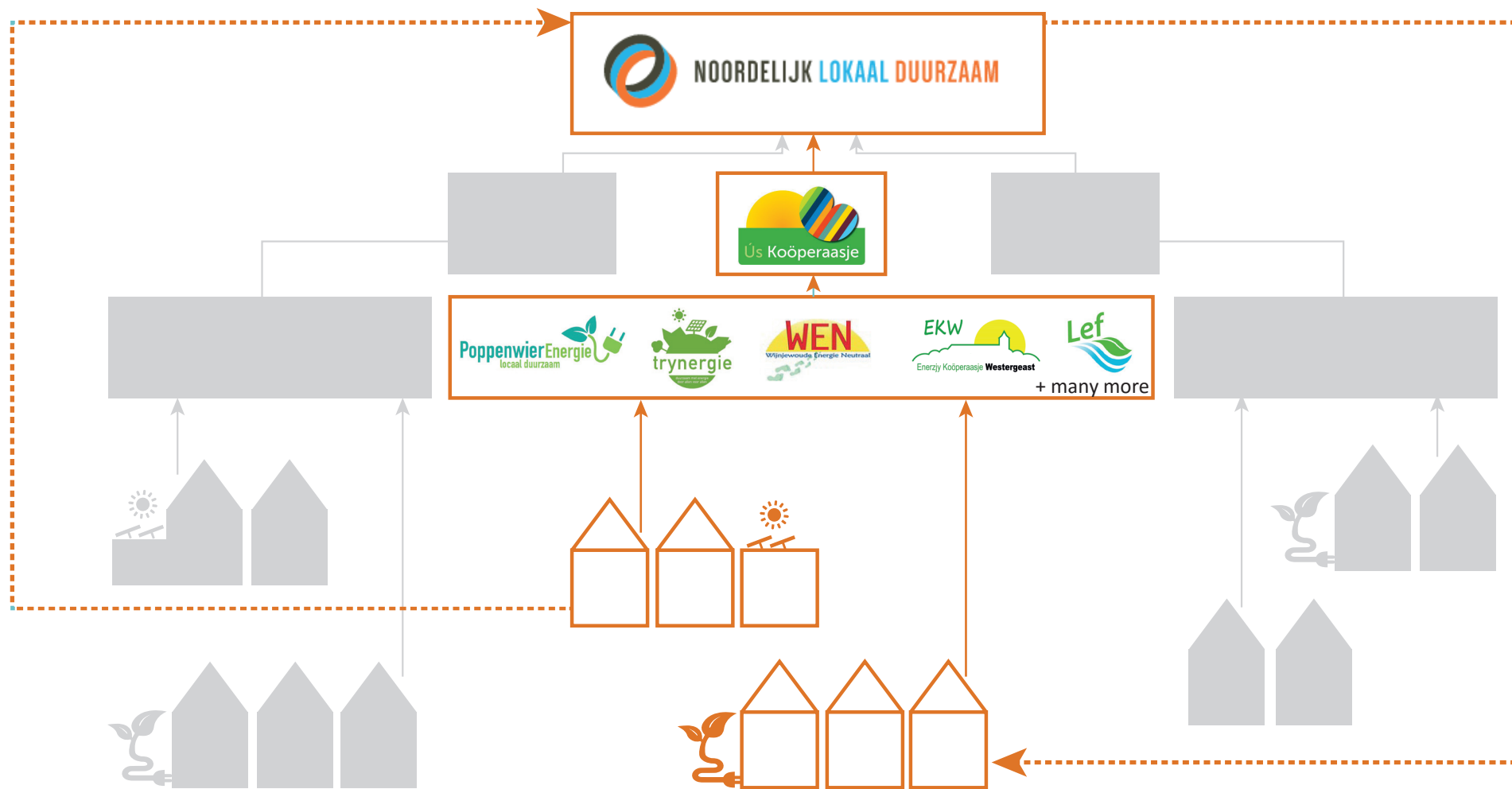
2. Mapping near-future developments.

3. Illustrating possible far-futures.

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5. Identifying spatial interventions.

Transition towards renewable energy | current approach



1. Analysing present conditions.

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Local energy cooperations | “Trynergie”



1. Analysing present conditions.

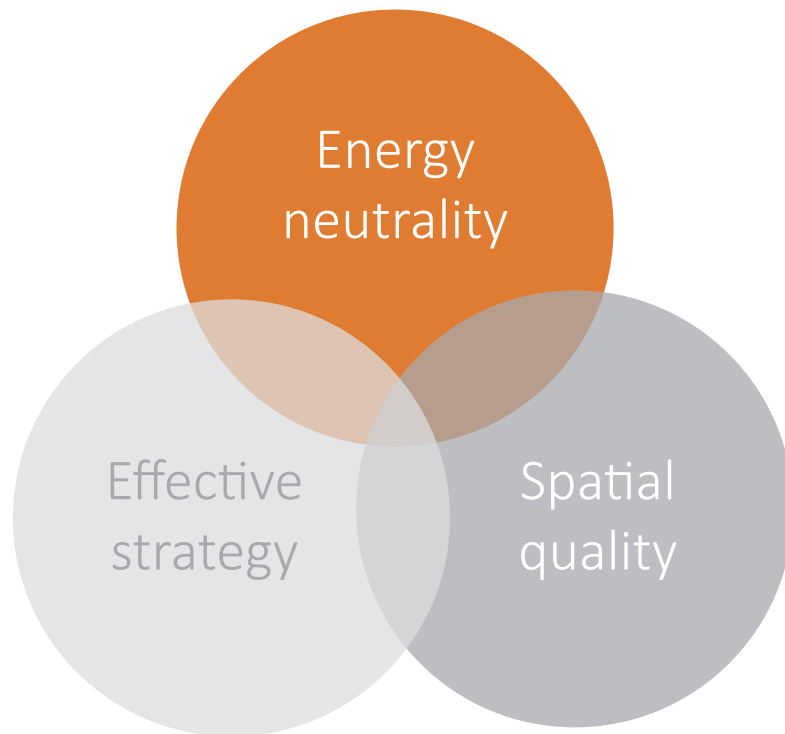
2. Mapping near-future developments.

3. Illustrating possible far-futures.

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What is the role for the urbanist? | Enabler



Top down

Project

Participation

Support/Acceptance

Bottom up

Support/Acceptance

Project

Participation



1. Analysing present conditions.

2. Mapping near-future developments.

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What is the role for the urbanist?

| Connect stakeholders

Top down

provinsje fryslân
provincie fryslân



Energiewerkplaats Fryslân



Bottom up

Workshops (2)

- investigation of goals, local opportunities, goals and ideas brainstorm
- reviews on the spatial effects of these ideas

Purpose:

Bring ideas together and make them spatial. Search for regional chances and create awareness, support and acceptance for renewable energy projects.



1. Analysing present conditions.

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Workshops with Trynergie | Regional approach



1. Analysing present conditions.

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Workshops with Trynergie | Investigation of energy waste flows



1. Analysing present conditions.

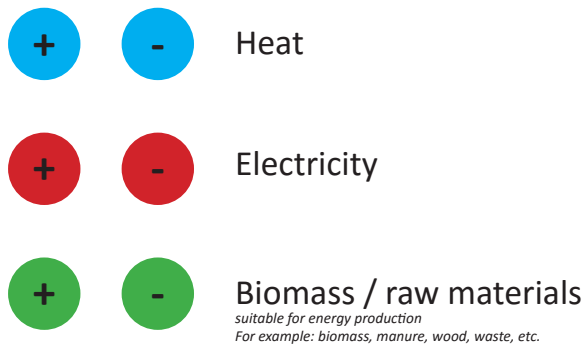
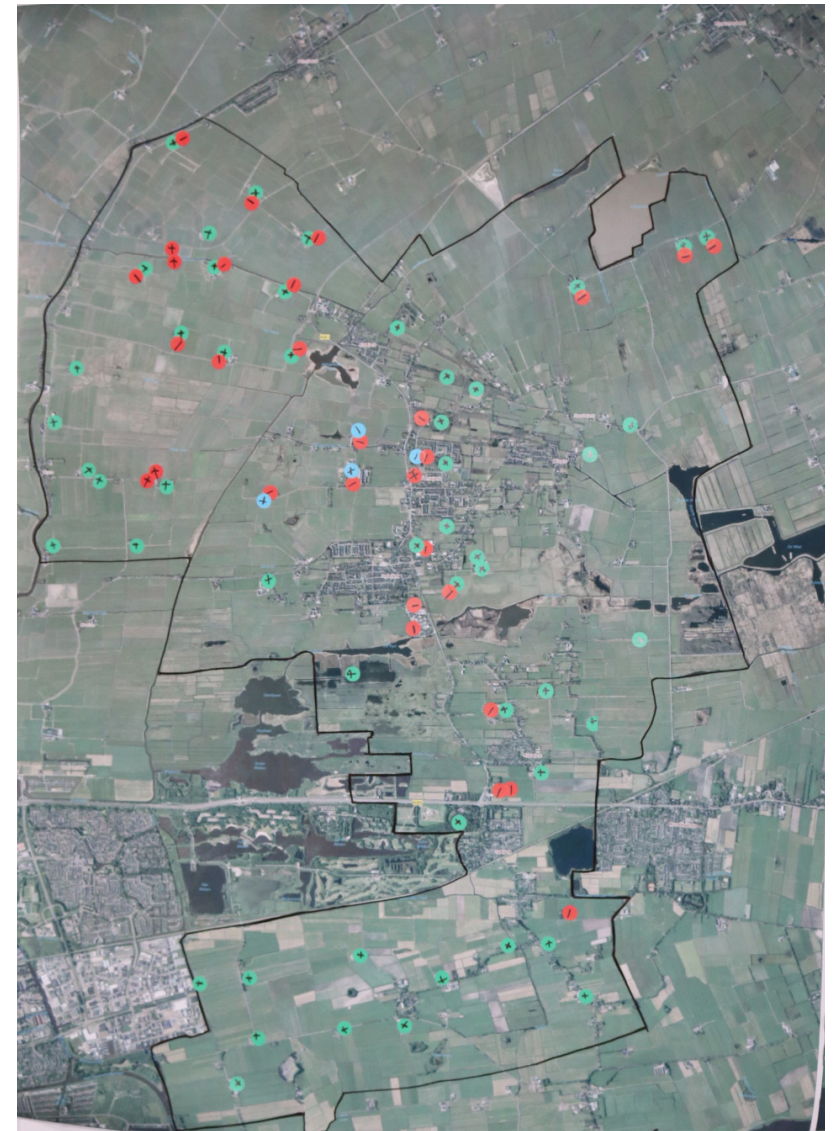
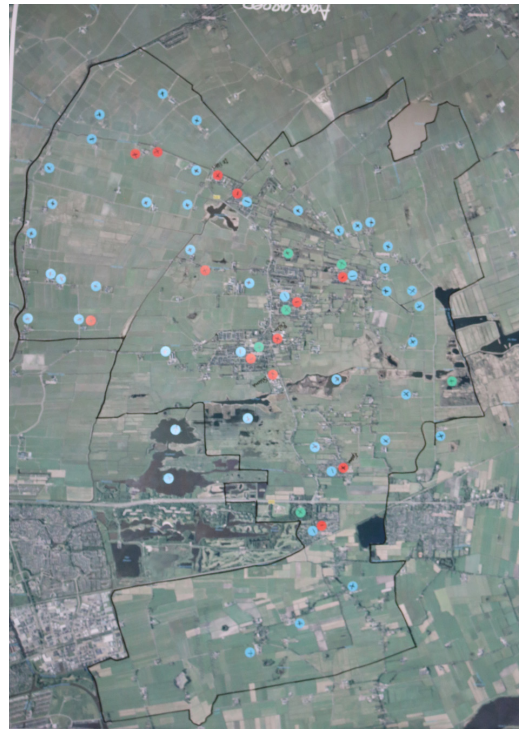
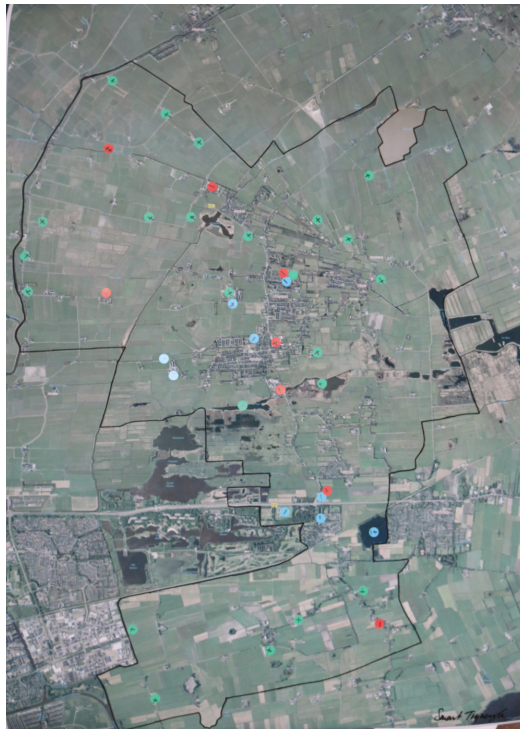
2. Mapping near-future developments.

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Workshop 1 | Investigation of energy waste flows



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Workshops with Trynergie | Investigation of energy waste flows



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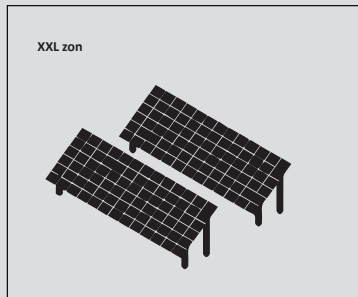
3. Illustrating possible far-futures.

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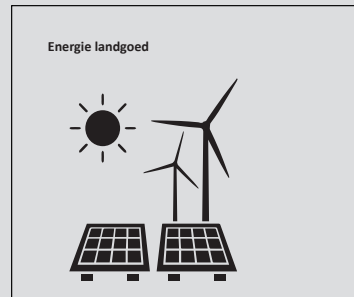
5. Identifying spatial interventions.

Workshop 1 | Spatial concepts

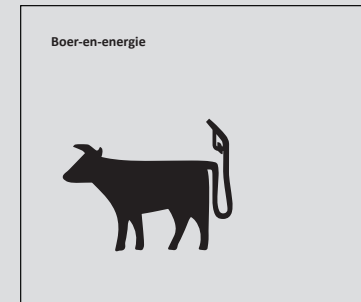
XXL Solar energy



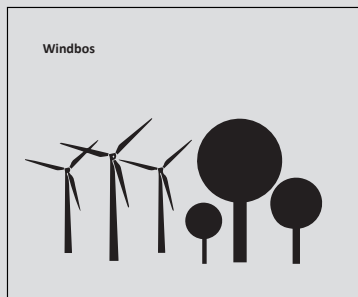
Energy estates



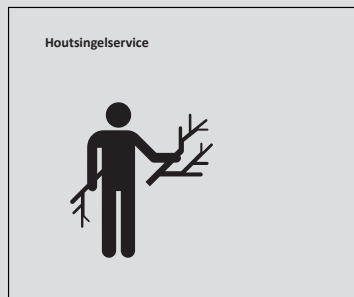
Farm and energy



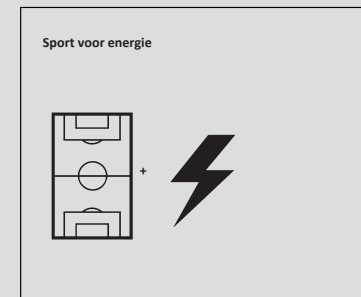
Wind forest



Wood from the neighbourhood



Sport for energy



6 spatial concepts given as a starting point for the brainstorm

1. Analysing present conditions.

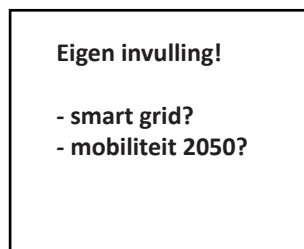
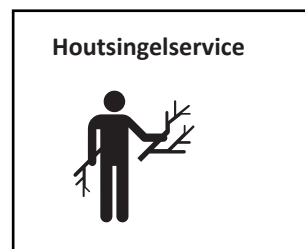
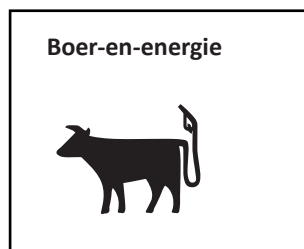
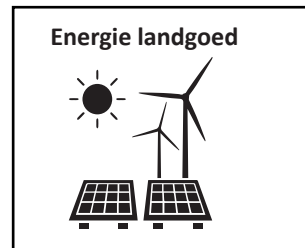
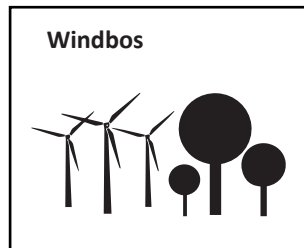
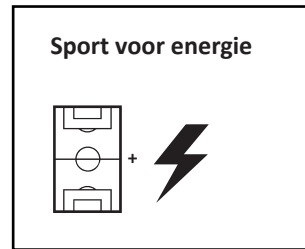
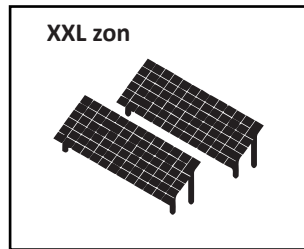
2. Mapping near-future developments.

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Spatial concepts and energy techniques



Wind turbine (70m.)



Wind turbine small (15m.)



PV panels on field



PV panels on large roofs



Thermal power plant



Biogas intallation

(mest + mais + biomassa: groenafval, hout e.a.)



Mono-digester

(alleen mest)



Energy storage?



Other (please mention what!)

1. Analysing present conditions.

2. Mapping near-future developments.

3. Illustrating possible far-futures.

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5. Identifying spatial interventions.

Workshops with Trynergie | Discussing and making plans



1. Analysing present conditions.

2. Mapping near-future developments.

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Spatial concepts and energy techniques



1. Analysing present conditions.

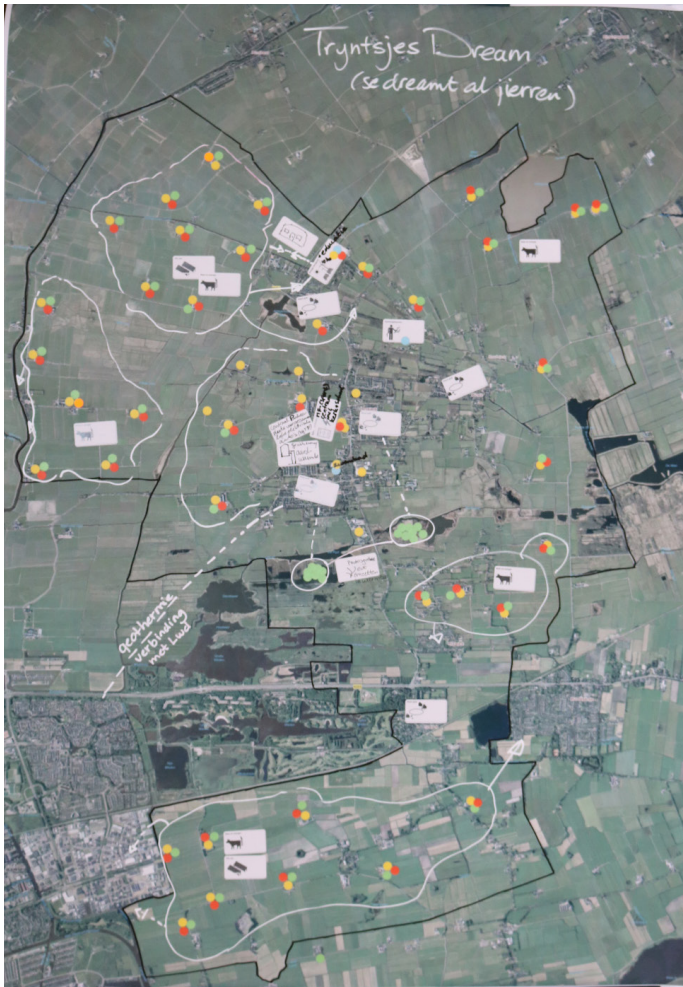
2. Mapping near-future developments.

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Results | lot of ideas!



1. Analysing present conditions.

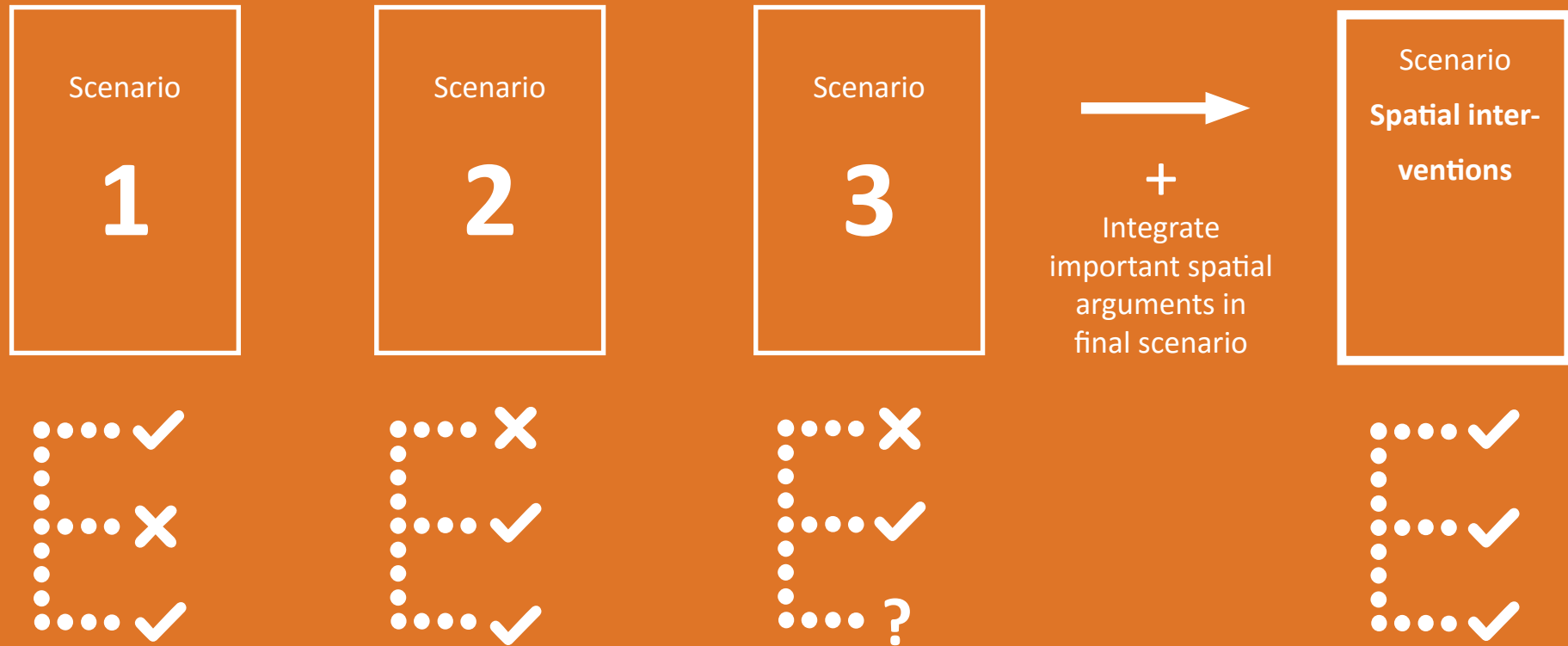
2. Mapping near-future developments.

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Trynwâlden | Scenarios and spatial interventions

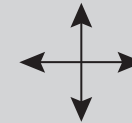


Methodology | Scenario planning

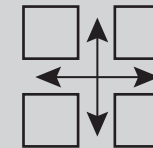
Quantity	several
Time horizon	medium and long term
Route development	yes
Ability to influence the development	partially
Desirability	neutral
Scope	complex
Form	lively
Core quality	plausible
Purpose	research
Finish	sufficient imaginary
Base	curiosity, reviews
Incident	possible



Identify driving forces



Identify critical uncertainties



Develop plausible scenarios



Discuss implications and paths

1. Analysing present conditions.

2. Mapping near-future developments.

3. Illustrating possible far-futures.

4. Composing integrated visions.

5. Identifying spatial interventions.

Scenarios | matrix

Smart farms

Smart mobility

Energy clusters/estates

	Smart farms	Smart mobility	Energy clusters/estates
Where	<i>The renewable energy will all be generated in the rural area at farms</i>	<i>In the built environment, current housing and buildings as well as public space and the areas along infrastructure</i>	<i>On the current industrial areas or in a new to build parks</i>
Initiative	<i>The initiative comes from the farmers, they have profit in this new business</i>	<i>By local community, everyone will generate renewable energy if possible on their own house</i>	<i>Local community and local businesses together</i>
Main innovations	<i>Bio-energy PV panels Wind energy (small scale?)</i>	<i>Smart grids Electric mobility Energy storage</i>	<i>Energy storage PV panels</i>
Socio	<i>Decentral new farming business</i>	<i>Sharing model</i>	<i>Local businesses + new businesses</i>
Spatial	<i>Huge impact on open landscape</i>	<i>Integrated as much as possible in current built environment</i>	<i>Few designated areas for energy production, new typology</i>

1. Analysing present conditions.

2. Mapping near-future developments.

3. Illustrating possible far-futures.

4. Composing integrated visions.

5. Identifying spatial interventions.

Smart farms | Driving forces and critical uncertainties

ALL ENERGY FROM THE FARMERS!

Driving forces

- Start with farmers, they are already entrepreneurs, energy = second business
- In the rural area is more space and potential for renewable energy resources like PV, wind and biomass
- but: “No energy crops on our farmland”

Uncertainties

- Legislation for agricultural industry
- Upscaling is unsure

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Smart farms | scenario 1: nearby future



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Smart farms | scenario 1: nearby future



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Smart farms | scenario 1: nearby future



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Smart farms | scenario 1: nearby future



1. Analysing present conditions.

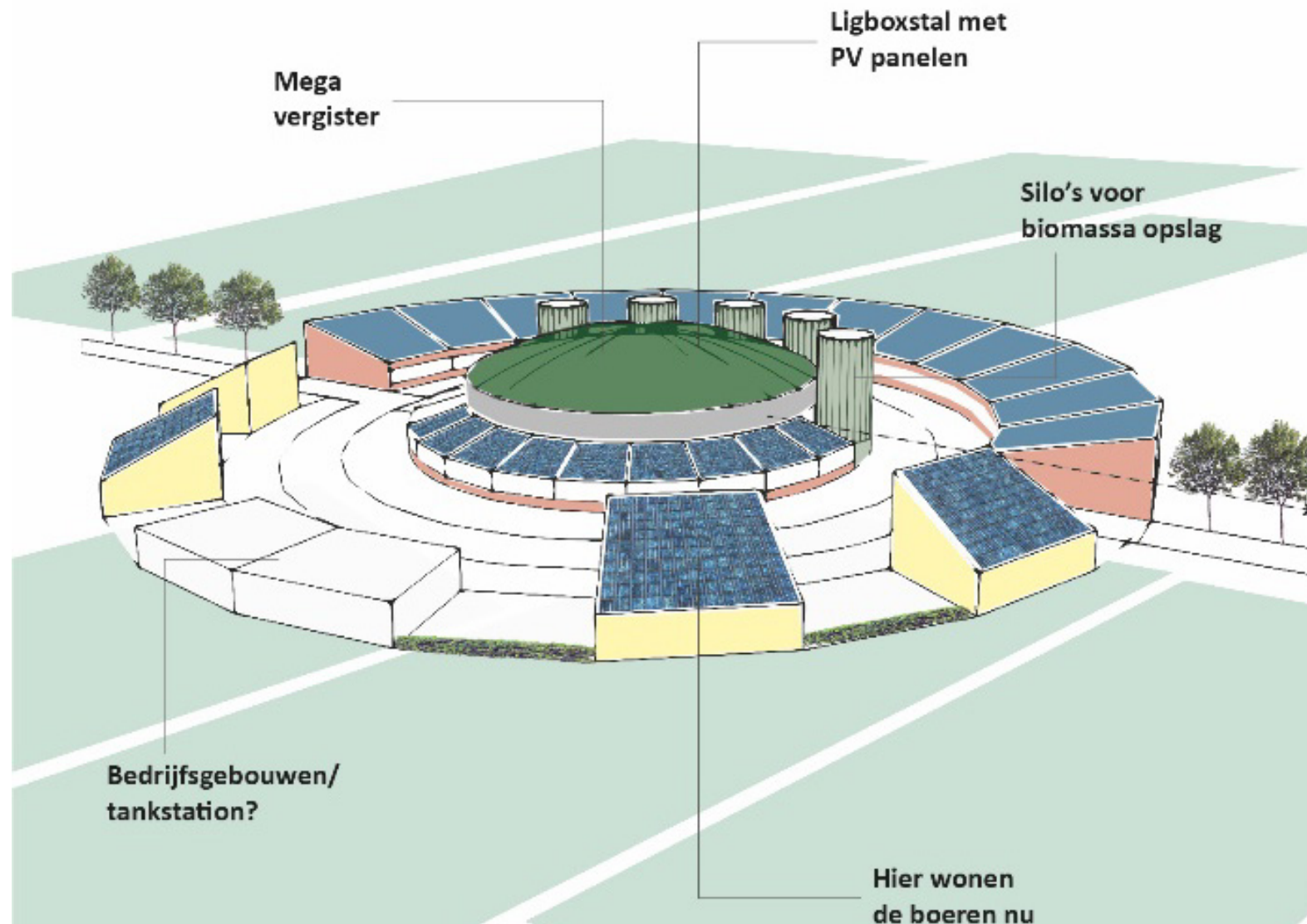
2. Mapping near-future developments.

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Smart farms | scenario 1: far future



1. Analysing present conditions.

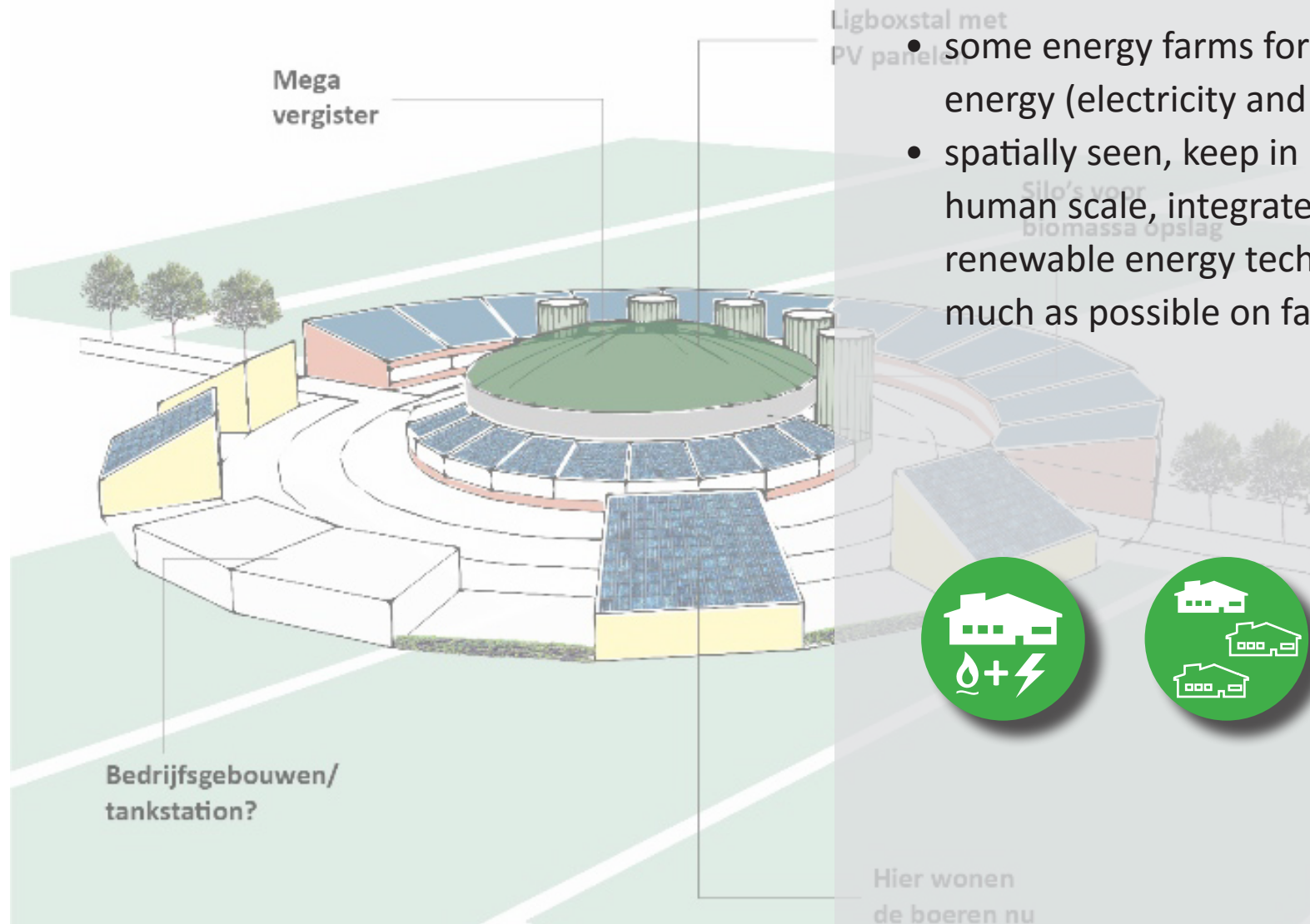
2. Mapping near-future developments.

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Smart farms | conclusions



Ideas for final scenario

- some energy farms for production of energy (electricity and biogas)
- spatially seen, keep in mind the human scale, integrate the needed renewable energy techniques as much as possible on farmyards



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Smart mobility | Driving forces and critical uncertainties

ENERGY PRODUCTION EVERYWHERE WE COME!

Driving forces

- Every house should maximize its energy saving and production
- Everywhere people come, energy is needed so produce on all these locations
- Good integration of energy in built environment
- Intelligent distribution of energy is feasible (by smart grids and cars)

Uncertainties

- Development of electric cars
- Innovation of energy storage, is off-grid possible?

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Smart mobility | Nearby future



1. Analysing present conditions.

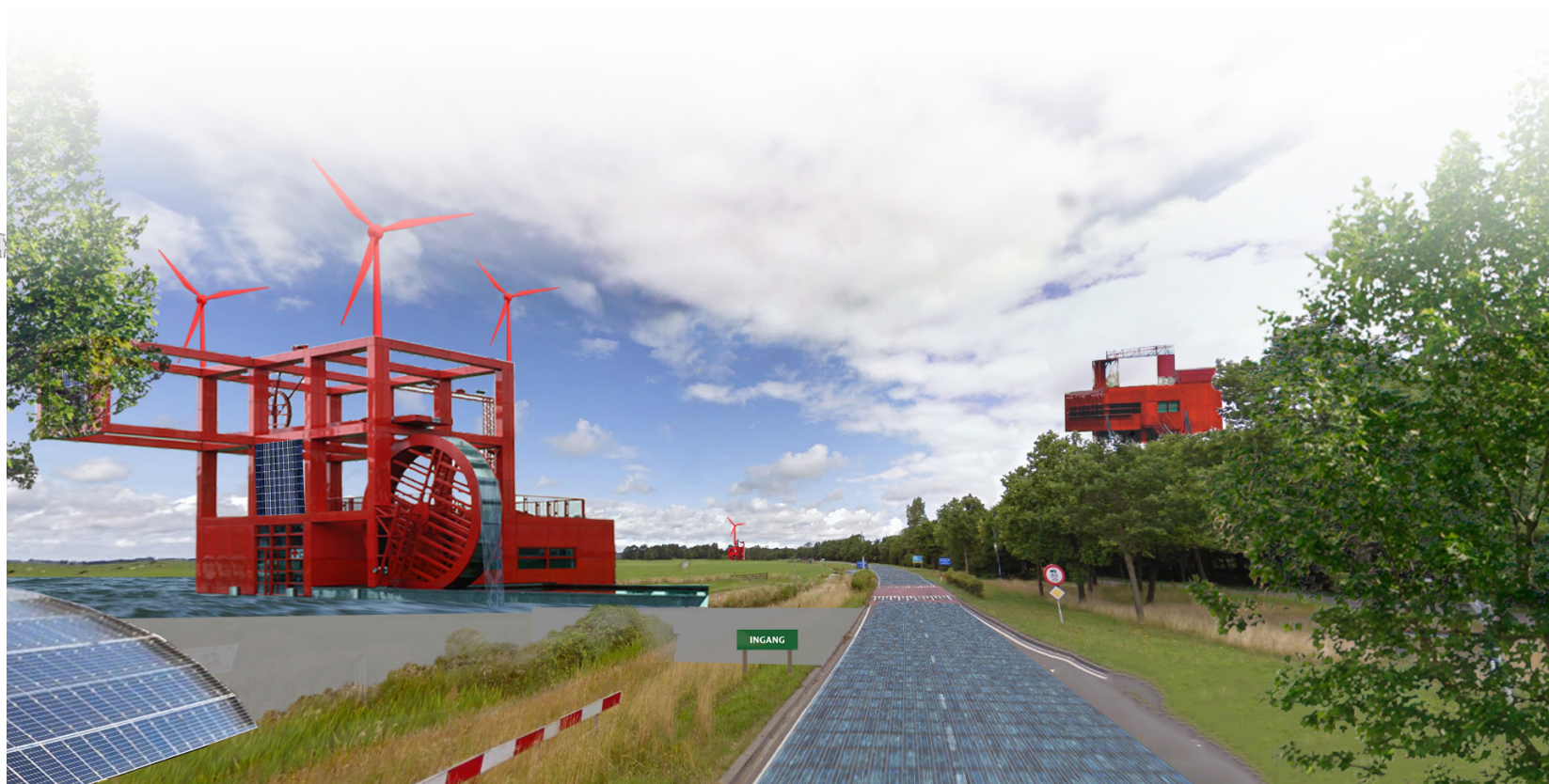
2. Mapping near-future developments.

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Smart mobility | Far future



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Smart mobility | Conclusions



Ideas for final scenario

- Combine new recognizable icons with existing vacant buildings
- Connect to P+R and regional functions
- Integrate energy storage in these HUBs (eg Power to Gas)



1. Analysing present conditions.

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Energy clusters | Driving forces and critical uncertainties

DESIGNED AS A NEW TYPOLOGY

Driving forces

- Designate specific areas for renewable energy as a region
- Generation where energy consumption is high (industry)
- Places that already have an industrial look
- Translate cultural heritage to “new multifunctional energy estate”

Uncertainties

- Innovation of energy storage
- New forms of renewable energy

1. Analysing present conditions.

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Energy clusters | Nearby future



1. Analysing present conditions.

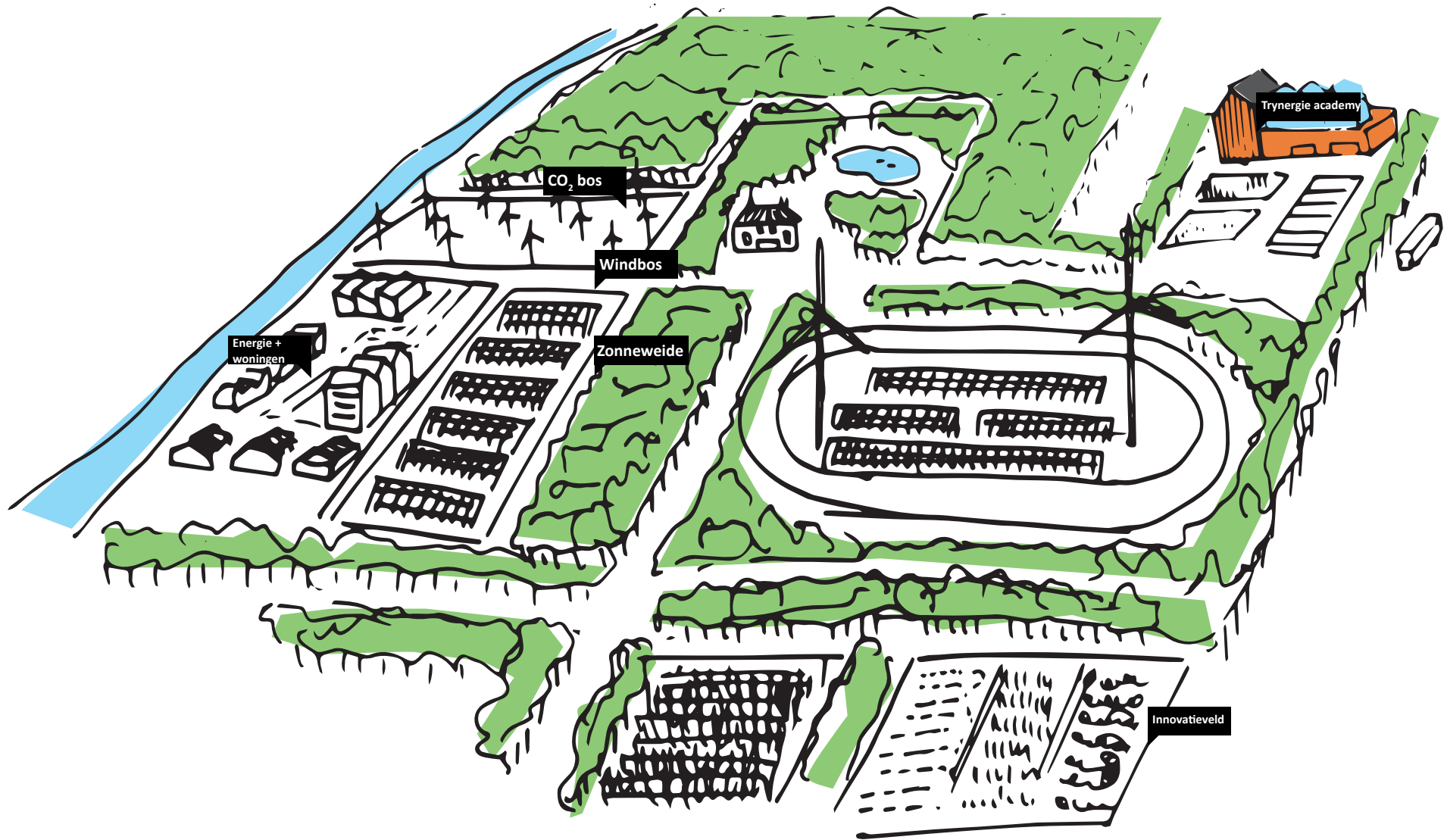
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Energy clusters | Far future



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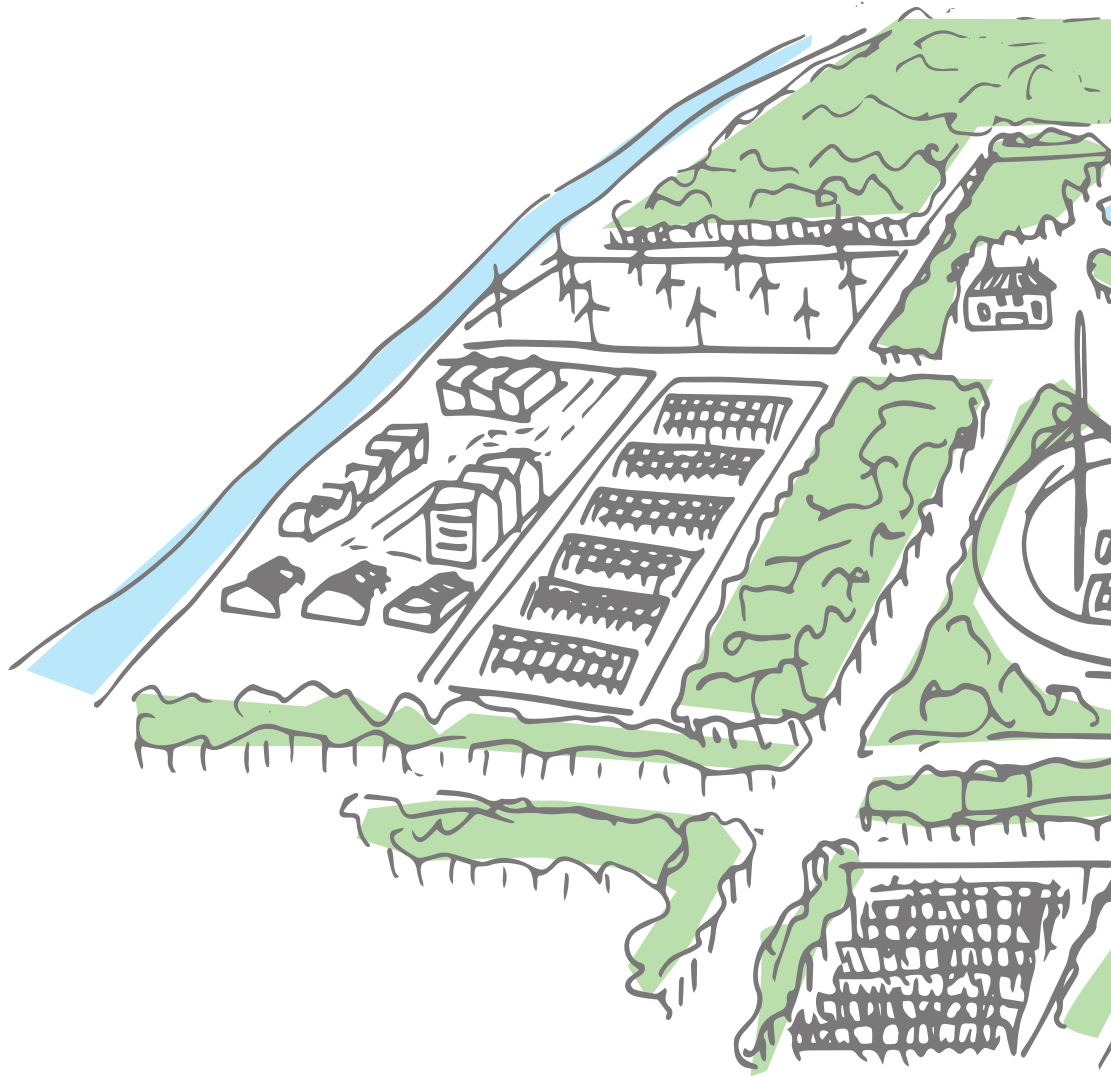
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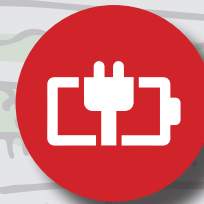
5. Identifying spatial interventions.

Energy clusters | Conclusions



Ideas for final scenario

- Add energy storage
- Multifunctional use of energy park
- Start Trynergie academy in empty building first



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Workshops with Trynergie | Reviewing scenarios



1. Analysing present conditions.

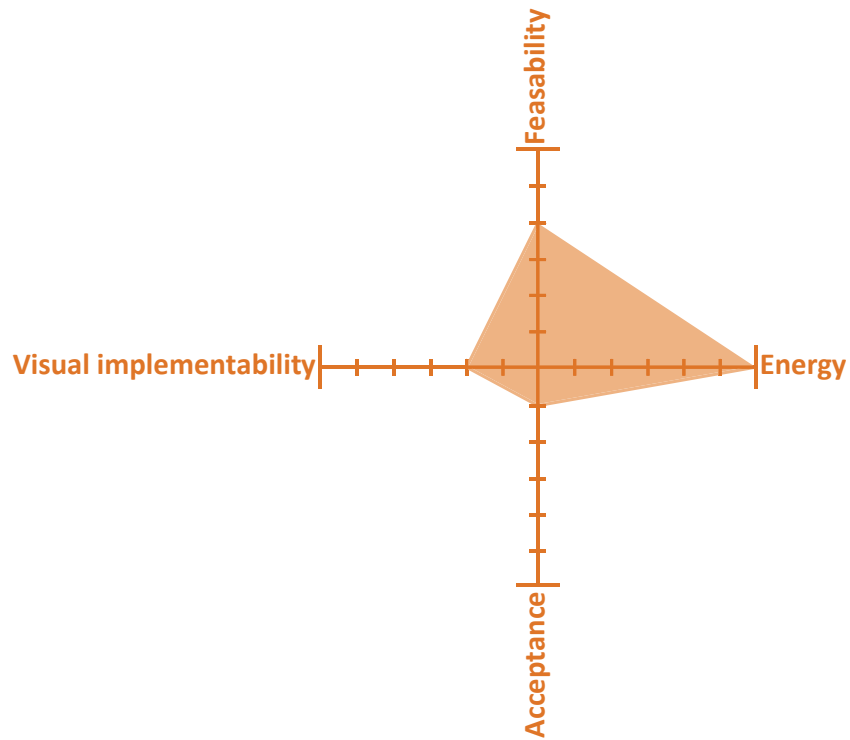
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Different aspects



| energy



Demand and supply of energy during the day/year is balanced



The energy mix doesn't rely too much on one energy resource



The degree to which the mix is energy neutral

1. Analysing present conditions.

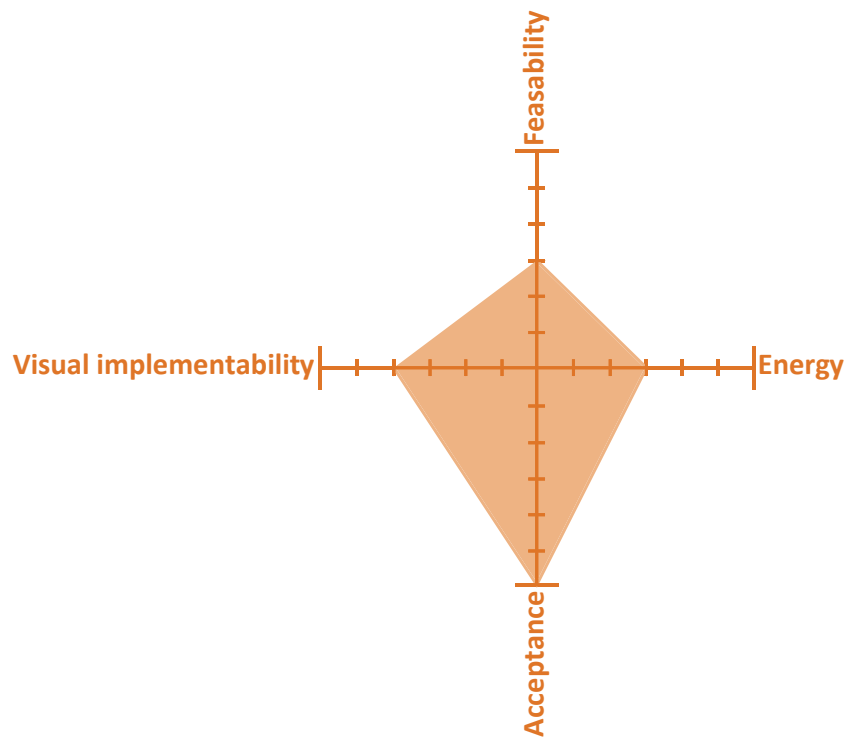
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Different aspects



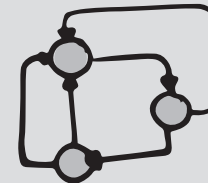
| acceptance



Opinion of inhabitants is included and respected



Working together



Sharing model, smart use of (waste) flows



Wishes and needs overlap as much as possible

1. Analysing present conditions.

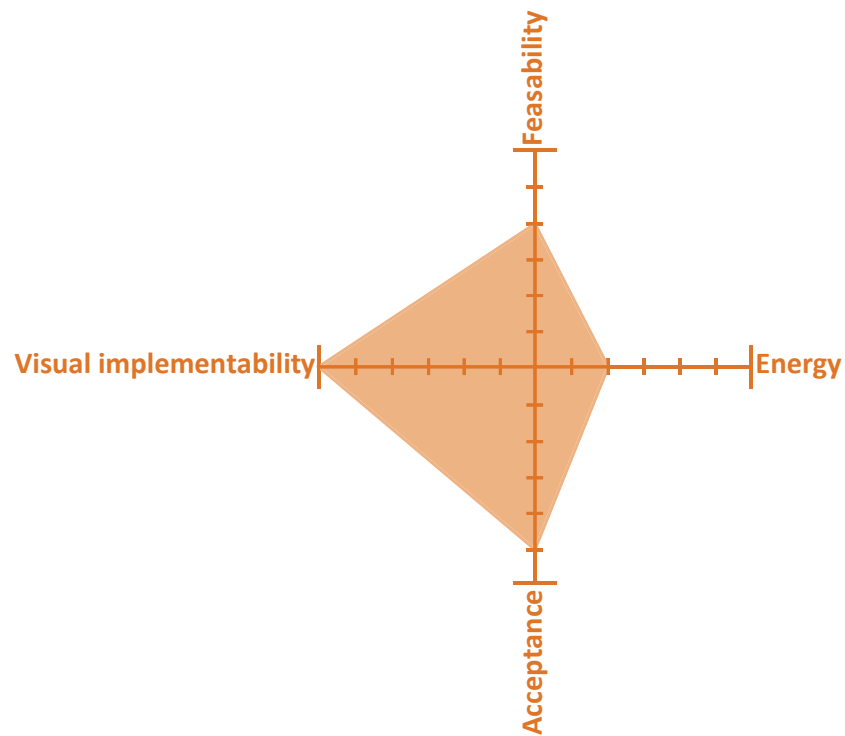
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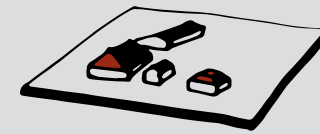
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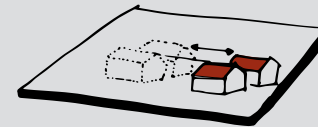
Different aspects



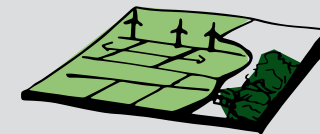
| visual implementability



Follow current
building typologies



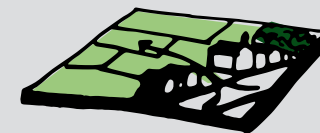
Building orientation on sun



Embrace important (sight)lines



Open and closed landscape



Make landscape more visible
and accessible

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Different aspects

| feasibility



Economic aspects, cost required and value to be attained



Innovations aspects, realistic future?

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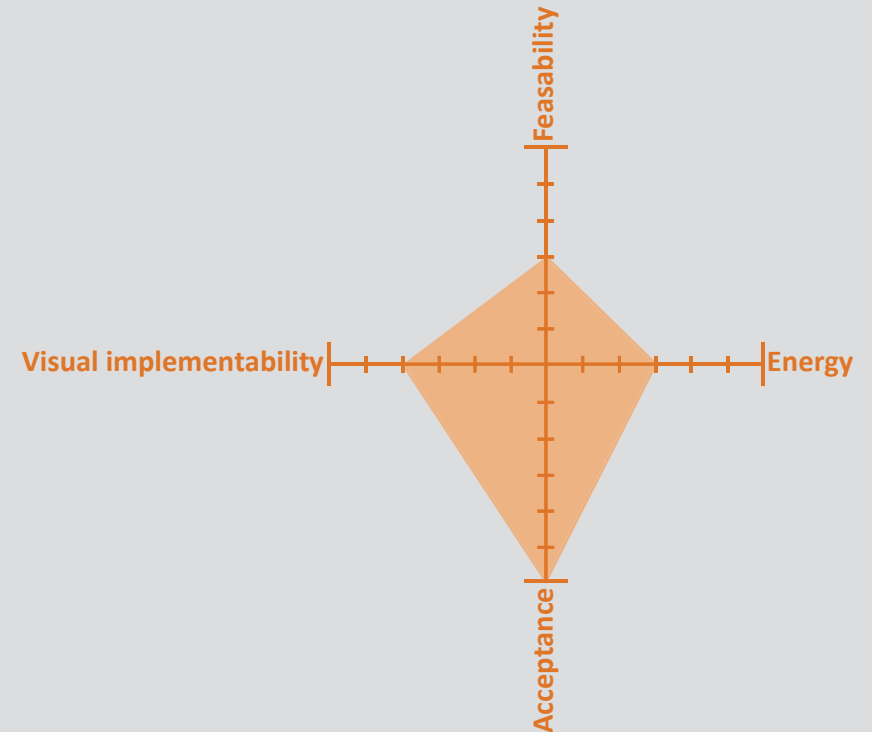
5. Identifying spatial interventions.

Integrated vision | acceptance

Driving forces Trynwâlden



- Working smart together as a region
- Designate few places for renewable energy production
- Connecting with research and innovation: Trynergie academy
- Use the current built environment and transform if needed for renewable energy production
- Recognizable as new typology, or almost invisible integration in current built environment



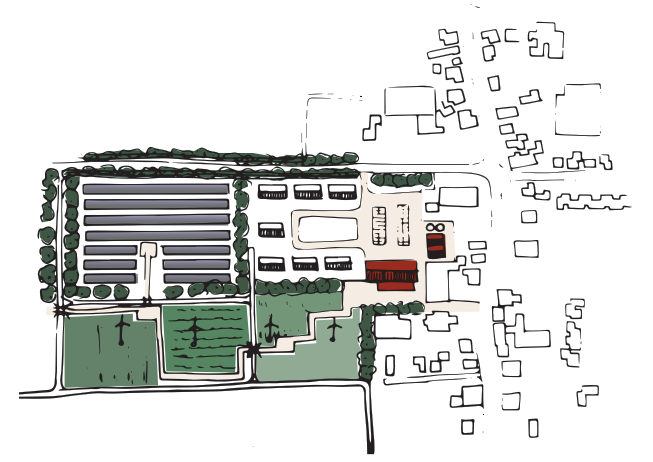
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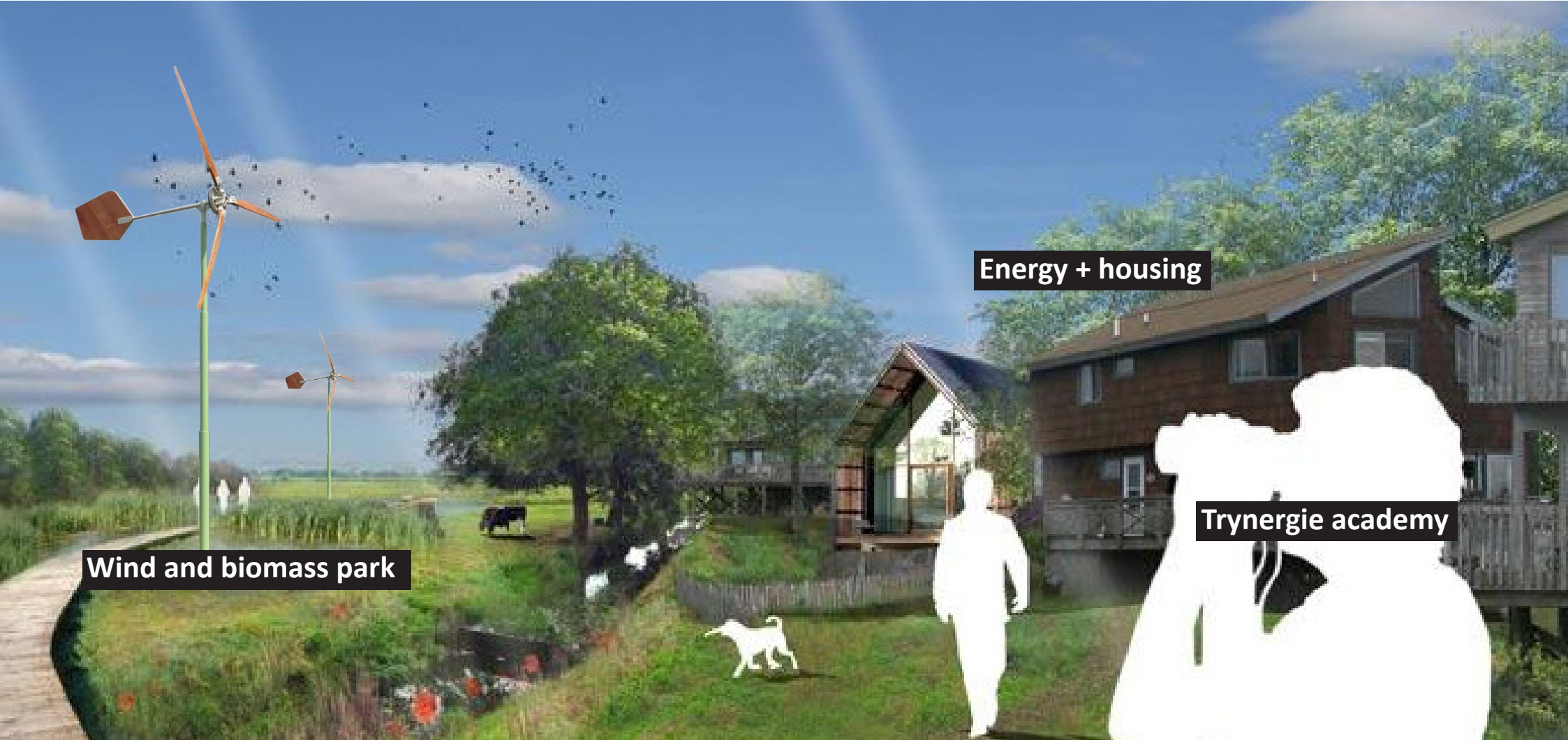
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Energy experience park | Aldtsjerk

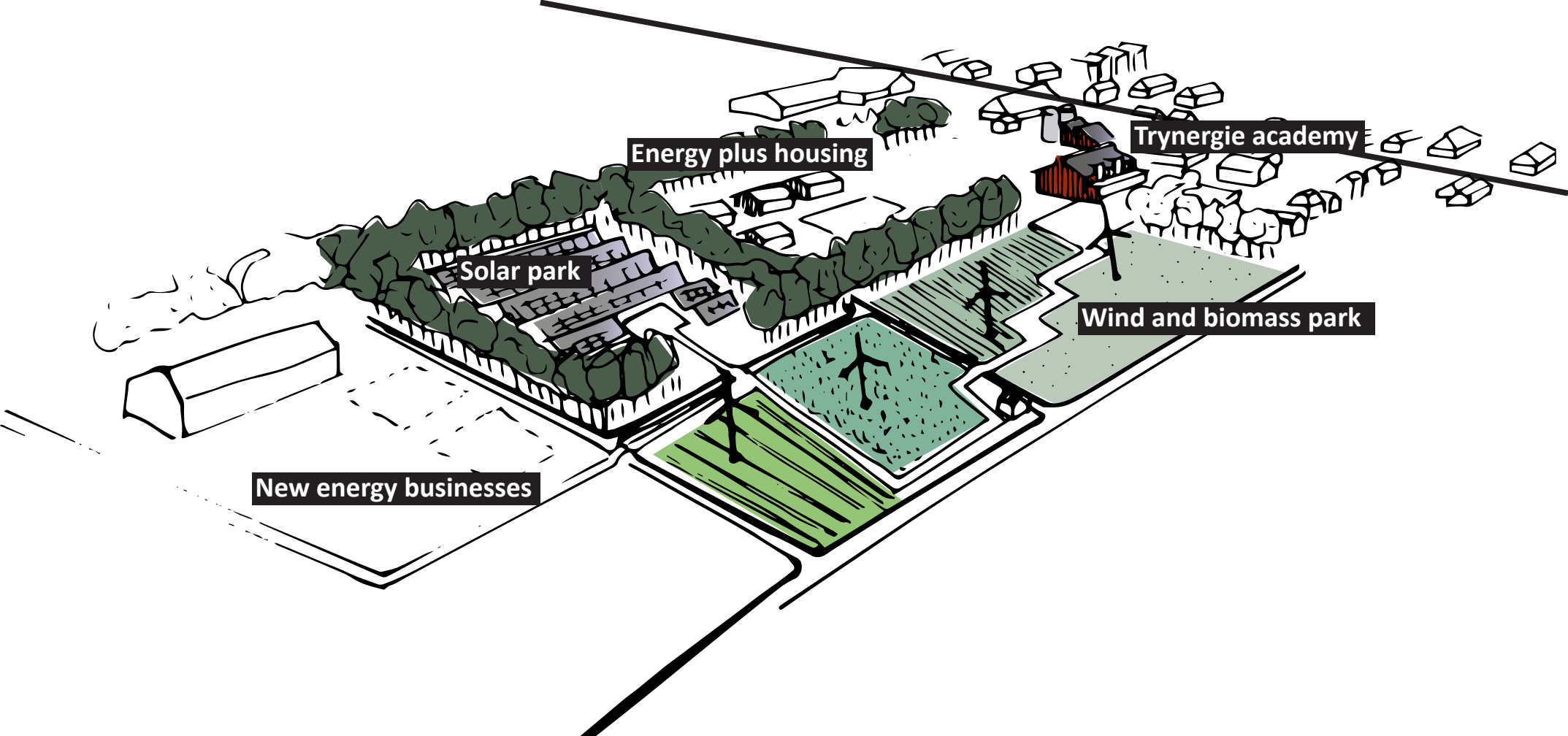


Wind and biomass park

Energy + housing

Trynergie academy

Energy experience park | Aldtsjerk



Energy experience park | Aldtsjerk



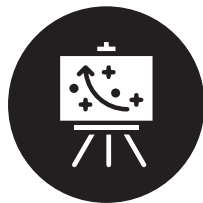
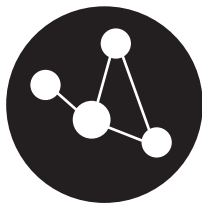
Solar- and windpark

Energy + housing

Conclusion

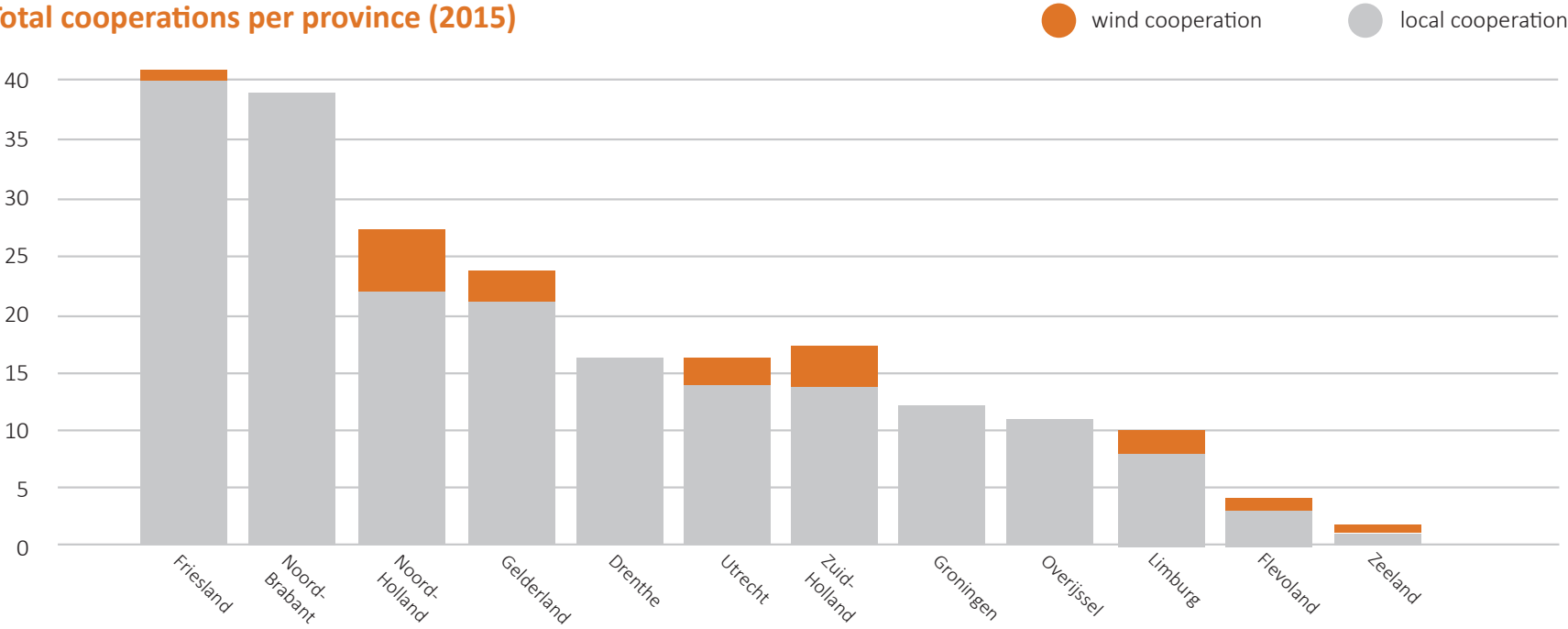
“A good strategy for regions to become energy neutral is:

to create awareness for the need of top-down plans on renewable energy goals and connect these plans with bottom-up initiatives and ideas through an interactive process of drawing and discussing multiple designs on possible spatial futures plans together in an open setting”.



Conclusion | lot of cooperations, start with regions

Total cooperations per province (2015)



Source: (Schöne, 2015)

