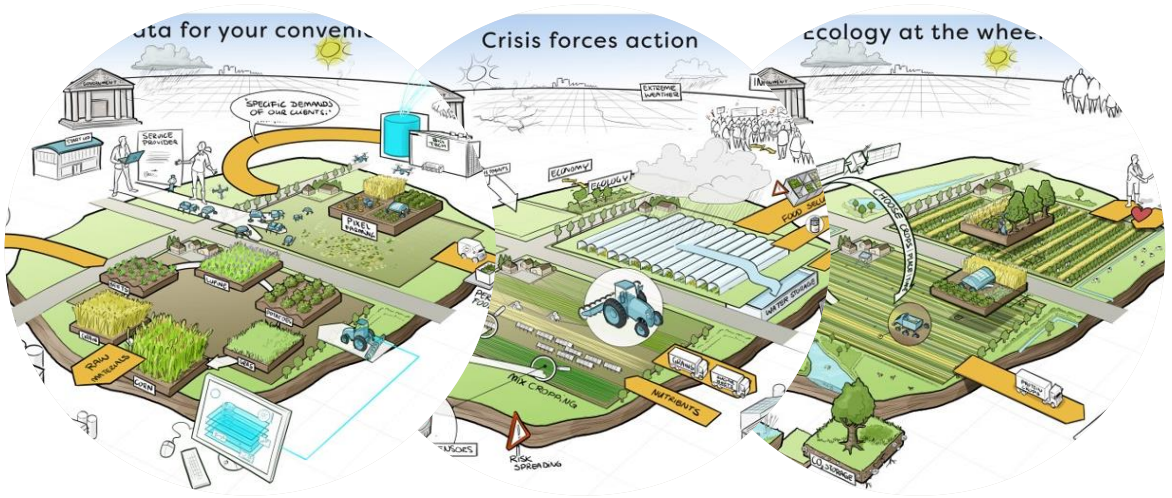
Agros – Future scenarios for smart mixed cropping systems

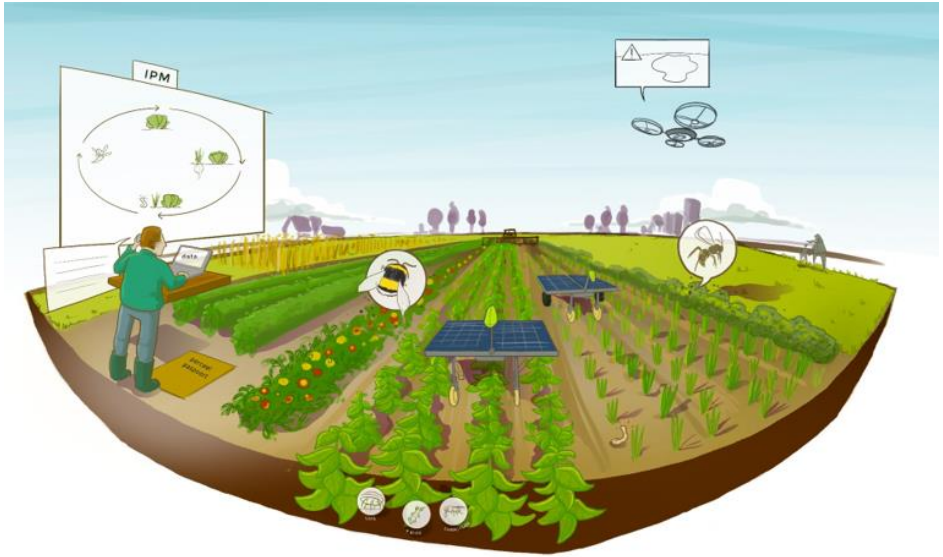
2024 april 24th, AGROS network and knowledge event

Herman Schoorlemmer, Ellen Bulten, Boelie Elzen, WUR Field Crops



WAGENINGEN
UNIVERSITY & RESEARCH

Smart mixed cropping systems as promising solution with technology supporting agro-ecology



But…

How do these systems develop?

What are relevant actions and investments with an eye on the future?

What technology and infrastructure should be developed?

What support is needed?

Approach

Analysis of **trends and challenges** in current arable system (system analysis)

Future visions for smart mixed cropping systems

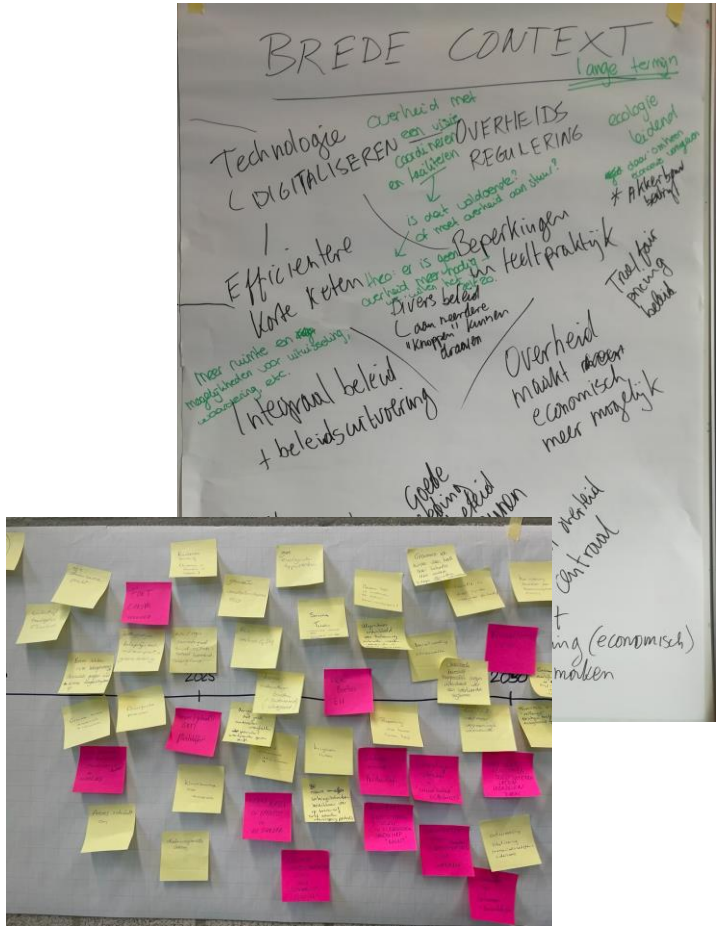
Transition pathways from current situation towards future visions

Recommendations: Suggestions for robust and flexible stakeholder strategies under varying circumstances

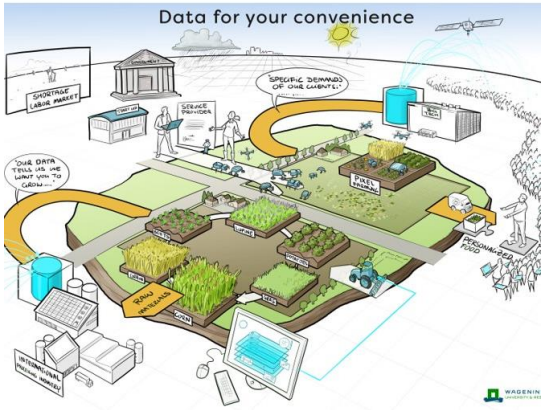
WAGENINGEN
UNIVERSITY & RESEARCH

Approach (2)

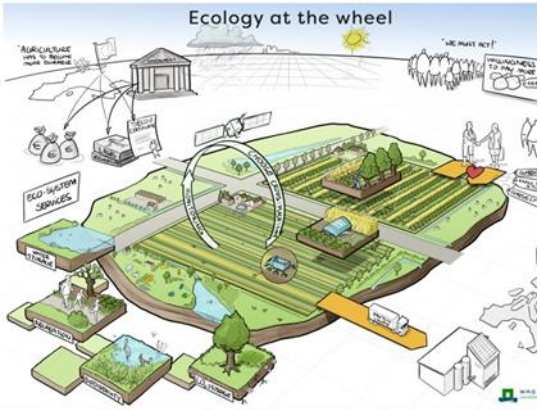
- Literature review: trends, challenges, uncertainties
- Scenario workshop: 3 future visions
- Strategy workshop: plausible pathways, identification of breakthroughs, needed actions
- Recommendations and robust actions
- Test: Energy working session
- Report:https://edepot.wur.nl/630284



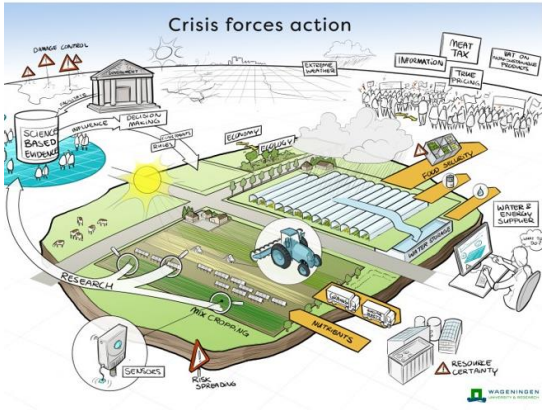
Three scenarios for mixed cropping systems



Data and technology driven – diverse rotations and individual plant treatment

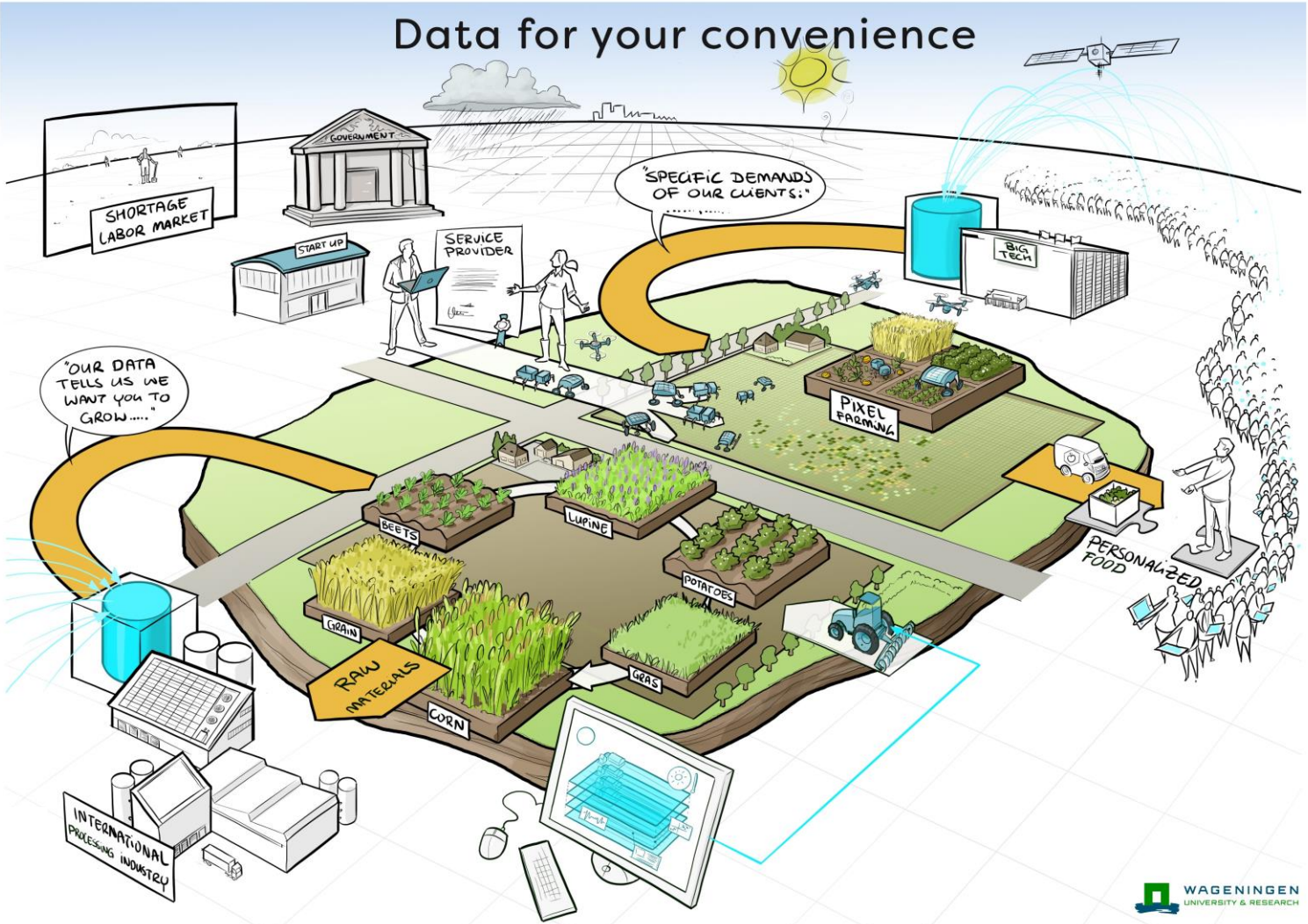


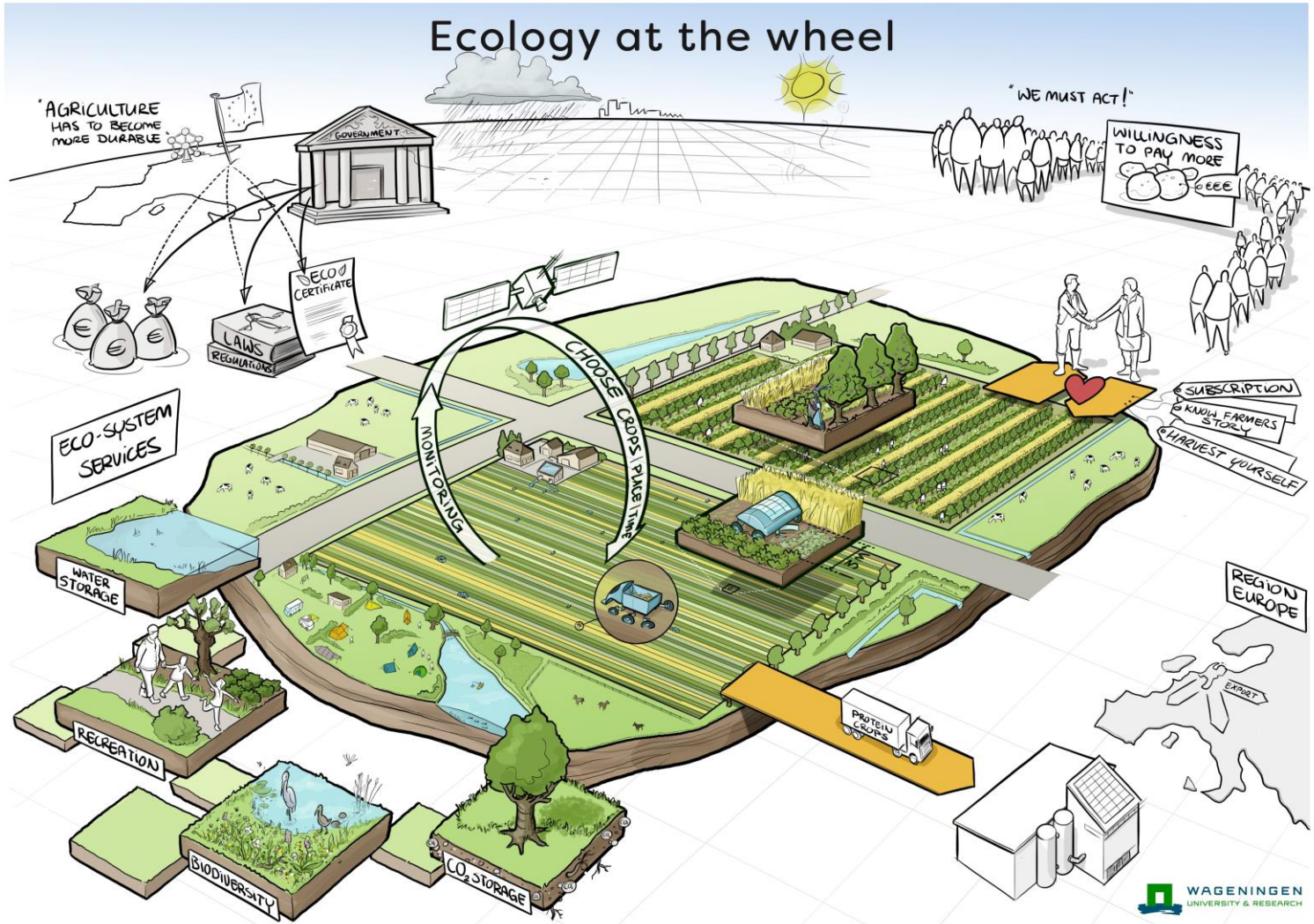
Regionalised food system, societal shifts – agroecology in the lead, technology follows



Climate crisis management – empty toolbox with mixed cropping systems to create resilient systems

WAGENINGEN
UNIVERSITY & RESEARCH


Data for your convenience
SHORTAGE LABOR MARKET
GOVERNMENT
START UP
SERVICE PROVIDER
"SPECIFIC DEMANDS OF OUR CLIENTS:"
BIG TECH
"OUR DATA TELLS US WE WANT YOU TO GROW....."
PIXEL FARMING
BEETS
LUPINE
POTATOES
GRAIN
GRAS
CORN
RAW MATERIALS
PERSONALIZED FOOD
INTERNATIONAL PROCESSING INDUSTRY


Ecology at the wheel
"AGRICULTURE HAS TO BECOME MORE DURABLE"
GOVERNMENT
"WE MUST ACT!"
WILLINGNESS TO PAY MORE
€€€€
ECO CERTIFICATE
LAWS
REGULATIONS
MONITORING
CHOOSE CROPS | PLACE | TIME
ECO-SYSTEM SERVICES
SUBSCRIPTION
KNOW FARMERS STORY
HARVEST YOURSELF
WATER STORAGE
RECREATION
BIODIVERSITY
CO_2 STORAGE
PROTEIN CROPS
REGION EUROPE
EXPORT


Crisis forces action
DAMAGE CONTROL
GOVERNMENT
FACILITATE
OTHER DATA
SCIENCE BASED EVIDENCE
INFLUENCE
DECISION MAKING
CONSTRAINTS
RULES
EXTREME WEATHER
INFORMATION
MEAT TAX
TRUE PRICING
VAT ON NON-SUSTAINABLE PRODUCTS
ECONOMY
ECOLOGY
FOOD SECURITY
WATER & ENERGY SUPPLIER
WATER STORAGE
WHAT TO DO?
RESEARCH
MIX CROPPING
GRAINS
SUGAR BEETS
NUTRIENTS
SENSORS
RISK SPREADING
RESOURCE CERTAINTY

Groups of 5-6: discuss one scenario

3’’ Just ask each other what you see and feel about this scenario

10’’
- You as **farmers**: If I want to be **successful in this world**, which technical and socio-economic **hurdles** do I need to overcome?
- You as **technology providers**: idem

2’’ Note 2 relevant actions to overcome a very relevant hurdle

1:..

2..

Robust actions – no regret

For farmers, technology providers, government

- Examples

Stakeholder	Robust action
Farmers	**Monitoring and collection of data**; communicate to consumers, strengthen market position
Technology suppliers	Investing in **collaborative platforms** around data (standards, codes of conduct, etc.)
Governements	Support processes for **fair pricing and compensation** for ecosystem/social services

Energy infrastructure in each scenario

Scenario	Data for your convenience	Ecology at the wheel	Crisis forces action
Elements related to energy already described in scenario descriptions	Robotisation and automation for personalised food; high energy demand from data centres; scaling up through	Autonomous and electric vehicles, fitting to the landscape; mechanisation is small, light and fossil free;	Farmers as food, water and energy producer; sensors for science based evidence; storage of water and energy;

Robust actions

- **Optimisation of local energy production**: it is cheaper to produce your own energy (e.g. right now in the Netherlands H2 costs 56ct/kWh, own electricity from solar panels costs 6ct/kWh);
- **Stabilisation** is possible if farmers collaborate with each other, with the requirement that e.g. each farm has comparable storage capacity;
- **Producing, storing and trading energy** already provide new opportunities and business models for farmers. If trading is not possible or attractive, there is still the alternative of using energy at the farm level year-round (e.g. in a 'crisis forces action' scenario);
- For each scenario there is a **business model related to trading** in energy in support of a mixed cropping system;
- Producing and storing large amounts of energy always allows farmers to be **flexible**; they can either use it on their own farm or trade energy when it is cost-effective.

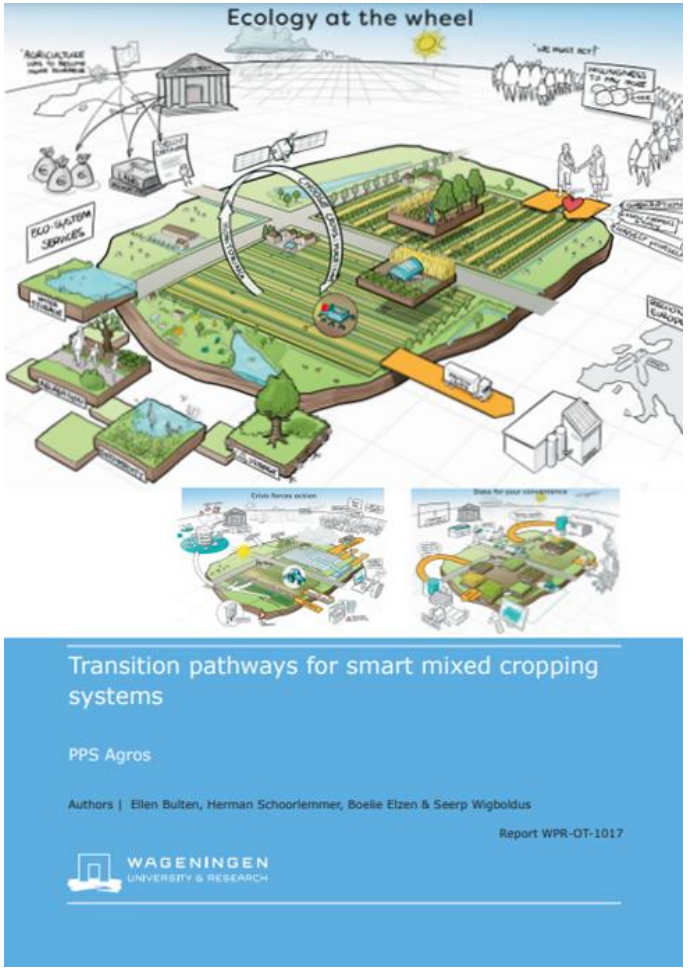
costs 6ct/kWh);
- **Stabilisation** is possible if farmers collaborate with each other, with the requirement that e.g. each farm has comparable storage capacity;
- **Producing, storing and trading energy** already provide new opportunities and business models for farmers. If trading is not possible or attractive, there is still the alternative of using energy at the farm level year-round (e.g. in a 'crisis forces action' scenario);
- For each scenario there is a **business model related to trading** in energy in support of a mixed cropping system;
- Producing and storing large amounts of energy always allows farmers to be **flexible**; they can either use it on their own farm or trade energy when it is cost-effective.

WAGENINGEN
UNIVERSITY & RESEARCH

Report

- Transitions pathways for smart mixed cropping systems

  https://edepot.wur.nl/630284



Thank you!

ellen.bulten@wur.nl

herman.schoorlemmer@wur.nl