

UNIVERSITY OF COPENHAGEN

Green Solutions Centre

GREEN RESEARCH MISSIONS

PLANT-BASED FOOD PRODUCTION – A new, climate-friendly industry with international potential

CLIMATE AND CITIES – GREEN TRANSITION OF CITIES – How do we develop liveable cities contributing to a CO2 neutral Denmark?

SUSTAINABLE BEHAVIOUR – Implemented in everyday practices across the private and public sector

INCREASED BIODIVERSITY – strengthening our community values

CARBON CAPTURE USE AND STORAGE – The green path to a fossil-free society

SUSTAINABLE ANIMAL PRODUCTION – an interdisciplinary and global perspective



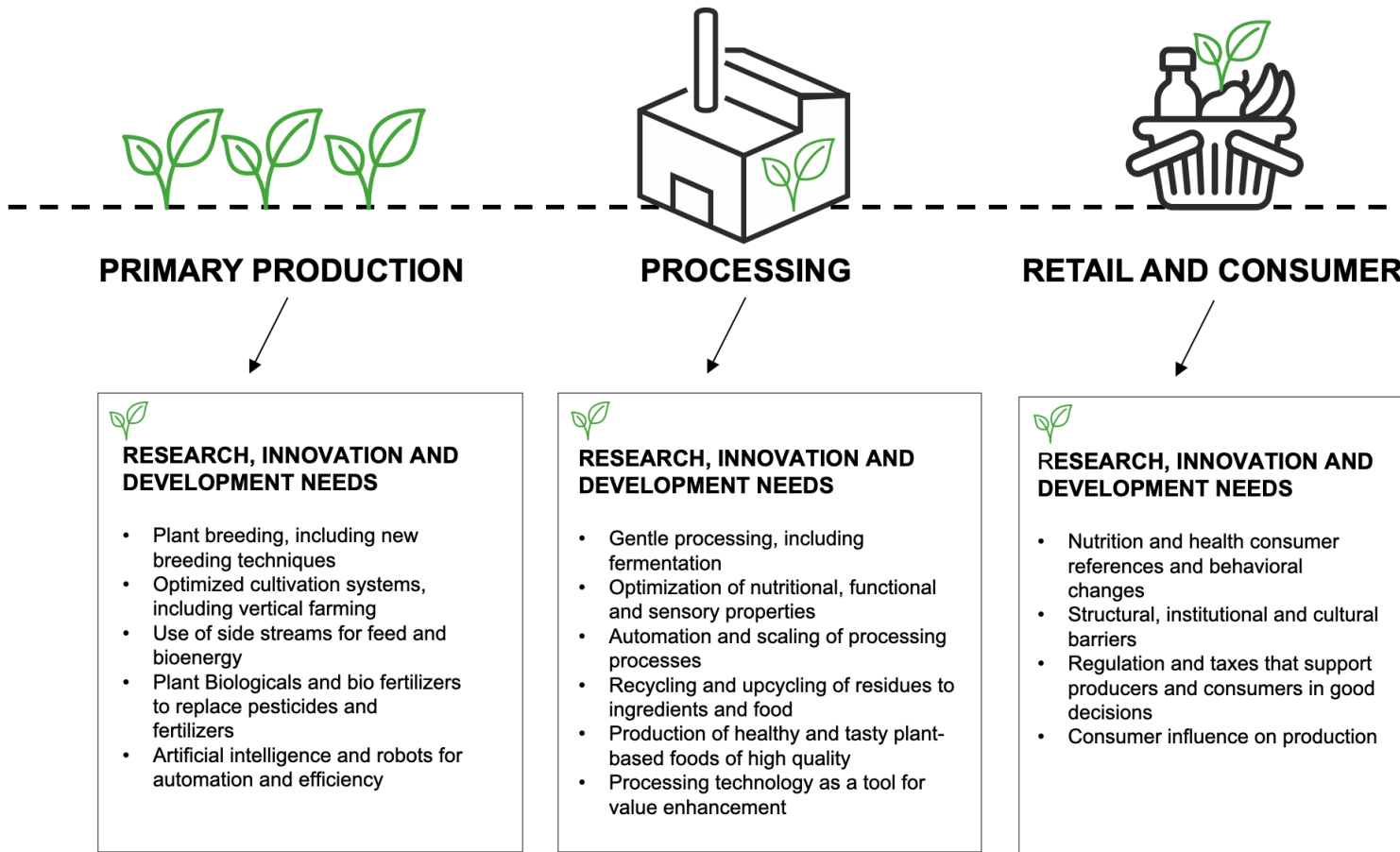


The University of Copenhagen's proposals for cross-disciplinary research missions within the areas of the government's green research strategy: Green Solutions of the Future.

The Green Research Missions are developed across disciplines at the university. With these actions, the university strives to inspire, motivate and engage researchers and stakeholders within and outside the university. These are examples of the challenges, needs and ideas we need to explore in order to succeed in the green transition.

PLANT-BASED FOOD PRODUCTION

– A new, climate-friendly industry with international potential
Research, innovation and development needs



BENEFITS FOR THE CLIMATE, ENVIRONMENT, HEALTH, ECONOMY AND EMPLOYMENT IN 2030

- Reduction of global greenhouse gas emissions (5.2 to 12.6 megaton CO₂ equivalents)
- 50% reduction in use of pesticides leading to cleaner water and increased biodiversity
- Health economic savings between 9.9 and 11.9 billion DKK
- Market share of between 4.5 and 13.5 billion DKK
- Creation of between 9,000 and 27,000 new jobs



CLIMATE AND CITIES – GREEN TRANSITION OF CITIES

How do we develop liveable cities contributing to a CO2 neutral Denmark?



RESEARCH & INNOVATION

GREEN SOLUTIONS

BENEFITS

More green and liveable cities with reduced waste and CO2 emissions

- Transportation without particle pollution for improved air quality
- Recycled and sustainable materials in construction
- Climate-friendly, circular and robust supply chains
- Increased biodiversity in cities
- Cities robust towards extreme weather
- New (circular) business models supporting recycling and job creation
- Improved quality of life for the urban population





CLIMATE CHANGE
How can cities contribute towards climate neutrality?
How do climate-neutral solutions contribute to green and liveable cities?
How do cities adapt to climate change?

URBAN DEVELOPMENT

Governance models
How can legislation, regulation and public/private partnerships contribute to the green transition?

Urban culture and behaviour
How does the people living in the city interact with the urban environment?
How can urban development contribute to sustainable choices at all levels?



Transport
Green and sustainable modes of transport that support residents and commuters in their daily lives.

Buildings
Buildings and constructions in which establishment and renovations are based on the recirculation of sustainable and reused materials.

Supply chains
Supply chains of food, materials and products that contribute to climate-neutral and greener cities, as well as to environmental, social and economic sustainability.

Urban farming
Local food production based on recirculation of nutrients.

Climate adaptation
Nature-based solutions to handle threats of e.g. stormwater, heatwaves and flooding.

SUSTAINABLE BEHAVIOUR

Implemented in everyday practices across the private and public sector



CHALLENGES

WE NEED:

- Sustainable knowledge, responsibility and education
- New understandings of growth, progress and change
- Insights into environmental effects of private and public consumption patterns
- Analysis of the impact of climate change on global security and geopolitics
- Ethical dilemmas in green transition
- Societal engagement in green transition
- Transnational dialogue and collaboration linking national and international legislation



RESOURCES

WE MUST DEVELOP:

- New, green perceptions and visions for nature and society
- Governance promoting local innovation and citizen engagement
- Models for Denmark's CO2 footprint in global supply chains
- Sustainable cultural development processes
- New principles and regulatory tools for public governance and framework conditions
- Green communication and co-ownership

BENEFITS

- Reduced emissions through changes in behaviour and consumption
- Transformations of the labour market and education sector towards a sustainable, green economy
- Capacity building towards a more sustainable future
- Improved policy and governance models supporting green transition
- Improved competitiveness for industries, positioning Denmark as a pioneer in the green transition



Industries demanding behavioural change:

- Agriculture, forestry and fishing
- Manufacturing, mining and utility services
- Energy
- Construction
- Trade and transport
- Public administration, education and health

INCREASED BIODIVERSITY

– strengthening our community values

Research, innovation and development needs



CHALLENGES

- Lack of understanding that diverse and functional, natural ecosystems facilitate a more prosperous society
- Necessary focus on safeguarding and restoring habitats for all natural species, both on land and in water
- Lack of space prevents the development of natural, functional ecosystems
- Necessary regulation of society towards multi-functional management, with special considerations for ecosystems and biodiversity
- Conflicts with and exclusion of large migratory mammals and birds in areas with human activity



DEVELOPMENT NEEDS

- Development of new technologies and use of artificial intelligence in production systems and natural resource management
- Improved ability to utilize the interplay between organisms as a resource in food production
- Increased research in regulation and alteration of support schemes to ensure protection of natural ecosystems
- Mapping the optimal distribution of areas dedicated to: 1) intensive utilization, 2) coexistence, and 3) protection with no commercial focus
- Increased opportunities for outdoor recreational activities facilitate human well-being and quality of life



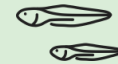


BEHAVIORAL CHANGE

- Behavioral change requires close collaboration with Danish businesses and the population at large
- Adapting production systems to provide consumers with biodiversity-friendly choices
- Consideration for natural ecosystems in industrial development, building and construction industry, the transport sector and among private landowners
- Implementation of multi-functional management in public administration
- Increased valuation of ecosystem services provided by nature
- Implementation of a holistic view that man is part of nature in the education system, the health services, etc.



BENEFITS

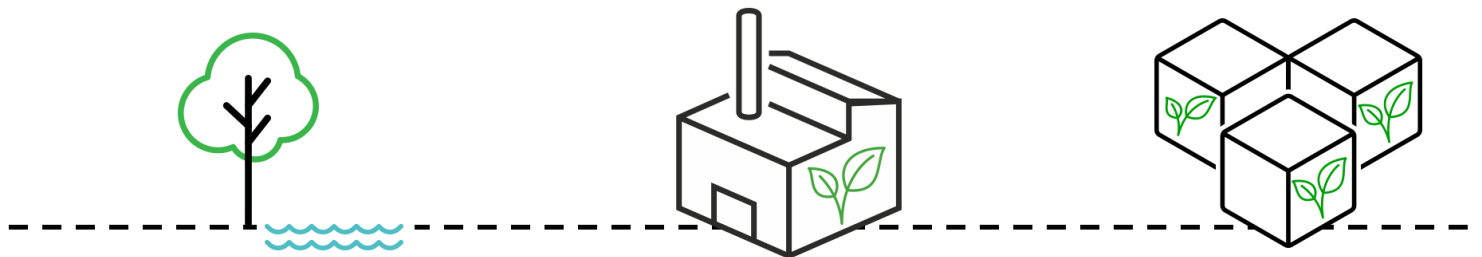


- Stop decline in biodiversity
- Denmark fulfills international commitments to SDG goals 14 "Life on Land" and 15 "life in the Sea"
- Implementation of EU 2030 biodiversity strategy 
- Alignment of expectations on balancing habitat protection with ecosystem services 
- Reduced use of pesticides and fertilizers
- Ensuring clean drinking water 

CCUS – CARBON CAPTURE USE AND STORAGE

– The green path to a fossil-free society

Research, innovation and development



CARBON CAPTURE

REFINING AND USE

STORAGE

- Production of biomass
- Afforestation
- Direct Air Capture
- Land use planning
- Biodiversity and environment

- Biorefinery – microalgae and green biomass
- Catalysts and catalysis
- Power-to-X and chemical substances based on CO₂

- Stable biomaterials for buildings and constructions
- Use of Biochar
- Use and scaling of CO₂ binding minerals
- Localisation and monitoring of underground reservoirs

PREREQUISITES

Prerequisites Regulation – The Danish Act on storage in underground, the regulatory framework, including taxes/price of CO₂ and consumer behavior
Sufficient green CO₂ through biomass and/or Direct Air capture
Green power and hydrogen for Power-to-X and other chemical compounds

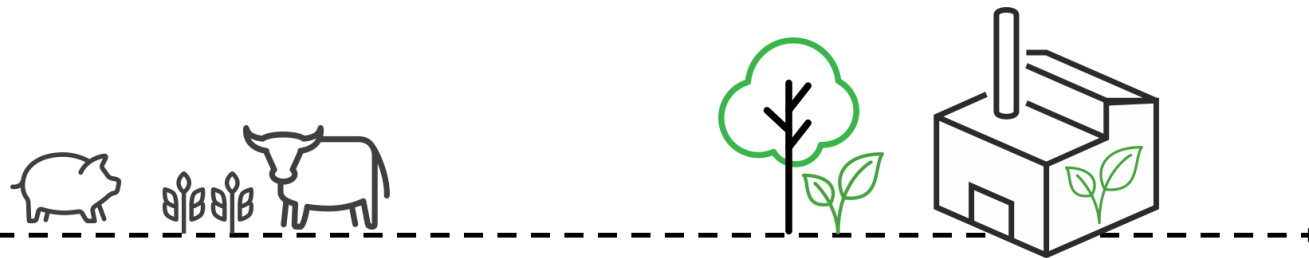
BENEFITS

- Significant reduction of CO₂ emissions to the atmosphere (8 megaton up to 2030, and further 6 megaton towards 2050)
- Long-term removal of CO₂ from the atmosphere and transition to a fossil-free society
- Basis for carbon supply to substances and materials
- Richer and more diverse nature
- Improved fertility of agricultural soils
- Development of Danish bio-based technology and industry
- Danish key role in a future CCUS industry, with the creation of Danish jobs and export opportunities



SUSTAINABLE ANIMAL PRODUCTION

– an interdisciplinary and global perspective



CHALLENGES

WE NEED MORE KNOWLEDGE ABOUT:

- How animal production affect the climate, the environment, animal health, and welfare
- How people, animals and surroundings are connected in livestock production
- The future role of food of animal origin in the Danish society, and what role Danish animal production shall play in a global context
- How animals can contribute to circularity and promote biodiversity in new production systems
- Which problems can be solved with technological innovation, and which will need other solutions
- How management and investment models facilitate or hinder green initiatives in the animal sector

RESOURCES

WE MUST DEVELOP:

- A better and more holistic understanding of different types of animal production (intensive, extensive, organic, etc.) nationally and globally
- New and sustainable methods and technologies with regard to stable systems, breeding, nutrition, animal welfare and health
- Outdoor animal production, including agroforestry
- More diverse understandings of technological innovation, growth and progress
- An open discussion about Denmark's past and future as an agricultural exporting country, as well as the farmers' contribution to the welfare state
- Improved financing and governance principles to support the green transition of livestock production
- New ownership and business models for the agricultural sector in Denmark

BENEFITS

WE WILL ACHIEVE:

- A reduced climate and environmental footprint from livestock through better technologies and changes in production, management and consumption patterns
- Increased biodiversity and nature conservation
- A more attractive work and daily life in rural areas, making the industry attractive to future generations. Among consumers: Greater insight into the food sources, giving a better basis for food choices in private and public households and institutions
- Among manufacturers: Greater insight into the interplay between production and the surrounding world, the environment, climate, and society
- Export of knowledge and technology regarding sustainable animal production





KU Green Solutions Centre (GSC)

Vision:

Green Solutions Centre's vision is to co-create genuine, durable and research-based solutions in close collaboration with private and public institutions, NGO's and students.

We aim to contribute to green solutions that will influence the green transition in Denmark and for integration of UCPH's interdisciplinary professionalism, which covers the entire value chain, in collaboration with external partners, ensuring that durable green solutions are developed.

GSC supports the training of graduates who have the competencies to provide green solutions and the necessary transformations in companies and organisations.

Would you like to know more? Please visit: **greensolutions.ku.dk**

Contact: **GSC@ku.dk**

