

# **White paper**

Contributing to the green transition

**TECH strategy process 2020-2021**

December 2020

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## 1. Introduction

In this white paper, a group of experts from across the departments and centers of The Faculty of Technical Sciences (TECH) at Aarhus University (AU) describes their idea of how the overall ambition of TECH's efforts to contribute to the green transition can be put into practice in the future. The purpose of the white paper is to deliver professional analyses, knowledge and ideas for developing a new strategy for the faculty. This is done by defining a long-term ambition as well as presenting key action areas, where TECH's contribution to the green transition can start, and from where it can develop ahead.

The white paper is prepared from November to December 2020. Afterwards it is to be presented to the faculty management of TECH, who will make the decision of implementing initiatives for contributing to the green transition.

The white paper is developed in an accelerated process where a group consisting of 12 employees from TECH's departments and centers have put forward ideas of how the faculty can work with a strategic effort at contributing to the green transition. Thus, the white paper emerges from a specific context and a specific group of employees with unique competences and professional expertise. The suggested long-term ambition, initiatives etc. should be adjusted on a continuous basis and will be developed as the collaboration across TECH matures. There will be an assessment of feasibility prior to major initiatives are put into action.

## 2. Focus and status for TECH's contributing to the green transition

### 2.1 Definition and scope of the theme

The topic of green transition is very broad. It includes developing the green technologies and solutions we need as a society to transition into a sustainable future, where goals for climate, environment and nature are met while green jobs, production and export thrive.

The strategic scope of this white paper takes its point of departure in the Danish Ministry of Higher Education and Science's strategy '*Green solutions of the future – strategy for investment in green research, technology, and innovation*'<sup>1</sup> and the material from the Danish Ministry of Environment and Food's consultation with TECH in their Roadmap 2020-2030, including '*the Ministry of Environment and Food's professional objectives to reach a less climate-damaging and resource efficient society by 2030 and associated research objective 2020-2030*'<sup>2</sup>. Objectives and focus of AU's proposal for a National Centre for Sustainable Transition of Agriculture is thematically included in the documents mentioned above.

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<sup>1</sup> Fremtidens grønne løsninger – strategi for investeringer i grøn forskning, teknologi og innovation, september 2020. Engelsk udgave, december 2020.

<sup>2</sup> Miljø- og Fødevareministeriets faglige målsætninger for at nå et mindre klimabelastende og mere ressourceeffektivt samfund i 2030 samt tilhørende forskningsmål for 2020 – 2030.

In addition to that, the white paper also takes into consideration the political signals in the Government's agreement with other political parties on funding for green research in 2021.<sup>3</sup>

As part of the work developing the white paper, an overview matrix displaying an assessment of TECH's research, expertise, and positions of strength in relation to other universities and knowledge institutions in Denmark. The matrix can be acquired per request and will be a part of the further strategy process.

## 2.2 SWOT-analysis

The starting point for the white book is a SWOT-analysis, describing the strengths, weaknesses, opportunities and threats for TECH's efforts for contributing to the green transition. Research is the basis for TECH's activities in education as well as public sector consultation. Thus, the SWOT-analysis takes its point of departure in research, but it also includes points specifically regarding education and public sector consultation. The SWOT-analysis describes the understanding of the framework conditions that underlies the initiatives listed in the following sections.

### Strengths

- Strong position with top ranking research, with international network and top research facilities
- Qualified and engaged staff
- Well-established collaboration with external partners
- Cross- and interdisciplinary capabilities and centers
- Unique or highly relevant expertise/knowledge to contribute to the green transition
- Top education capacity
- Special position and strong expertise for public sector consultancy
- ISO 9001 certification of TECH's quality management system for public sector consultancy as the first university in Denmark

### Weaknesses:

- Lack of faculty strategy for research
- Lack of faculty strategy for lobbying activities
- Strains on staff and development of new talents/staff
- The major part of the faculty's permanent staff need to obtain funding to cover their own salary. It is often a weakness in relation to e.g. recruitment.
- Direct interaction with consumers is too weak
- Barriers for cross-department and -faculty collaboration, e.g. knowledge sharing and lack of seed-funding
- Lacking relevant expertise/knowledge in relevant areas. E.g. AI, genetic improvement of animal and plant production systems in developing countries.

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<sup>3</sup> Fordeling af forskningsreserven mv. i 2021 and ii) fordeling af den tværgående reserve i 2021.

- New educations across departments is a challenge
  - Number of students and teaching language
  - Number of students are not yet sustainable
- Low prioritization of teaching activities
- Need for new teaching capabilities and foci

### **Opportunities:**

- Momentum for green transition
- Collaboration with external partners
- Specific research areas with potential for contribute to the green transition, e.g. microbiomes, genetics, AI, circular agriculture, new food sources, climate change, animal and plant production systems in developing countries, energy conversion technologies and socioeconomic context.
- Strong campus environment supporting student initiatives that can be developed further
- Demand for candidates
- New educations and cross-departments collaborations

### **Threats**

- Change in political priorities and policies outdated by technological developments.
- Need for fast(er) results and bigger scale research applicable to different societal contexts
- Competition from other universities with clearer technological profiles.
- Recruitment of staff complicated by AU procedures
- Recruiting students and drop in demand for candidates
- Continuous 2 pct. annual reduction of funding for public sector consultancy combined with a higher demand
- Lost funding opportunities due to low capacity and/or lack of strategy towards industry and private funding.
- Time scope of some external funding agencies is not aligned with the reality of TECH research.
- Varying administrative conditions, standards and requirements in relation to e.g. overhead and co-funding in different funding sources.

### 3. Ambition for contributing to the green transition

#### 3.1 Strategic ambition

Based on the work with TECH's strength positions presented in the matrix and the SWOT analysis the group has come up with a suggestion for a shared strategic ambition for TECH's contribution to the green transition.

*We want to be a leading international and national green hub for academia, industry, and other societal stakeholders.*

*Building on TECH's strong competencies in the fields of agricultural, engineering, and environmental science we will solve important societal and global challenges by generating knowledge and balanced interdisciplinary solutions for green transition and sustainability.*

*This will be facilitated by a systemic approach to sustainable development in the circle of agriculture, industry, construction, energy, and consumption. This includes:*

- *Solutions for further reduction in greenhouse gas and other emissions.*
- *Development of synergies and reducing trade-offs between food supply, biodiversity, use of resources and ecosystem services.*
- *Development of new technologies and digitalisations.*

*All solutions include biological, technical and societal aspects of the green transition.*

The ambition targets both academic staff and students at TECH and aims to present/brand the faculty as an attractive platform for collaboration among external stakeholders national and internationally.

#### 3.2 Key dilemmas and balances

The strategic ambition highlights three key dilemmas for the direction, scope and foci for TECH's research areas and activities in green transition. Each dilemma and argumentation for a future balance that supports the ambition is presented below:

##### ***Dilemma 1: Academic depth/curiosity/excellence vs. societal needs/impact/missions***

The ambition to provide solutions for the green transition leads the balance towards societal impact, when handling this dilemma. It is a challenge that this prioritization will not give the same results in publications and e.g. h-index. A common paradox is foundations asking for societal solutions while at the same time demanding very high h-indexes from applicants. Also, societal solutions normally build on basic/strategic research.

***Dilemma 2: Environment and climate concerns vs. provision of resources***

Green transition is closely linked to the concept of sustainability and a sustainable development in all fields. This points to the following dilemmas which overall must be handled at equilibrium. It is a hallmark of TECH, in its pursuit of green transition solutions, to seek to balance environment and climate concerns with the need for provision of resources and the broader societal context into which solutions must be integrated.

***Dilemma 3: Technical solutions (e.g. reducing GHG emissions) vs. usability and consumer behaviour***

TECH's focus in the green transition takes its point of departure in gaining and utilising biological knowledge, technical solutions, methods of cultivation, production systems etc. However, if they are to work in practice, it is also needed to pay close attention to national and international usability, societal needs and consumer behaviour. Another dilemma that overall must be handled at equilibrium.

**Other dilemmas:*****Research vs. teaching and public sector consultancy***

TECH must meet the future need for candidates in the green transition area. All teaching and public sector consultation are based on research, but currently this supply is unevenly distributed among research areas at TECH.

***Focus vs. diversity***

TECH has research capacity beyond green transition and this must be balanced.

**3.3 Possible key action areas**

To support the realization of the strategic ambition the group points to three key actions areas, that TECH must address in the coming years. Each action area holds potential to become a long-term strategic goal for TECH, but further assessments of feasibility and resource allocation must be conducted before setting specific strategic goal.

**Action area I) Improved cross-/interdisciplinary research collaborations across departments and centers**

To be able to generate knowledge and balanced interdisciplinary solutions for green transition and sustainability TECH must further develop the fora, tools and culture for sharing expertise/knowledge and research ideas and projects across departments and centers, for example by supporting monodisciplinary collaborations across departments and centers.

## **Action area II) Develop current and future state of the art research capacities and infrastructure in collaboration with external stakeholders, including Living Labs<sup>4</sup>**

To reach the ambition of being a leading international and national green hub for academia, industry, and other societal stakeholders TECH must provide accessible research capacity and infrastructure that invites to collaboration with these stakeholders. A center structure like GRAIN is an example of a platform for state of the art research collaborations.

To facilitate a systemic approach to sustainable development in the circle of agriculture, industry, construction, energy, and consumption TECHs research capacity and infrastructure must accommodate needs spanning from open user-centered to closed industry-centered collaborations.

## **Action area III) Impact through dissemination, educating students/educations, public and private sector consultancy and own practise.**

TECHs contribution to solving important societal and global challenges by generating knowledge and balanced interdisciplinary solutions for green transition and sustainability creates impact through a variety of channels. Goals for creating impact through dissemination, education and consultancy activities needs to be integrated in all research activities on green transition.

## **4. Attention points for realization of the ambition**

The SWOTs on research and education points to a list of attention points from TECHs current situational status, that can be prerequisites, change drivers or red flags for working with the key actions areas and the ambition presented above. Some points are linked specifically to TECH's contribution to the green transition and others are generic potentials and barriers for changes at TECH. Below are listed the most pressing barriers and opportunities, that must be addressed to pave the way for the key action areas.

### **Barriers**

- Need of knowledge-sharing across TECH on competencies at departments and centers.
- Lack of occasions and framing for integrating knowledge and discuss across departments and centers to secure larger and more interdisciplinary problem-solving projects.

### **Opportunities**

- TECHs profile on green transition needs to be strengthened.

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<sup>4</sup> A Living Lab is a user-centered, iterative, open-innovation ecosystem, often operating in a territorial context (e.g. city, agglomeration, region or campus), integrating concurrent research and innovation processes within a public-private-people partnership.

- Defining international partners. E.g. peer networks.
- Professional support for research funding, especially for Horizon Europe calls and other large research project (e.g. Centers of Excellence). Preparing for large funding opportunities regarding green transition, nationally as well as internationally.
- Mapping educational activities across TECH and defining goals for developing the education portfolio and teaching methods of TECH. E.g. MOOCs<sup>5</sup>
- Develop opportunities for flexible location and exchange of staff among departments and centers.

## 5. Process plan for contributing to the green transition

Based on the key action areas and the attention points a prioritized list of actions is presented below :

- 1) Faculty management decide on Tech strategy and implementation through action plans.
- 2) Need of knowledge-sharing across TECH on competencies at departments and centers, e.g. by making visits between entities and locations easier. Synergies from matrix needs to be analyzed. Defining Tech strategic growth areas.
- 3) Joint focus on better exploiting existing data across the faculty.
- 4) Proactive TECHs profile on green transition needs to be communicated externally. E.g. through organizing webinars and hosting a yearly open conference under the title of Green Transition Days. Using the new Tech strategy for lobbying and political positioning.
- 5) Funding strategy on faculty, department and center level needs to be developed. Focus on funding for green transition research at Tech
- 6) More professional organization of the support systems across the faculty/university for taking home external funding.

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<sup>5</sup> MOOCs: Massive Open Online Courses

## 6. Composition of the focus group

Carsten Suhr Jacobsen (chair)	Department of Environmental Science
Klaus Lønne Ingvarsen (chair)	Department of Animal Science
Anders Bentien	Department of Engineering
Bent Lorentzen	NAT-TECH Administrative Centre
Hanne Lakkenborg Kristensen	Department of Food Science
Kasper Lynge	Aarhus School of Engineering
Lars Kjerulf Petersen	Department of Environmental Science
Lene Hegelund	Danish Centre for Food and Agriculture
Morten Tune Strandberg	Department of Bioscience
Peter Lund	Department of Animal Science
Torben Asp	Center for Quantitative Genetics and Genomics
Vibeke Vestergaard Nielsen	Danish Centre for Environment and Energy
Uffe Jørgensen,	Department of Agroecology
Kia Sofie Abildtrup (secretary)	Deans' Secretariat
Marie Louise Blauenfeldt (facilitator)	Mobilize Strategy Consulting