

# Land surveyor business areas in planning and realization of renewable energy plants - a Danish showcase

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**Keywords:** Land management, spatial planning, property rights, renewable energy plants, green transition, machine learning

## **SUMMARY / ABSTRACT**

The Danish government has decided that the capacity of renewable energy plants must quadruple by 2030 to approx. 40,000 ha. This must be done by expanding renewable energy facilities with wind turbines, solar parks and Power-to-X facilities.

In this transformation of the open country into an energy landscape, there is a need for land surveyor skills in both planning and realization of the renewable energy plants.

The land surveyors possess both legal, planning, surveying/mapping and geoinformatics skills, which provide a particularly broad and holistic approach to the projects.

This presentation outlines the services the Danish land surveying companies offer within this business area - renewable energy plants.

## **SUMMARY / ABSTRACT (Danish)**

**Nøgleord:** Arealforvaltning, fysisk planlægning, ejendomsrettigheder, vedvarende energianlæg, grøn omstilling, maskinstyring

Den danske regering har truffet beslutning om, at kapaciteten af vedvarende energianlæg skal firdobles inden 2030 til ca. 40.000 ha. Det skal ske ved udbygning af vedvarende energianlæg med vindmøller, solcelleparker og Power-to-X-anlæg.

I denne transformation af det åbne land til et energilandskab er der behov for landinspektør kompetencer i såvel projektering som realisering af de vedvarende energianlæg.

Landinspektørerne besidder både ejendomsjuridiske, planlægnings, opmålings / kortlægnings samt geoinformatik kompetencer, som giver en særlig bred og helhedsorienteret indgang i projekterne.

Dette oplæg outlines de ydelser de danske landinspektørvirksomheder tilbyder indenfor dette forretningsområde – vedvarende energianlæg.

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## **1. INTRODUCTION**

The Danish government has decided that the capacity of renewable energy plants must quadruple by 2030 to approx. 40,000 ha. This must be done by expanding renewable energy facilities with wind turbines, solar parks and Power-to-X facilities. This means that there must be significant changes in land use in the open country.

In this transformation of the open country into an energy landscape, there is a need for land surveyor skills in both planning and realization as well as securing the renewable energy plants – in the whole process from "bare land" to finished project.

This presentation outlines the services and competences that the Danish Land Surveying Companies offer within this business area of renewable energy plants divided into three phases - preliminary study, realization and documentation and rectification.

The presentation is based on a product map, which outlines the various phases and business areas.

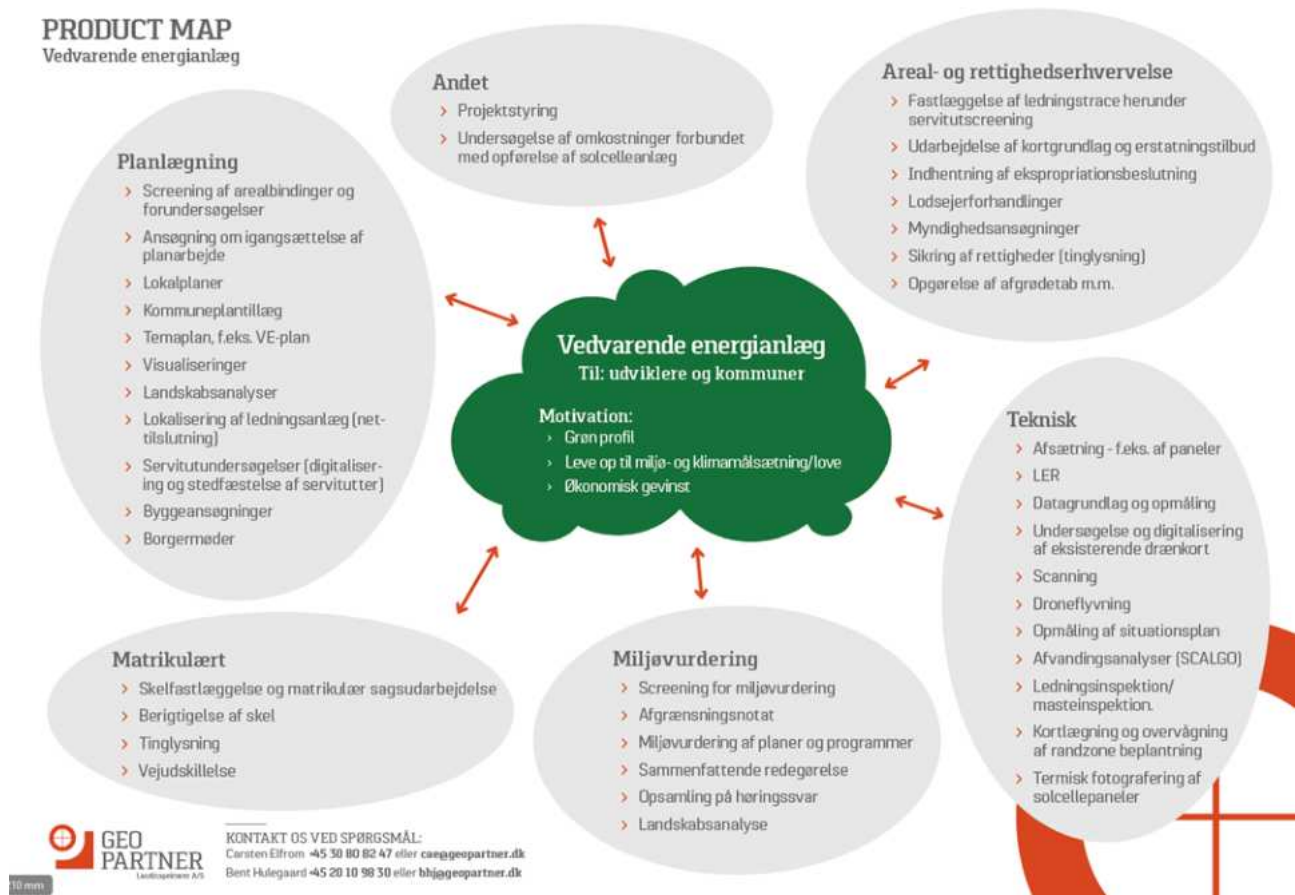


Fig. 1 – Product Map “Rene[will be translated into English]

## 2. LAND SURVEYOR COMPETENCES – DANISH CONTEXT

The Danish land surveyor education is a multidisciplinary academic university education - 3 years bachelor and 2 years master. Land surveyor science includes four different disciplines:

- Property law - cadastral works and legislation regarding use and modification of our physical surroundings
- Planning – spatial planning in the city and open country
- Surveying and mapping – surveying methods, data processing and map projections
- Geoinformatics - collection, refinement, processing, analysis, interpretation and dissemination of geographical information

The education is offered by Aalborg University, which bases the education on a problem-based learning model, where you work in groups with your fellow students, and identify, analyse, formulate and solve problems from real life. The model strengthens the students' holistic and solution-oriented competences.

### **3. PRODUCTS - RENEWABLE ENERGY PLANT**

When changes are to take place in the landscape, rights, interests, the landscape's potential and topography, public and private law bindings, etc. has to be taken into account, and it includes significant preparatory works - to this comes a significant advisory task in relation to finding sustainable solutions.

#### **3.1 Preliminary study / investigation**

The preliminary investigation includes both property legal and technical works.

##### 3.1.1 Property legal preliminary studies

- Property screening – rights (ownership, mortgage and easement rights) and obligations (legislation, planning)
- Cadastral conditions – determination of distinction

##### 3.1.2 Technical feasibility studies

- Surveying and mapping – 3D terrain model, situation plan
- Examination and digitization of cables and drains

#### **3.2 Realization**

The realization includes property legal, planning and technical works

##### 3.2.1 Property legal

- Land and rights acquisition – purchase agreements, deeds, leases, easement rights, liens, property design
- Dispensations, permits – legislation, planning frameworks etc.

##### 3.2.2 Planning

- Preparation of planning basis – municipal plan supplement, local plan

### 3.2.4 Technical works:

- Sales - machine control data (terrain modelling), sales for installation of technical equipment

## **3.3 Documentation and rectification**

Documentation and rectification include property legal and technical works

### 3.3.1 Property legal

- Cadastral rectification – demarcation of boundaries
- Registration of rights
- Reporting of line data to LER

### 3.3.2 Technical

- Measurement of RE plants – as build, reporting to authorities

*[to be continued and fulfilled when product map has been translated]*

## **REFERENCES**

## **BIOGRAPHICAL NOTES**

## **CONTACTS**

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