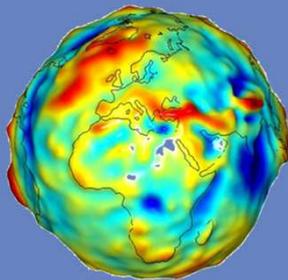


Transforming the Energy System in Germany

About the Role of the Surveyor in Dealing with Climate Change



Dr. Frank Friesecke

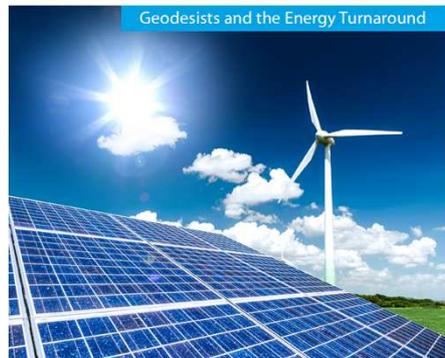
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The Role of the Surveyor in Dealing with Climate Change Table of Contents

- Climate Change in Germany
- Germany's Climate Policy
- Combating Climate Change – Measurable Contribution of a Surveyor
- Conclusion and Future Directions



Geodesists and the Energy Turnaround



Dr. Frank Friesecke
Chair of FIG Working Group 8.1
Kuala Lumpur, June 17, 2014

Climate Change in Germany

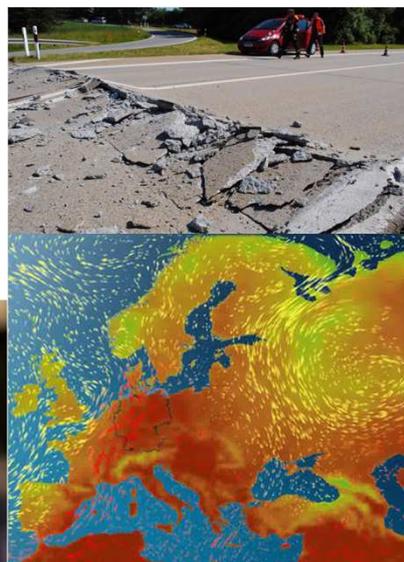


Climate Change in Germany

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Heat waves

- Mean annual temperatures have risen by 0,9 °C since 1901
- Temperature increase is 1,5 °C in the Alps
- Reduced snow cover in the Alps



Climate Change in Germany

Floodings

- High temperatures and floods cause problems
- Latest flooding in Southern and Eastern Germany in May and June 2013
- It caused a loss of more than 12bn Euro



Climate Change in Germany

Hailstorms

- Massive Hailstorms in Southern and Eastern Germany in July 2013
- Trees were uprooted
- Roofs and facades were uncovered
- Cars were damaged
- It caused a damage of several Million Euro



Germany's Climate Policy



Germany's Climate Policy

- In 2011, the Federal Government decided to phase out nuclear energy by 2022.
- Energy concept with ambitious goals until 2050 to secure a reliable, economically viable and environmentally sound energy supply:
 - Cost-efficient expansion of the renewables
 - Upgrading the grid infrastructure
 - Modernisation campaign for buildings
 - Greenhouse gas emissions are to be cut by 80 % by 2050
 - Renewable energies currently account for 12 % of the total energy consumption
 - In 2050 they are to account 60 %



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Germany's Climate Policy

	year 2020	year 2030	year 2040	year 2050
Reduction in greenhouse gas emissions (base year: 1990)	- 40 %	- 55 %	- 70 %	- 80 %
Share of renewable energies in total final energy consumption	18 %	30 %	45 %	60 %
Share of renewable energies in electricity consumption	35 %	50 %	65 %	80 %
Reduction of primary energy consumption (base year: 2008)	- 20 %			- 50 %
Reduction of electricity consumption (base year: 2008)	- 10 %			- 25 %
Reduction of final energy consumption in the transport sector (base year: 2008)	- 10 %			- 40 %

→ Germany wants to become one of the most energy-efficient and greenest economies in the world.

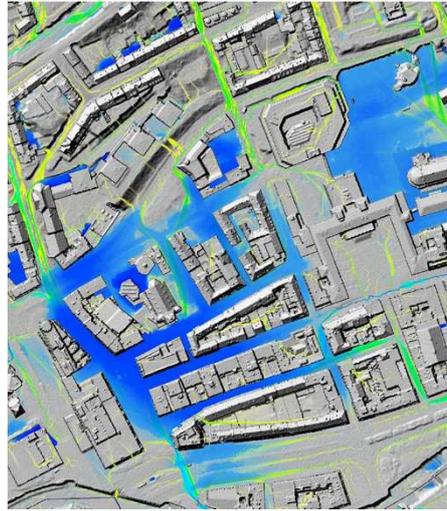
Combating Climate Change – Measurable Contribution of a Surveyor



Climate Change – Measurable Contribution of Surveyors

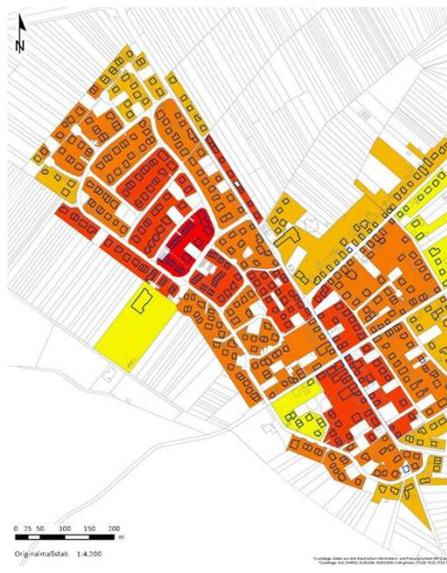
...in the fields of geodesy, geoinformation and land management

1. No surveyors, no **geodata!**
2. Renewable Energy: Determine and evaluate regional potentials
3. Decentralised energy generation: Keeping track with the help of **geoinformation systems**
4. Earth from above: The energy turnaround and **earth observation**
5. No energy turnaround without **geodetic measuring procedures**
6. Sustainable **land management**
7. My home, my land, my wind turbine: The energy turnaround and **property valuation**
8. Transparency and **public participation**



1. Provision and Assessment of Geodata

- Geo-information is an important **decision base** for energy-related issues:
 - Are **environmental risks** such as earthquakes, floods or landslides expected in the region?
 - In which areas is it possible to **use geothermal energy**?
 - Which areas are suitable for **wind power** priority zones?
 - Which roofs are suitable for the production of **solar energy**?
 - What property areas are affected?
 - How can networks be optimally adapted for the **transport of energy** under various requirements?
- Objective basis for spatial decisions related to the energy transition



2. Regional Potentials for Renewable Energy

- Regional potentials can be identified with the help of geo-information:
- What **locations** qualify for the **construction of decentralised energy systems** due to their topography, available roof areas or the framework of planning regulations they are subject to?
- Do the average wind force or the expected sunshine duration allow for a **profitable operation** of the decentralised energy systems?
- Is there enough **space** available in the catchment area to grow renewable resources for the operation of biomass power plants?
- Is the required **traffic infrastructure** available for the construction and operation of the facility or is there a connection to the electric power grid to enable the transport of the energy generated?



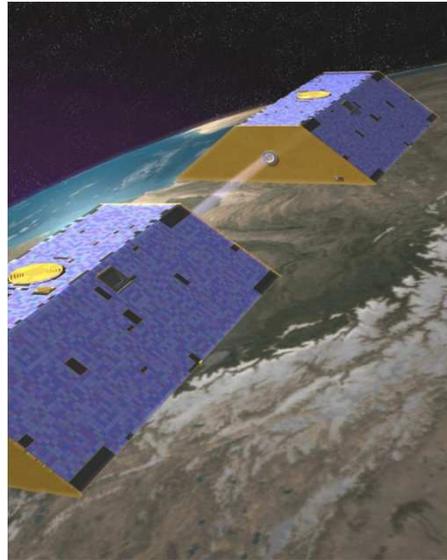
3. Decentralised Energy Systems: Keeping track with the help of GIS

- Decentralised energy systems are of high economic value
- Life expectancy of more than 20 years
- GIS documents the four stages of the life cycle of a plant:
 - I. Planning process: simulation and construction of approval documents
 - II. Construction phase: optimize and support
 - III. Operations and maintenance phase: efficient coordination of maintainance and monitoring of geometry
 - IV. GIS also supports the controlled demolition



4. Earth Observation

- Continuous change of the world's climate
- Dramatic changes also in regional and local scales
- Do they represent the increasing human intervention in climate processes or are they part of a natural variability?
- Are we able to influence this in the context of an appropriate climate and environmental policy?
- **Geodesy** plays an important role in measurement, evaluation and analysis of data
- **Geodetic sensors** are deployed in space and on the earth's surface
- **Surveyors work interdisciplinary** with meteorologists, oceanographers, geographers and geophysicists.



5. Geodetic Measurement Methods

- Non-contact measurement methods via **laser scanning** to analyse the potential of roofs for photovoltaic
- **Tachymeter data and GPS** provide reliable information on possible deformations or periodic behaviour of buildings
- Geodetic applications relate to engineering structures or natural objects that need to be monitored
- Laser scanner aerial survey, stereo image analysis, tachymeter data and **3D modeling** support the transition to renewable energy
- Surveyors make a significant contribution to a decentralized and sustainable energy landscape.



6. Sustainable Land Management

- Groundbreaking geodetic research on the four land administration functions (i.g. ENEMARK, MAGEL, WILLIAMSON)
- All functions must be built on core cadastral knowledge!

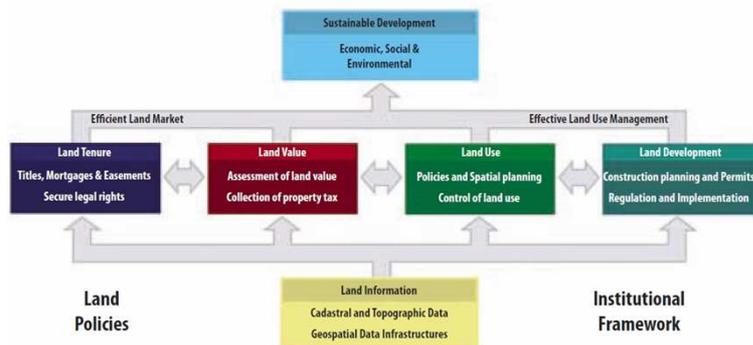


Figure: A Global Land Administration Perspective (Enemark, 2004)

6. Sustainable Land Management

Climate protection goals are determined on international and national level

Regions, cities and municipalities have to implement these goals

Rural area provides contribution to the energy revolution with areas for wind energy, water power, photovoltaic and biogas

In **metropolitan** and rural areas exists diverse task fields for surveyors:

- Which strategies and instruments of urban and rural development are available for a successful realization of the energy turnaround?
- How can the most suitable locations and areas for the use of renewable energy be developed?



7. Energy Transition and Land Valuation

For valuation, Surveyors provide information about the concerned object

Exact values are calculated from various data

The role of energy is increasingly important in the valuation of properties:

- How periodic flood events or solar panels on a building roof affect the plot value?
- What is the impact of wind turbines on the market value of developed parcels?
- How is the market value of an agricultural property with a bio gas facility to be determined?
- Do planning regulations for wind power facilities have positive (possibility to build) or negative (interferences due to close proximity) effects on property values?



8. Public Participation

- Fundamental principle of our democracy
- Key factor of success of open and transparent planning methods
- Tailored form of cooperation and participation can be chosen or developed for every individual case
- Initiated offers of participation have to be stabilized
- Legal modifications and adjustments have to be checked for the warranty of early participation in planning and approval procedures
- Procedures of civic involvement relating to the expansion of renewable energy, require the special knowledge and skills that surveyors possess due to their professional education and practice.



8. Public Participation in Urban Renewal Processes

How Public Participation Can Succeed!

- Choosing **the right moment**: PP should take early enough to have an influence on as many basic conditions as possible.
- Choosing **the right form of participation**
- Defining **the interfaces with politics**
- Compiling **a time-table**, securing financing
- **Disclosing influence**: All involved parties have to be clear about what influence on the result they have and who will make decisions within the participation process.
- **Implementing immediate measures**
- **Documenting and evaluating the participation process**



8. Stakeholder Involvement in Urban Renewal Processes

Stakeholder:

- Federal Government / State / City
- Owner
- Redevelopment Agency
- Office for historic monuments
- Energy Consultant
- Tax office



Conclusion and Future Directions



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Conclusion and Future Directions

Surveyors provide with their diverse competences measurable solutions for a successful implementation of the energy transition:

- They **involve citizens in planning processes** to find solutions in close consultation with all stakeholders.
- They **capture, actualize, manage, analyze and visualize spatial information** by network expansion for the energy supply using a GIS.
- They **monitor local, regional and global changes** of the earth with the help of modern satellite technology, digital remote sensing sensors or automated instruments such as tachymeter.
- They **develop and implement high-precision measurement techniques** to support Government and municipalities during disasters and energy management as well as in monitoring the necessary industrial infrastructure.
- They **verify properties and property rights** of the citizens which are affected by planning.
- They **draw attention to problems, options and solutions in planning** and with land restructuring strategies as well as to the instruments of land management in energy transition projects.



The German Interest Group Geodesy ...

1. takes the initiative in starting an intensive dialogue with decision makers and participants of the energy turnaround,
2. offers its services as a partner and consultant in the successful design and implementation of the energy turnaround to the Federal Government,
3. calls upon the political, administrative and economic decision makers to draw on the surveyors' expertise when taking decisions and implementing measures with regard to the new energy policy.



Geodesists and the Energy Turnaround



The German Marketing Campaign



Geodäten gestalten die Energiewende –
flächendeckend und wegweisend

Energiewende
**Präzision.
Expertise.
Geodäten**

 www.arbeitsplatz-erde.de/energiewende   

The International Perspective

FIG Task Force on Surveyors and the Climate Change

Chair: Dr. John Hannah (New Zealand)

Terms of References

- To identify and investigate specific areas where surveyors have the professional expertise to contribute to studies related to climate change,
- To identify how and where surveyors can partner with other global agencies (e.g. FAO, UN-HABITAT, World Bank) in developing sustainable solutions to problems arising from climate change,
- Where appropriate, to comment from a climate change needs perspective on the development of future global monitoring systems.



Source: blogs.scientificamerican.com

Thank you for your attention!

