Integrating solar potential into urban web-based decision support

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Urban planning has to bridge a number of disciplines as city development attempts to reach ambitious carbon reduction goals. Numerous tools are available to help urban planners assess the CO_2 impact of various options. But most lack integration into spatial data infrastructures and the information and communication strategy of cities. Such a linkage would add considerable value, helping build a more complete picture of a city's energy balance.

This presentation will describe a new approach to integrate renewable energy and energy demand, creating a new data layer for the urban planning process. Photovoltaic (PV) panels represent one of the most promising technologies for generating energy in cities. Therefore, we have developed a solar cadastre module as part of the framework of an integrated Geospatial Urban Energy information decision Support System (iGUESS). iGUESS is currently being developed as part of an EU project (http://www.themusicproject.eu) working toward reducing CO_2 emissions in five European cities.

The tool, built on Free and Open Source components such as GRASS GIS and PyWPS, computes solar irradiation per building and per roof segment taking cloud cover, shadowing effects, and roof geometry into account. Input data includes the surface area, building footprints, and meteorological data sets, such as long-term cloud cover. The resulting data is then fed into a web-based decision support system where an assessment based on further parameters, such as PV panel technology and the related costs can be carried out. One typical scenario would be the calculation of electricity production (or equivalent CO_2 savings) of PV panels that could be installed for a fixed budget in a given urban area based on the analysis of the most valuable rooftops. This scenario could be then combined with the outputs of modules dealing with other renewable energies (such as wind and geothermal) to estimate an overall CO_2 saving potential for the area under investigation.

We are building a web-based platform providing access to distributed data sources and integrating spatial modelling tools for assessment and comparison of different renewable energy potentials such as for solar, wind, geothermal, and biomass sources. All data and links between components are using the standardised web services specified by the Open Geospatial Consortium (OGC).

The presentation will focus on the implementation of the solar cadastre module, and the use of the resulting data in a decision support system to aid in the urban planning process.