

# Summary

## ENERGY AND SPATIAL DEVELOPMENT

Due to aspects like rising energy demand, shortage of fossil fuels, challenges regarding climate protection as well as aspects of energy policy, future energy supply systems require an enhanced use of renewable energy carriers. The use of renewable energies implies a partly more regionalised energy provision, which results in the need of an intensified spatial planning. Referring to the currently used renewable energy carriers in Austria like biomass, geothermal, photovoltaic or wind it can be assumed that with the implementation of defined objectives also wide-ranging spatial consequences are involved.

The focus of this ÖROK-project „Energy and spatial Development” lies on the thematically and content wise connection of the dimensions “space” and “energy” as well as on the presentation of spatial impacts by the use of renewable energy carriers. Within this project an integrative and Austria wide approach is developed for the first time, which allows for the cartographical visualisation of spatially differentiated potentials of different renewable energy carriers in a systematized and comparable way for entire Austria. Furthermore an overview on corresponding spatial planning instruments and their influence on utilisable potentials of renewable energy carriers are presented. With this a basis of strategic decision making is available for further planning in the energy sector, which amongst others allows for a regional prioritization of the respective energy carrier within planning programs.

Based on a brief account of selected relevant literature and data essentials on the single energy carriers the potentials of renewable energy carriers are modelled systematically and spatially differentiated and visualised both cartographically and as charts. The modelling of energetic potentials includes the renewable energy carriers solar, water, wind, biomass, ambient heat, hydrothermal geothermal energy and near surface geothermal energy and is carried out by using a top-down approach. This approach is based on theoretically available potentials of the single energy carriers, which is described as the energetic potentials considered by physical aspects and determined by local conditions. Thereafter a reduction of the theoretical potentials to technically

available potentials is carried out, whereby solely technological factors are used. After that restricted technical potentials and scenarios are modelled. For this reduction selected assumptions on basic conditions and restrictions of the single energy carriers are utilised, whereby adjusted to the particular energy carrier and to regional conditions also further political-social and economic restrictions e. g. acceptance or costs have to be considered. For the determination of the restricted technical potentials and the scenarios results of the expert-workshop, which was carried out in cooperation with the ÖROK office and where the general framework and restrictions for the restricted technical potentials and scenarios were discussed, are integrated. Due to the graphical and Austria-wide comparable illustrations of the potentials, also spatial impacts and the specific demand of land for the single energy carriers come into view. The estimation of the potentials for the single energy carriers is carried out with methods of applied geoinformatics, whereby a cartographic visualisation of the outcomes on different scales is enabled. The results of the modelling of potentials are visualised adjusted to specifics of the respective energy carrier, either on province level or optionally on district level – according to the circumstances.

In the framework of this project supporting and framework providing options of regional/spatial planning and its instruments are analysed and suggestions for potential related strategies and measures within regional/spatial planning are developed for the utilisation of these potentials. The strategies and measures developed pursue the aim “support of the use of potentials from regional renewable energy”. For this an analysis of regional/spatial planning instruments and selected instruments related to spatial planning for the Austrian provinces is carried out. Additionally programs and spatial planning instruments on the national and European level as well as national and international Best Practice Examples are analysed. The strategies and measures developed are based not only on the analysis of existing instruments but also on the outcomes of the modelling of renewable energy potentials, interviews with experts and two expert workshops. Measures for spatial planning on the

support of the use of energy potentials, prepared within this project, are concentrated to different fields of strategy. Favourable spatial planning instruments for the implementation are assigned to these strategies. Simultaneously those energy carriers are accentuated, which can be influenced by the respective strategy most effectively. The institutional spatial planning can undertake versatile tasks, ranging from the provision of spatial basic information to a theoretically conceivable comprehensive, coordinating planning of energy supply. The following strategies developed within this project try to take this broad spectrum of tasks into account:

- Legal regulation of climate protection
- Spatial research
- Publication of criteria catalogues and manuals for production facilities, construction and settlement development
- Spatial regulations
- Energy concepts/Energy guiding principles/  
Energy planning
- Cooperations in the context of a functional spatial planning
- and public relations and model projects.

Alongside the promotion of renewable energy carriers, sustainable energy systems require a reduction of energy demand by measures on energy saving and the enhancement of energy efficiency. Spatial planning also has to fulfil principal tasks within this domain.