

Case studies for supporting market rollout of SDH

Initial situation

Large scale solar thermal installations are a particularly cost-effective, competitive option to generate renewable district heating. However, the implementation of such projects in Germany in urban spaces usually fails due to a tough competition about space.

The situation calls for multifunctional approaches that realize projects for climate-friendly and pollutant-free heat and generate further benefits for the cities and their communities. As there is a growing number of people – especially in urban areas – who like to grow their own food and learn more about food production and ecological lifestyles, a combination of these interests with solar heat production is promising. The movement called “urban gardening” is not only about producing fresh and healthy food but also about community building and education.

“Solar Neighborhood Greenhouses” combine ground-mounted solar thermal heat plants with urban gardening in greenhouses. While the heat produced can be fed into an existing local heating network or delivered to a large heat consumer, the greenhouses provide new possibilities for the respective neighborhoods.



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Objectives

The Solar Neighborhood Greenhouses aim at building social and ecological infrastructures: The sustainable, cost-effective and communal self-supply with fresh food ("urban gardening") is combined with new technologies to generate renewable heat.

This case study shall give a first technological, economic and legal analysis of "Solar Neighborhood Greenhouses". Connections to relevant stakeholders shall be made. Moreover, it will evaluate two locations in the City of Hamburg that could be possible sites for such a project.

The results of the case study shall be the basis to approach necessary partners like the City of Hamburg, heat suppliers, housing companies and others.

Measures and actions

The case study examines the technological, economic and legal feasibility of the concept in German cities. This will happen in close contact to possible stakeholders like urban gardening initiatives, solar thermal installation companies or greenhouse construction companies.

Furthermore two possible sites in the City of Hamburg will be evaluated:

Hamburg-Altona/Eimsbüttel

In the district of Altona and Eimsbüttel an innovative and sustainable project is planned to protect citizens from motorway noise. In course of the expansion of motorway A7 by two lanes the entire motorway will be covered by overground tunnels. The gained space shall be used for new parks and small urban gardens. Beyond the additional quality of life in the area, quarters will be reconnected that were once divided by the construction of the motorway.

Solar Neighborhood Greenhouses would be an innovative solution for small urban gardens on the tunnel. The case study will investigate if and how a realization is possible. An analysis of the relevant stakeholder, potential partners and heat customers will be followed by presenting the idea to the authorities of the city.



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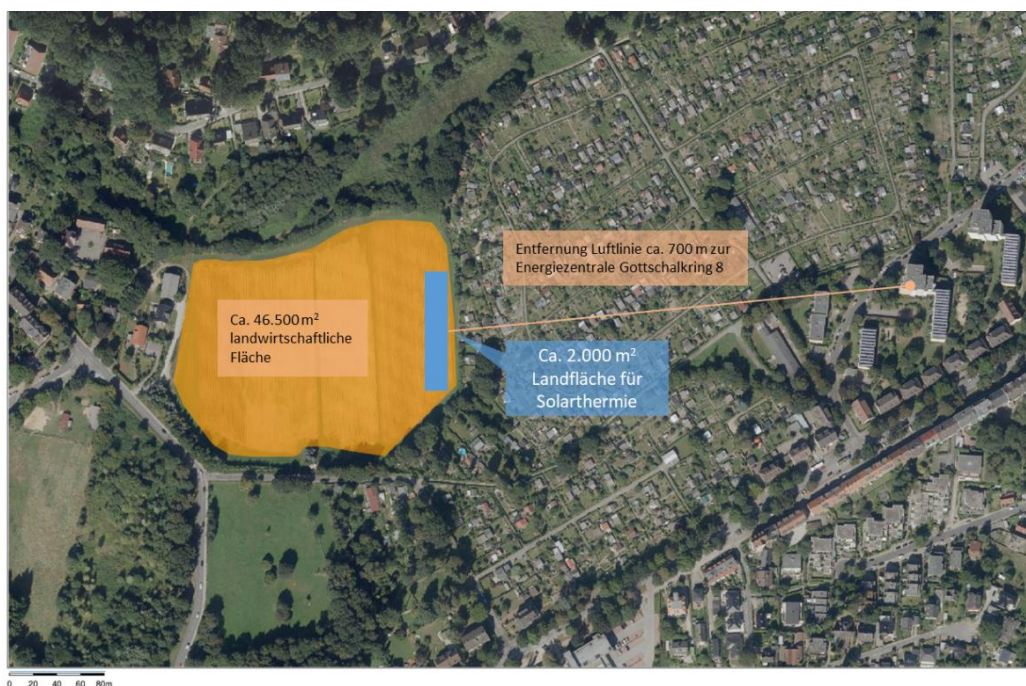


(Source: <http://www.hamburg.de/fernstrassen/a7-deckel/>)

Hamburg-Harburg

In the district of Harburg a recent concept for the sustainable development ("Integriertes Quartierskonzept") of the neighborhood "Südöstliches Eißendorf/Bremer Straße" has examined the possibility of integrating solar thermal heat into the district heating grid of a local housing cooperative. It proposed two possible locations which would be suitable for a groundmounted solar thermal heat plant. Today, the respective locations are used for strawberry farming and allotment gardens.

The case study shall analyse the possibility of Solar Neighborhood Greenhouses by screening the possible areas. The results shall be presented to the housing cooperative and the landowners.



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Barriers and opportunities

Solar Neighborhood Greenhouses provide many opportunities as an integrated solution to cover the inhabitants' basic needs for energy, food and community. During the course of the case study discussions with an urban gardening initiative, a solar thermal installation company and a greenhouse construction company led to a generally positive feedback. Both from the urban gardening perspective and the solar thermal perspective the concept was considered to be feasible.

Still, barriers for realisation remain. Whilst giving a promising perspective for urban multifunctional land use, stakeholders and decision makers have to be convinced. Moreover, in a lot of cases development plans would have to be changed to realise Solar Neighborhood Greenhouses. And finally, financing of the greenhouses and the urban gardening project needs a more thorough analysis.

Results

The case study could show that the Solar Neighborhood Greenhouses are feasible for both solar thermal heat production and urban gardening use.

There are no major technological challenges for the realisation of the concept as the technologies are available on the market. The greenhouses and the racks for the solar thermal collectors would need special constructions but no new technologies.

Economically, investment costs for solar thermal installations are only slightly higher than for regular ground-mounted solar thermal heat plants as the racks need special construction. They would be about twice as expensive as standard solutions. On the other hand the racks only account for roughly 10% of the investment costs. Therefore heat production costs can be competitive. The investment costs for the greenhouses and running costs of the urban gardening project would have to be financed through different channels. Funding from user fees, urban development funds, research funds and donations can be acquired.

From a legal perspective Solar Neighborhood Greenhouses in the city would make local changes in the development plans necessary. On the edge of the cities greenhouse constructions without changes in the development plans are possible as they are agricultural infrastructure.

Of the two locations examined in this case study, the location in the district of Harburg appeared to be more promising than the location in the districts of Altona and Eimsbüttel. In Altona and Eimsbüttel the planning process for the area on the noise protecting tunnel is quite advanced. A change in the current plan that would leave enough space for a considerable heat production seems challenging at this point in time. In Harburg however, the areas are considered feasible for a partial use for Solar Neighborhood Greenhouses.



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Lessons learned

The case study for Solar Neighborhood Greenhouses was able to show that stakeholders from different fields are open towards new solutions for the land use competition in the urban environment.

While the results of the case study are assuring, new challenges will have to be overcome in the development of Solar Neighborhood Greenhouses. A project of this kind makes an integrated approach necessary that involves urban gardening initiatives, heat suppliers, housing companies and decision makers from the beginning. Even more than in other energy projects, only an open and community-driven process can lead to the successful realisation.

Furthermore, as the conditions and the goals differ in every location and in every group of "urban gardeners" there cannot be one kind of Solar Neighborhood Greenhouses for all projects but unique solutions that follow the same idea.

Finally, it became clear in the discussions with the stakeholders from the agricultural sector and greenhouse constructors that the combination between solar thermal collectors and greenhouses is most promising in the urban gardening context. For professional farmers further monetary benefits would be needed to make up for possible shades in the greenhouse. Concepts like Agro-PV (<http://www.agrophotovoltaik.de/english/agrophotovoltaics/>) should be considered for solar thermal heat plants.

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