Best practice guide for SDH land areas development

Subject:	Best-Practice Policy to improve the regional policy and legal framework
Description:	Best-practice guide and policy recommendations for SDH land area development and double usage of space
Date:	09.06.2017
Authors:	Simona Weisleder and Christian Maaß, Hamburg Institut
Document download:	www.solar-district-heating.eu/

Summary description of the instrument

Region: Metropolitan Region of Hamburg

Partners involved: HIR Hamburg Institut Research

Short description of the measure: Scarcity of areas is a major barrier to implement SDH in urban areas. To overcome these barriers policy instruments are needed to facilitate the usage of urban areas for SDH and for double usages– in parallel and on the same space – with other purposes. The best practice guide points out possibilities to develop SDH areas and double usages of urban areas with best practice examples. On this basis, recommendations for policy instruments to facilitate such solutions are developed.

Initial situation

The Metropolitan Region of Hamburg is an area located in northern Germany with ca. 5 million inhabitants and comprises 28.500 km2 in four states (Hamburg, Schleswig-Holstein, Niedersachsen, Mecklenburg-Vorpommern).

There are numerous DH networks in all four states of the Metropolitan area, the largest located in the City of Hamburg with more than 400.000 housing unit equivalents connected .

The Metropolitan region is economically prospering and has continiously growing population, leading to massive development of real estate for housing and for commercial purposes.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

Fig. 1: Administrative districts of the federal states Hamburg, Schleswig-Holstein, Lower Saxony and Mecklenburg-West Pomerania in the Hamburg Metropolitan Region (Source: Metropolregion Hamburg)

The City of Hamburg has been a forerunner to establish SDH, with projects like Solarsiedlung Bramfeld (Karlshöhe), HafenCity West, the Bavaria quarter and the Energiebunker Wilhelmsburg. However, the share of RES in DH, and in particular the share of SDH, is still neglectable.

The development of SDH projects often fails due to a lack of space. In densely populated urban areas like the Hamburg Metropolitan Region, space is needed for many other competing purposes like housing, traffic infrastructure, industry and commerce, nature conservation or - in the rural parts of the region - for agriculture. Under these circumstances, urban planners have been reluctant to allocate space for SDH as such and it facilitates the implementation of SDH if scarce areas can be used in parallel for other purposes.

Examples of such double space usage are rare and only partially found not in the Metropolitan Region of Hamburg. SDH land area development and double usage of areas for SDH and other purposes is so far hardly addressed in national or regional planning law or other policy instruments. Examples from many regions in the EU show that solutions for SDH land development and for parallel land use through SDH and other purposes can be found. To explore the potentials for such land area development in favor of SDH is one of the key measures identified in the in the SDHp2m strategic action plan of the Metropolitan Region of Hamburg.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

Best practice guide for SDH land areas development

Objectives

The SDHp2m strategic action plan for the Metropolitan Region of Hamburg points out five relevant categories for land area development and double usage of space for SDH and other purposes:

1) Development of large scale roof areas for SDH
2) Development of polluted or contaminated areas for SDH
3) Development of areas along traffic routes for SDH
4) Development of agricultural areas for SDH
5) Development of double utilization for nature preservation and SDH

The goal here is to identify best practise examples for SDH projects from across the EU, to identify possible opportunities for equivalent projects in the Hamburg Metropolitan Region and to develop policy instruments that foster the development of SDH projects in these respective areas.

Measures and actions

In a first step, best practise examples for the different development areas are sought and analysed.

Secondly, we analyse if, where and how these examples could be transferred to the situation in the Hamburg region; concrete possibilities for project development in the region are examined as pre-case studies.

In a third and final step, it is analysed what policy options there are to facilitate the land development in the examined fields.

Barriers and opportunities

1) Development of large scale roof areas for SDH

- Best practise examples

There are numerous examples across Europe – and also in the City of Hamburg - of large SDH-plants on rooftops. These examples will be looked at closely in the best practise guide. Among the examples abroad are – for instance - plants on commercial roofs in Wels (Austria)[1] or in Switzerland.[2] In the Hamburg regions, plants on rooftops of residential and commercial buildings in the HafenCity (West) and the on the premises of former brewery Bavaria can be mentioned – both on the basis of a state law that allowed the establishment of legally binding regulations for real estate developers to provide a minimum share of heat with RES. The Energy

[1] http://ritter-xl-solar.com/en/applications/district-heating/wels-austria/
[2] http://ritter-xl-solar.com/ueber-uns/news/news-details/article/sonnenwaerme-fuer-die-produktion/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

Bunker[3] in Hamburg Wilhelmsburg is another well-known best practice example and starting point of a new installed SDH grid in an existing district.

- Transferability to the Hamburg region

The existing examples from the City of Hamburg show that SDH plants can successfully be operated on rooftops and that the states have the legal possibilities to establish a regional framework to make SDH on rooftops a mandatory part of real estate development. However, there are still many barriers that keep municipalities from implementing such legal measures: In particular, SDH on rooftops is – in comparison to DH based on fossil fuels, ground mounted SDH or compared to individual heating with natural gas or oil – relatively costly. If SDH is planned on very large rooftops before construction with an integrated solar-friendly building design, these costs can be lowered significantly. Depending on public funding, SDH could be cost competitive with other heating solutions, it could therefore be a promising approach to take advantage of the ongoing construction of many large commercial buildings in the Metropolitan Region. Another obstacle to overcome is yet a competition with PV on rooftops. So far, the economic benefits to run a large rooftop PV plant are often higher than to run an SDH plant, while the technical and legal barriers for rooftop SDH are higher than for PV.

- Policy instruments

The study will analyse possible legal and policy instruments to improve prospects for SDH on new large commercial rooftops. In particular, it will be looked at legal options to establish a state regulation in the states' building codes that require developers of large commercial buildings (e.g. with roof surface areas above 1.000 sq meters) to harvest solar energy or at least to construct the building in a way that allow later construction of solar appliances without major construction work.

2) Development of polluted or contaminated areas for SDH

- Best practise examples

There are some best practice examples of SDH on polluted or contaminated areas in Germany as the last year build plant in Senftenberg[4]. In August, 2016 on a recultivated landfill site in the town Senftenberg the up to now biggest solar thermal plant of Germany went into operation. With 8,300 m² collector area is it at the same time one of the biggest divices with vacuum tube collectors world wide and the first real tall divice in Germany which feeds into a classical urban district heating grid.

[3] http://www.iba-hamburg.de/en/projects/energiebunker/projekt/energy-bunker.html
[4] http://ritter-xl-solar.com/en/applications/district-heating/senftenberg-ger/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

In the City of Hamburg we have up to now only one comparable example with a PV-installation of 5,000 m² on the Energy Hill[5]. The Georgswerder landfill site has been transformed into a renewable energy hill as part of the Internationale Bauausstellung IBA Hamburg (International Building Exhibition). It supplies around 4,000 households with electricity using wind power and solar energy alone, and is being made accessible to the public as a view point.

- Transferability to the Hamburg region

Hamburg has significant potentials due to large areas that are used to store contaminated sludge from the river Elbe. There are several „sludge mountains“ existing or under construction e.g. in Francop, Feldhofe and in Altenwerder/Moorburg.

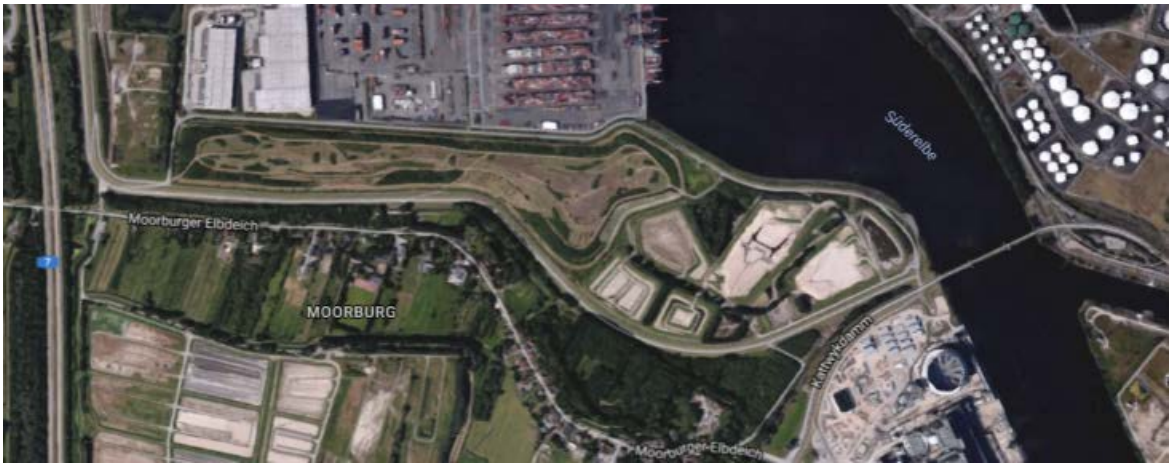

Fig. 2: Potential area on a ‘sludge mountain’ in the harbour of Hamburg-Altenwerder (Source: google maps)

A broad estimate for the Altenwerder site concludes that 40.000 square meter collector area with 28 MW peak load could be possible. For all sites; the main barriers are the lacking connection to a grid. In addition, it is legally challenging to alter the permit for the sites in a way that allows SDH.

An opportunity can be seen in the development of large new residential area Oberbillwerder, which is in four to five km distance to the sludge mountain of Feldhofe. Equivalently, housing development plans for the quarter of Finkenwerder with plans for a new DH system based on RES could be a good opportunity to develop SDH on the nearby sludge mountain of Francop.

- Policy instruments

It will be analysed if legal procedures for the development of SDH on existing contaminated areas or on sludge mountains can be simplified.

[5] http://www.iba-hamburg.de/en/projects/energieberg-georgswerder/projekt/energy-hill-georgswerder.html

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

3) Development of areas along traffic routes for SDH

- Best practise examples

Looking at best-practice examples for SDH projects along traffic routes the EU-Life project “NOISUM”[6] evaluates this topic. The main objective of the NOISUN project is to demonstrate innovative noise barriers that produce solar energy for distribution to local district heating systems, hence an environmentally sound technology. This will be achieved by installing and evaluating specially adapted solar collectors at a major transport thoroughfare for both road traffic and rail. The project will demonstrate that the technology is a well working solution for considerably cutting noise levels from road and rail traffic in European cities, receiving a more attractive near environment, at the same time producing useful energy to the local energy network.

Another focus has the best-practice example of the plant in Crailsheim[7] where a noise reducing berm is used for the collectors. The majority of the solar panels (5,000 m²; 2,500 kWth) are installed on the southern flank of a 13 to 15 m high noise reducing berm separating the residential area from the adjacent industrial park.

- Transferability to the Hamburg region

As a logistic hub with the harbor, there are many traffic ways in and around Hamburg. In the next years in the Metropolitan Region there are several new roads in the development and under construction, e.g. motorway A 26 (Hamburg), motorway A 20 (Bad Segeberg) or the western bypass Pinneberg.

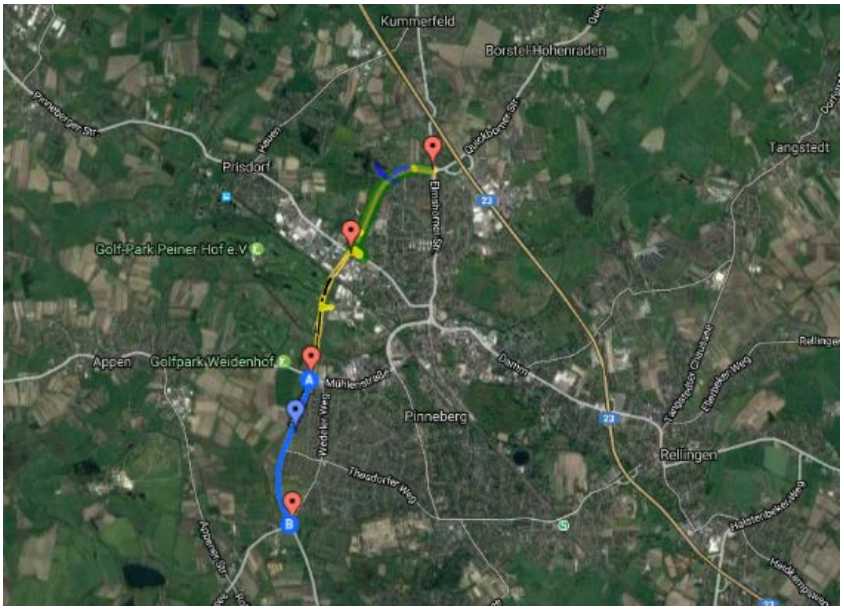

Fig. 3: Western Bypass in Pinneberg is under construction – completion until 2019 (Source: Google Maps)

[6] https://noisun.wordpress.com/in-english/the-project/

[7] http://solar-district-heating.eu/Portals/0/NewFolder/BroschüreCrailsheimEN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

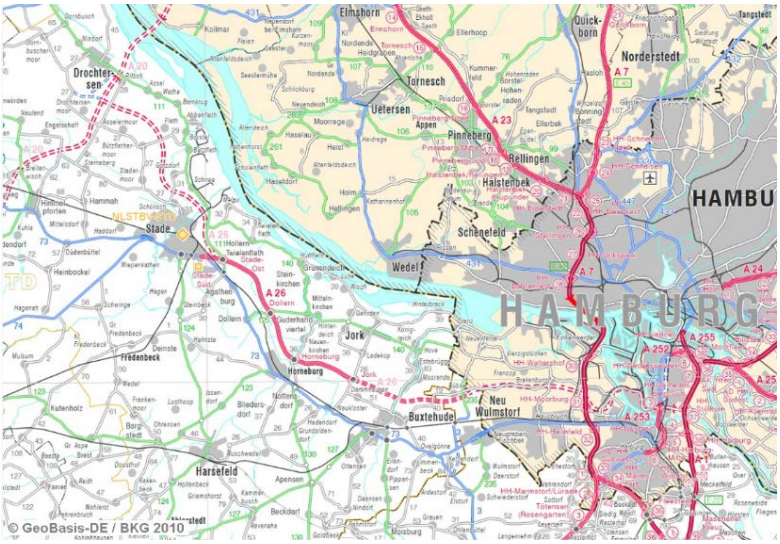

Fig. 4: The motorway A 26 connects the western region of the Metropolitan Region of Hamburg with the planned motorway A 20. – planned completion until 2022
(Source: Niedersächsische Landesbehörde für Straßenbau und Verkehr)

All these enormous trafic road constructions needs noise procteion walls or noise reducing berms, which could be used for solar thermal installations.

Barriers are often the willingness of traffic planners to integrate energy aspects and the competition with PV installations (EEG grants subsidies for plants in 100/150 m proximity of traffic infrastructure).

- Policy instruments

It will be analysed if legal procedures for the development of SDH on noise protection devices along traffic infrastructure can be simplified.

4) Development of agricultural areas for SDH

- Best practise examples

SDH plants in Denmark.

- Transferability to the Hamburg region

Danish plants are mostly built in rural areas or in the proximity of small and medium sized cities. So far, there are hardly any plants in large cities, mainly due to high prices of real estate and high competing land use pressure. The Danish examples can therefore be best transferred to the rural areas of the Hamburg Metropolitan Region. A main barrier is that there are only few DH networks in the rural areas in place. However,

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624

in some cases, particularly in the part of the Metropolitan Region that used to belong to Eastern Germany, there are DH places in small and medium sized towns.

- Policy instruments

It will be analysed if legal procedures for the development of SDH on agricultural areas can be simplified. (e.g. as solar regional planning: development of a preventive area policy for the securement of areas for SDH nearby existing district heating grids; corresponding adjustments/adoptions in the regional development plans).

5) Development of double utilization for nature preservation and SDH

- Best practise examples

Crailsheim[8] again is here one of the best-practice examples of the plant in where a noise reducing berm is used for the collectors. By integrating the large solar collection surfaces on the southern flank of the noise reducing berm into an overall ecological concept, this area has become a place with recreational value, and offers suitable habitat for many native plants and animals – a “hot spot” for many rare species is created. With these measures valuable „eco-points“ were collected and thus meant real money which made the SDH plant even more economic feasible .

- Transferability to the Hamburg region

Land area for compensation measures is very scarce. Ecologic upgrading of formerly intensively used agricultural area could become a business model for farmers. Potential for upgrading of area will be discussed with nature conservation administration.

- Policy instruments

It will be analysed if legal procedures for the development of SDH by double utilization those areas for nature preservation can be simplified (e.g. “eco account” –principle function and application in the different regions).

Results

Results will be available as soon as the measure has been implemented

Lessons learned

Lessons learned will be available as soon as the measure has been implemented

[8] http://solar-district-heating.eu/Portals/0/NewFolder/BroschüreCrailsheimEN.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691624