

# **SUPPORTING POLICY FOR SOLAR DISTRICT HEATING AS A COMPONENT OF THE THERMAL ENERGY TRANSITION IN THURINGIA**

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**Abstract** – This paper describes the supporting policy for solar district heating as a component of the thermal energy transition in Thuringia, Germany. To contribute to the internationally stated climate protection targets at local level, Thuringia is pursuing a double strategy and focussing the reduction of heat demand and the increase of heat production from renewable energies. An examination of the heat supply system, which is dominated amongst others by district heating systems, showed that the potentials of geothermal and solar thermal energies are not tapped yet. Currently, in Thuringia one pilot solar district heating plant is in operation while other projects are under examination or conception. Supporting policy for solar district heating in Thuringia has different levels: Currently the State Government is discussion and voting over a Draft Law of the Thuringian Climate Law, which could set concrete climate protection targets with respect to greenhouse gas emission reduction potentials within the heating sector. Furthermore the State Government is discussing a Draft of an Integrated Energy and Climate Strategy that contains concrete measures to tap the greenhouse gas emission reduction potentials of the heating sector in Thuringia. Additionally, several supporting services for stakeholders are or will soon be available in Thuringia, such as a Solar Calculation Tool, information handouts and a supporting service at the Thuringian Energy- and GreenTech-Agency (ThEGA).

## **1. INTRODUCTION**

Thuringia may contribute to the internationally stated climate protection targets at local level. Therefore it is necessary to promote the “Thermal Energy Transition” as an essential part of the “Energy Transition” at political level. To take advantage of the greenhouse gas emission reduction potentials the heating sectors bears for a “Thermal Energy Transition” Thuringia is pursuing a double-strategy: not only the overall heat demand should be reduced, but the share of renewable energies and efficient technologies on the heat supply should be increased as well.

## **2. SOLAR DISTRICT HEATING IN THURINGIA**

An examination showed that the regional heat supply system in Thuringia is dominated amongst by natural gas and oil boilers also by district heating systems and is rather heterogeneous. Moreover, the examination showed that in 2010 the share of renewable energies on the heat supply in Thuringia already has been significantly higher than in Germany.

An essential part of this heat from renewable energies has been supplied by biomass (about 85%), which potentials in Thuringia are nearly exploited. However, the potentials of other renewable energies, such as geothermal and solar thermal energy are not tapped yet.

Due to this, and Thuringia’s settlement structure with lots of rural areas, combining biomass and solar thermal in

district heating systems could be one promising approach to increase the share of renewable energies within the heating sector. Furthermore, Thuringia’s cities have a high share of multiple dwelling units, which often are either already connected to the cities district heating grid, or could possibly get connected to a local grid, integrating solar thermal collectors on their roof areas. Beside these two promising approaches, the Thuringian Ministry of Environment, Energy and Nature Conservation (TMUEN) is pursuing several activities to support the market roll-out of renewable energy sources and solar district heating by addressing different target groups and following different approaches. The participation as a Level A-partner within the EU Horizon 2020-project “SDHp2m” is underlining these activities.

Currently, in Thuringia one pilot solar district heating plant in Jena-Pößneck is in operation, while other solar district heating-projects are under conception and several feasibility studies concerning the integration of renewable energies within the heating system at regional level are in progress.

## **3. POLITICAL FRAMEWORK**

Already in 2014 the Thuringian Solar Thermal Initiative was founded and a funding of decentral photovoltaic and solar thermal plans as well as energy storage systems was established.

Since 2014 the Thuringian energy and climate politics concerning solar district heating has been developed further and the following key points of the regional policy

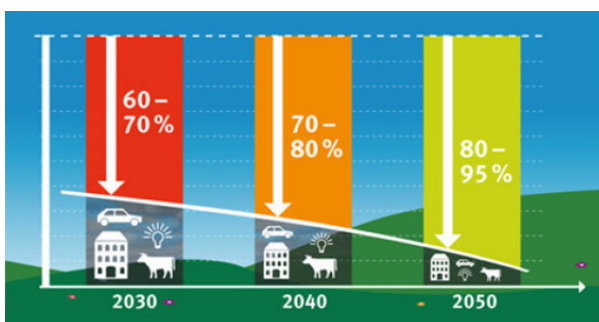
are supporting renewable energy sources and solar district heating:

### 3.1 Climate Law

In 2017 the Thuringian Ministry of Environment, Energy and Nature Conservation (TMUEN) has developed a Draft Law of the Thuringian Climate Law, which was accepted by the State Government after two interdepartmental coordination processes and finally handed over to the State Parliament for further discussion and voting over it in January 2018.

The Draft Law of the Thuringian Climate Law, which is under discussion within the State Parliament since February 2018, could build, when getting accepted by the State Parliament, an essential part of the present energy politics of Thuringia concerning renewable energy sources and solar district heating amongst others. The Draft Law of the Thuringian Climate Law is containing for example the following cornerstones:

- Reduction corridors for greenhouse gas emissions of 80 to 95% until 2050 with respect to the greenhouse gas emissions in 1990
- Reorganization of the regional energy supply system to 100% renewable energies on a yearly balance until 2040
- Role model function of public administration, especially climate neutrality for state department by 2030
- Development of regional climate concepts, heat analysis or heat concepts by municipalities
- Development of supply concepts by municipal utilities
- Transition to a climate-neutral building stock until 2050
- Climate adaption measures



**Figure 1:** Greenhouse gas emission reduction target corridors within the draft of the "Thuringian Climate Law" (base year 1990)

The Climate Law is focusing amongst others the greenhouse gas emission reduction potentials of the heating sector. These potentials of the heating sector should be tapped through cooperation with regional stakeholders:

Following the Draft Law of the "Thuringian Climate Law", municipalities could develop heat analysis and heat consumption concepts. Administrative districts and municipalities could develop or update existing climate protection concepts, which would contain aspects of heat analysis and heat consumption concepts as well. These climate protection concepts should describe, how greenhouse gas emissions could be reduced and the usage of renewable energies be extended. Furthermore, heat analysis for municipalities should contain an analysis of heat consumption and available heat sources. Heat concepts should contain measures for reducing heat demand and the expanding of renewable energies. In this manner, options for actions or concrete projects at local level might arise.

Furthermore, operators of district heating networks would have to develop concepts for their local heat supply system, to meet the targets of the transformation of the Thuringian energy supply system up to a mix of 100% renewable energies on a yearly balance until 2040. Implementation steps have to be part of these concepts, which need to be updated at the latest every ten years. District heating network operators have to publish product information for consumers (share of renewable energies) as well as information about the environmental impact (carbon dioxide emissions and primary energy factor) of their heat supply system.

Building owners, with regard to their economic conditions, would have to ensure that the particular heat demand of a building will be covered from renewable energy sources by 25% by 2030 to reach the persuaded climate neutrality of the consumption sector of existing buildings. This target might be reached through a connection to a district heating network providing more than 25% heat from renewable energy sources.

These actions should lead not only to energy savings and increasing energy efficiency within the heat supply system but to an increasing share of renewable energy sources within the heat supply system.

While the Draft Law of the Thuringian Climate Law specifies climate protection targets, it does not describe a step-to-step proceeding to meet these targets set. Therefore, the development of an Integrated Energy and Climate Strategy that will collect concrete measures is foreseen within the Draft Law of the Thuringian Climate Law.

A draft of the Integrated Energy and Climate Strategy was under development in 2017 within cooperation with regional stakeholders and experts in a broad public discussion.

### 3.2 Integrated Energy and Climate Strategy

Involving regional stakeholders and the general public, a draft of the Integrated Energy and Climate Strategy (IEKS) that will collect concrete measures to foster the

realization of the targets set within the Draft Law of the Thuringian Climate Law was under development in 2017. Within two workshop-series with experts and taking into account the general public as well as representatives of institutes and associations personally and online the draft of the Integrated Energy and Climate Strategy has been developed step-by-step.

The final draft has been handed over to the State Government for further discussion in January 2018.

Content-related, renewable energy sources district heating is taken into account here as well. The field of action „energy supply system” contains the following measures that could help to reach the climate protection target set within the Draft Law of the Thuringian Climate Law:

- Development of concepts for a CO<sub>2</sub>-neutral heat supply system for public district heating systems and transparent product information
- Support for the expansion of local heating grids with renewable energies
- Development of a Coordination Unit and Forum for Dialog concerning the Energy Transition in Thuringia
- Pilot projects for the transition of a district heating system from high temperatures to low temperatures
- Development of a strategy concerning the energy supply system stability and the integration of options for flexibility including integrated energy
- Improvement of financing conditions for the development of renewable-energy-projects, energy-efficiency-projects, combined heat and power-projects and excess heat-projects
- Pilot project for the integration of geothermal energy in hybrid systems
- Continuation and further development of the incentive Instrument SolarInvest
- Provisioning of state-owned areas for the exploitation of renewable energies

### 3.3 Financing and Funding

In Thuringia three funding programs, that complement with national funding programs concerning solar district heating directly and indirectly are already existing or under development. The funding programs GreenInvest, KlimaInvest and SolarInvest, that are addressed to different target groups due to different focusses, presently are available in Thuringia:

- Within the GreenInvest program, companies can receive funding for advice services, feasibility studies and exemplary investments in projects with renewable energies and energy efficient technologies targeting at a greenhouse gas

emission reduction with up to 80%. Obligatory condition is a pilot character of the measures.

- Within the KlimaInvest program, municipalities can receive funding for the development of greenhouse gas emission reduction or heat concepts with up to 40%. Advice services and professional trainings can be promoted with up to 80%. Furthermore, municipalities can receive a 100% funding for a 7500 € climate protection-starter package, such as initial advice services.
- Within the SolarInvest program for example municipalities, companies, housing cooperatives and citizen cooperatives can receive funding for investments in heat storage systems and correlating advice service and feasibility studies, amongst others. Citizen cooperatives can receive funding for investments in heat storage systems with up to 40%, all other target groups can receive funding with up to 20%. Advice services are supported with up to 80% funding.

Furthermore a funding program of the Thuringian Ministry of Infrastructure and Agriculture (TMIL) concerning investments in district heating systems with renewable energies in rural areas is under coordination.

## 4. TOOLS, MANUAL AND CONSULTING

Several tools, that can support stakeholders with developing and implementing renewable energy sources and solar district heating projects, are under construction:

### 4.1 Tools

In 2017 a webbased software application called Thuringian Solar Calculator has been developed and will be launched in 2018. This tool aims at an increasing generation of heat and power from solar energy in Thuringia in general. It should support different user groups, such as house owners, planners, municipalities or companies to exploit the potentials of solar energy by identifying potential areas for installing solar thermal collectors or photovoltaic modules on any roof or open area in Thuringia. Identification of potential areas for the exploitation of the potentials of solar energy contains calculations of the yield and the economics of possible solar energy plants in Thuringia.

Concerning solar district heating, beside roof areas also any open area in Thuringia can be chosen for calculations by marking a certain polygon-shaped area manually. The allocation of this area with solar thermal collectors runs automatically but adjustments such as adding, removing or shifting collector modules can be taken into account. Also the type of solar thermal collectors (flat plate or vacuum tube collector) can be chosen for calculations.

Solar yield and costs for investing are calculated and results can be printed and saved as PDF-document.

A detailed concept for public relation activities in May and June 2018 has been developed in cooperation with the Thuringian Energy- and GreenTech Agency (ThEGA) to inform potential users as well as multipliers about the implementation of the “Thuringian Solar Calculator”. This concept includes for example the offer of information events and workshops, the printing of leaflets and brochures and the presentation of the “Thuringian Solar Calculator” online and at fairs.

Furthermore it is important to support stakeholders with the usage of the “Thuringian Solar Calculator”. On this account, the “Thuringian Solar Calculator” will be linked to the “Servicestelle Solar” (Solar Service Center) at the Thuringian Energy- and GreenTech Agency (ThEGA), which offers practically oriented consulting e.g. for municipalities, citizen and companies concerning the identification of potential areas for implementing solar thermal and photovoltaic plants, correlating business models and subsidy possibilities.

Furthermore, a webbased waste heat cadaster for Thuringia has been launched in May 2017, where possible sources of excess heat are listed and located. This tool should foster the integration of excess heat in the heat supply system and could build a further starting point for renewable energy district heating.

Finally, a webbased system for heat energy analysis of quarters is currently under development and will be a helpful tool for municipalities, planners or municipal utilities to analyse the local heat demand and identify local renewable energy sources for heating by comparing economic aspects of different technical solutions.

#### 4.2 Manual “Future Sun!”

The brochure “Future Sun!” was developed with regional stakeholders and experts and is available online and printed. It contains a question-answer-catalogue as well as three case studies concerning solar district heating and can give interested stakeholders an overview on technical, organizational and juridical aspects of solar district heating.

#### 4.3 Consulting

Beside information material such as the manual “Future Sun!”, also consulting service dealing with renewable energies is available in Thuringia:

The Thuringian Energy- and GreenTech-Agency (ThEGA) builds the point-of-contact for technical questions related to energy and climate topics in Thuringia. Stakeholders can receive consulting and further information in topic-related workshops and

events. So, the Thuringian Energy- and GreenTech-Agency (ThEGA) is supporting and connecting stakeholders.

For example, the Thuringian Energy- and GreenTech-Agency (ThEGA) is offering an advice service for representatives of municipalities concerning energy management and renewable energies in their municipal buildings.

Moreover, currently the “Solar Service Center” with respect to the well settled and successful “Wind Service Center” is under development at the Thuringian Energy- and GreenTech-Agency (ThEGA). The “Solar Service Center” offers consulting and support in connection with the topics of solar thermal and photovoltaic and its establishment is linked to the development of the “Thuringian Solar Calculator”, which will be maintained and announced by the Thuringian Energy- and GreenTech-Agency (ThEGA).

## 5. CONCLUSIONS

The Thuringian Ministry of Environment, Energy and Nature Conservation (TMUEN) is pursuing several activities to support the market roll-out of renewable energy sources and solar district heating by addressing different target groups and following different approaches.

So, the stakeholders in Thuringia currently receive support at several levels: political, financial and content-related support for developing solar district heating projects is available. Still, it is foreseen to intensify activities concerning information and advice services to stimulate further demonstration projects.

Especially low prices for gas and oil are high barriers for an implementation of solar district heating. And beside this, concerning the market roll-out long and intensive planning processes are necessary and include several barriers for stakeholders. To overcome these barriers, stakeholders need to get supported in different fields, as described.

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