

# "Energy villages" in Baden-Württemberg – Solar thermal and biomass for small scale district heating

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# Solites - Steinbeis Research Institute for Solar and Sustainable Thermal Energy Systems

Member of the Steinbeis Network:

- turnover 146 Mio Euro in 2015
- technology transfer, consultancy and research

**Research, demonstration, consulting and market development for non fossil energy systems supplying blocks, district heating, cities, industries etc.**

- Surveyor for large scale solar thermal systems with seasonal thermal energy storage
- Chairman of the German experts group on seasonal thermal energy storage (STES)
- Member of several international experts groups  
(R&D for large scale solar thermal systems, STES and RES (renewable energy sys.))
- Advisor to different ministries and international organisations (IEA/ OECD, EU, GER, etc., DHC+ and RHC+ technology platform) for large scale solar thermal systems, STES and RES

## Solar District Heating in Baden-Württemberg

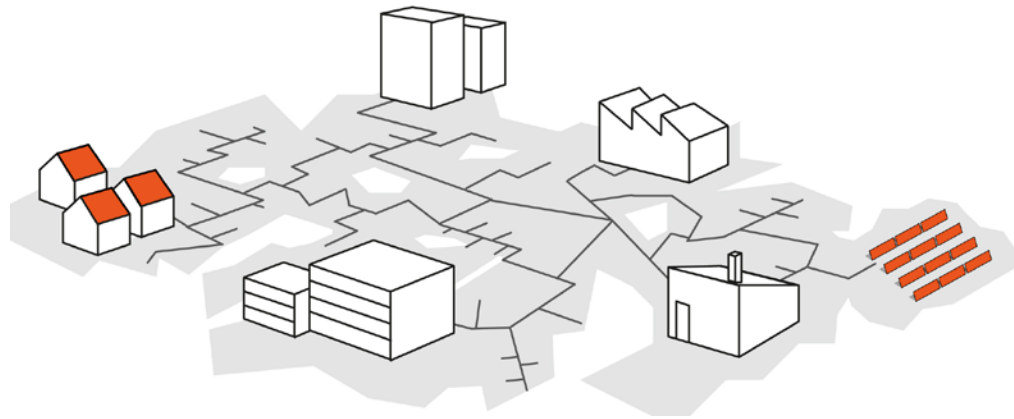
- Climate protection law with ambitious goals. Until 2050:
  - 50 % less energy consumption
  - 80 % renewable energies
  - 90 % less CO<sub>2</sub> emissions
- Integrated energy and climate protection concept (IEKK):
  - Concrete strategies and measures
  - ⇒ e.g. more Solar District Heating!



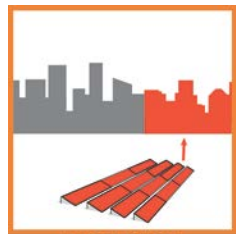
Solar District Heating  
system in Büsingen

*Picture: Ritter XL Solar*

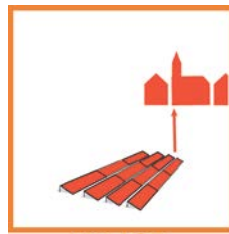
# District Heating – Platform for RES and efficiency technologies



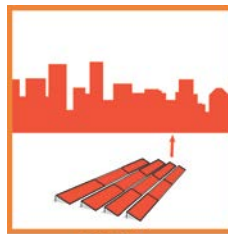
- biomass  
(heat plants, CHP)
- solar thermal
- geothermal
- CHP
- industry surplus heat
- power-to-heat from RES  
(electric boilers, heat pumps)
- thermal energy storage



DISTRICT



VILLAGE



CITY

# Solar thermal for district heating



- emission-free and 100 % RES
- mature and market available
- available everywhere, but need for areas
- capacity up to 100 MW
- solar fraction up to 50 %
- stable heat costs below 50 €/MWh
- new opportunities in the heating sector

Picture: Arcon-Sunmark A/S

# ST and biomass for small scale DH – Energy village Büsingen



## Initial goal

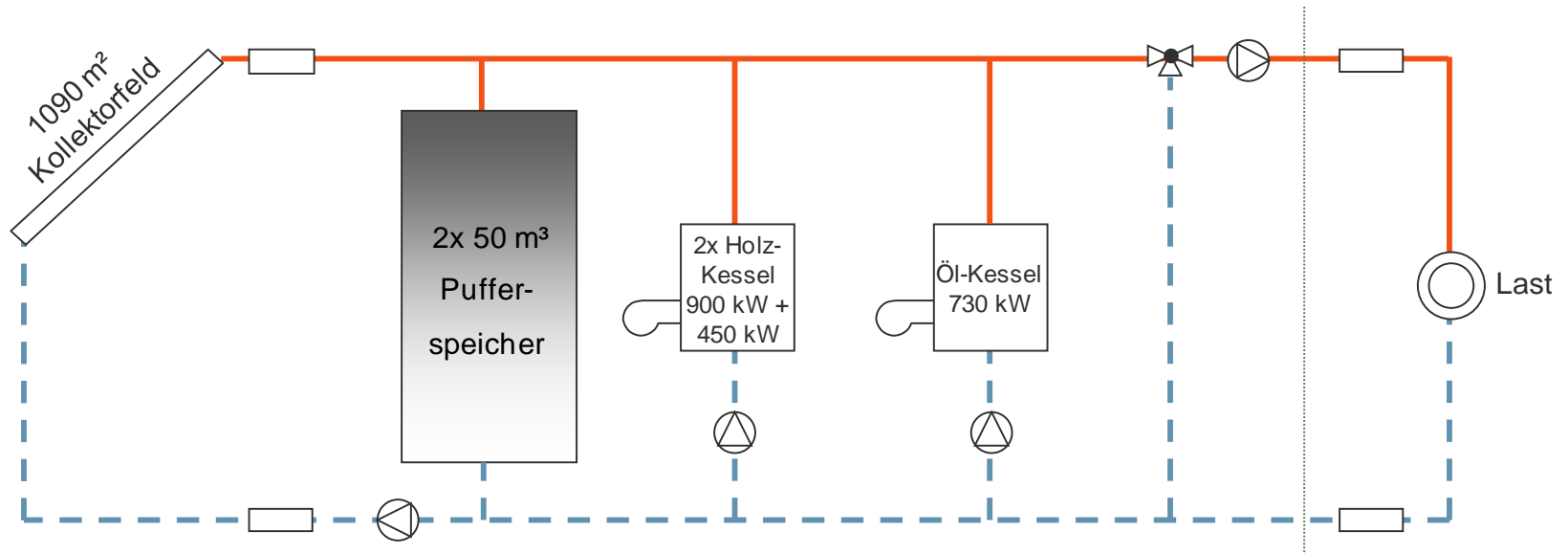
- Significant share of the heat demand of Büsingen shall be covered by local renewable energies

## Realization

- System in Büsingen is planned, built and operated by Solarcomplex since 2013
- It is possible to become shareholder at Solarcomplex AG that realizes renewable energy projects in the region of Lake Constance since 2000

*Picture: Ritter XL Solar*

# ST and biomass for small scale DH – Energy village Büsingen





# ST and biomass for small scale DH – Energy village Büsingen



## Investment costs

3.75 Million €

## Heating network

- length about 6 km
- 107 connections: residential, industrial and public buildings

## Heat generation

about 4,500 MWh/a

## Supply temperature

80 - 85 °C

*Picture: Solarcomplex AG*



## ST and biomass for small scale DH – Energy village Büsingen



Solar (gross) collector area:

- Facade 105 m<sup>2</sup>
- Ground mounted 985 m<sup>2</sup>
- **Total 1.090 m<sup>2</sup>**

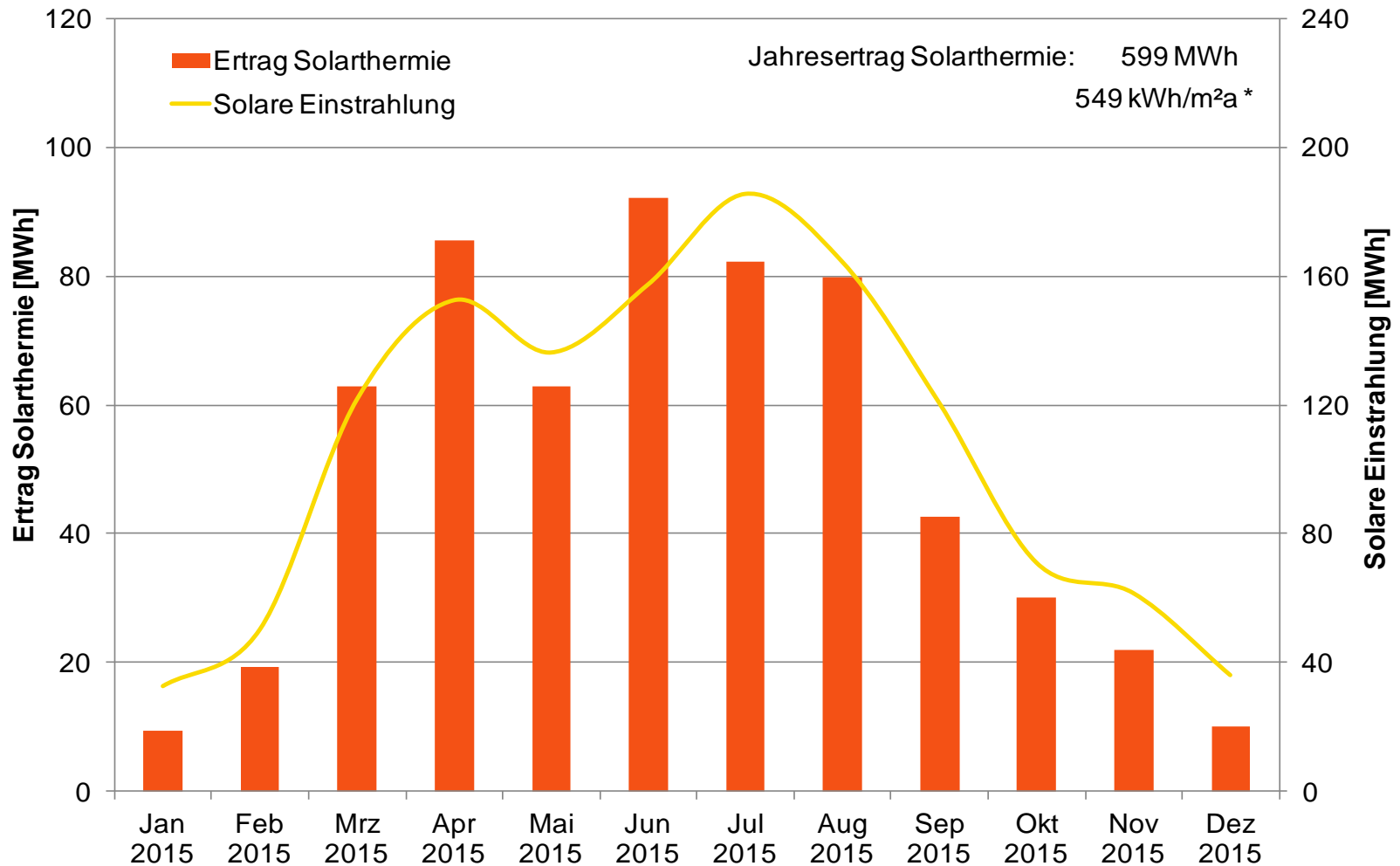


Static foundation similar to photovoltaic open-site systems:

- driven steel profiles
- no ground works
- no soil sealing

*Pictures: Solarcomplex AG*

# Operating data of solar thermal system in Büsingen 2015



\* based on gross collector area, without antifreeze

## Operational experiences in Büsingen

- During summer time the biomass boilers are switched off:
  - supply from solar thermal collectors
  - saving of wood chips
  - no uneconomic turndown
- In spring and autumn the biomass boilers are supported by solar energy
- During the heating season the solar share is very low
- Solar fraction in heat generation:
  - 100 % in summer time
  - about 13 % for the whole year

# Small district heating systems – Success factors

## Organization

- Motivated and competent person promoting the project locally
- Competent planner
- Close to citizens and public participation
- Communication, confidence and transparency

## Realization and operation

- District heating system in best available technique
- Low network temperatures and low heat losses
- Use of local and cost-efficient energy sources

# SDH in Germany and BW – Current status ...

## Information materials

- Materials have been prepared: e.g. guideline for funding and financing, guideline for planning and authorizations, etc. ([www.solnetbw.de](http://www.solnetbw.de))

## Quality and competence

- To increase quality and efficiency of RES DH the program 'Energieeffiziente Wärmenetze' funds since Feb 2016:
  1. Municipal climate protection concepts
  2. Regional initiatives promoting RES DH and giving advice
  3. DH investments linked to advanced quality criteria

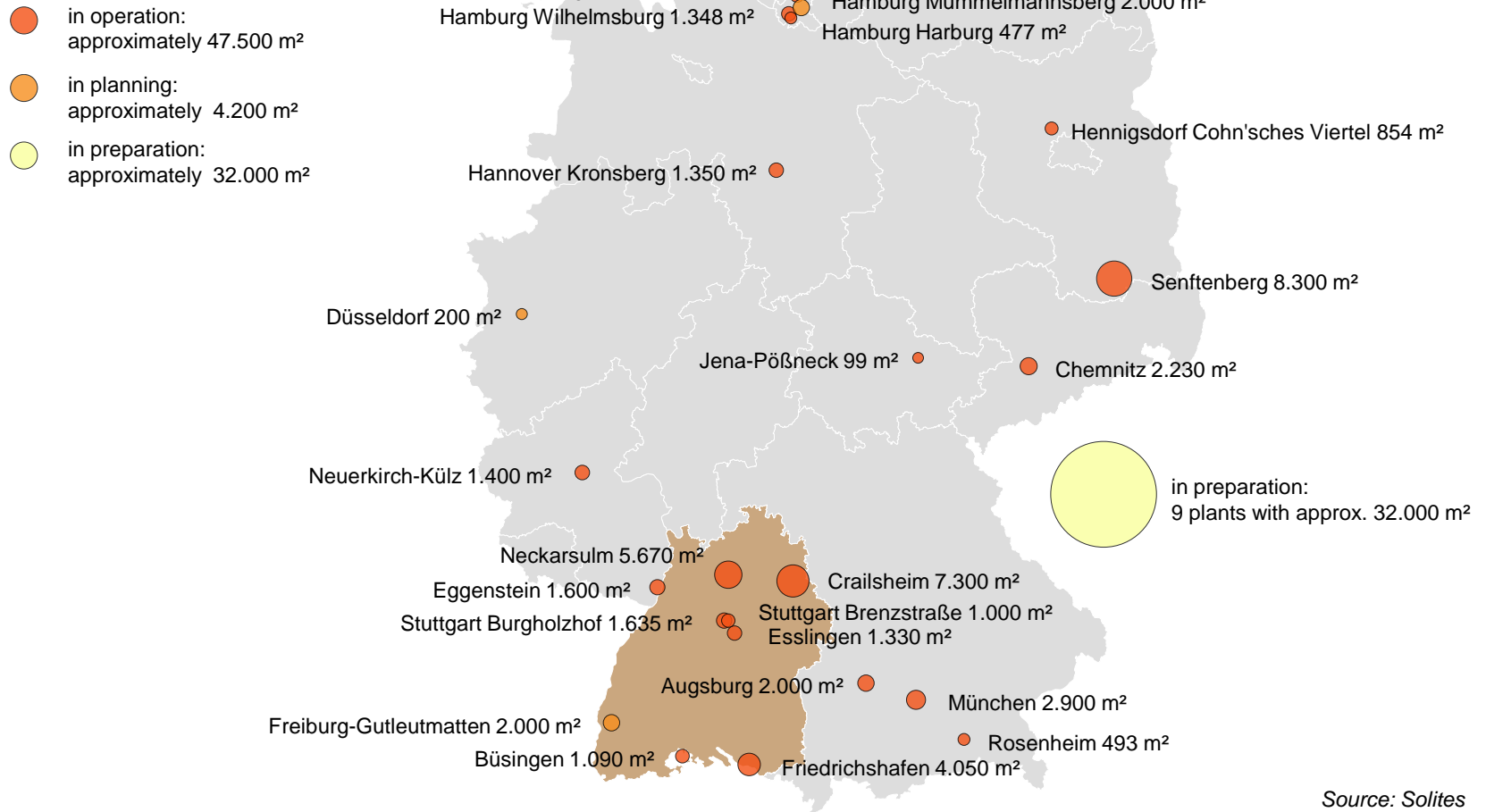


Baden-Württemberg

MINISTERIUM FÜR UMWELT, KLIMA UND ENERGIEWIRTSCHAFT

⇒ Positive mood regarding the use of SDH in Baden-Württemberg, together with funding programs it should be taken up in activities!

## ... and outlook!



Source: Solites  
Status: Sept 2016

## Contact details



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### Website

[www.smartreflex.eu](http://www.smartreflex.eu)

### DE project partners



### Supported by



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