

D-D5. ENRSIM Software

IEA SHC FACT SHEET 55.D.D.5.2

Subject:	ENRSIM software
Description:	“ENRSIM software, a simple calculation tool for renewable-based DHN production plant”
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Download possible at:	http://task55.iea-shc.org/fact-sheets

Intro

Due to their ability to distribute large amounts of renewable energy, District Heating Networks (DHN) are expected to exhibit a considerable development in the coming years. The ENRSIM software, cofounded by the French Renewable Energy Agency (ADEME), aims at providing a simple tool to size DHN production plants with renewable production units and storage.

General info about the tool

The tool is free and should be downloaded and installed on the user’s computer. It targets mostly engineering offices and administrations. It is available in French and English. The user can simulate up to 3 generators in the following list: Solar thermal, Biomass boiler, Gas boiler, CHP and Heat pump. Daily storage common to all generators and dedicated daily storage for each solar field can be setup. Finally, various configurations (serial and parallel) can be simulated.

Architecture of the tool

The software includes:

- Pre-processing modules for load curve calculations and solar resource correction (tilt and masks);
- A calculation core based on a co-simulation platform including a Modelica model of the production plant and a rule-based control module;
- Post-processing modules for energetic, economic and environmental calculations;
- A user friendly graphical user interface to create a project, load or create boundary conditions, set the configuration and parameters of the heat production plant, launch the simulation and visualize the results;
- An automatic report generation engine.

Features of the tool

As the tool focuses on solar thermal, many parameters are available for the solar plant (solar collector characteristics, maximum temperature, solar tank, field and connecting pipes geometry ...) while the other heat units have a limited number of parameters (usually control priority, maximum and minimum power, maximum temperature, availability, efficiency).

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Snapshot of the tool

Figure 1 to Figure 4 present snapshots of the 4 main tabs of the tool, i.e. project configuration, network load calculation, production unit configuration and results visualization.

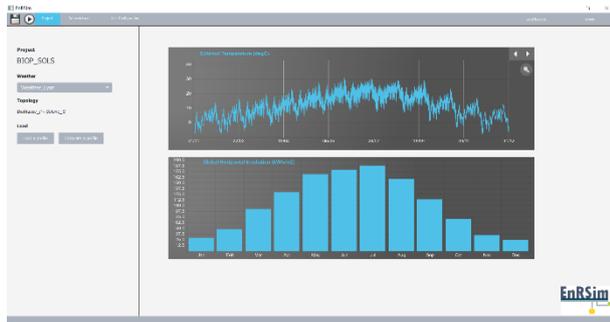


Figure 1: Project configuration Tab



Figure 2: Network load Tab

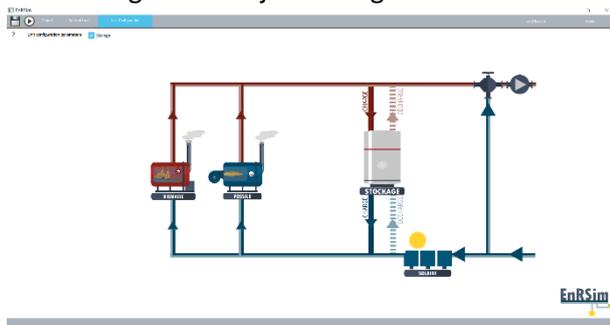


Figure 3: Production unit Tab



Figure 4: Results visualization Tab

Type of results obtained

The production trajectories of all the generators and charging/discharging of the storage units are obtained at a time step of 1 hour for an entire year. In addition, the tool provides the calculation of a set of energetic operational, environmental and economic indicators together with a set of summary graphs in the generated report.

Validation of the tool

Validation of the tool has been performed by three different actions: i) case studies comparison of energy mix with engineering offices dedicated steady-state tools, ii) case studies comparison with TRNSYS simulation mostly to compare solar field production, and iii) real case studies.

Dissemination of the tool

The software is currently being reviewed by 10 beta-testers. It will be available for download in April 2020 on the website ines-solaire.org. A first training session is planned for April 2020.