Rescue

RENEWABLE SMART COOLING FOR URBAN EUROPE

WORK PACKAGE 4

RESCUE SUPPORT PACKAGE TOOL LIST

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Report prepared by:

TECHNISCHE UNIVERSITÄT DRESDEN

RESCUE – RENEWABLE SMART COOLING FOR URBAN EUROPE

RESCUE SUPPORT PACKAGE TOOL LIST

CONTENT

1. PREFACE

This report has been elaborated in the RESCUE (Renewable Smart Cooling in Urban Europe) project. This IEE (Intelligent Energy Europe) co-funded project is scheduled from June 2012 to November 2014.

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With Contribution by the RESCUE partners:

- TU Dresden (www.tu-dresden.de)
- Capital Cooling Energy Service AB (www.capitalcooling.se)
- Climespace (www.climespace.fr)
- Helsinki Energy (www.helen.fi)
- AGFW (www.agfw.de)
- Euroheat and Power (www.euroheat.org)
- ICLEI Europe (www.iclei-europe.org)
- Regional Energy Agency of Liguria (www.areliguria.it)

If you would like to know more about RESCUE project please visit our website www.rescue-project.eu.

2. PROJECT DESCRIPTION

Cooling energy demand within Europe, especially in urban regions, is rising significantly, mainly caused by building design, internal heat loads, heat island effects, and comfort reasons. If served conventionally using small scale and distributed electric driven compressor chillers this would result in a significant rise in primary energy consumption, greenhouse gas emissions and peak electricity demand.

The RESCUE project focuses on the key challenges for further development and implementation of District Cooling (DC) using low and zero carbon emitting sources, thereby enabling local communities to reap the environmental and economic benefits of this mature technology. Although DC allows the application of high efficient industrial chillers or

absorption chillers driven by waste heat it is estimated that DC market share today is about 1-2 % in the service sector (which is about 3 TWh) but less than 1 % of the total present existing European cooling market including residential. The main steps to extend the use of smart, energy efficient and renewable DC Systems are:

1. Dissemination of essential background information.

2. Decision making based on (pre-) feasibility studies exploring cooling options.

3. Implementation, monitoring and optimization.

The RESCUE project focuses on steps 1 and 2 within the project duration addressing main actors and target groups, i.e. Local Authorities (LA), utility companies, building owners, and the financing sector. The main objectives of the project are therefore:

- Promote DC as a high potential, sustainable energy solution.

- Increase familiarity and reliability of information available to decision makers and LA about the DC business.

- Improve networking activities and experience exchange.

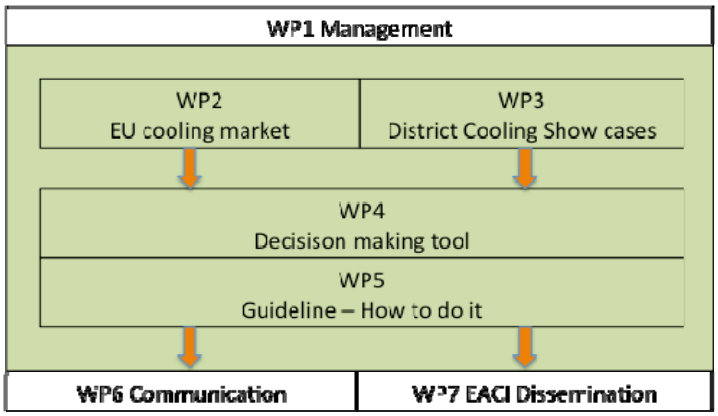
A key action of the project is to provide a number of target cities with a decision-making support package assisting LA to account for DC in their planning policies and to guide them when looking for cooling options fitting best to their Sustainable Energy Action Plan (SEAP). Key outputs and main deliverables of the project, available to the public, are:

- An impact calculator which shows the key figures in comparison between Central and Distributed solutions.

- A set of guidelines and handbooks related to the DC business and the decision making process.

- Reports describing the cooling energy market, the energy performance evaluation as well as DC best practice and show cases.

The RESCUE project consists of seven Work Packages (WP), whereas WPs 1, 6 and 7 are dedicated for project management and communication, WP2 is dedicated to conducting a market survey for cooling in Europe and to establish how DC can contribute to the 20-20-20 targets. WP3 is to showcase examples of DC systems in Europe in order to demonstrate their performance and to provide details on the use of renewable energy sources (RES), improvements in energy efficiency and CO_2-savings. Within WP4 a “Decision Making Support Package” is developed, applied and enhanced to guide and assist LA in their decision processes regarding cooling issues in local energy concepts. The purpose of WP 5 is to provide practical information related to start-up of DC systems and the DC business in general.


WP1 Management
WP2
EU cooling market
WP3
District Cooling Show cases
WP4
Decisison making tool
WP5
Guideline – How to do it
WP6 Communication
WP7 EACI Dissemination

3. REQUIREMENTS FOR A DECISION MAKING TOOL

The tool which will be developed in the RESCUE project is to be used in or in preparation for workshops with cities that want to pre-check feasibility of a district cooling system in their town. The tool should calculate some key figures and present it in a suitable way.

3.1 TARGET GROUP, USER INTERFACE

Target group of the presentation are non-experts in the field of District Cooling. The preparation of the calculations will be done by members of the RESCUE consortium, whereof not all are technical experts but there is the chance to instruct these "preparators". The user interface of the tool therefore can be split up in two unequally complicated parts.

The tool should be easy to use and understandable. Also no complicated installation procedure should be necessary, therefore an implementation in Microsoft Excel® has been chosen.

3.2 CONTENTS

Key figures to calculate are based on the needs of Local Authorities to decide whether to force a feasibility study or to abandon District Cooling in their town. These numbers are usually connected to common goods and have been chosen:

- CO_2 emissions
- Non-renewable primary energy
- Electrical peak demand (which has an high impact on the sufficiency of the capacity of the Grid)

As the actors in DC business will usually not be the Local Authorities but economically oriented companies and costumers also

- consumptive costs

will be calculated – knowing that for a real feasibility study far more numbers are needed. But these detailed studies cannot be publicly funded. Consumptive costs give (in comparison with consumptive costs of a business-as-usual scenario) a rough impression whether there is a business in District Cooling or not.

The key figures have to be calculated for all the main possible concepts in a city, which depend on availability of hot and cool sources in the town.

The necessary input data should be adapted to the conducted target groups. The preparators of the calculation are mainly non-technical experts and non-locals. Input data that can be elaborated by the RESCUE consortium members in cooperation with the cooperation municipality staff in a very short period of time has to be sufficient.

4. EXISTING TOOLS

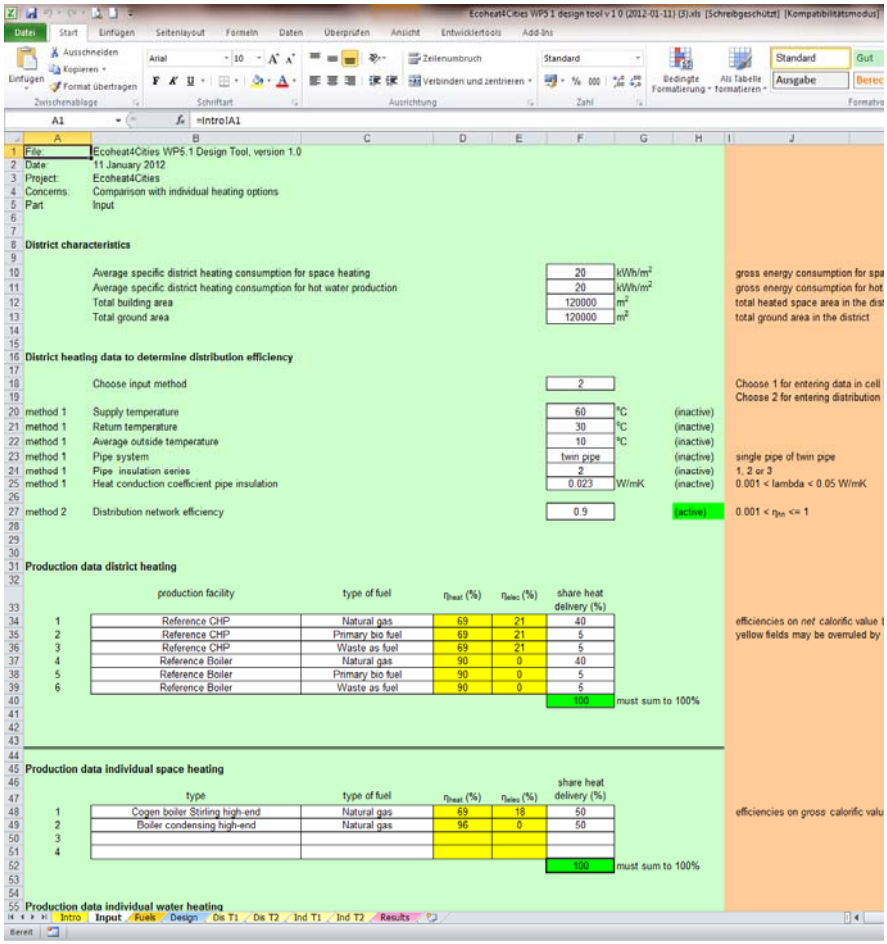
An investigation on existing tools has been performed to find a tool which suits the needs defined in chapter 0.

4.1 CONSULTING COMPANIES

Consulting Companies usually use their own tools which comprise expert knowledge of many people and years. As they are key know how of the companies these tools are not publicly available and therefore not usable for the RESCUE project.

4.2 ECOHEAT4CITIES

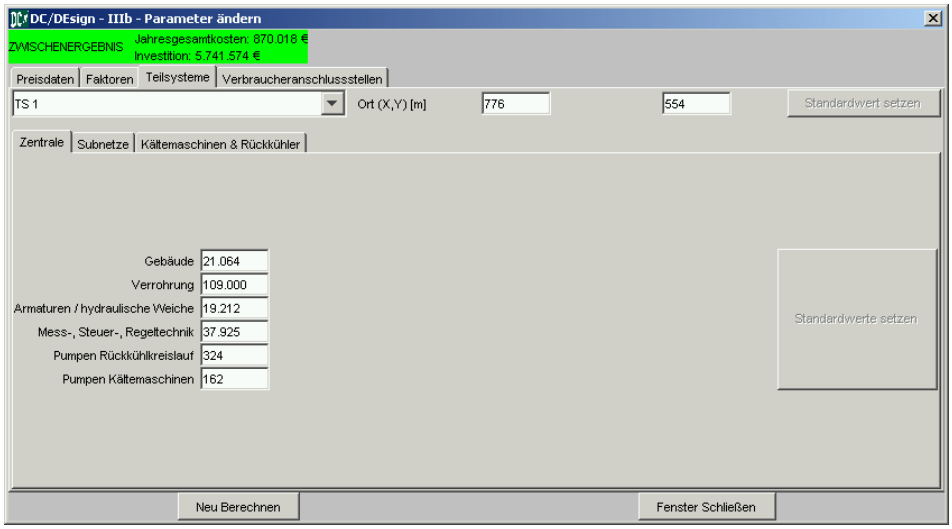
In the EU co-funded EcoHeat4Cities project a calculator has been developed by TU Delft. It calculates (primary) energy efficiency of district heating systems based on the area and the specific heat demand. Also the share of heat providing devices has to be given. The methodology can be used to build a similar tool for District Cooling. Specific demands are usually not known there some steps to calculate these have to be added. The user interface can be a guide to an easy to use UI.



4.3 DC/DESIGN

DC/Design has been developed as a diploma thesis at TU Chemnitz (Germany) in 2009. It calculates investment and annual costs based on ambient temperature, building characteristics and coordinates. It accounts for chillers, coolers, pumps, network, building connection, but not for storage. Its target group is more technically oriented than the one defined in chapter 0. Also it doesn't cover most of the numbers defined in paragraph 0 and it is only available in German.

http://www.elisabeth-eckstaedt.de/dcdesign/



4.4 POLYSMART

The calculator developed in the polysmart project performs simplified energy and economic simulations for micro-CHCP (Combined Heat Cooling Power). Its input are hourly load files (ambient temperature, humidity, heating, domestic hot water, cooling and electricity demand), which is far too detailed for use in RESCUE project. The interface seems pretty straight forward and it covers a lot of equipment, but not one of the most important (concerning costs): the network. Information concerning the method of calculation is not readily available wherefore it cannot be easily extended.

http://www.polysmart.org/cms/upload/publications/PolySMART_D2-5_WP2_Final_Report.pdf