



# Tools and methodologies for rapid assessment and pre feasibility analysis of district heating and cooling systems



## DISTRICT ENERGY IN CITIES INITIATIVE

A GLOBAL INITIATIVE TO UNLOCK THE POTENTIAL OF ENERGY EFFICIENCY AND RENEWABLE ENERGY



Supported by:



MINISTERO DELL'AMBIENTE  
E DELLA TUTELA DEL TERRITORIO E DEL MARE



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# DISTRICT ENERGY KEY TO RENEWABLES & EFFICIENCY IN SMART CITIES



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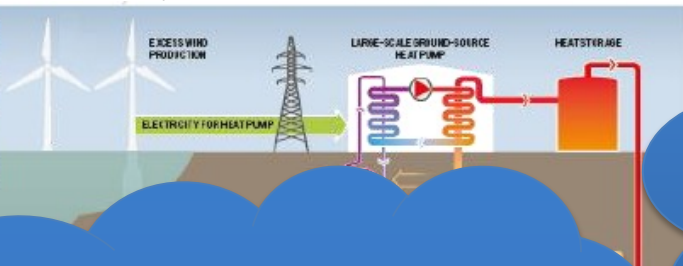
District Energy Systems:

- Are defined as public service
- Includes district heating, cooling and domestic hot water
- Integrate renewable energy, waste heat, free cooling etc.

District Energy Systems can:

- Utilise sustainable technologies that may not be economic viable in single buildings
- Improve regional energy efficiency and air quality

**CONNECTING  
RENEWABLE  
ELECTRICITY  
GENERATION**

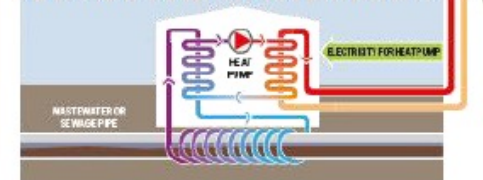


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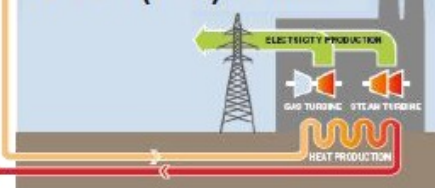
**CAPTURING WASTE HEAT FROM  
SEWAGE AND WASTEWATER**



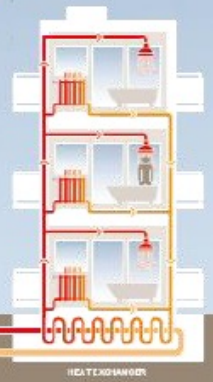
**ABSORPTION CHILLER  
CAPTURING  
WASTE HEAT**



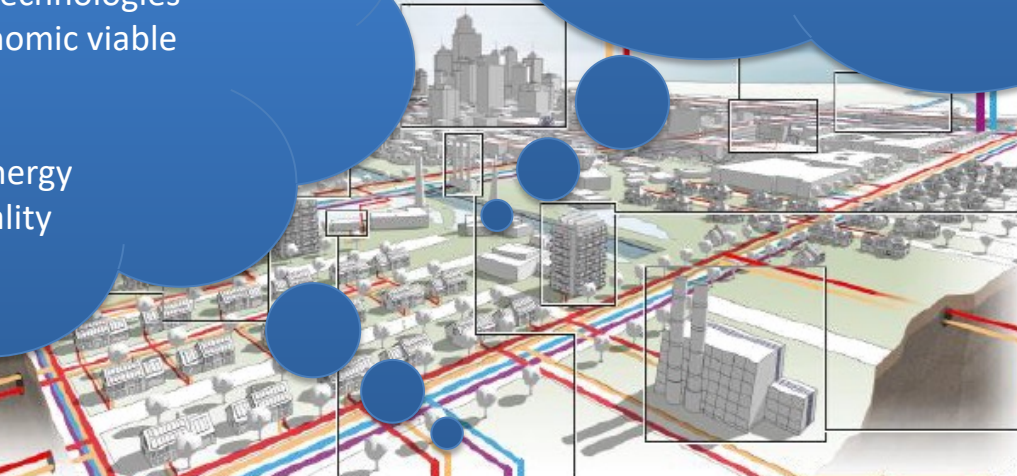
**COMBINED HEAT AND  
POWER (CHP) PLANT**



**CUSTOMERS**



**SOLAR THERMAL  
CONNECTED TO  
DISTRICT HEATING**



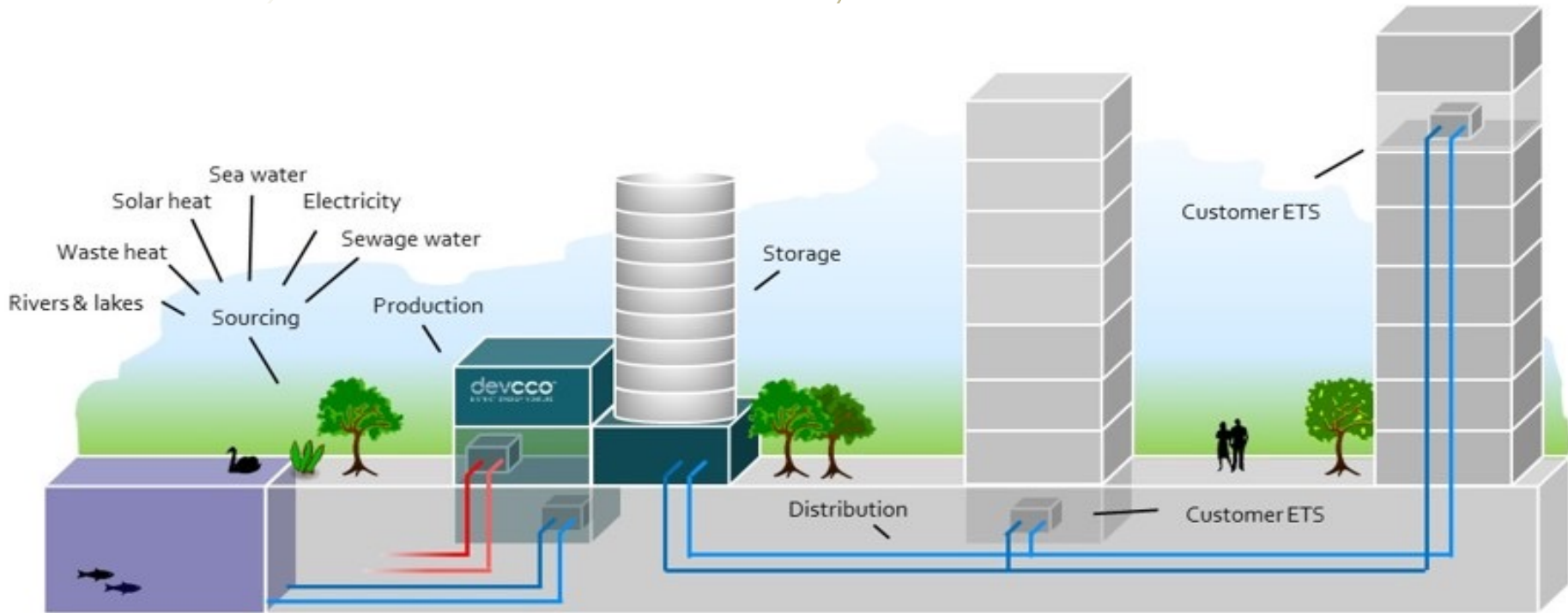


# INTRODUCTION



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UN  
environment



District energy aims to use local energy sources that otherwise would be wasted or not used, in order to offer for the local market a competitive and high-energy-efficient alternative to the traditional heating and/or cooling solutions.



### **Background:**

- Based on the peer-reviewed reports of rapid assessment (RA) and pre-feasibility studies in pilot countries (Chile, Serbia, India & China), as well as the experiences, training needs and other activities to integrate DES in cities
- Integrated with the experiences that similar analysis and activities are taken in other learning countries (Malaysia, Morocco, Tunisia, etc.)

### **Purposes:**

- Support municipalities or other local stakeholders in the pilot countries to develop rapid assessment, and evaluate technical, environmental and economical benefits of DES in a reliable way in early stages of project development
- Save time for the users in data collection, calculations as well as the reporting and presenting the results of rapid assessment (RA)
- Standardize the procedure of RA, raise the awareness of necessary activities that need to start before RA and continue after RA
- The RA toolkits and pre-feasibility tools will be kept updated in the future so as to include the up-to-date experiences for DES development

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## TOOLS AND R.A. METHOD DEVELOPMENT

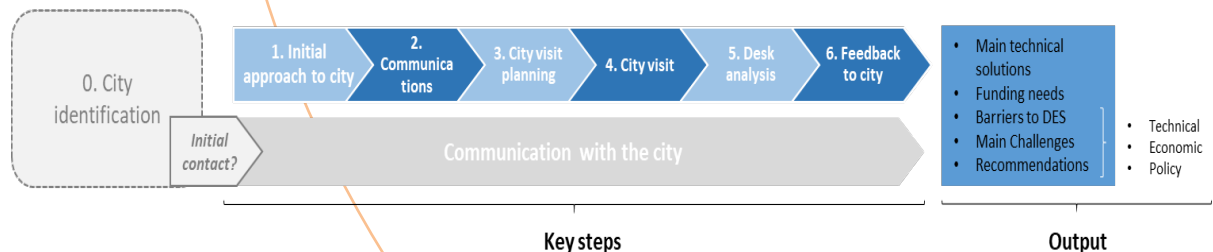
### What we are developing for DES project development:

#### ➤ Rapid assessment methodologies

- Adapt the '10 key steps for DES development' to pilot countries
- Key steps and outputs for RA
- Activities should be started before RA, incl. data collection, stakeholder mapping & coordination, etc.
- Activities should be continued for future DES development
- Suggestions (templates in annex) for data collections, ToR for RA consultancy, city selection criteria etc.

1.	ASSESS existing energy and climate policy objectives, strategies and targets, and identify catalysts
2.	STRENGTHEN or develop the institutional multi-stakeholder coordination framework
3.	INTEGRATE district energy into national and/or local energy strategy and planning
4.	MAP local energy demand and evaluate local energy resources
5.	DETERMINE relevant policy design considerations
6.	CARRY OUT project pre-feasibility and viability
7.	DEVELOP business plan
8.	ANALYSE procurement options
9.	FACILITATE finance
10.	SET measurable, reportable and verifiable project indicators

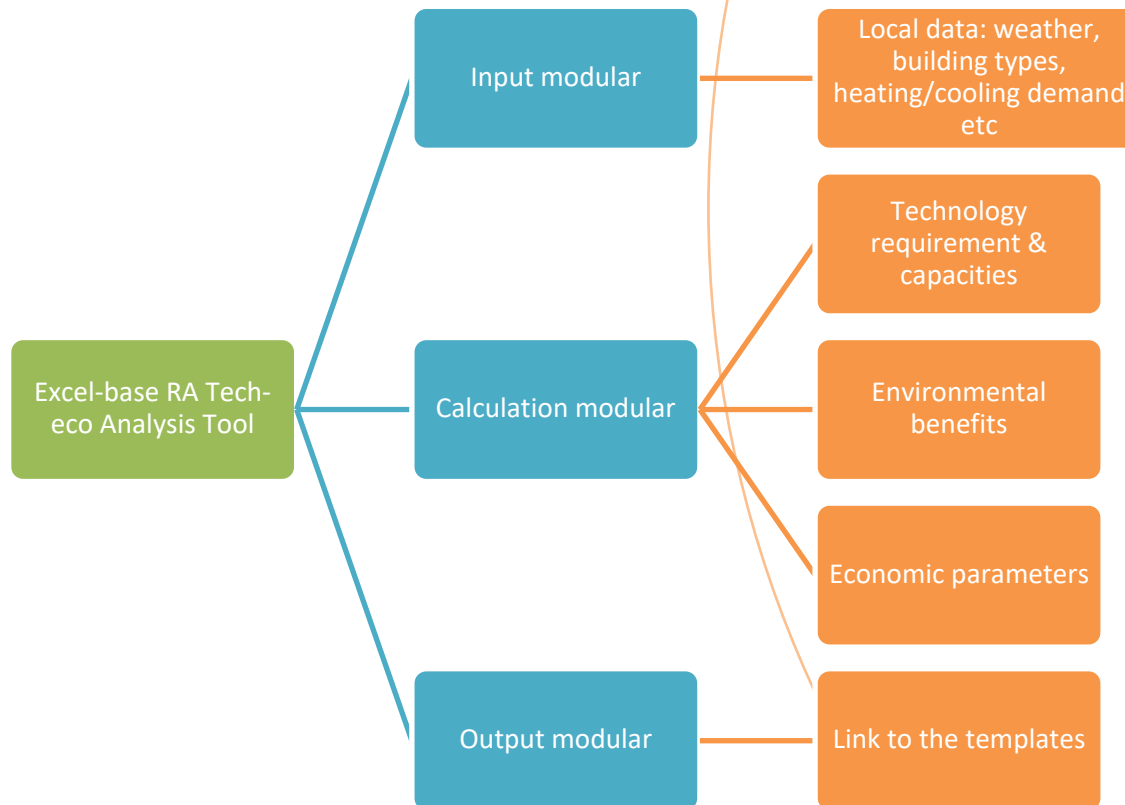
Rapid Assessment	City-wide deep assessment	Pre-feasibility	Feasibility & master planning	Procurement	Design	Tender
Scope of options						
<ul style="list-style-type: none"> <li>• Framework conditions: climate, policy, energy demand</li> </ul>	<ul style="list-style-type: none"> <li>• Initial mapping</li> <li>• Policy and barrier analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Mapping for detail</li> <li>• Business case</li> </ul>	<ul style="list-style-type: none"> <li>• Mapping for feasibility</li> </ul>	<ul style="list-style-type: none"> <li>• Mapping for feasibility</li> </ul>	<ul style="list-style-type: none"> <li>• Final design &amp; construction permits</li> </ul>	<ul style="list-style-type: none"> <li>• Tender for operation and construction</li> </ul>
<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> <li>• Urban planners</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> <li>• Energy consultants</li> <li>• Urban planners</li> </ul>	<ul style="list-style-type: none"> <li>• Local authorities</li> </ul>





### What we are developing for DES project development :

- Rapid assessment tech-eco analysis toolkits
  - Users manual
  - Excel-based tech-eco analysis tool
  - WORD template for RA tech-eco analysis report
  - Powerpoint template for RA tech-eco analysis results presentation



Also work as data request/ questionnaire, default/suggested values



### What we are developing for DES project development :

- Pre-feasibility tech-eco analysis tools
  - Connected with the RA tool
  - Considered the experiences from other open-assess tools, incl. DHAT, Plan4DE etc.
  - Excel-based tech-eco analysis tool for pre-feasibility study
  - Provide tech-eco results of various scenarios with combinations of different potential technologies or connection/development plans



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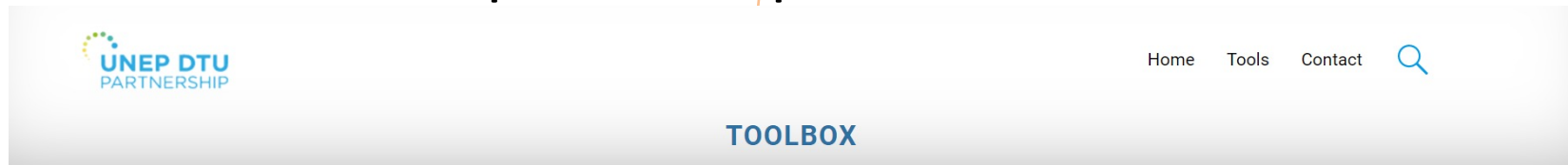
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### What we are developing for DES project development :

- Both the rapid assessment and pre feasibility study tools will be integrated into other tools that were developed by UNEP-DTU Partnership
- The toolkits are placed as part of the online toolbox



Transformers



Buildings



District Energy



Motor-pump



Street Lighting



Motor



Water supply





### Knowledge management system:

- Hosts the training modules for district energy systems
  - Introduction to District Energy
  - Stakeholder coordination for district energy development
  - Energy mapping and data collection
  - Strategy development
  - Policy development
  - Business models
- Contains best practices and case studies of district heating and cooling projects from both developed and developing countries as well as emerging economics

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## VIRTUAL KNOWLEDGE MANAGEMENT SYSTEM

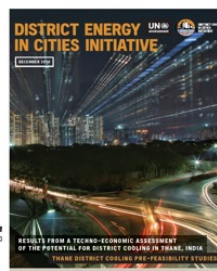
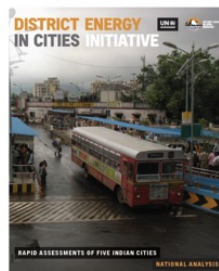
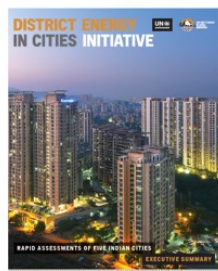
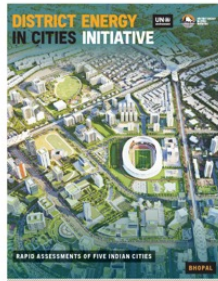


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### Knowledge management system:

➤ is developed on the basis of works in pilot countries from the UNEP-led District Energy in Cities Initiative and the expertise in UNEP-DTU Partnership





### Knowledge management system:

- In the future, KMS will also be developed for the virtual knowledge sharing platform for clean district heating in China, under the collaboration with Danish Energy Agency



#### Introduction

This training covers the basics of district energy systems (DES). It shares valuable insights of the key aspects of DES planning, as well as tools and skills to successfully implement DES at a city and district scale. By following this training you will also be able to learn more about real cases across the globe, including China, Chile, India, Argentina, Denmark, Sweden, France, etc..

The programme is conceived within the District Energy in Cities initiative – a global initiative with the aim to unlock the potential of centralised energy solutions to double the rate of energy efficiency improvements for heating and cooling in buildings by 2030, helping countries meet their climate and sustainable development targets. The content has been developed by UNEP in collaboration with the UNEP-DTU Partnership, and financed by the GEF-6 project.

#### About the District Energy in Cities initiative

The District Energy in Cities Initiative is a multi-stakeholder partnership coordinated by UN Environment, with financial support from DANIDA, the Global Environment Facility, Italian Ministry of Environment and Protection of Land and Sea, and the Kigali Cooling Efficiency Program (K-CEP).

As one of six accelerators of the Sustainable Energy for All (SEforALL) Energy Efficiency Accelerator Platform, the Initiative aims to double the rate of energy efficiency improvements for heating and cooling in buildings by 2030, helping countries meet their climate and sustainable development targets.

The Initiative supports local and national governments to build know-how and implement enabling policies that will accelerate investment in low-carbon and climate-resilient district energy systems. It currently provides technical support to cities in four pilot countries (Chile, China, India and Serbia) and ten replication countries (Argentina, Bosnia and Herzegovina, Colombia, Egypt, Malaysia, Mongolia,

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Sector: District energy





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## VIRTUAL KNOWLEDGE MANAGEMENT SYSTEM

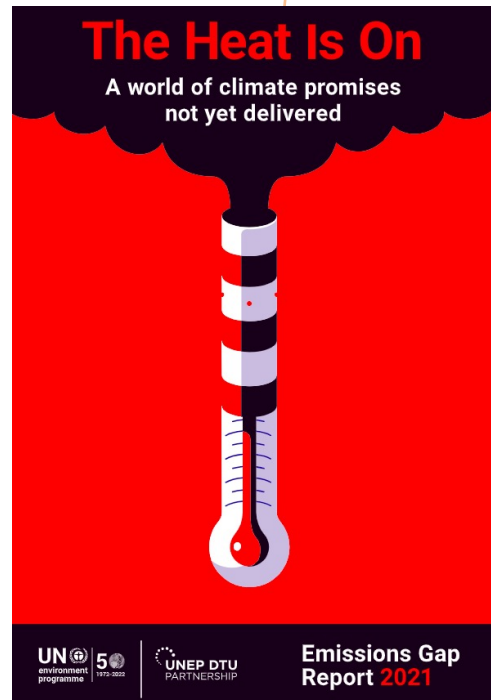
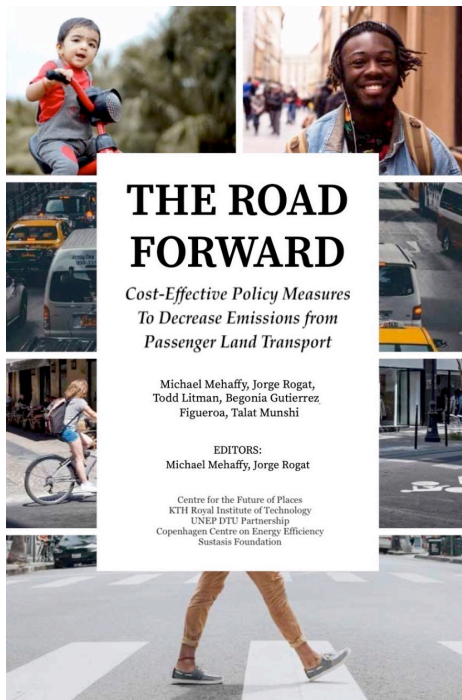


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### Knowledge management system:

- Integrate to other training materials from UDP
- We also welcome other organizations to link their tools, case studies and other training materials of district and building energy systems to this public-assessed platform







**For more information, please contact:**

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