



MRV OF DISTRICT ENERGY SYSTEMS AND DEVELOPMENT OF CITY-LEVEL MRV PLANS

06 SEPTEMBER 2019 MRV FOR DISTRICT ENERGY
SYSTEMS (WEBINAR)

STEFAN WEHNER



**DISTRICT ENERGY
IN CITIES
INITIATIVE**

At a glance

- Almost 15 years of experience in the *energy sector and climate change* as project coordinator, energy analyst and consultant
- Expertise on creating *innovative MRV approaches* for mitigation activities in the context of international climate policies, incl. baseline and emission trend scenario determinations
- Energy sector specialist, with extensive work experience in the assessing and planning *projects and programmes in the (renewable) energy sector* in developing countries for *accessing international climate finance*, e.g. under the UNFCCC

Stefan Wehner

Founding Partner of the greenwerk.



Agenda

Introduction

- Purpose and benefits of MRV frameworks for district energy systems

Steps to design an MRV Plan for individual district energy systems

- 8 Steps to adapt generic MRV framework to individual city-wide projects



Objectives of the MRV framework for DES projects

- Measure, report and verify *emissions reductions (ER)* generated by DES implemented in cities
- *Sustainable development* metrics to highlight the impact on the local or national economic development, the environmental situation and public welfare.
- Provide a comprehensive set of performance metrics and indicators
 - robust and rigorous enough to be usable in Nationally Determined Contributions (NDCs)

Measurement

- Keeping track of GHG emissions, reductions (and co-benefits!)
- Collection and measurement of the relevant key data and parameters to assess the progress of the overall project and impact of the mitigation measures

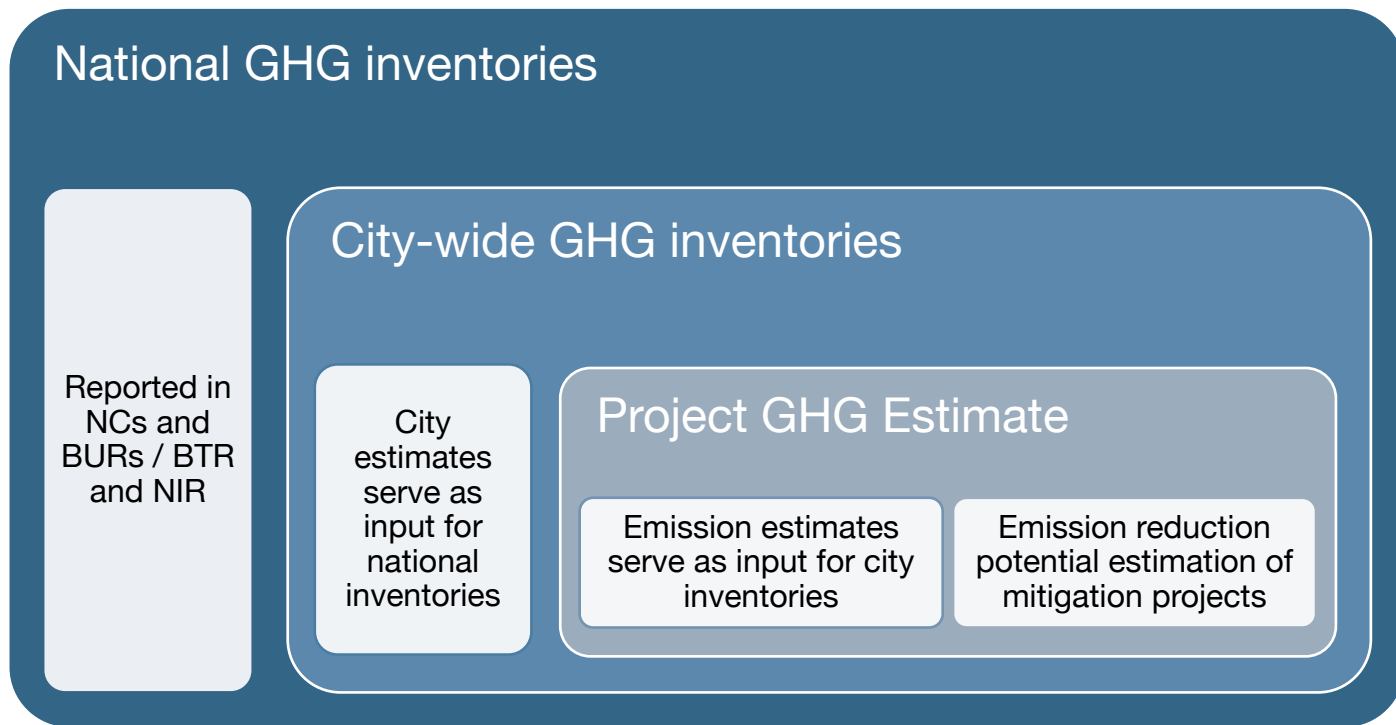
Reporting

- Communicating information on GHG emissions, reductions and co-benefits
- Presentation and report of the measured data and parameters in a transparent and standardized way

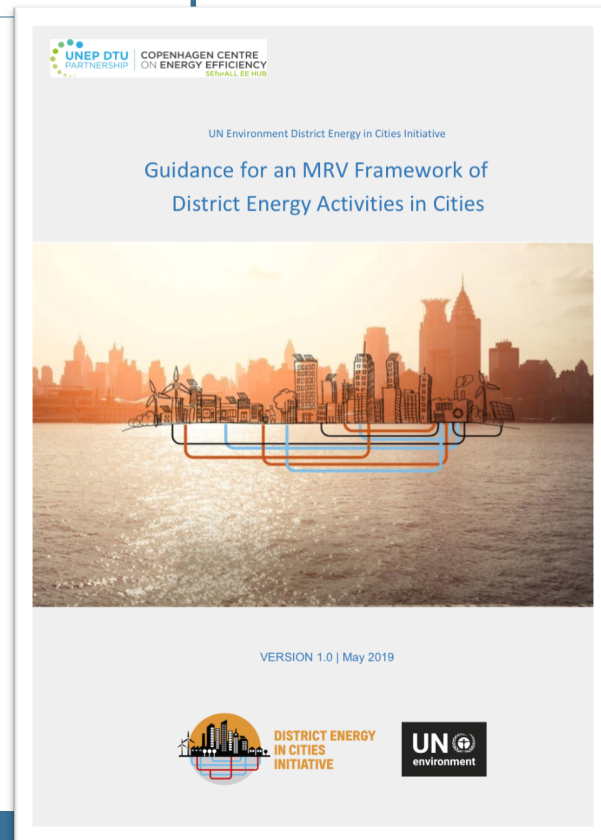
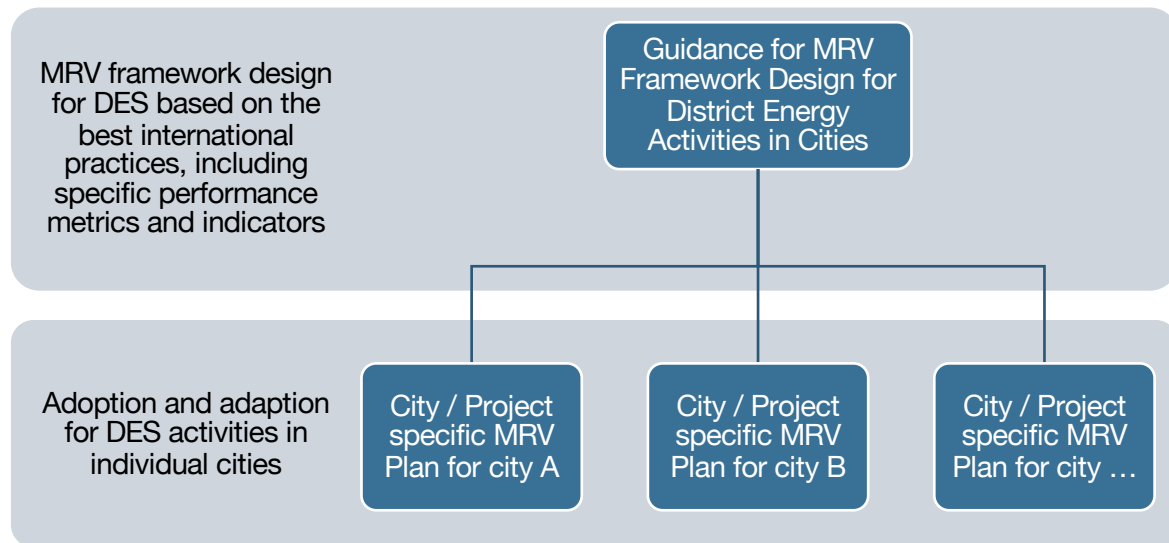
Verification

- Checking that the data reported reflect the reality on the ground
- Evaluation of the correctness, completeness, consistency and robustness of the data and information reported through an third-party independent verification process

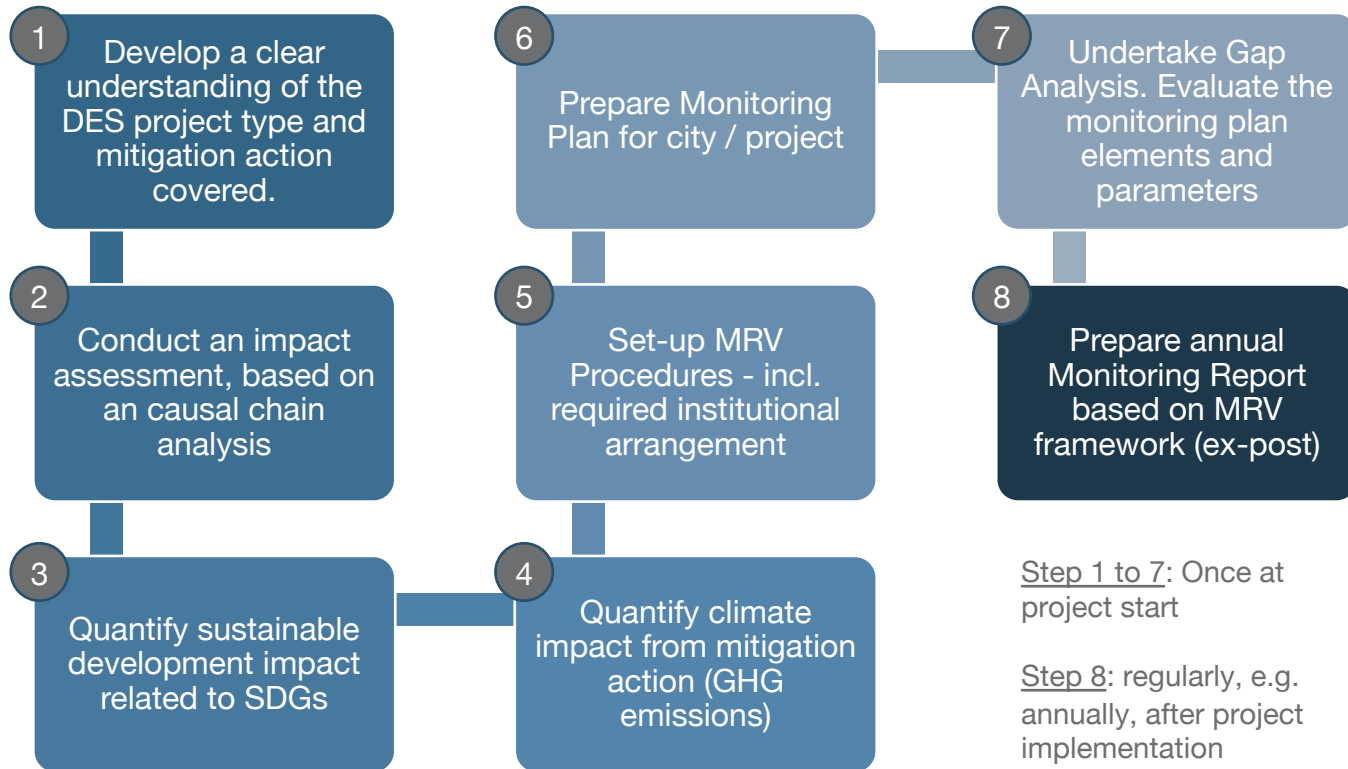
Relevance of MRV on emission tracking



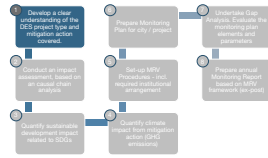
How to use the MRV guidance as basis to adopt MRV Plan



Steps to design an MRV framework for district energy systems

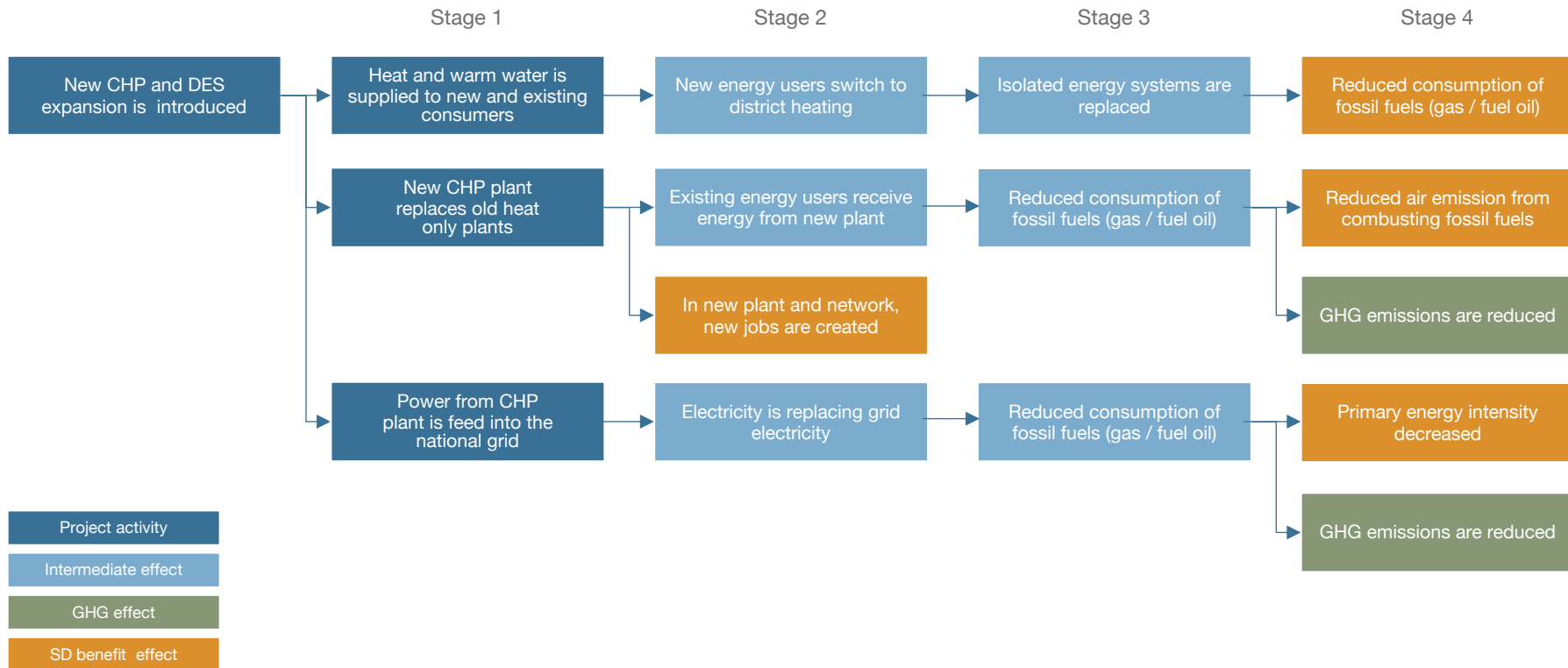
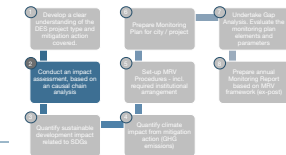


Step 1: Identifying different district energy project types

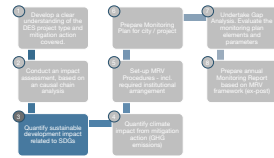


DES project type	Description / Definition
New / expansion of district heating system	Introducing a new district heating system - a system for distributing centrally generated heat to residential and commercial users. A district heating supplies heat to a significant area, i.e. a neighbourhood or a city
New / expansion of district cooling system	Introducing a new district cooling system - a system for distributing centrally generated coolant (e.g. cooled water) to existing and/or new buildings. A district cooling system supplies coolant to an area of several buildings, i.e. a neighbourhood or a city. It includes the district cooling plants and cooling distribution network
New tri-generation system	Simultaneous generation of electrical energy and thermal energy in the form of cooling and heating in one process from a single heat source such as fossil fuel. Trigeneration is also referred to as CCHP (combined cooling, heating, and power generation)

Step 2: Impact assessment - identifying all potential GHG mitigation and sustainable development benefits



Step 3: How to quantify the sustainable development impact



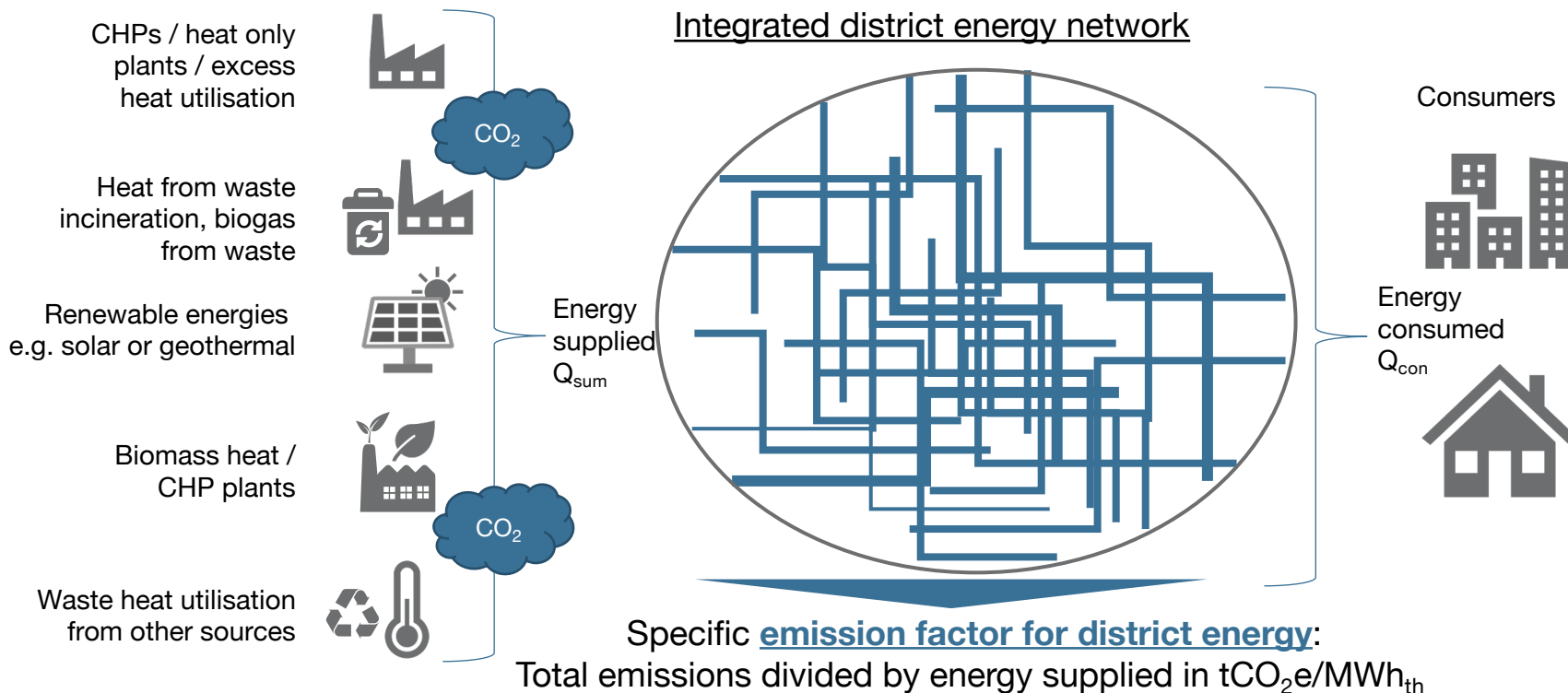
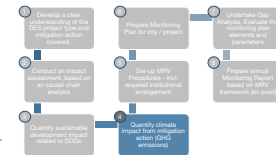
Sector relevant for DES projects	Most linkages with SDG					
Energy supply (efficient / clean)	3 GOOD HEALTH AND WELL-BEING 	7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	11 SUSTAINABLE CITIES AND COMMUNITIES 	13 CLIMATE ACTION
Buildings			8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	11 SUSTAINABLE CITIES AND COMMUNITIES 	13 CLIMATE ACTION

```

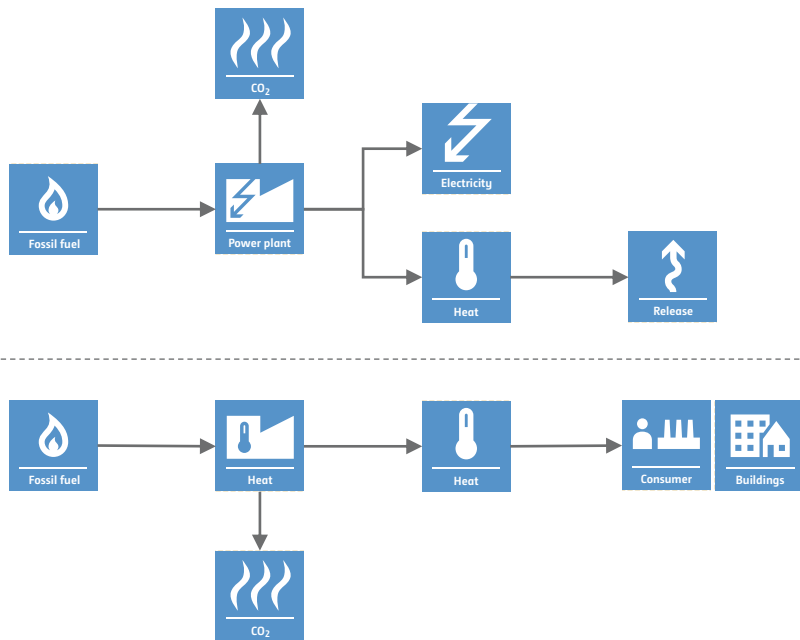
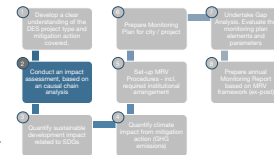
graph TD
    1[1. Develop a clear understanding of the LULU and climate change issues to be covered] --> 2[2. Conduct an impact assessment, based on a causal chain analysis]
    2 --> 3[3. Quantify sustainable development impact related to SDCs]
    3 --> 4[4. Prepare Monitoring Plan for city / project]
    3 --> 5[5. Prepare annual Monitoring Report based on MTR framework (see page 2)]
    4 --> 6[6. Quantify climate impact from mitigation action (GHG emissions)]
    5 --> 6
    6 --> 7[7. Interpolate the findings, Evaluate the remaining gaps and parameters]
    7 --> 8[8. Prepare annual Monitoring Report based on MTR framework (see page 2)]
  
```



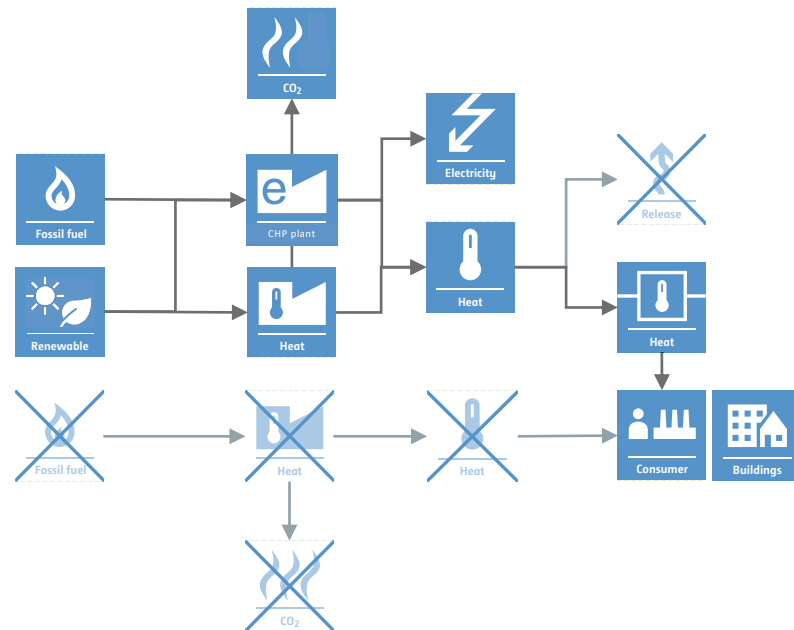
Step 4: How to quantify the climate impact



Example for heating: Determine the baseline and project scenarios



Baseline scenario



Project scenario

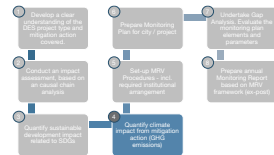
Source: Adapted from UNFCCC, 2018



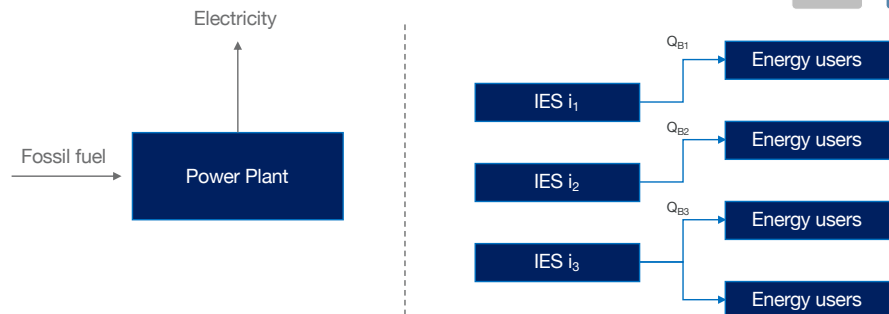
DISTRICT ENERGY
IN CITIES
INITIATIVE

MRV FOR DISTRICT ENERGY SYSTEMS (WEBINAR)

Example heating: Relevant monitoring parameters

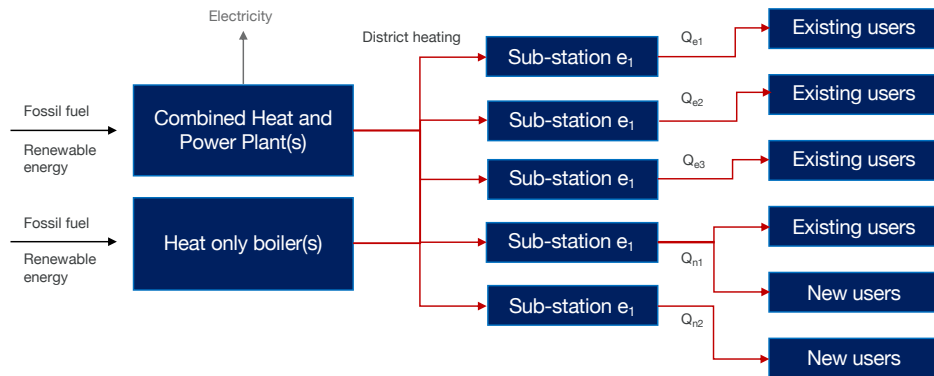


1. Quantity of *heat energy* delivered (Q)
2. Amount of grid and/or captive *power supplied* (EG)
3. Analysis of the *replaced baseline technologies*, e.g. gas / fuel oil boiler, wood stoves etc.



Baseline situation

IES = Isolated energy system, e.g. boiler, chillers, ACs



Project scenario




```

graph TD
    1[1. Develop a clear understanding of the DSS project type and mitigation action covered.] --> 2[2. Prepare Monitoring Plan for city / project.]
    2 --> 3[3. Undertake Gap Analysis, Evaluate monitoring plan elements and parameters.]
    3 --> 4[4. Prepare annual Monitoring based on MRV framework (see post).]
    4 --> 5[5. Set-up MRV Procedures and required institutional arrangements.]
    5 --> 6[6. Quantify climate impact from mitigation action (GHG emissions).]
    6 --> 7[7. Quantify sustainable development impact related to SDGs.]
    7 --> 8[8. Conduct an impact assessment based on an climate chain analysis.]
    8 --> 1
  
```

-

```

graph TD
    1[1. Develop a clear understanding of the LULU project flow and impact assessment covered] --> 2[2. Prepare Monitoring Plan for city / project]
    2 --> 3[3. Undertake the impact analysis. Evaluate the monitoring plan elements and parameters]
    3 --> 4[4. Prepare annual Monitoring Report based on MRP / framework on-post]
    4 --> 5[5. Quantify climate impact from transportation action (GHG emissions)]
    5 --> 6[6. Quantify sustainable development impact related to SDGs]
    6 --> 7[7. Conduct an impact assessment, based on a causal chain analysis]
    7 --> 8[8. Develop a clear understanding of the LULU project flow and impact assessment covered]
  
```

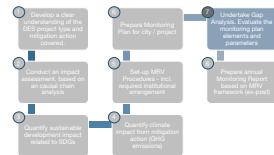
The flowchart illustrates a cyclical 8-step process for climate change impact assessment. The steps are as follows:

1. Develop a clear understanding of the LULU project flow and impact assessment covered
2. Prepare Monitoring Plan for city / project
3. Undertake the impact analysis. Evaluate the monitoring plan elements and parameters
4. Prepare annual Monitoring Report based on MRP / framework on-post
5. Quantify climate impact from transportation action (GHG emissions)
6. Quantify sustainable development impact related to SDGs
7. Conduct an impact assessment, based on a causal chain analysis
8. Develop a clear understanding of the LULU project flow and impact assessment covered

The MP shall include the following content to be robust and detailed:

Description of project	Description of measuring approach and system	Description of SD benefits contribution	General MRV procedures
<ul style="list-style-type: none"> Describing the purpose and general description of DES project, incl. details of the location and technologies/measures undertaken. 	<ul style="list-style-type: none"> Identified mitigation measures, results of the impact assessment, definition of the system boundary, sources and GHGs as well as baseline and project scenarios. Presentation of the calculations procedures for the estimation of GHG emission reductions, incl. emission reduction data and parameters used. 	<ul style="list-style-type: none"> How does the project contribute to sustainable development, with data and parameters of SD benefits. 	<ul style="list-style-type: none"> Outlining the institutional set-up and responsibilities in particular with regards to data recording, reporting and verification (data quality control).

Step 7: Identify gaps and barriers for the implementation city and project level



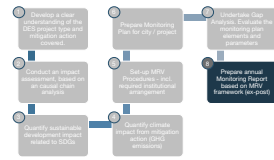
Main objective: *Confirm and check the compliance and capability* of the specific DES project, including its operators and institutions, with potential MRV requirements

- Ensure that the MRV approach covers the relevant impacts, using applicable, relevant indicators
- Identify existing sectoral data and required data for tracking the progress and impact

Specific MRV system may be confronted with *different barriers*

- Technological, financial, infrastructural, knowledge, social, political and institutional
- Robust determination approach of GHG emissions estimates, requires appropriated monitoring devices and a clear process for reporting and verification of data, which may potentially represent a challenge

Step 8: Prepare annual Monitoring Report based on MRV framework



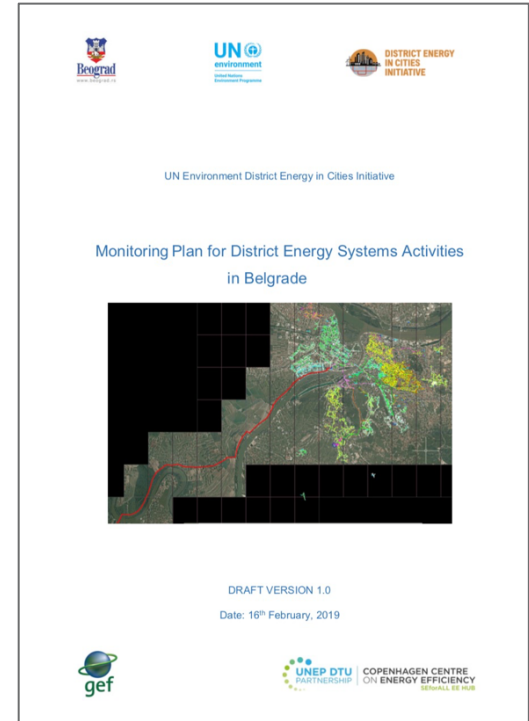
General information and general description

Description of monitoring approach and system: impacts included in the project boundary and defined baseline scenario

Emission reduction data and parameters: values for relevant parameters for the assessment period, including assumptions and methods used.

Calculation of emission reductions: Estimated GHG calculated for the assessment period using the measures / estimated values for each parameter.

Sustainable Development Benefits: Description how on the project contributes to sustainable development (SD), by reporting in key SDG indicators for the project.



Benefits of MRV frameworks for district energy systems

- A good foundation of data and information will *allow a more effective planning, facilitate decision making, help evaluate policy impacts* and hence supports the formulation / achievement of GHG and SD targets
- A solid MRV framework will generate transparency and build trust regarding the effectiveness of projects, which will *empower cities to identify relevant opportunities, identify priorities and take action*
- MRV will increase credibility, in particular, to *attract financial support and to improve access to finance* for the implementation of mitigation actions
- MRV supports meeting international reporting *requirements under the UNFCCC*, but also *national reporting* on climate change and sustainable development



Many thanks

Stefan Wehner

Email: sw@thegreenwerk.net

Phone: +49 (0)40 228 599 47

the greenwerk. Björn Dransfeld, Michel Köhler, Stefan Wehner GbR
Große Theaterstraße 14, 20354 Hamburg, Germany
info@thegreenwerk.net, www.thegreenwerk.net



**DISTRICT ENERGY
IN CITIES
INITIATIVE**