



DISTRICT ENERGY
IN CITIES
INITIATIVE



District Energy MRV Indicators at the National Level

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Outline

- Why do We Need MRV Indicators at the National Level
- Existing DES Statistics from Various Countries
- Suggested set of DES MRV Indicators at the National Level

Why DES Indicators at the National Level

- **Regional, structural and sectoral policies**

Policy makers are a main user of national statistics for designing and assessing their policies. Reliable data can improve transparency and accountability of different stakeholders

- **Banks and Investors**

National DES statistics can provide the main sectoral background information that can be helpful to banks and investors during decision-making regarding DES project financing.

- **Target setting, benchmarking and contributions**

Government agencies at different levels and DES companies can use the national DES data for target setting and project performance assessment

- **Trend analysis and future prediction**

National DES statistics can be used by analysts and researchers to examine the current situation and developments of the DES sector.

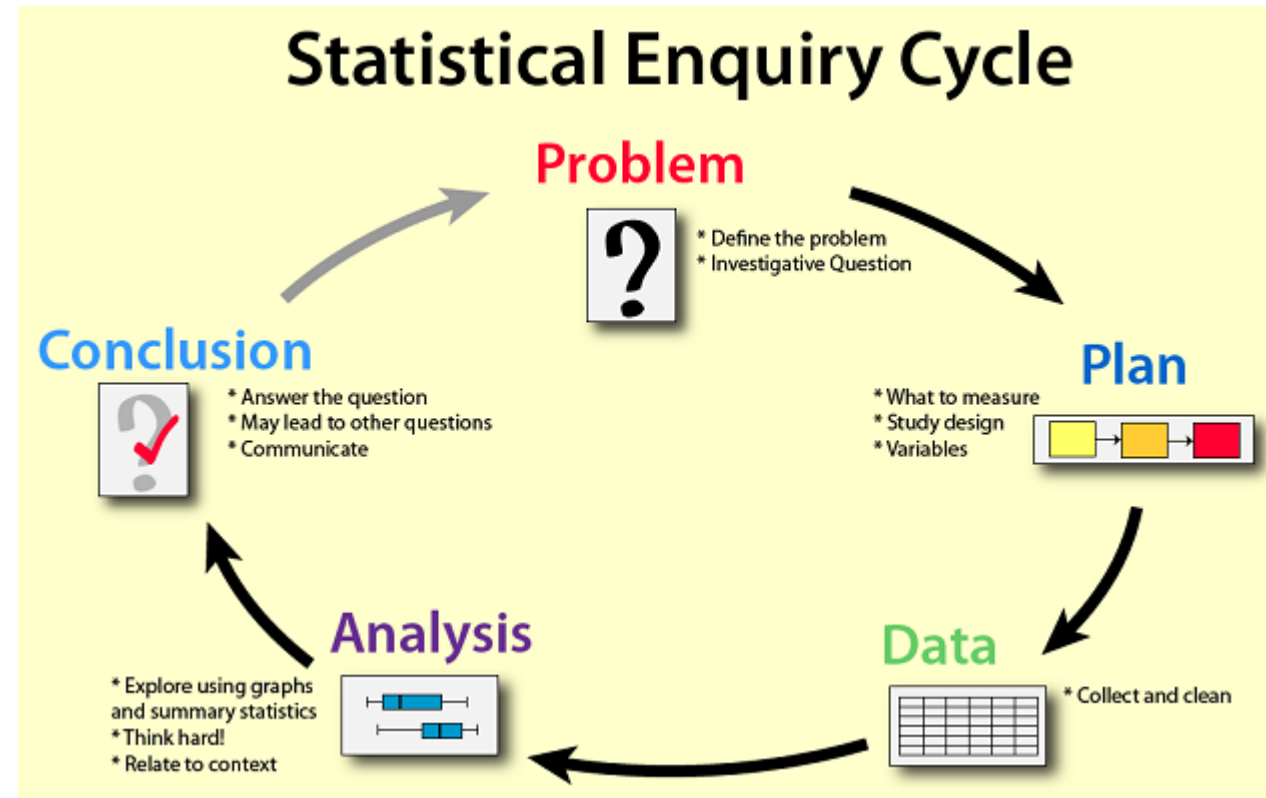
The Importance of A Common Set of indicators

- Increase the international comparability of national DES statistics
- Create the foundation for policymaking and decision-making based on facts and reliable data
- Provide the basis for past trends analysis, current status assessment, and future projection

Features of Statistics

- **Statistics are aggregates of facts** – single or unrelated figures are not statistics, because they do not throw light on any problem.
- **Affected to a marked extent by multiplicity of causes** – Statistics refer to the measurement of phenomena in a complex universe.
- **Numerically expressed, enumerated or estimated**
- **According to the reasonable standards of accuracy** –According to the reasonable standards of accuracy. There has to be certain rules while collecting data associated. This is necessary to maintain homogeneity of data.
- **Collected in a systematic manner for a predetermined purpose** – Data is collected as per a set of rules decided prior to the collection to avoid any kind of redundancy as well as inaccuracy.

Stages in a statistical investigation



Existing DES Statistics in main countries and regions - EU

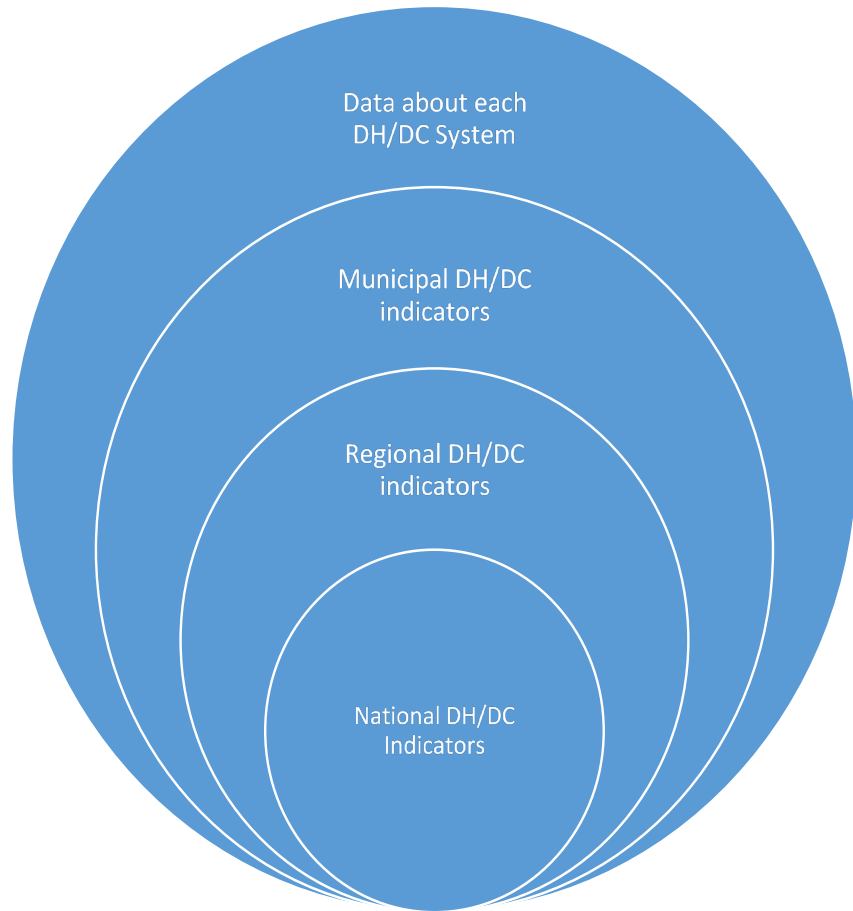
- District heating data are in the Energy Transformation Section of member country energy balances published by Eurostat
- Euroheat & Power directly collect data from member companies, and made the detailed data only accessible for paid members (including companies and professionals)

Indicators covered in the Euroheat Table on District Energy Statistical Overview

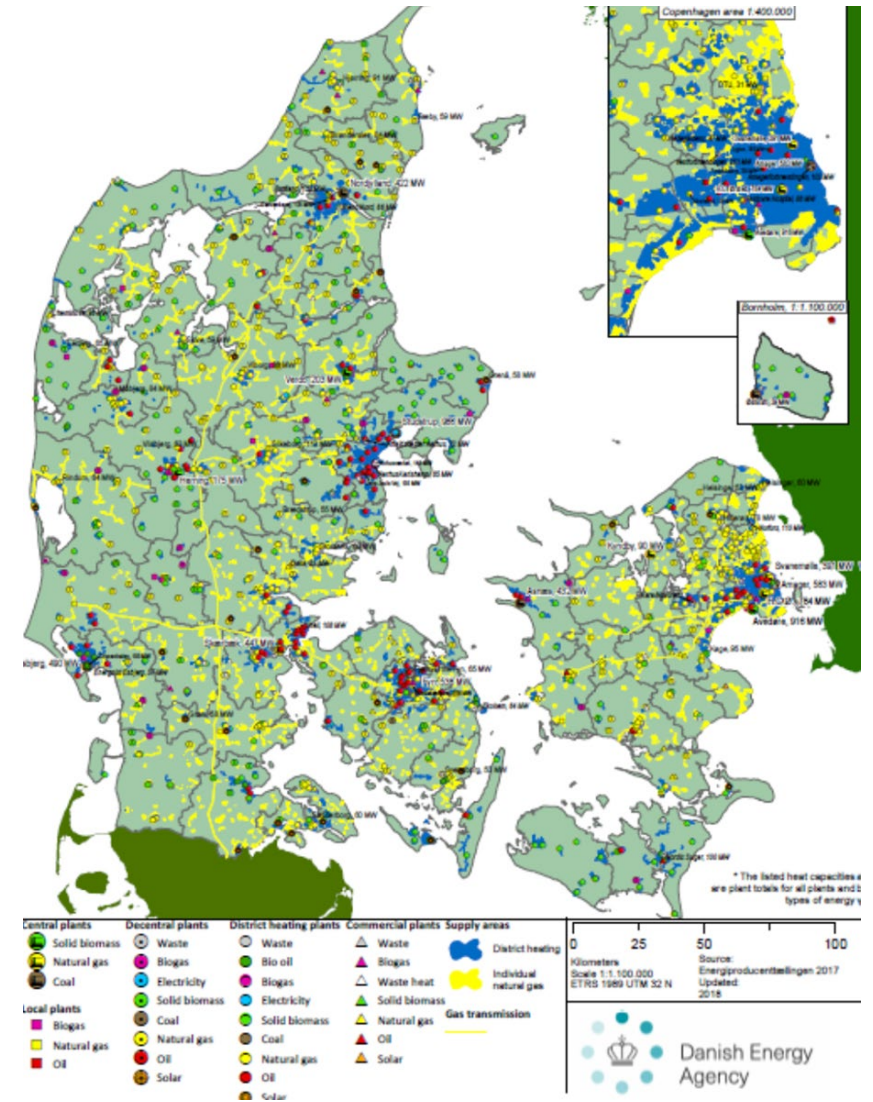
Type	Energy supply composition for District Heat generated			District heat sales				% of citizens served by District heating
Indicators	Recycled heat	Direct Renewables	Other	Total District Heat sales in 2013	Total District Heat sales in 2009	Annual District Heat sales turnover, 2013	Annual District Heat sales turnover, 2009	
Trench length of District Heating pipeline system 2013	Trench length of District Heating pipeline system 2009	Number of District Heating Systems	Total Installed District Heating capacity	Total investment in District Heating	District heating floor space	Total heat demand for domestic space heating	Share of CHP in national electricity production	Share of CHP in District Heating generation
		District cooling						
CHP heat auto-production	Average energy use of buildings per m ²	District cooling capacity 2013	District cooling capacity 2009	District cooling sales 2013	District cooling sales 2009	Trench length of district cooling pipeline system 2013	Trench length of district cooling pipeline system 2009	

Source: <https://www.euroheat.org/publications/country-by-country/>

DES data at different levels



DES Data at statistics and data at different levels



Map of DH Systems in Denmark, Source: DEA, 2017

Finland DES statistics - DH

Until May 2019, district heating statistics of 2015, 2016, and 2017 are available. The statistics contain eight tables.

- **Table 1: Basic information on district heating business in 2017.** Total supply, DH production by fuels, Net production of electricity in CHP production, Fuel energy consumed, Heat recovery and heat produced by heat pumps, DH consumption, Customers; Average selling, and Total length of DH network.
- **Table 2 is about the district heating buyers and sellers and the district heating sales,** as there are district heating wholesale and retail companies in Finland.
- **Table 3 is about the % distribution of the fuels used in district heat and CHP electricity production in 2017.**
- **Table 3.1 is an additional table of the specific types of fuel use** at separate district heating plants, i.e. district heating plants that are not CHP and only produce heat.
- **Table 4 about each district heat plant's primary information:** startup year, their types, number of boilers, heat output.
- **Table 5 is about each district heating plant's customers.** Three customer types: dwelling houses, industrial customers, and other customers.
- **Table 6 is on heat sales and sales revenue.**
- **Table 7 is about each DH plant's annual DH supply from 2008 to 2017.**
- **Table 8, also is about district heating supply in each city,** including the company, the year starting the supply, the number of population living in DH houses on Dec 31, 2017, average population in 2017, and rate of population covered with DH supply.



District Energy Statistics in Finland - District Cooling

District Cooling Statistics from Finland. The 2017 DES statistics includes details of all the 10 district cooling systems in operation in Finland. The data are provided in 5 different tables.

- **Table 1 is about customers and sales of each DC system.**
- **Table 2 is about DC production.**
- **Table 3 is on production capacity**, including the starting operation year, cooling capacity, the number of units, technology type (heat pump, absorption, and compressor).
- **Table 4 is on the free cooling capacity.** The table covers the startup year of each free cooling DC system, the cooling capacity, as well as energy source.
- **Table 5 is about accumulators.** Some of the free cooling DC systems are equipped with accumulators. This table specifies the startup year of the accumulators, the accumulation effect, and the volume.

China DES Statistics

No specific DES statistics. But DH data includes in a few statistical yearbooks

District energy data in China National Statistical Yearbook 2018

Section 25 - Urban, Rural, and Regional Development includes a table on District heating statistics of 23 provinces, 4 municipalities, and 5 autonomous regions in 2017. The columns in this table include:

- District heating supply capacity (steam in tonne/hour; hot water in MW)
- Total heat supply (Steam; hot water in 10,000 GJ)
- Pipeline length (Km)
- Heated floor area (10,000 square meters)

In the table on general status of urban utilities, includes district heating floor area for 1990, 1995, 2000, 2010, 2015, and 2017.

MoHURD publishes the Urban-rural Construction Statistical Yearbook.

The data on district heating in the 2017 Yearbook includes : Fixed asset investment in central heating made during the year both at the national level, at the provincial level (each province, municipality, and autonomous region), as well as in each of the 681 cities; The newly added production capacity for district heating (hot water vs steam) and pipeline length (hot water vs steam)

MoHURD publishes the **annual Urban and Rural Construction Statistical Communique**, which includes DH supply capacity, supply, pipeline length and heated floor area data for Cities; county seats; towns and villages.

Main observations

- DES statistics vary widely among different countries and regions
- The most detailed data (at company and project level are available in Nordic countries, especially at project/company level in Denmark and Finland)
- Even among countries with same indicator, the detailed level can vary a lot. For example, DH customers, in China it is only floor coverage; at the EuroPower& Heat, it is residential, commercial, and industry; in Finland, households further divided into multi-family buildings, one or two-family buildings, service sector further divided into schools, hotels, hospitals, retails etc.
- In Denmark, the DBDH annual statistics include data about expenses of each DH company, and information on consumers covers number of meters
- Compared with DH, DC data and statistics are much rarer.

A Set of DES Indicators at the national level - DH

- 1) **Profile of the DH Sector:** the number of DH plants; Total installed capacity; Annual DH supply; The number of population and floor areas served by DH; Size of the DH network; The floor area and population of DH coverage.
- 2) **Fuel composition of the DH systems** (coal, oil, natural gas, waste, biomass etc.)?
- 3) **The district heating generation from DH plants using different fuels**
- 4) **Technology types** (heating only, or CHP, even trigeneration) and their generation capacity, DH generation, fuel input and output ?
- 5) **DH plants of different size groups** (large, medium, and small)?
- 6) **Ownership** of DH plants and DH networks (public, private, cooperative, or other) ?
- 7) **Composition of the DH networks** (based main pipes or connecting (secondary pipes), the medium of heating supply as heat, steam, hot water).
- 8) **District heating users/customers** (residential buildings, commercial and public buildings, industries), captive DH plants

A Set of DES Indicators at the national level - DH

- 9) Investment (total, in DES production capacity, in DES network, in DES retrofitting etc., and the resulted production capacity and network increase)
- 10) DH sold and sales revenue of the DH /DC
- 11) Heat losses in the DH networks**
- 12) Prices of district heating, average price, fixed connection charge, consumption charge, prices for different consumer groups
- 13) Job creation, use of renewables /waste/residual energy
- 14) Temperatures of outflow and inflow of water/steam in the DES networks during summer and winter**
- 15) Expenses composition of each district heating enterprises
- 16) Role of DH in heating supply
- 17) Climate adjusted use of district heating

A Set of DES Indicators at national level - DC

- 1) **Key indicators of the DC sector: number of DC systems**, the year the DC system starting operation, number of customers, number of buildings, contracted capacity, building floor area, cooling energy sold, and the network length
- 2) **DC production from each technology type, including absorption chillers, heat pump, compressor, free cooling.**
- 3) **The energy input for each source of DC cooling production**
- 4) **DC production capacity**, including the starting operation year, cooling capacity, number of units, technology type (heat pump, absorption, and compressor).
- 5) **The free cooling capacity.** The table covers the startup year of each free cooling DC system, the cooling capacity, as well as energy source (sewage, ground, seawater, lake water, and air).
- 6) **The information on the accumulators.**
- 7) **The DC network**
- 8) **Prices and sales revenue of DC services**
- 9) **DC role in job creation/export**
- 10) **Temperatures of outflow and inflow of chilled in the DES networks during summer and winter**
- 11) **Role of DC in total space cooling supply, climate adjusted use of district cooling**

Factors to be considered in DES indicator selection

- Existing institutional setup for DES administration and statistics
- Status, trends, potential, and national policies and strategies for DES development
- Existing DES data and statistics
- Costs of data collecting, processing, and publishing
- Primary objectives of the DES statistics
- Willingness of data sharing among DES businesses, government authorities, and industrial organisations
- High level coordination among different government agencies

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