Developing an effective strategic heating/cooling plan: What key success factors?

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Agenda

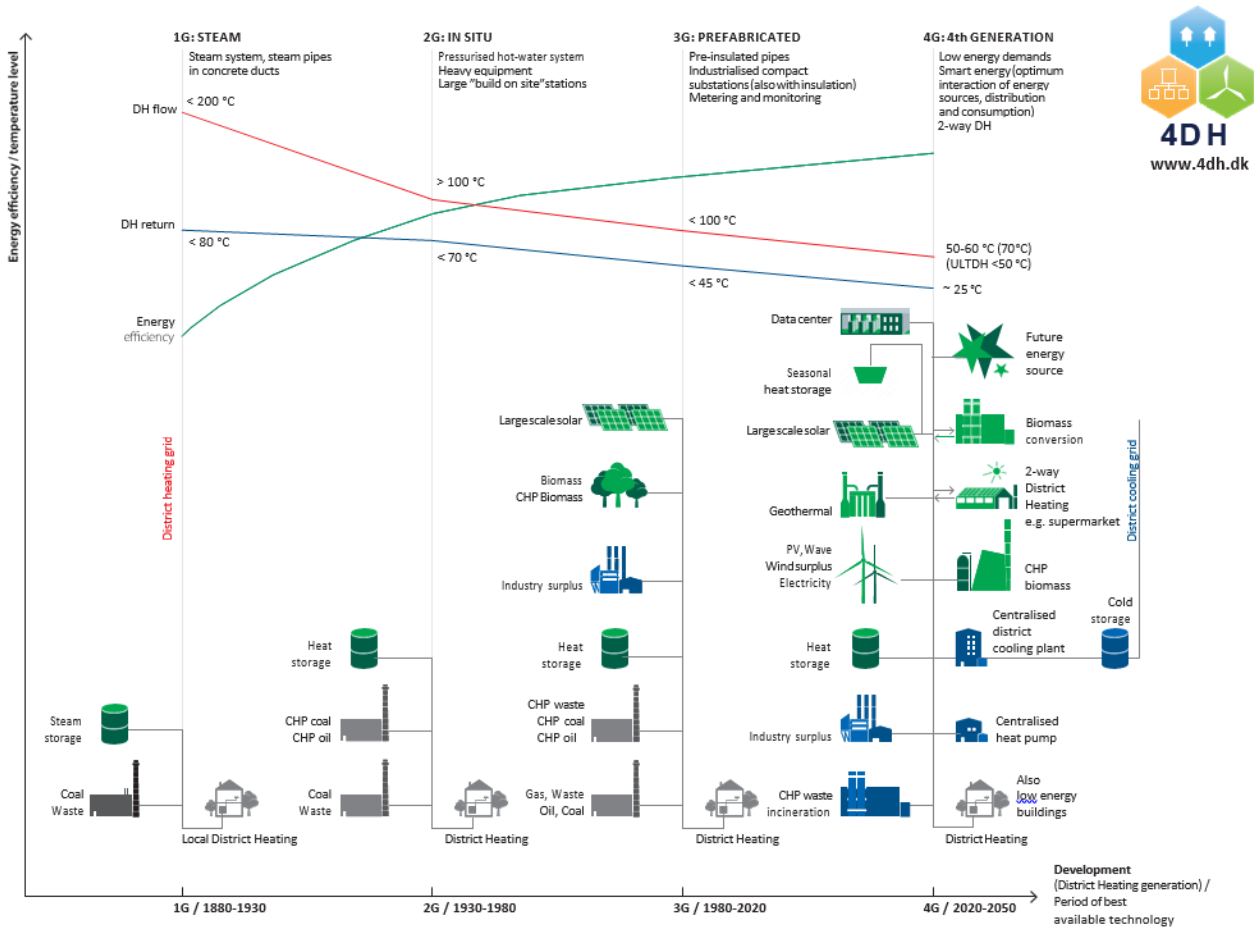
- **Introduction**
- **Strategic heat planning:**
  - **Identify stakeholders and project drivers**
  - **Constructing technical scenarios**
  - **Framework conditions, financing and business models**
- **Conclusions and summary**

Introduction

Heating is the largest end-use in Europe

District heating allows access to many supply sources

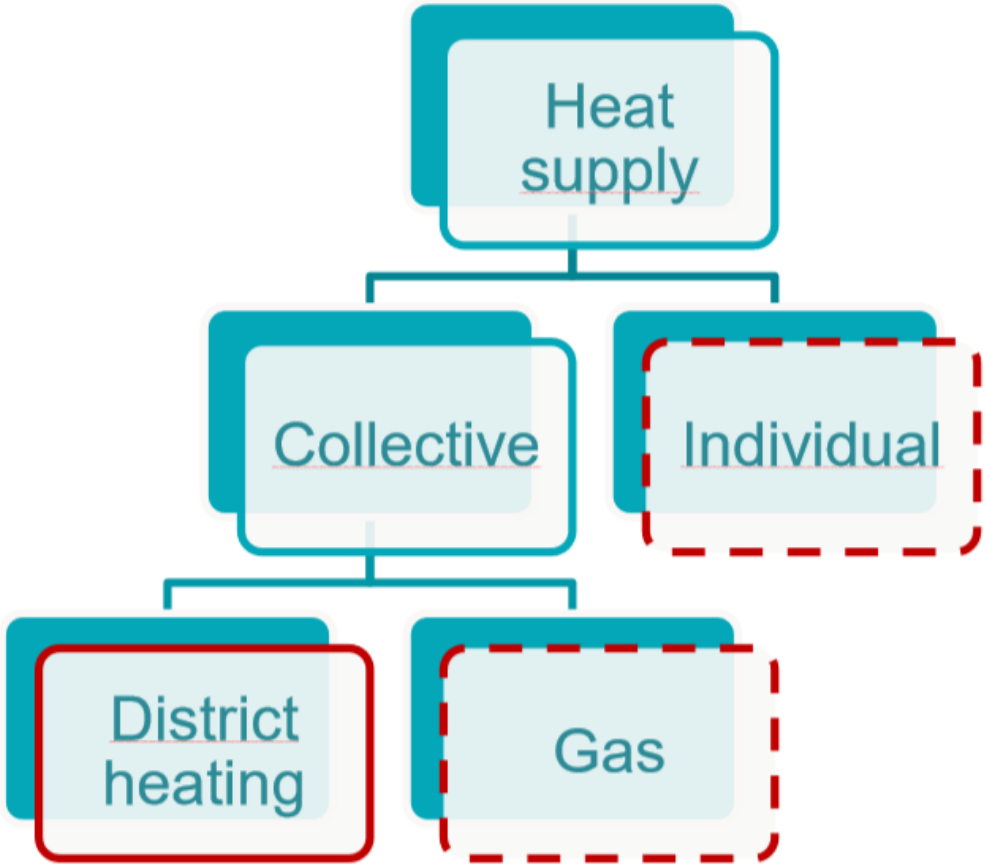
Smart energy systems and sector coupling exploits important synergies



Lund et. al. 2014

Types of heating infrastructures

Strategic heat planning for collective large-scale infrastructures



Djørup et. al. 2019: Definition & Experiences of Strategic Heat Planning

Heat planning and governance

Heating is a local demand

- Unlike electricity and gas, heating is situated locally
- Often overlooked in national energy policy
- Often covered by different regulation: buildings, energy efficiency, fuels etc.

If not treated systematically in energy policy and governance:

- Significant sector coupling and synergies are missed
- Many renewable or efficient heat sources are not considered

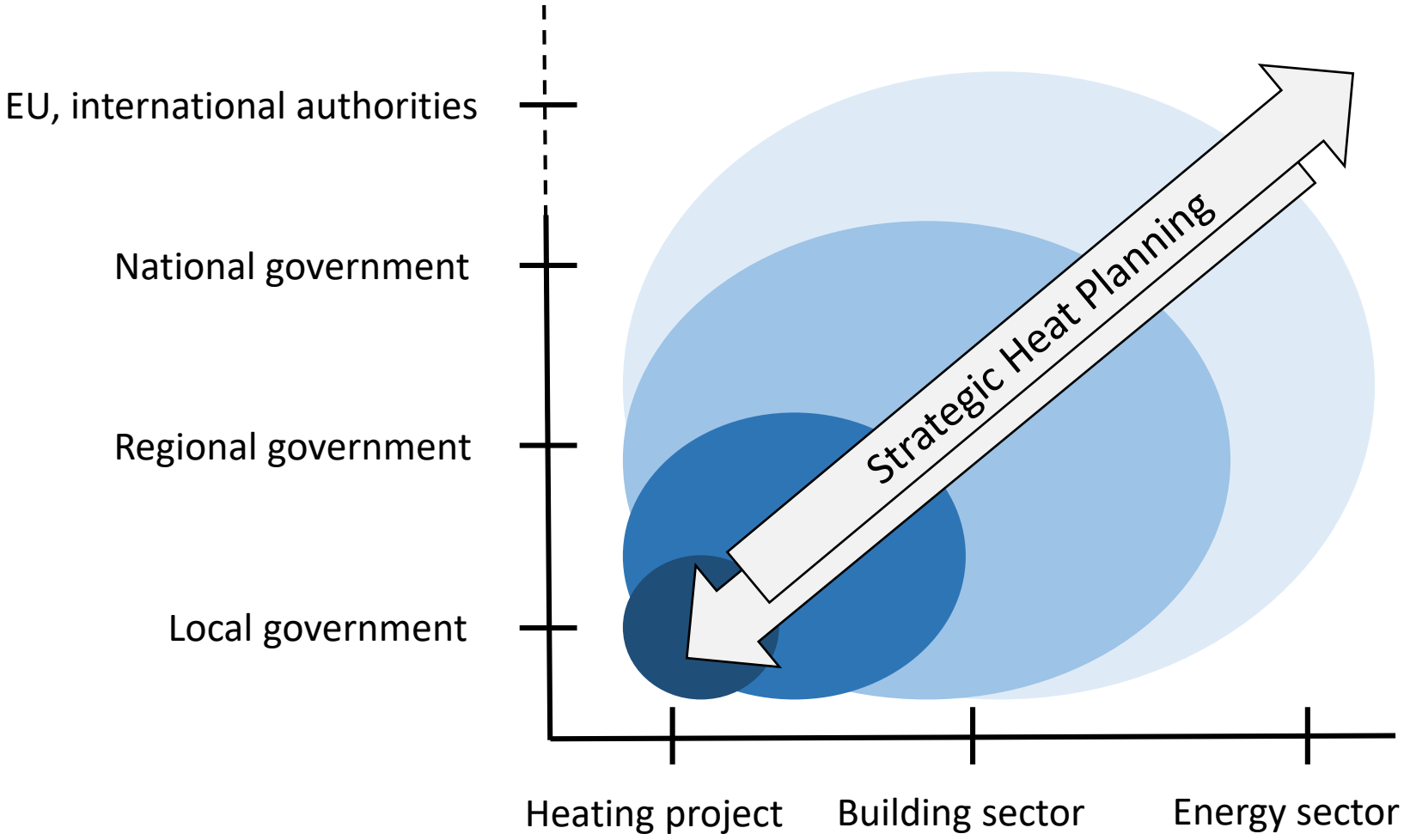
Strategic energy planning

- The purpose of Strategic Energy Planning is to **address issues** with current energy supply and to **formulate strategies** and plans for transitions.

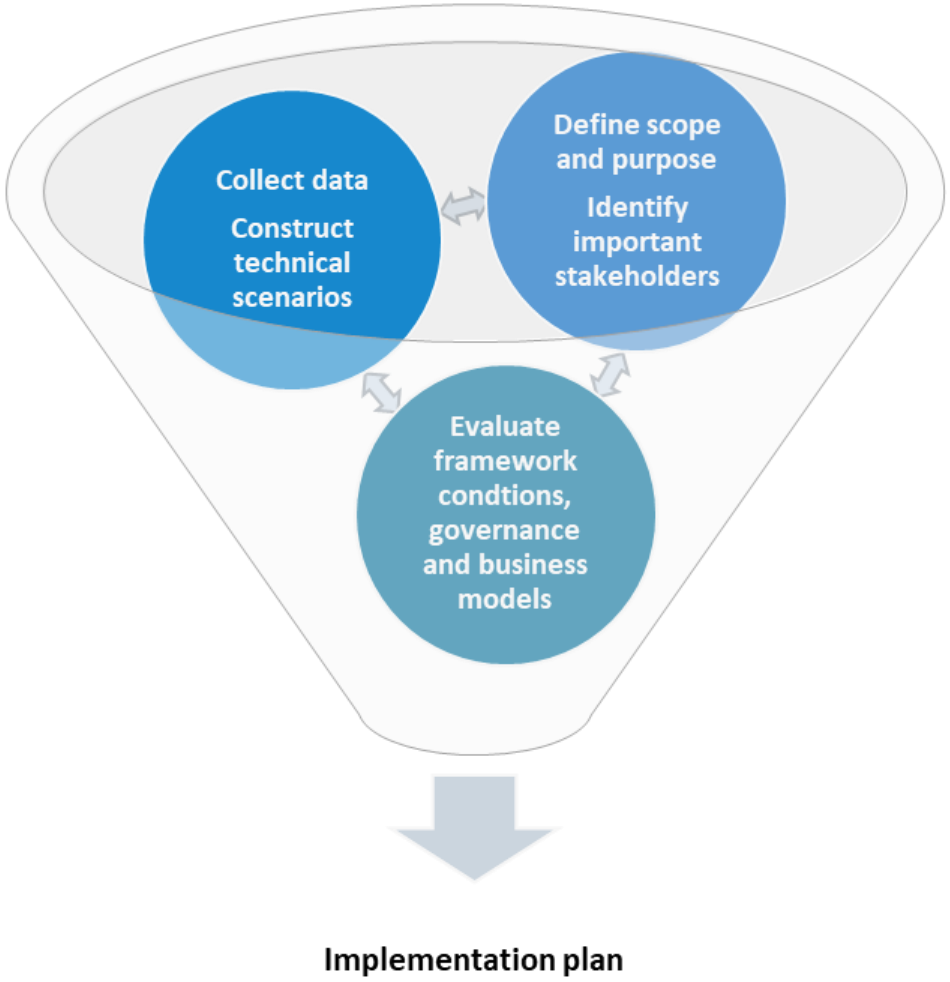
- Strategic heat and cooling planning does differ from planning for other energy carriers due to the **local nature of heating and cooling** supply.

- **Interdisciplinary**: available resources, energy demands, technical potentials, current legislation, the organisation of the energy sector and the related actors, political drivers and barriers should be considered

The context of Strategic heat planning



Key success factors in a Strategic Planning Process



1. Scope and purpose

- Identify main stakeholders
- Identify drivers for district heating projects

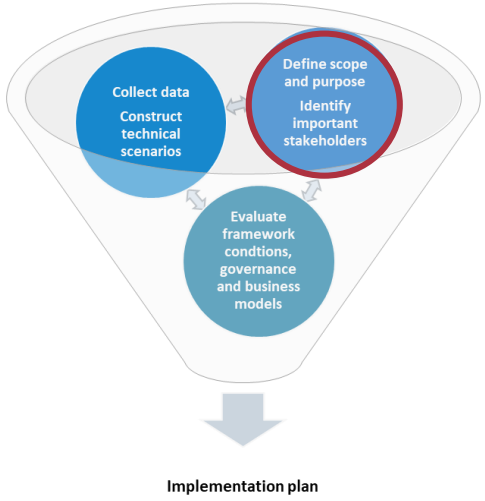
2. Technical scenarios

- Measure heat demand
- Identify potential heat sources
- Balance heat savings and supply
- Establish scenarios

3. Evaluate Framework conditions and business models

- Ownership
- Financing
- Pricing
- Regulation

1. Scope, Purpose and Stakeholders in Strategic Heat Planning



Scope, Purpose and Stakeholders

- Important to identify drivers of the strategic energy planning process:
  - Climate change, energy security, air pollution, energy poverty etc..
  - Multiple drivers are likely to exist: important to figure out which ones align

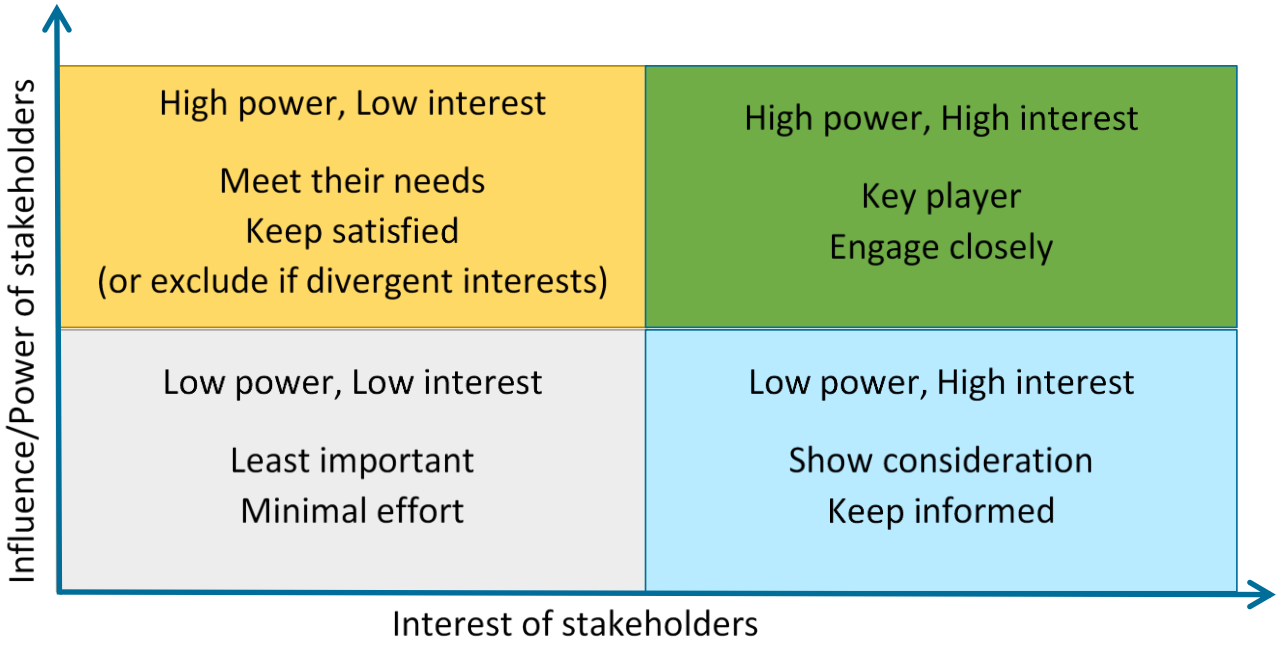
Identification and coordination of stakeholders

- *Who* are the main actors engaged in the process
  - Industry, high demand consumers, consumers with special needs
- Identifying opportunities to involve stakeholders that can play a constructive role in realizing heat plans
- Identifying synergies and opportunities for cost-effective district energy systems

1. Scope, Purpose and Stakeholders in Strategic Heat Planning

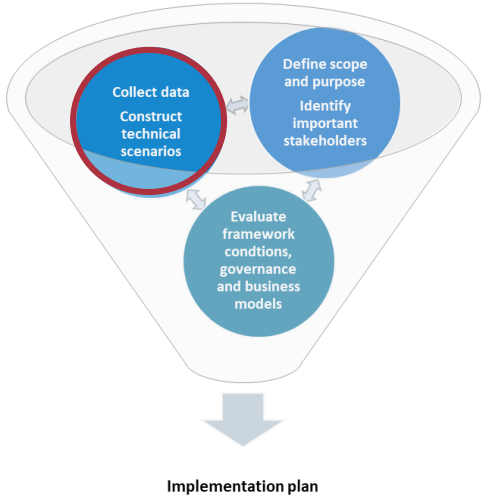
Some Stakeholders to Consider:

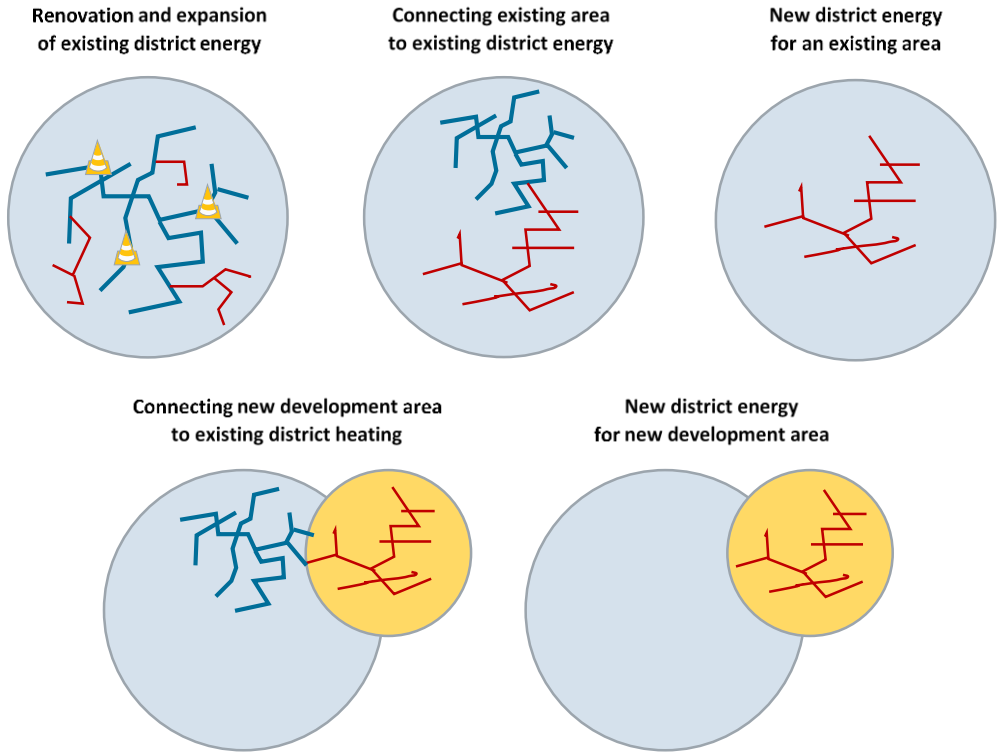
- National Authorities
- Local Authorities
- Utility Companies
- Investors
- Researcher / Academia
- Developers
- Technology developers: geothermal, solar thermal, PV, wind etc.
- Excess heat suppliers: industry
- Customers and Citizens



2. Technical scenario building for strategic heat planning

1. Quantify and locate heat demand
2. Quantify and locate heat resources
3. Quantify and assess heat-saving potentials
4. Establish scenarios for heat supply





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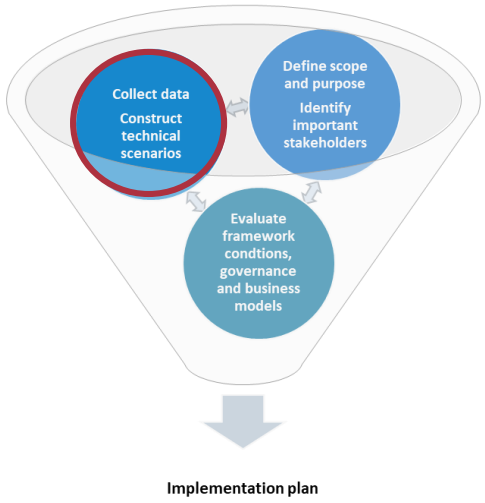
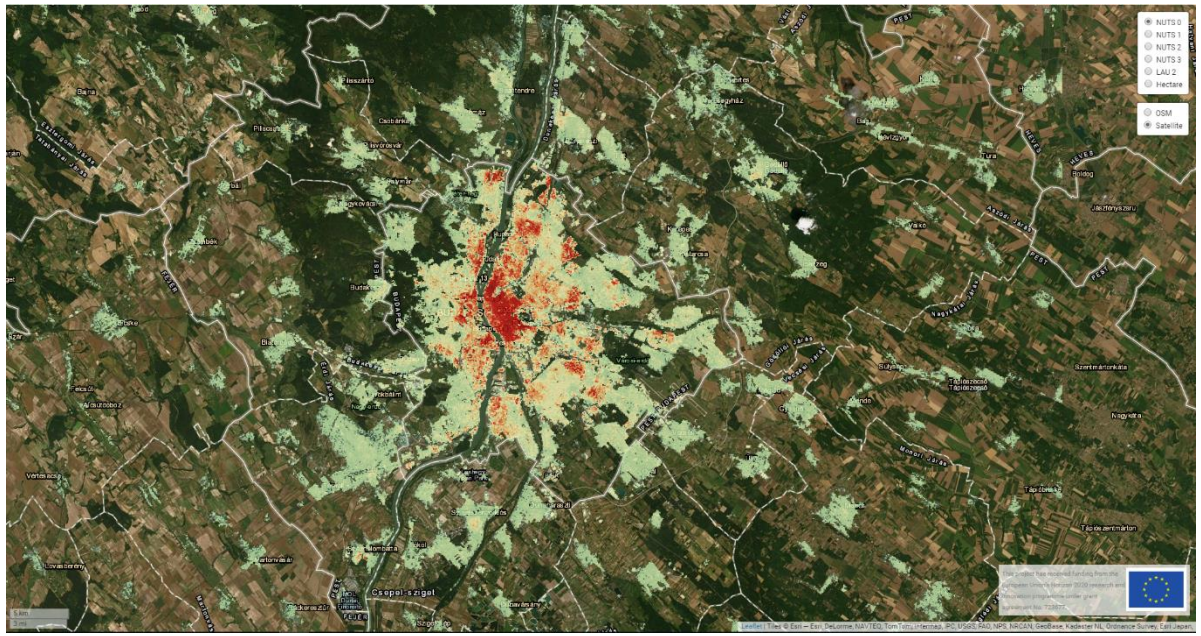


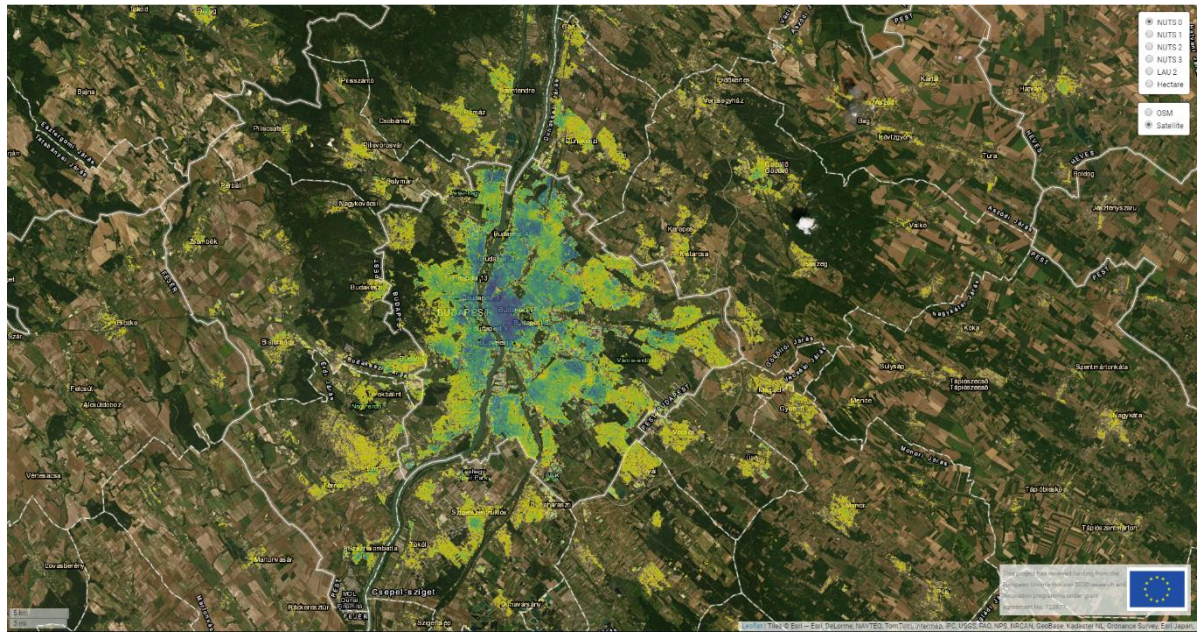
1. Quantify and locate demands

- **Measurements** of actual demands allow for actual knowledge of distribution of consumption.
- **Modelling** or estimating demands can be a way forward to provide inputs for decision making – see for example Peta4 and Hotmaps.

Heating demand Budapest



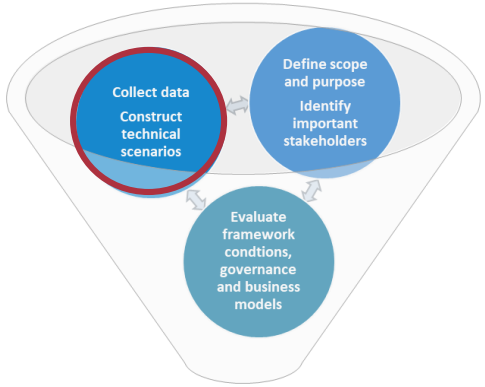
Cooling demand Budapest



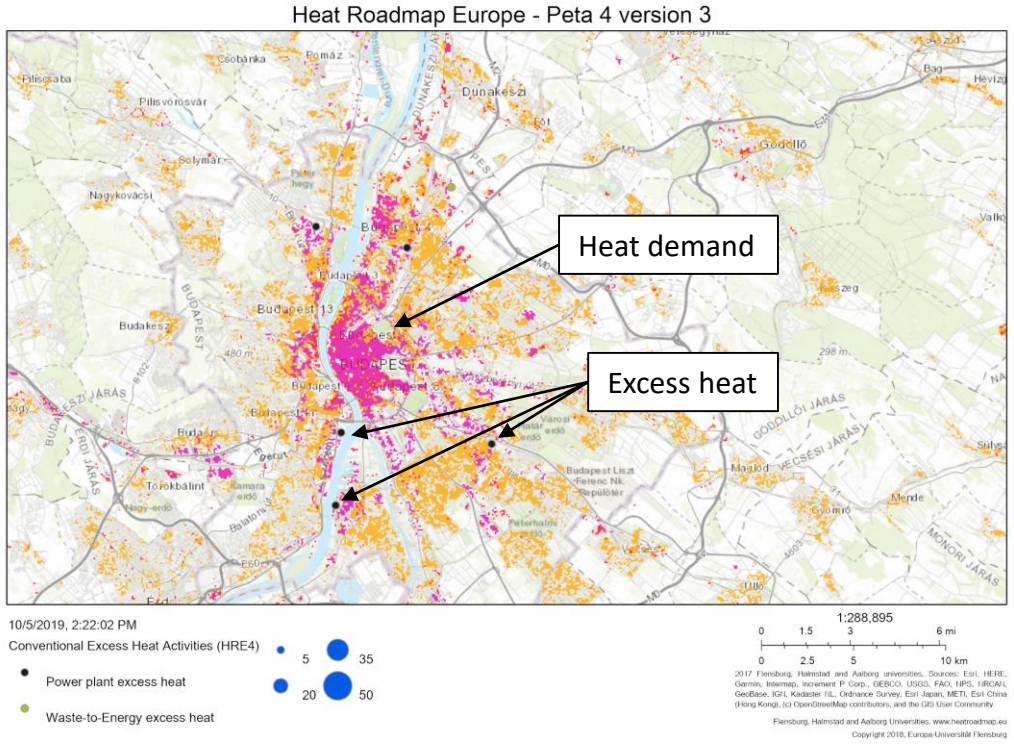
From Hotmaps

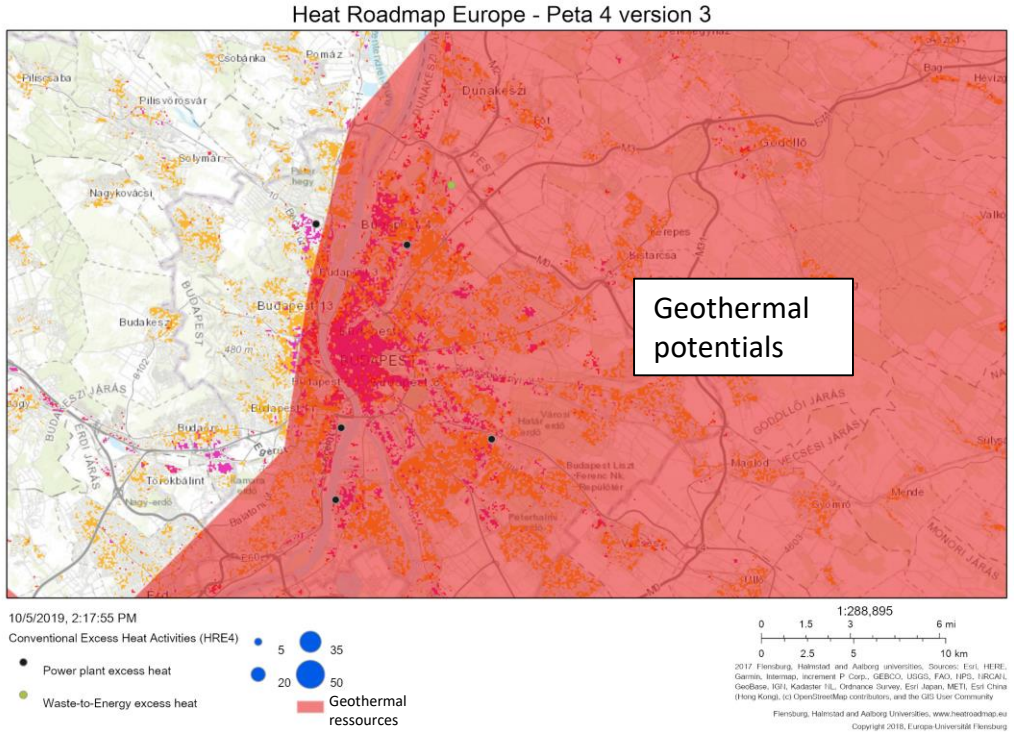
2. Technical scenario building for strategic heat planning

2. Quantify and locate heat resources



- Strategic heat sources are typically either excess heat or renewable sources
- Low district heating supply temperature enables the use of low temperature geothermal resources
- Strategic heat sources can thus be low-temperature decentralised renewable such as solar thermal, geothermal heat, or excess heat recovered from compressor machines





From Peta4

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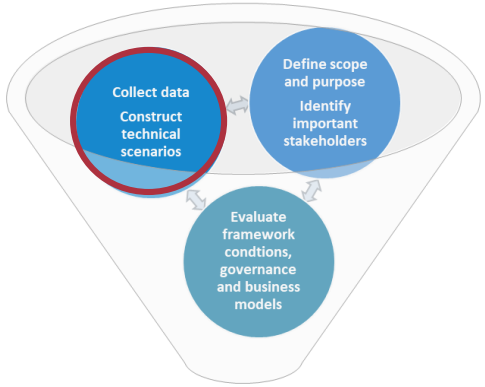
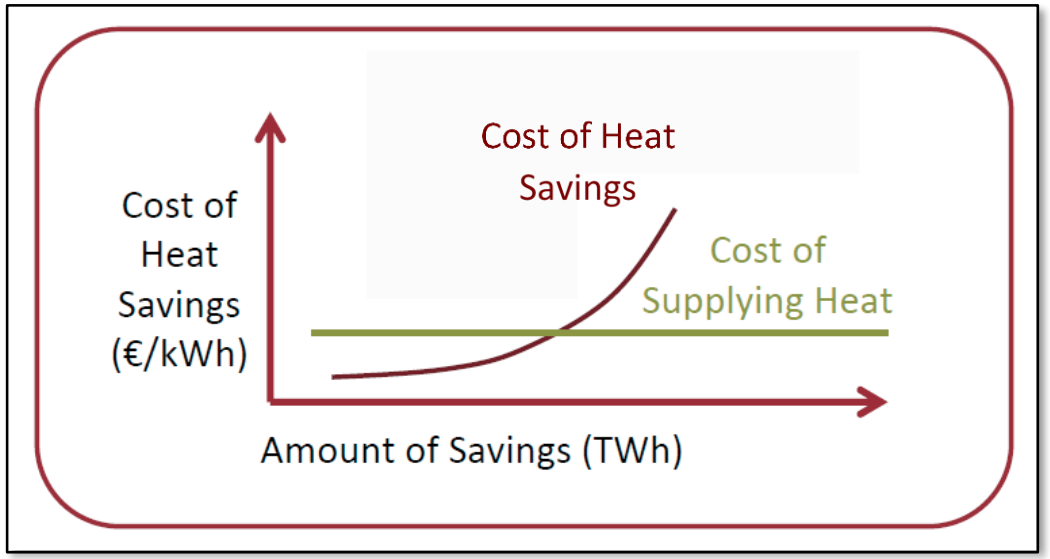
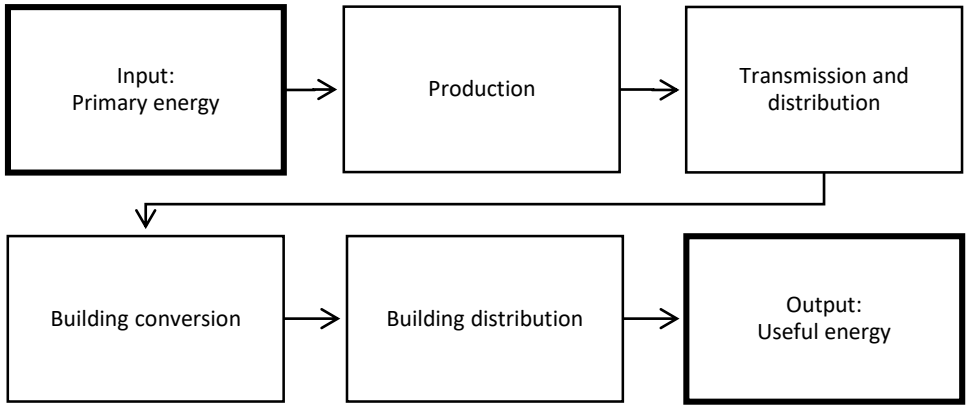
3. Quantify and assess heat-saving potentials







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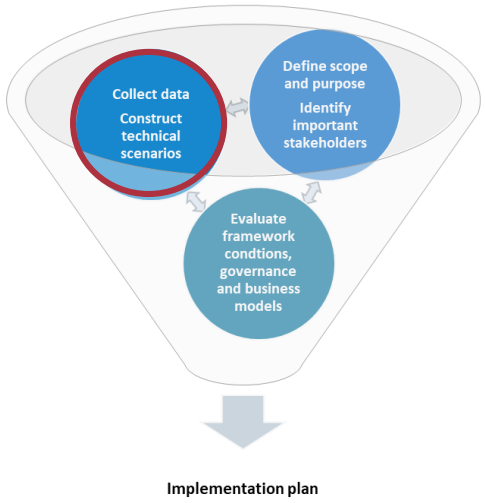
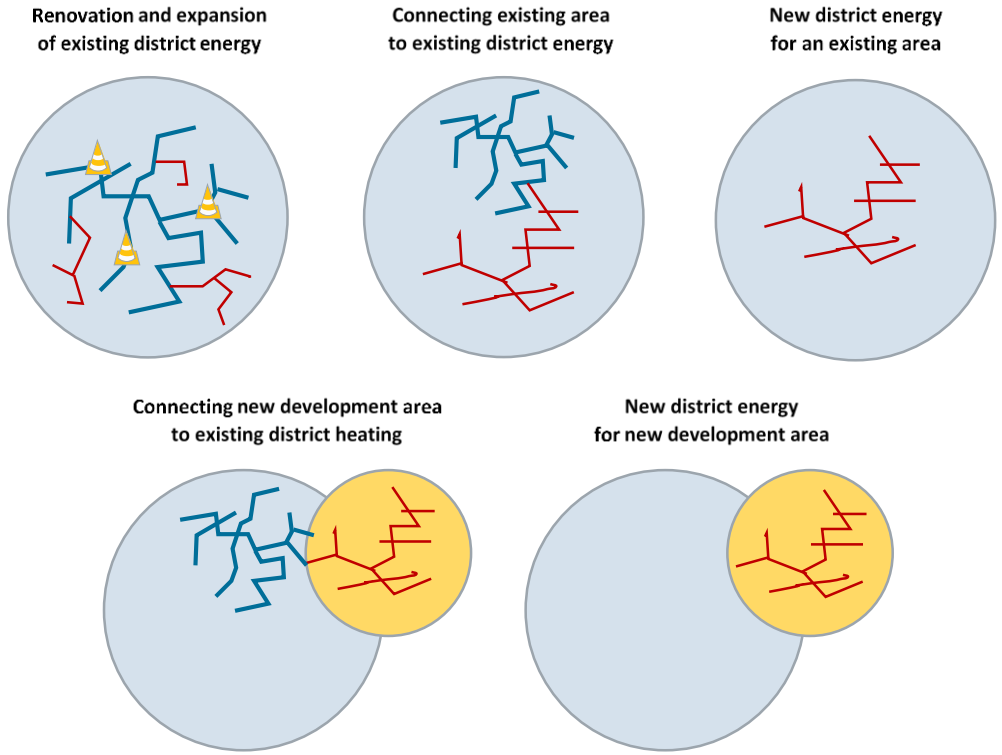


4. Establish scenarios for heat supply

- When establishing these scenarios, keep in mind the i)scope, ii) perspective and iii) timeframe of energy systems analysis

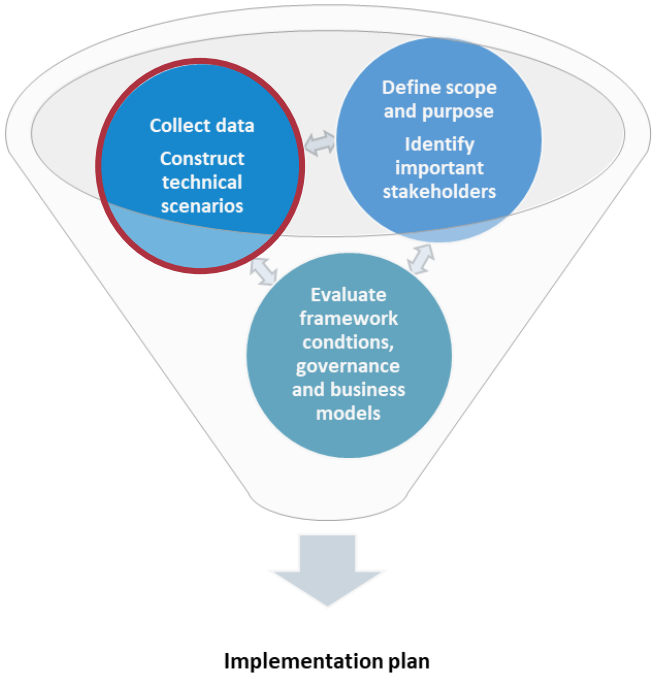
- Do not make them too detailed at first! Easy to get lost in technical or legal details. It is important to keep the process moving. Include the level of detail needed to make decisions and move further.



2. Technical scenario building for strategic heat planning

Methodological points for scenario building:

- Energy system scope:
  - *Include entire energy system to identify synergies*
- Data is important:
  - *Good quality heating data is vital*
- Timeframe:
  - *Ensure that scenarios are in line with long-term targets*
- Differentiate between socio-economic and business economic prices:
  - *Taxation, subsidies, externalities etc. influence the result. Use costs that are relevant to <u>society</u> and not supporting status quo.*
- <u>Important to remember that strategic heat planning is not business as usual</u>



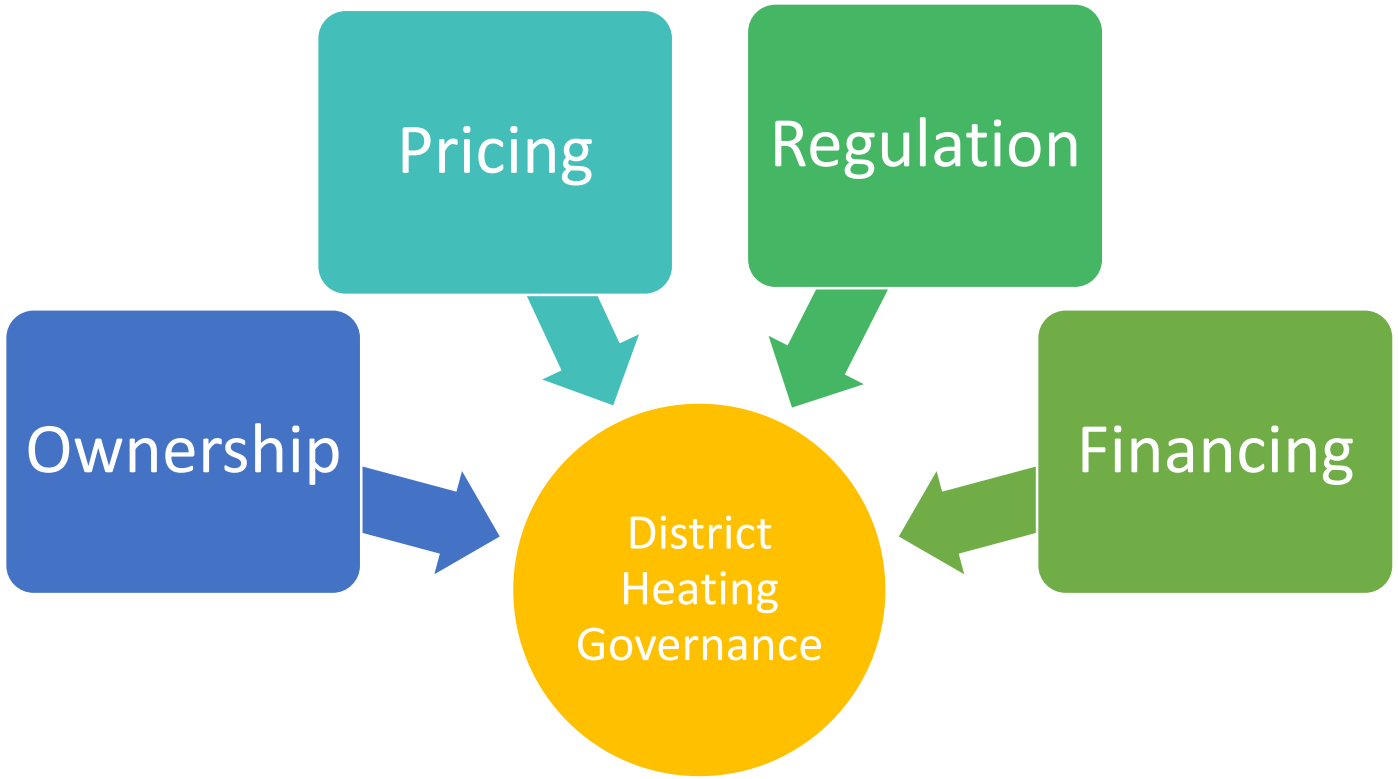
3. Enabling Framework Conditions, Financing and Business Models

Ownership structure
Interests and monopoly
Who owns the distribution infrastructure?

Pricing
What heat pricing mechanisms are being used?

Regulation
Is there specific district heating regulation?

Financing
Is it possible to ensure a long timeframe for the return on investment?



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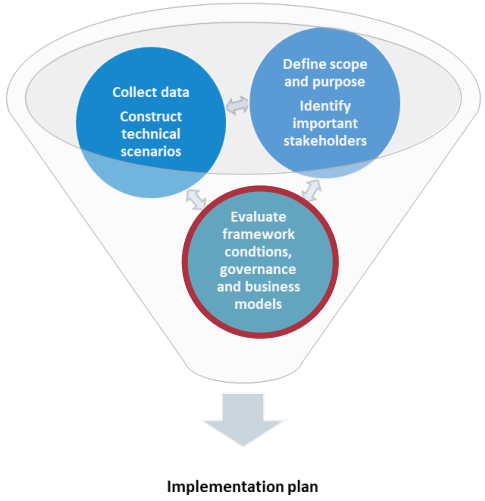


Three typical barriers:

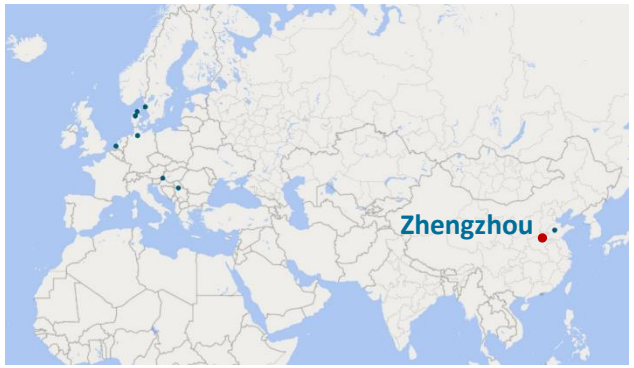
<u>Challenge 1:</u> Level playing field
Recommendations:
- Fiscal levers
- Specific district heating legislation
- Consider district heating grids as infrastructure
- Consider externalities: decarbonisation, supply security, air quality

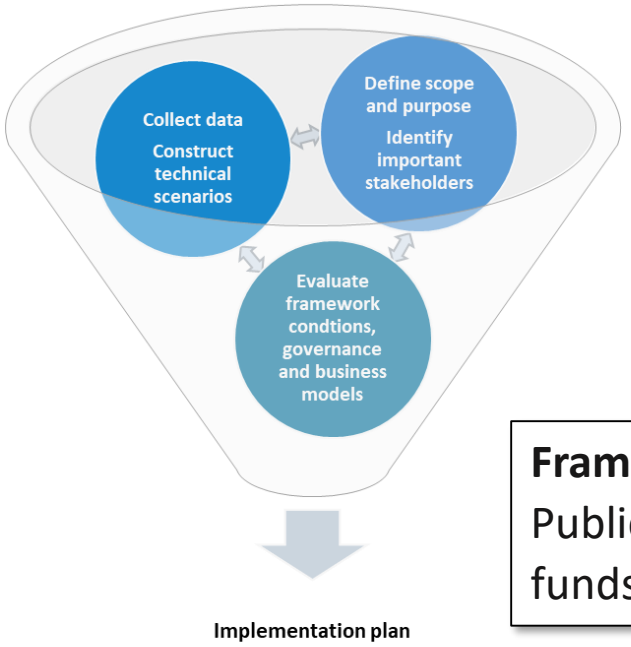
<u>Challenge 2</u>: Lack of governance tools to implement district heating
Recommendations:
- Feed back needs and ideas to national authorities and legislature. Create awareness of lacking tools.
- Identify what is possible within current regulatory framework

<u>Challenge 3:</u> Overcoming barriers to investment
Recommendations:
- Picking low-hanging fruits: start with high-demand consumers,
- Government intervention through economic and financial instrument
- Capacity building for authorities and heat market stakeholders

Case study - Zhengzhou Municipality

Zhengzhou Municipality included urban planners, architects, construction contractor, future building owners (mainly financial companies), distributor company and the heat supplier (water treatment factory) for planning new district heating systems





Scope and purpose:

1. Replace all coal-fired energy production
2. Increase energy efficiency in buildings by 15%
3. Reduce air pollution levels

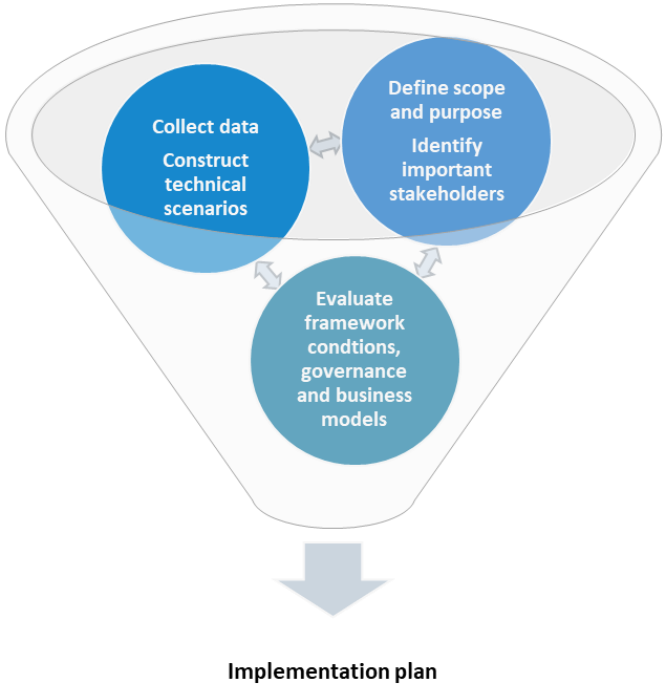
Technical scenarios:

- Interaction with buildings to achieve energy savings
- Use the wastewater heat

Framework and financing:

Public endowment fund – to recirculate funds for new district heating investments

Key success factors in a Strategic Planning Process



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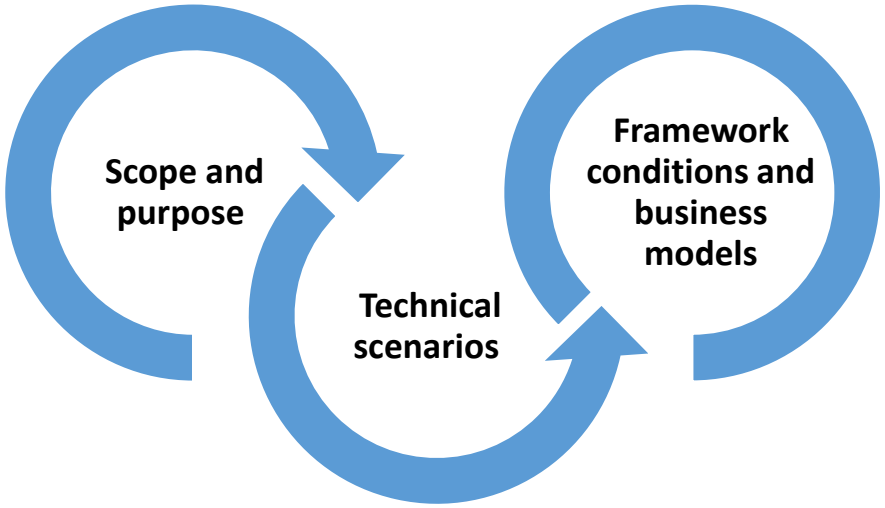
More on these topics in the next webinars

Strategic heat planning and the integration of low-temperature renewable energy sources in DHC

Strategic Heat Planning is an iterative, multidisciplinary and continuous process



Key Success Factors:

Scope and purpose

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Evaluate Framework conditions and business models

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Further Heating and Cooling Planning Ressources

Heat Roadmap Europe studies: link

- Heat Roadmap Scenarios for 14 European countries: link
- Heating and cooling demands: link
- Interactive heat demand and ressource map: link

HotMaps Research Project: link

- HotMaps toolbox (still under development – more features to be added): link
- HotMaps report: Definition & Experiences of Strategic Heat Planning: link
- HotMaps report: Guidance for the comprehensive assessment of efficient heating and cooling: link
- HOW TO FINANCE GEOTHERMAL DISTRICT HEATING? SEMINAR, BRUSSELS 13 DECEMBER: link
- WEBINAR: HEATING AND COOLING PLANNING MADE EASIER: link

Other heat planning research projects:

- THERMOS – district heating network planning tool: link
- ReUseHeat – exploiting urban excess heat: link
- KeepWarm – Renewing district heating: link
- IRENA & AAU – Guidebook: Integration low-temperature renewables in district energy systems

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International Renewable Energy Agency

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Thank you for your attention!

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