MODULE 4. STRATEGY DEVELOPMENT: INCORPORATING DE INTO LOCAL ENERGY & LOW-CARBON HEAT/COOL STRATEGIES
MODULE 4. STRATEGY DEVELOPMENT IN DISTRICT ENERGY

LEARNING OUTCOMES

Objective: share insights on strategy development to incorporate district energy into a local energy and low-carbon heat/cool strategies

By the end of this module, you will be able to:

1. Describe, understand and discuss the role of district energy strategy development in local energy and low-carbon heating and cooling strategies;

2. Recognise and apply key steps to integrate district energy in local energy and low-carbon heating and cooling strategies;

3. Identify best case practices in incorporating district energy planning in local energy strategies;
Key Steps in District Energy planning

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. **Replicate**

Incorporating district energy into local energy and low carbon heating and/or cooling strategies …

- Most efficient and measurable way to meeting city objectives
- Provide a coherent vision around which to mobilize project champions
- Reassure investors, making possible longer-term infrastructure developments such as district energy
- Resources spent justified against the potential benefits
- A city can shape the low-carbon pathways of its services, capture synergies across business segments, and direct the local district energy strategy towards social and economic objectives
- In essence, to tackle energy-related challenges in a coordinated and informed manner, with a long-term perspective

Source: EnergyLab Nordhavn
An energy and low-carbon heating/cooling strategy implies...

- Identify and apply the **practical steps** required to develop the “portfolio” of projects and actions.
- **Coordination and monitoring of progress** and the engagement of stakeholders.
- Setting **delivery mechanisms** and enabling mechanisms in order to facilitate and stimulate investment in the “portfolio”.
- **Strategic heating and cooling planning** differs from planning for other energy carriers due to the local nature of heating and cooling supply.
- It is necessary to include **technical, economic, environmental and societal contexts** in the assessment.

Source: Vancouver Authorities
An energy and low-carbon heating/cooling strategy…

- Elaborate technical scenarios
- Assess compatibility with existing heating and/or cooling networks in buildings
- Address technical challenges when implementing low-temperature heat sources (e.g. geothermal, excess heat/cooling, etc.)

Strategy development in local energy and low-carbon HC is not solely an engineering, economic or political activity but it is **interdisciplinary** in its nature
Six steps in incorporating district energy into a local energy and low-carbon heat/cool strategies

1. Objectives
   Identify city objectives for the heat and cool sectors.

2. Stakeholder coordination
   Bring together the various actors in the development of the strategy to ensure it is holistic and has full support.

3. Data Collection
   Ensure data is collected on heating and cooling that can link back to the city objectives.

4. Heat and Cooling Assessment
   Carry out a heat and cooling assessment that identifies technology pathways.

5. Targets
   Develop technology specific targets to provide investor certainty and to measure progress.

6. Reflection & Revision
   An energy strategy in a city is constantly evolving and should be updated and progress evaluated.
1. Objectives: Definition

Cities develop district energy to achieve a variety of objectives

- Understanding and articulating these objectives is key to get ‘buy-in’ from different actors and the community.
- It also provides a focus for the strategy development.
1. Objectives: An example

Annual energy consumption by building type in Paris (2009)

Source: District Energy in Cities Initiative
HOW TO DEVELOP STRATEGY IN DES?

1. Objectives: Challenges & Opportunities

Heating and cooling not being considered at the city level

In some countries heating and cooling solutions are traditionally focused at the national level (electricity, gas, building efficiency)

Many objectives are expressed at the national level (CO2, efficiency, renewables, fuel poverty)

Data on the city’s consumption of heat and cool may not be measured or collected.

Local solutions to heat and cool consumption are thus overlooked that could more cost effectively meet national targets than national solutions.

Development of a **local energy strategy**, particularly **data collection** at the city level, can shift the discourse of energy policy to the local level.

A **heat and cool assessment** as part of the development of an energy strategy may demonstrate that local solutions such as utilizing a city’s waste heat in district heating or cooling systems is best.
## 2. Stakeholder coordination

Bring together the various actors in the development of the strategy to ensure it is holistic and has full support.

### Public authorities
- City department
- Independent body (public and private players)
- Role: to provide framework conditions

### Investors
- Public or private companies
- Role: to provide financial support to carry out the project

### Utilities
- Electricity, gas, water etc providers
- Role: to operate DES in line with strategic objectives

### Buildings developers
- Construction and real estate companies
- Role: to provide consumer data during the project

### Customers
- Residents
- Role: connected to the network and pay heating bills to the utilities.

[Further details in Module 2!]

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### MODULE 4. STRATEGY DEVELOPMENT IN DES

**HOW TO DEVELOP STRATEGY IN DES?**

**SYNTHESIS**

**BEST PRACTICES**

**KEY STEPS**

**DEFINITION**

**CONTEXT**
3. Data Collection

Ensure data is collected on heating and cooling that can link back to the city objectives. This step is called energy mapping and refers to the visual representation of energy and material flow distribution along the system, related to its geographical location.

4. Heating and Cooling Assessment

Carry out a heat and cooling assessment that identifies technology pathways to achieve city objectives. These technology pathways must account for costs, fuel price risks, timescales, changing regulatory environments and local economic benefits.

Source: PLANHEAT Tool
### New
- Not commit to large scale DE development immediately;
- **Capacity building**, development and testing of appropriate policies and ‘proving the technology’ takes time;
- Can later refine energy strategy to reflect lessons learned in the local authority and the increased investor confidence;

### Consolidation
- Keeping the **business model stable** and customers connected is a priority;
- Lessons learned from the initial development should be collected and implemented;
- **Staged development allows periodic refining of the energy strategy and slowly increasing the ambition of the development**;

### Refurbishment
- Cities will **target reduced losses, high efficiency and cheap heat in the long term**;
- Cities may not be available to upgrade the whole network at once;
- Proving the cost savings and financial viability of new technologies is important;
- Best practise is to demonstrate new policies before expanding to the whole network;

### Expansion
- Lessons learned from the initial development should be collected and implemented;
- Again, staged development allows periodic refining of the energy strategy and slowly increasing the ambition of the development as benefits are proven, risks reduced and working capital increased;
5. Targets in Vancouver: Transitioning from ‘new’ to ‘expanding’

Between 2006 and 2010 Vancouver developed Southeast False Creek Neighbourhood Energy Utility (SEFC NEU).

SEFC NEU tested new policies such as service area by-laws requiring connection and proved the benefits of district energy.

In 2010 the city developed the ‘Greenest City Action Plan’ in 2010.

Vancouver consulted with utilities, NGOs, building developers and other levels of government on new district energy strategy.

City now has district energy strategy targeting specific network development up to 2020.

Current strategy and vision based on SEFC NEU and the lessons learned.

Source: Neighbourhood Energy in Vancouver -- Strategic Approach and Guidelines
The **objective** of refurbishment is to **reduce** the **subsidies required** to district heat networks and make them more efficient whilst keeping heat affordable.

Many municipalities do not have the capital for large scale improvements. **A lack of investment can push tariffs up making it harder to retain customers**, which makes the problem even worse.

For many municipalities **the solution will be slow and long-term with small incremental improvements** made that do not impact the business model significantly.

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**5. Targets in Latvia: Refurbishing and keeping heat tariffs low**

Source: Laima Gūtmane

- **73%** Share of CHP in DE
- **577,409** Residents served by DE
- **2,254** MWth installed capacity
An energy strategy in a city is constantly evolving and should be updated after a period (e.g. 5 years) and progress evaluated.

CASE STUDIES

Shenzhen, China Source: Unsplash
New: Setting City targets

- Energy saving rate: 12.3%
- Electricity saving: 0.13 billion kWh
- Reduction of standard coal: 16000 tons
- Reduce peak electric power: 0.12 mkWh
- Reducing thermal island effect
- CO₂ emission reduction: 123,000 tons
- Reduce water: 3 million tons
**Consolidation:** from oil to waste heat

- From 8 isolated heat island to an interconnected sustainable network reaching 60% of the city.
- The oil crisis in the 70's lead the shift towards a decarbonisation of the generation mix.
- The network optimizes available heat from its surroundings, reducing the dependency on imports.

Source: Göteborg Energi
POOLING OF NETWORKS, CONNECTION OF WASTE HEAT AND REMOVAL OF SMALL COAL FIRED BOILERS.

CONNECTION TO A LARGE TRANSMISSION LINE AND POOLING OF NETWORKS IS BEING ACHIEVED IN STAGES CONNECTING AND UPGRADING INDIVIDUAL DISTRICTS AT APPROXIMATELY 200MW EACH STAGE.

SHORT PAYBACK PERIOD OF LESS THAN 2.5 YEARS.

Developing a strategy in *expansion* project

Current district heating network:

- **2 different utilities** partially owned by the municipality
- **Large potential for heat recovery from the harbour**
- **Risk for private investors** to interconnect the harbour while the demand is not ready
- **City intervention**

Source: Map of main components of the district energy network in Rotterdam, Warmtebedrijf Rotterdam
Future plans: Regional expansion

- **Economy of scale** achieved by the city through stakeholder coordination such as housing cooperatives, building developers and energy companies
- **Interconnection achieved**

Source: Regional expansion plans, Warmtebedrijf Rotterdam
Some of the main aspects we have seen in this module are:

• District energy planning should be **consistently integrated with local energy and low-carbon heat/cool strategies**
  - Ensure a stable and sustainable development, maintenance and operation of the network, throughout its complete life-cycle
  - Cities to assess and demonstrate the benefits of district heating and cooling in the context of local objectives and its potential.
  - Enable the support for stakeholder buy-in and reassure investors
• Key steps are: (1) defining objectives, (2) stakeholder coordination, (3) data collection, (4) heating and cooling assessment, (5) setting targets, (6) reflection and revision
• There are **different levels of strategy development** depending on the **pre-existing infrastructure**: New, Consolidation, Refurbishment, Expansion
• The **various levels of local or city engagements** in each phase to capture synergies across business segments, and direct the local district energy strategy towards social and economic objectives.
Some recommendation for strategy development are:

- Incorporating district energy into a local energy and low-carbon heat/cool strategies will ensure that the city can shape the low-carbon pathways of its services, capture synergies across business segments, and direct the local district energy strategy towards social and economic objectives.
- It allows to tackle energy-related challenges in a coordinated and informed manner, with a long-term perspective.
- It should be done from the start following the steps that were shared in this module.
- Development of a local energy strategy, particularly data collection at the city level, can shift the discourse of energy policy to the local level.
- A heating and cooling assessment as part of the development of an energy strategy may demonstrate that local solutions such as utilizing a city’s waste heat in district heating or cooling systems is best.
THANK YOU FOR COMPLETING THIS MODULE!

For more information about the initiative or this Training, please visit the following websites or contact:

www.districtenergyinitiative.org
unep.org
c2e2.unepdtu.org
In the upcoming modules, you will learn about ... 

Module 5
• Carbon heating and cooling strategies

Module 6
• Business models for sound sustainable district energy systems