



Boosting renewable energy in heating and cooling

Summary of best practices, success factors and recommendations based on literature, interviews and surveys in six case studies



D3.3 Fact sheet of best practices and success factors and recommendations on actions and policies.

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The progRESsHEAT project

The progRESsHEAT project aims at assisting policy makers at the local, regional, national and EU-level in developing integrated, effective and efficient policy strategies to achieve a rapid and widespread penetration of renewable and efficient heating and cooling systems. Together with 6 local authorities in 6 target countries across Europe (AT, DE, CZ, DK, PT, RO), heating and cooling strategies will be developed by a detailed analysis of (1) heating and cooling demands and future developments, (2) long-term potentials of renewable energies and excess heat in the regions, (3) barriers & drivers and (4) a model-based assessment of policy intervention in scenarios up to 2050. progRESsHEAT will assist national policy makers to implement the right policies based on a model-based quantitative impact assessment of local, regional and national policies up to 2050.

Policy makers and other stakeholders will be strongly involved in the process, learn from experiences in other regions and gain a deeper understanding of the impact of policy measures and their specific design. They are involved in the project through policy group meetings, workshops, interviews and webinars targeted to the fields of assistance in policy development, capacity building and dissemination.

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1. Introduction

This report sums up the results of the analysis of barriers and drivers to the deployment of heating and cooling solutions based on renewable energy sources (RES), carried out in the framework of the progRESsHEAT project (Work Package 3). Based on the review of existing policies (task 3.1, Holländer et al. 2016) and the empirical analysis of barriers and drivers (task 3.2, Chassein et al. 2017), this publication provides a status quo of energy-related policies and success factors for the promotion of heating and cooling technologies based on renewable energy sources (RES-H/C technologies).

These results are interim results of the progRESsHEAT project and will be discussed in the policy group meetings. The empirical results will be supplemented by quantitative modelling of different scenarios and policy packages (Work Package 4 of the progRESsHEAT project), summed up in the final policy recommendations to be published end of 2017. This fact sheet therefore depicts preliminary results based on the analysis of barriers and stakeholders for the six case study cities of Ansfelden (Austria), Litoměřice (Czech Republic), Helsingør (Denmark), Herten (Germany), Braşov (Romania), and Matosinhos (Portugal) at national, regional and local level.

Chapter 2 provides answers to the following questions for the six case studies:

- Are the policies and activities on the different governance levels harmonised and consistent? Do they complement one another, or do they mitigate each other's impact by not being congruent? Do they interfere with each other?
- To which extent do the policies and activities include and refer to CO₂ targets and the required share of renewable energies?
- Do the policies and activities identified address the barriers so that these can be minimised or abolished? What are the reasons for success or failure?
- Which framing conditions, policies, and actions are real drivers? Are they transferable to other communities, other regions, or other countries? Which adaptation processes are needed?
- Which policy measures, at national, regional and local level, has proved to be particularly successful (best practices)?

Chapter 3 gives an overview of success factors and best practice examples identified in the case studies. The fact sheet ends with preliminary policy recommendations derived from literature analysis, interviews and surveys. Detailed results for all chapters can be found in the individual fact sheets of success factors for each case study.

2. Evaluation of policy measures based on literature, interviews and surveys

From a general point of view, we see significant differences in the level of detail of policy programmes and target settings at regional and local levels across the case studies. While in some cases the local policy initiatives are very advanced, providing targeted funding and running effective information campaigns, other cities still work on issues such as the identification of renewable energy potentials in the area. Awareness and information gaps as well as financial constraints were identified as barriers by empirical analysis in every case study. These findings confirm previous research results (e.g. Dolman et al. 2011; International Energy Agency (IEA) 2009; Paar et al. 2013; Reddy 2013; Reitze et al. 2012).

2.1 Are the policies and activities on the different governance levels harmonised and consistent?

In order to reach climate and energy objectives, the six target countries have set up a wide range of policy measures (see Holländer et al. 2016 and Individual fact sheets for each case study). All case studies but Litoměřice implemented a combination of command-and-control instruments ("sticks"), incentive regulation/financial instruments ("carrots") and capacity-building activities ("tambourines"). In terms of consistency, policy measures at national, regional and local level should complement each other and not be contradictory or overlapping. In Ansfelden and Helsingør, and their respective regional and national levels, a high degree of complementary and consistency can be found. The degree of complementary is rather medium in Herten, Matosinhos and Braşov and their respective regional and national levels as some policy measures at local level are part of national regulations and funding. In Litoměřice and in the Czech Republic, this degree is low due to similar target groups and funding issues at national and local levels which are not coordinated sufficiently. A lesson learned from Denmark is that regulation has to be continuously adapted to new situations. Detailed descriptions of these findings can be found in the individual fact sheets of success factors of the local case study cities. Table 1 shows an overview of the most relevant policy measures for renewable and energy efficient heating and cooling solutions implemented in the case studies, the target groups they address, the policy level and the policy approach (from Holländer et al. 2016).

Tab. 1: Most relevant policy measures implemented in the case studies

Country (Region/City)	Policy Measures	Target Group	Policy Level	Policy Approach
Austria (Upper Austria / Ansfelden)	subsidy programmes	industry	national + regional	carrot
	regulation programmes	energy supplier	national	stick
	subsidy programmes	building owners and agricultural sector	national + regional	carrot
	building regulation	building owners	regional	stick
	contracting programme	ESCOs	regional	carrot
	energy advice services	energy supplier and consumers	regional	tambourine
	training programme	energy professionals	regional	tambourine
Czech Republic (Ústí Region / Litoměřice)	subsidy programme	public institutions	national	carrot
	subsidy programme	companies	national	carrot
	subsidy programme	building owners	national	carrot
	subsidy programme	building owners	local	carrot
	subsidy programme	public institutions	local	carrot
	information campaign	citizens	local	tambourine

Country (Region/City)	Policy Measures	Target Group	Policy Level	Policy Approach
Denmark (Zealand / Helsingør)	action plan with various policy measures	energy consumers	national	all
	renovation programme	municipal buildings	local	carrot
	demonstration site programme	energy consumer and producer	local	carrot and tambourine
	training programme energy advice services	craftsmen citizens and businesses	local local	tambourine tambourine
Germany (North-Rhine Westphalia / Herten)	market incentive programme	energy consumers	national	carrot
	regulation programme	new buildings	national	stick
	regulations and subsidies programmes	energy suppliers, grid operations and consumers	national	sticks and carrots
	tax law favouring RES action plan with various policy measures action plan with various policy measures	energy consumers energy suppliers and consumers energy suppliers and consumers	national regional local	carrot carrots and tambourines carrots and tambourines
Portugal (Norte / Matosinhos)	action plan with various policy measures	energy consumers	national	tambourines
	action plan with various policy measures	energy infrastructure and energy sector	national	carrots and tambourines
	subsidy and information programme	energy consumer, supplier, researcher and professionals	national	carrot and tambourines
	subsidy programme	energy consumer and supplier	national	carrot
	building regulation subsidy programme	building owners energy consumer	national national	stick carrot
	action plan with various policy measures	energy consumers and energy related professionals	local	sticks and tambourines
Romania (Braşov Region / Braşov)	subsidy scheme	CHP producers	national	carrot
	action plan with various policy measures	energy infrastructure and energy consumer	national	carrots and tambourines
	building regulation and subsidies	building owners	national	sticks and carrots
	energy audit	companies and building sector	national	tambourine
energy efficiency programmes	All energy sectors (municipalities included)	national	stick	

2.2 To which extent do the policies and activities include and refer to CO₂ targets and the required share of renewable energies?

The EU Directives are to be reflected in the national law of each member state. Using them, a number of targets are predetermined at national level. However, many countries chose to also set their own targets, as did several regions and municipalities. In the analysed countries, targets and policy measures are mainly set at national or local level but not so much at regional level, with the exception of Austria. In general, targets from higher level apply to lower levels but it can be found that local authorities are even more ambitious than national directives. This is even more pleasant as local targets might be more realistic as they may be set by stakeholders who are directly involved in the implementation of policy measures.

Although the local contexts are very different, the case studies share one common feature: all of them have defined general targets with respect to the energy sector and have implemented policy measures to reach them. The targets, however, vary to a great extent with respect to their specification. Whereas some have very specific goals for the heating and cooling sector, other countries and municipalities remain rather vague in their target formulation (see table 2, updated from Holländer et al. 2016).

Tab. 2: Targets on GHG emissions, RES and energy consumption in the case studies

Country (Region/City)	GHG emission targets	RES targets	Energy efficiency targets
Austria (Upper Austria / Ansfelden)	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 16 % reduction non-ETS (ref. year: 2005) • <u>regional</u>: Reducing emissions by 2030 up to 33 %, and by 2050 up to 90 % 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 34 % of gross final energy consumption covered by RES • <u>regional</u>: until 2030: 100 % of electricity and space heating demand covered by RES (2016) 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: increasing the renovation rate to 3 % • <u>regional</u>: 1 % reduction of heat demand per sqm annually
Czech Republic (Ústí Region / Litoměřice)	<ul style="list-style-type: none"> • <u>national</u>: until 2020: emissions in non-ETS not more than 9 % above (ref. year 2005) 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 13,5 % share of RES among its entire energy supply / until 2030: 16 % share of RES 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 15 % reduction of energy consumption (ref. year 1990) • <u>local</u>: until 2030: 20 % reduction of energy consumption (ref. year 2012)
Denmark (Zealand / Helsingør)	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 20 % reduction non-ETS (ref. year: 2005) / until 2020: 40 % red. (ref. year: 1990) • <u>local</u>: until 2020: 25 % reduction (ref. year 2008) / until 2050: CO₂-neutral 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 30 % of gross final energy cons. covered by RES* / until 2050: entire energy supply based 100 % on RES • <u>regional/local</u>: until 2030: 30 % RES in energy supply / until 2035: heat supply 100 % based on RES 	<ul style="list-style-type: none"> • <u>national</u>: until 2020: 7.6 % reduction of gross energy consumption (ref. year 2010) / until 2050: reducing net energy consumption for space heating and warm water by 35 % (ref. year 2011)

Country (Region/City)	GHG emission targets	RES targets	Energy efficiency targets
Germany (North-Rhine Westphalia / Herten)	<ul style="list-style-type: none"> <i>national</i>: until 2020: 14 % reduction non-ETS (ref. year 2005) / until 2050: at least 80 % reduction (ref. year: 1990) <i>regional</i>: until 2020: 25 % reduction / until 2050: 80 % reduction (both ref. year 1990) <i>local</i>: until 2020: 27 % reduction / until 2050: 92 % reduction (ref. year: 1990) 	<ul style="list-style-type: none"> <i>national</i>: until 2020: 30 % of gross final energy consumption covered by RES / until 2050: 60 % of gross final energy consumption covered by RES <i>local</i>: until 2050: 40 % increase of the share of photovoltaic and wind energy on electricity generation 	<ul style="list-style-type: none"> <i>national</i>: until 2020: primary energy demand and heating demand in buildings reduced by 20 % / until 2050: primary energy demand reduced by 50 %, in buildings by 80 % (ref. year for all: 2008) <i>local</i>: until 2050: reduction of final energy demand by 54 % / until 2050: 3.000.000 sqm residential and commercial building area to be energetically modernised
Portugal (Norte / Matosinhos)	<ul style="list-style-type: none"> <i>national</i>: until 2020: emissions in non-ETS not more than 1 % above (ref. year 2005) <i>local</i>: until 2020: 21 % reduction (ref. year 2008) 	<ul style="list-style-type: none"> <i>national</i>: until 2020: 31 % of gross final energy consumption covered by RES 	<ul style="list-style-type: none"> <i>national</i>: until 2020: 25 % reduction of primary energy consumption <i>local</i>: until 2020: 21 % reduction of energy consumption (ref. year 2008)
Romania (Braşov Region / Braşov)	<ul style="list-style-type: none"> <i>national</i>: until 2020: emissions in non-ETS not more than 19 % above (ref. year 2005) / until 2020: 20 % reduction of emissions / until 2050: 80 % reduction of emissions (both ref. year 1990) <i>local</i>: until 2020: 32 % reduction (ref. year 2008) 	<ul style="list-style-type: none"> <i>national</i>: until 2020: 24 % of gross final energy consumption covered by RES <i>local</i>: until 2020: 4 % of energy gained from RES in all sectors in total 	<ul style="list-style-type: none"> <i>national</i>: until 2020: 19 % reduction of primary energy consumption (ref. year 1990) <i>local</i>: until 2020: 12 % reduction of energy consumption (ref. year 2008)

Note: Targets in italic are binding national targets from EU level. An empty field means that no targets have been described in the case studies so far – updates might occur

source: Holländer et al. 2016, www.covenantofmayors.eu, updated for this report by local partners

*This target was changed from 35 % to 30 % by the new Danish government.

Regarding **GHG emissions**, binding national targets from EU level are in some cases expanded. It seems that Herten has the most ambitious target of 95 % reduction of GHG emissions by 2050 (ref. year 1990).

With respect to **renewable energy** targets, Denmark has set an ambitious target of covering 100 % of the electricity and heating demand with renewable energies by 2035. This is, however, not the ambition of the current government any more who set this target for 2050 instead (target of 50 % renewable energy in the final energy consumption by 2030). Despite not having this goal nationally anymore, Helsingør and the Capital Region still have similar ambitions. Regional and local authorities fully support this strategy. A nearly 100 % renewable energy target was also set by Upper Austria (although excluding industrial process energy demand). In comparison to that, the targets of the Czech Republic may seem rather low with 16 % RES by 2030 – however, this might be more realistic judging from the specific context of a country highly dependent on coal. It stands out that no region or municipality has set up a target for RES as regards cooling (besides general statements about making heating and cooling infrastructures more efficient).

Regarding **energy reduction** targets, Portugal and Matosinhos stand out with an objective of 21 % and 25 % reduction in energy consumption by 2020 (ref. year 2008).

2.3 Do the policies and activities identified address the barriers?

The national heating and cooling plans according to the Energy Efficiency Directive, the policy measures identified (Holländer et al. 2016) supplemented by commitments made in the framework of the Covenant of Mayors¹ (which was signed by every case study city except Ansfelden), as well as overall conditions regarding energy issues in the case study cities have been evaluated by several experts and surveys (Chassein et al. 2017).

Table 3 (summary of results presented in Chassein et al. (2017) and Individual case study fact sheets on success factors) shows the barriers having a high relevance in the case study cities, based on empirical results. The depicted barriers may exist in all case study cities to some extent but they do not have high relevance for all cities.

¹ www.eumayors.eu

Tab. 3: Barriers with high priority in the case study cities

	Ansfelden (AT)	Litoměřice (CZ)	Helsingør (DK)	Herten (DE)	Matosinhos (PT)	Braşov (RO)
high investment costs	x	x	x	x	x	x
lack of awareness	x	x		x	x	x
lack of information and demonstration sites		x		x	x	x
inadequate grid*		x		x		x
concerns due to cultural or historical issues					x	x
energy security concerns			x			x
owner structure of energy supply			x			x
dependence concerns on single systems			x	x		
concerns due to contract agreements				x	x	
lack of legislation and standards				x		x
unfavourable tax regime			x			
restrictive regulations			x			

*In the special case of Matosinhos there exists no heat distribution network.

As table 3 shows, the most relevant barriers regarding the use of renewable energy for heating and cooling across almost all case study cities - identified by an empirical analysis - are financial constraints for investing in renewable energies, lack of awareness about renewable energy (RES) options and lack of information and demonstration sites that could serve as best practice examples. Another frequently mentioned problem is insufficient grid due to several reasons. These barriers are described below:

- **Investment decisions:** High (upfront) investment and a long payback time (for several technologies as well as for the transport and distribution system, including business models, funding arrangements, etc.) are named as a high barrier by the interviewed experts and in the surveys. This is a well-known barrier and several solutions can be used to reduce the barriers such as subsidies, crowd-funding, soft loans or contracting. One Danish expert points out that high initial investment requires long-term planning which could be affected by changes in regulatory regimes. Therefore it has to be ensured that policy measures with a long-term perspective are available. Another barrier related to investment is the investor-user dilemma in buildings that are rented. Here neither the user nor the owner might have an interest to invest in (long-term decentral) renewable energy or energy efficiency technologies due to split incentives.

- **Lack of awareness and information:** The first step to get consumers to think about renewable energy is to raise awareness about their energy supply options and funding possibilities of renewable energy and energy efficient technologies (which is a serious problem in Portugal, for instance). For example in Brasov the 70 % of the survey participants reported to be badly informed about alternatives regarding heating. In the interviews, experts proposed an awareness-raising campaign for alternative heating options. The second step would be to provide information to citizens about their heating and cooling options. Best practice examples regarding renewable energy and energy retrofitting would be helpful to perform comprehensive transformation. Another stakeholder group with both knowledge and awareness gap regarding renewable technologies is the trade and repair businesses as well as untrained professionals developing technologies. Training programmes and demonstration sites could help overcome these barriers.
- **Inadequate grid:** In three case studies (Litoměřice, Herten, Braşov) temperature level of heat supply is too high or not suitable for combination with renewable energy technologies or district heating grids. In Helsingør the temperature levels of the grid were recently lowered to save energy. In the special case of Matosinhos there exists no heat distribution network but a closer look on potential for using industrial excess heat in proximity to large services buildings is necessary. Regarding excess heat it is a crucial factor that excess heat supply and demand match. In addition some grids (Litoměřice, Braşov) suffer from energy losses making energy supply inefficient or even unreliable.

Other barriers identified are:

- **Concerns due to cultural or historical issues:** In Portugal and Romania people's preference for individual solutions instead of centralised systems can be a barrier for renewable solutions. In addition, in Romania there is general discontentment with district heating as this system was obligatory during the communist period and its functionality has since been questionable. These concerns should be taken seriously when looking for the best technology to make heating and cooling systems renewable.
- **Trust in energy security and energy supply:** A relevant barrier for every heating system is that heat demand is intermittent due to seasonal fluctuations and heat supply of several renewable energy sources is not continuous either, for the same reason. In Helsingør, energy security concerns lead citizens and companies to fear being dependent on one single system according to the interviewees. This barrier was overcome in Herten by providing heat from a trusted municipal energy supplier instead from a less trusted "big player" energy company. It has to be analysed if citizens have more trust in public authorities in other regions as well. According to an interviewed expert the owner structure of the district heating system in Helsingør (mainly owned by an independent energy supplier), however, together with the non-profit regulation of district heating companies partly hinders investments according to the climate action plan. In Braşov, energy security concerns are due to the unreliable district heating system that caused lack of trust in the energy supplier. As a consequence, the municipality recently decided to close the district heating company and found a municipal solution.

- **Dependence on energy supplier and problems on supply side:** Several problems are linked to the following barriers: 1) security of energy supply due to irregular availability of energy and irregular heat demand as a barrier for the supplier; 2) fear of long-term commitments for example in the case of excess heat; 3) the notion of dependence on one single energy supplier or one single system. Back-up systems, a mediating party and trust of partners are necessary to overcome these barriers. Policy measures are necessary to support and directly enhance renewable energy supply.
- **Lack of legislation and standards:** In Germany, the interviewed experts reported that a serious barrier for manufacturers is that there are no standards for heat pump installation in existing buildings. The topic is part of campaigns of the municipality and the manufacturers in Herten. In Romania, regulation for feed-in tariffs and legislative incoherence regarding the selective waste collection in the context of using excess heat from a waste incineration plant are identified as a barrier. However, legislative obligations to use a specific kind of heating system could help provide a centralised heating grid.
- **Unfavourable tax regime and restrictive regulations:** The energy tax regime in Denmark is favourable to retrofitting existing CHP plants or implementing new units for biomass combustion, but very unfavourable to other solutions to make district heat “green” such as using heat pumps and excess heat from industry or shopping centres.
- **High barriers for funding:** In the case where funding is available it is reported as a barrier that 1) there are too many funding possibilities and it is not clear which available funding option might be the best; and 2) it is complicated and time-consuming to apply for funding. According to the survey participants, this is for example the case for companies in Ansfelden.

Policy measures available in the case study cities address these barriers at different degrees. This has been evaluated in individual fact sheets for each case study according to criteria based on several documents and empirical results. A short overview is given below (from Holländer et al. 2016, individual case study fact sheets on success factors):

Ansfelden (Austria): In Austria, most legislative powers as well as the financial resources for support measures in the heat market are within the responsibilities of the regions and apply to the local level. Stable policy and funding conditions in Upper Austria have been very favourable to the uptake of renewable energies and the development of the renewable energy market. In Upper Austria, policy “packages” are applied to the different target groups and technologies. These consist in a combination of legal instruments (“sticks”), financial instruments (“carrots”) and promotional activities (“tambourines”). An important driver in renewable heating policy in Upper Austria is besides various activities of the energy agency (OÖ Energiesparverband) linking renewable heating and cooling policy to other economic sectors - such as agriculture - or to job creation that allows for wider political support within authorities and stakeholders. Most support instruments have been adopted with a long-term perspective.

Litoměřice (Czech Republic): A lot of policy measures at national and local levels aim at reducing high upfront investment for renewable energy technologies. These are for example financial incentives for solar thermal heating or policies that support national energy (technology) market e.g. through financial subsidy and motivation of installation of renewable energy in companies (“carrots”). At local level, these programmes are particularly well publicised. Much direct investment support (“carrots”) is available and information campaigns (“tambourines”) are developed. It is obvious that command-and-control instruments (“sticks”) could be a relevant add-on for the policy mix.

Helsingør (Denmark): The policy measures in Denmark are various at national level as well as at local level. There is a wide range of initiatives that comprise information instruments (“tambourines”) as well as elements with incentive regulation (“carrots”) and requirements and restrictions (“sticks”) for the private and public sectors. A very active climate secretariat with numerous activities and information campaigns created good awareness and appreciation of renewable energies in Helsingør but more could be done for publicity of the policy measures as the majority of respondents to the questionnaire were not aware of subsidies on national level for changing to a more energy efficient heat source.

Herten (Germany): High upfront investment of RES is addressed by a mix of policy measures such as low-interest loans, subsidies, feed-in-tariffs, tax reduction (“carrots”) and obligation to use RES in new buildings (“sticks”) at national, regional and local levels. In addition, at regional and local levels several demonstration sites as well as awareness and information campaigns are available (“tambourines”). This offers a very favourable framework for the use of renewable energy. The high motivation of companies to invest in renewable technologies could be further supported by information about alternative technologies.

Matosinhos (Portugal): Most programmes in Portugal are available at the national level providing financial incentives for renewable energy (“carrot”), obligations for buildings (“sticks”) and awareness-raising instruments (“tambourines”) on energy demand and supply side. At local level, the above-mentioned action plan focuses on awareness-raising instruments (“tambourines”). All policy measures address renewable energy but only a few also address energy savings. The emphasis on policy measures that strengthen the Portuguese economy is a peculiarity of Portugal given its difficult current economic situation.

Braşov (Romania): In Romania, a good policy mix addressing energy efficiency and renewable energy is available at national level. For several target groups (building owners, energy consumers, companies, municipalities and the energy infrastructure operators), policy measures such as financial incentives (“carrots”), building regulations (“sticks”) and the promotion of energy audits (“tambourines”) are in place. The insufficient number of consumers connected to the district heating system is a very serious problem in Braşov. A long-term master plan for the heating system in Braşov in combination with awareness raising instruments is strongly recommended.

Where policy measures to address these barriers are missing, preliminary recommendations for how and which policy measures could be implemented in the different municipalities were derived (see an overview in Chapter 4 and detailed information in the Individual fact sheets for each case study).

3. Selected success factors and best practice examples

In order to enhance the use of renewable energy for heating and cooling, a combination of framework conditions and activities is required (so called success factors). Some success factors or success factor packages stand out as best practices as they have provided superior results. These best practice examples can serve as a role model for other cities. We want to emphasize that if the policy measure or activity should be transferred to other cities it has to be adapted to frame conditions and an analysis of potential improvements is recommended.

Within the case study cities, a lot of success factors and best practice examples could be identified for addressing barriers regarding the use of renewable energy for heating and cooling. Selected examples are depicted in detail in the case study fact sheets. For an overview, these success factors and best practice examples are clustered in Table 4. Identified success factors and best practice examples can serve as a basis for knowledge transfer and learning. The context, from which the practice is derived, however, has to be carefully considered.

Tab. 4: Selected success factors and best practice examples in the case study municipalities

Category	Success Factors and Best Practice Examples	Case Study
stakeholder involvement	<ul style="list-style-type: none"> round table which regularly discusses energy topics (Project READY21) and a forum for enterprises 	Litoměřice
“tambourine”	<ul style="list-style-type: none"> annual meetings of all stakeholders related to energy close cooperation with neighbouring municipalities concept of climate ambassadors in municipal departments Regular competition for households regarding climate protection 	Braşov Litoměřice, Herten Helsingør Herten
awareness raising & capacity building	<ul style="list-style-type: none"> the "Energy Academy" (ESV), runs various courses for energy advisers, professionals and representatives of municipalities* 	Ansfelden
“tambourine”	<ul style="list-style-type: none"> “Alley of change” - a bicycle lane with information panels regarding renewable energies and other energy related topics in the region Climate Days and Climate Award*/Energy Efficiency Week* Monitoring and evaluation of public buildings award winning information campaign (ENGAGE) advisory team on energy efficiency measures for public buildings provision of 10 mini-guidelines going through the 10 Solutions for Energy Efficiency 	Herten Herten, Braşov Braşov Litoměřice Matosinhos Matosinhos

Category	Success Factors and Best Practice Examples	Case Study
awareness raising & capacity building	<ul style="list-style-type: none"> several “demonstration districts” for district heating, reduced energy demand, innovative energy technologies for companies and 100 % renewable energy supply 	Herten
“tambourine” (continued)	<ul style="list-style-type: none"> ECO-City: demonstrations of buildings and renewable energy systems, training activities, socio-economic monitoring and knowledge sharing between participating communities* 	Helsingør
Financial subsidy	<ul style="list-style-type: none"> small, but quickly available local subsidy for home owners willing to replace coal boilers with solar water heaters* 	Litoměřice
“carrot”	<ul style="list-style-type: none"> Municipal Energy Saving Fund* introduction of a new business model where owners of oil boilers can get "district heat" as the district heating company implements and maintains financed support for energy performance contracting in order to overcome the challenge of high upfront investments of RES-H installations. subsidies for several renewable and energy efficient technologies (e.g. solar thermal heating, heat pumps) 	Litoměřice Helsingør Ansfelden Herten, Ansfelden, Litoměřice, Matosinhos
legislation	<ul style="list-style-type: none"> direct electric heating for all new buildings is banned by the building legislation. 	Ansfelden
“stick”	<ul style="list-style-type: none"> obligation to remove old oil tanks the Climate Secretary has an own budget to realize initiatives. district heating supplier has every year an energy saving obligation (typically around 2%) construction regulations imposing the installation of solar thermal systems in new constructions. energy responsible in each public building + Monitoring and evaluation of public buildings 	Helsingør Helsingør Helsingør Matosinhos Braşov

* These examples are depicted in more detail in the individual fact sheets per case study.

4. Preliminary policy recommendations across all case study cities based on literature analysis, interviews and surveys

This chapter summarizes the main findings regarding policy recommendations based on the status quo of policies (Holländer et al. 2016), a literature analysis, interviews and surveys (Chassein et al. 2017) carried out as part of the progRESsHEAT project. These recommendations will be complemented by the quantitative, model-based policy analysis in autumn 2017.

It is necessary to have a mix of policy instruments (sticks, carrots and tambourines) for the successful deployment of renewable energy for heating and cooling. Another significant factor is the involvement of all relevant stakeholders (energy supplier, professionals, administration, political leaders and end users) as described in more details by Chassein et al. (2017). As depicted in chapter 2 several policies are already available in the case studies that address some of the barriers. Sometimes simple knowledge about (funding) possibilities is lacking. As an overview derived from detailed recommendations that can be found in the individual fact sheets for the case studies, the following policy recommendations have been derived from the analysis:

- | | | | | |
|-------------------------------------------------------------------------------------------|----------|----------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Increase local government's procurement of renewable energy. Installations of renewable technologies in public buildings can serve as demonstration examples. This has several advantages, such as increasing awareness, reducing perceived risk, and imparting knowledge to potential investors.</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Provide demonstration sites where exemplary technologies are installed and accessible to the public (at least on special occasions such as the Energy Week in Herten). Energy renovation of municipality buildings can serve as a role model for private households and motivate them to take action.</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Assessment of grid temperature (reduction) and possibility for heat provision from excess sources. It is a crucial factor that temperature of excess heat supply and demand match. Also for other renewable technologies the reduction of district heating temperature level is crucial in order to operate efficiently.</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>For individual installations new business models should be introduced, where the financing and responsibility for maintenance and performance rest with the energy supplier/installation provider (contracting).</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Establish specific and clearly measurable targets regarding the share of renewable energy for heating and cooling not only at national level but at local level as well. In addition, a roadmap on how to reach these targets with relevant policy measures and specific responsibilities has to be clearly defined. Strategic energy plans at regional level promote cooperation between municipalities and coordination of investments in energy infrastructure such as district heating. At national level, local targets and policy measures should be monitored in order to ensure the achievement of national targets.</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Simplify funding processes and make subsidies quickly available. Support for applying processes should be provided.</p> |
| national | regional | local | | |
| <table border="1"> <tr> <td>national</td> <td>regional</td> <td>local</td> </tr> </table> | national | regional | local | <p>Impart knowledge of renewable technologies as alternatives to conventional technologies by implementing information campaigns or similar policy measures. In addition information campaigns about funding possibilities are crucial.</p> |
| national | regional | local | | |

national	regional	local	Training of planners, designers, craftsmen, etc. on renewable energy. Sufficient skills of professionals for successful implementation of renewable heating and cooling technologies.
national	regional	local	Regulation to forbid energy-inefficient or fossil technologies (like heating with individual electric boilers). Regulation has to be continuously adapted to new situations.

In some regards, frameworks, barriers, success factors and recommendations substantially differ from a case study city to another. As this fact sheet shows, some findings still apply to all. The success factors and best practice examples can notably be transferred internationally as learning cases. To implement best practice examples, the specific context has to be considered:

- **Ansfelden (AT):** Special characteristic is the focus on biomass due to the city's location and the excess heat potential of the pulp and paper company.
- **Litoměřice (CZ):** Special characteristic is the geothermal plant that is planned to be integrated into the district heating system.
- **Helsingør/Denmark** has been very active in enhancing renewable energy and energy efficiency for many years now. Its special characteristic resides in the promotion of heat supply according to socio-economic criteria, the non-profit energy supplier and the municipality as a key factor in the energy system.
- **Herten (DE):** Special characteristic lays in the former coal mining sites that characterise the city as well as geographic frame conditions.
- **Matosinhos/Portugal:** Special characteristic is the low heating and cooling energy demand and the culture of individualised energy supply.
- **Braşov (RO):** Special characteristic is the resentment towards district heating due to the communist era and the culture of individualised energy supply.

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- Individual fact sheets for each case study (not published) and respective documents.