SmartReFlex
RENEWABLE DISTRICT HEATING & COOLING

Smart and Flexible 100 % Renewable District Heating and Cooling Systems for European Cities

Summary report

Deliverable

WP 2	Improving the regional framework
Task 2.1	Survey of regional RES DHC framework
Del. 2.2	Summary report

Edited by
Dipl.-Ing. Oliver Miedaner, Solites
Text contributions from all partners
Stuttgart, 10.06.2015

Supported by

Intelligent Energy Europe Programme
of the European Union

Table of contents

1. Introduction

The summary report describes the situation regarding legal, organizational and technical possibilities of regional authorities in Catalonia (ES), Kerry and Tipperary (IE), Emilia Romagna (IT), Schleswig-Holstein and Baden Württemberg (DE) for the development of district heating and cooling (DHC) systems with high shares of renewable energy sources (RES). This is followed by recommendations to improve e.g. the legislative framework (see chapter 2).

The descriptions of the different regions base on the regional strategies that have been elaborated by each region (see www.smartreflex.eu).

Within the context of improving the framework a task force with stakeholders and experts is established in each region. In chapter 3 ‘Conclusions and recommendations’ the experiences and recommendations of the regional partners regarding the build-up and management of a task force on regional level are described as well as the required activities that should be undertaken in parallel to implement the approach of SmartReFlex.

2.1 Spain – Catalonia

2.1.1 Description of the situation

Catalonia has 57 district heating and cooling networks in 2014. Mainly all the networks are small heating networks and four of them supply heating and cooling at the same time. The main renewable energy source is biomass in small DH networks. Incasòl and IREC have realized sectorial meetings within the task force members and a survey among the regional stakeholders, besides a regional study. From this exercise the main barriers and opportunities have been analyzed which leaded to the creation of the guidelines of the regional strategy.

The main barriers and opportunities are summarized in the following paragraphs organized by topic:

	BARRIERS	OPPORTUNITIES
LEGISLATION	• Unstable energy policy in Spain leading to regulatory risk • Lack of specific normative for DHC • Not possible to reduce the “Regulation of Low Voltage” in the case of districts / buildings with DHC • No specific consideration of DHC in urban planning legislation • Dichotomy between users free choice and having enough consumers	• DHC is mentioned as an efficient technology in building regulations • Tax instruments at local level • Safety of water distribution installations to be regulated in the coming months • A modification of the Urban Law is currently starting
ECONOMIC	• Difficulties to attract investors • Dichotomy between users free choice and having enough consumers • Long term amortization • Lack of bank financing • Few public investment	• Some economic public funding to support the renovation and retrofitting of existing buildings (residential and hotel use) including DHC networks, and to promote installation of biomass, geothermal and solar thermal energy.
THECNICAL	• Civil works are expensive and usually have unforeseen issues in already built areas. • Lack of knowledge of the urban planners • Inadequate call for tenders • Mild climate • Lack of guarantee of consumers	• Existing strategies to promote renewable energies, like the Catalan Strategy for the Biomass • Assessment of national heating and cooling potentials referred to in Article 14 of Directive 2012/27/EC • Background existing in Catalonia: several experiences (57 DHC networks; some of them with renewables) have been already developed and they are in operation.

SOCIAL	• Dichotomy between users free choice and having enough consumers • Mistrust from the user's side about technology and service • DHC is not a popular system • Individualist culture • How to intervene in cases of energy poverty	• The cooperative network is present in Catalonia social fabric. • Existing background

2.1.2 Strategy and recommendations for improvement

The strategy focus is on four main objectives covering the legal, economic, technical and social barriers. The task force group is considered of main importance to develop this strategy. The guidelines will be tackled with the creation of thematic groups in the task force and with the demonstrative case studies.

1-Setting legal conditions for RES DH

1. Proposals for adaptation of national, regional and national regulations:
   - Proposal for adaptation of the "Regulation of Low Voltage" RBT in the case of districts / buildings with DHC
   - Proposal for consideration of DHC in the new Law on Urban Planning.
   - Routing rules to targets 2020
   - Proposition of regional regulation of energy self-production for immediate consumption, which does not contradict state regulation
2. Study of the obligation of connexion using normative requirements

2- Procurement and financial tools for RES DHC:

A- Provide favorable financial conditions for RES DHC

1. Identify the basic financial conditions related to NPV, IRR and Payback for different types and casuistic of DHC (RES, non RES and waste heat)
2. Dissemination of SmartReFlex project in the public and private financial sector and investment entities
3. Developing a list of banking entities and financial products specifically for RES DHC

B- Introduce public aid for RES DHC

1. Analysis of possible public funding support measures, either to DHC promoters or building promoters or users.
2. Proposals of tax benefits: reduced municipal tax, reduced building permit costs, bonus company tax for ESE / energy cooperatives.
3. Proposal for simplified contract of public - private partnerships that allow feasible implementation of RES DHC.

3- Technical and economic viability and best available technologies:

A- Increase the use of local energy sources

1. Promote collection of information about the types of local energy sources that can supply RES DHC (industrial waste heat, biomass, solar thermal, geothermal, biogas, etc.)
   - Participation in the Catalan Strategy to promote energy use of forest and agricultural biomass
2. Creating strategies "soft law" that support industrial symbiosis

B- Establish DHC in new areas and incorporate of renewable energies in existing DHC

1. Consider implementing RES DHC in the new urban plan developments, where there is available waste heat or renewable energy availability, through development of feasibility studies in the framework of ‚Case Studies' analysis of SmartReflex project
2. Analyze the possibility of introduction of RES to existing nonRES DHC in Catalonia, their costs and feasibility. through development of feasibility studies in the framework of ‚Case Studies' analysis of SmartReflex project
3. Create a specific office to provide support and advice to DHC and all actors involved in its creation (energy developers, real estate / property developers, municipalities, financial / investment entities, users, etc.)

C- Realize a pilot plant

1. Promote the development of a DHC RES considering and evaluating the application or the outcome of all guidelines necessary for achieving each of the goals that shape the strategy.

4- Improving the social acceptance and participation in DHC:

A- Improving the social acceptance

1. Conducting an information campaign on DHC
2. Training and dissemination of knowledge related to DHC to consumer protection agencies
3. Promoting of the public building connection to DHC

B- Strengthening the "energy cooperative format"

1. Comparison in Case Studies work about different managing scheme: energy cooperative format vs private-public format.
2. Write simplified specifications for implementation of Energy Cooperative RES-DHC, to be applied in future Calls for Tenders. This information could be available in the DHC Information Office.).
3. Simplify the requirements of the procurement specifications for energy services to allow the largest contingent of stakeholders, with particular attention to the inclusiveness of SMEs.
4. To promote the unification of energy management and production, including thermal and electrical energy, as well as public and private services that are derived from them.
5. Allow to unify the management of DHC for private and public users, the management of public lighting, electricity supply in buildings, etc.

C- Improving the consumer protection

1. Development of a proposed Code of Protection of the end user to ensure the supply of DHC on predefined conditions and supported by the local administration.
2. Development of "soft law" directed to the building promoter to facilitate the DHC supply to homes, and communication of the technical conditions necessary to ensure proper connection to the DHC.
3. The DHC Information Office (objective 3; guideline B3) will provide contractual protection of end users and of the building developer.

2.2 Ireland – Kerry and Tipperary

2.2.1 Description of the situation

A summary of the main barriers to the development of DH in Ireland is given in the following.

Policy / Regulation

- There is no policy or regulation to directly support DH
- Lack of central heat planning (even for public sector owned buildings)
- Lack of a DH plan or targets
- All public sector organizations purchase heat in an uncoordinated manner
- Public sector is not required to purchase heat from DH network if one exists

Financial

- DH networks requires a long term financing structure
- Lack of finance for good quality feasibility study and pre finance business case preparation
- High cost of finance for projects (7% is too high)
- No support from state or local authority for development of the heat distribution network (as there is for natural gas & water)
- Low level of experience in financing projects within communities who may install DH

Capacity

- Lack of technical knowledge & experience in the different steps of DH project development, from feasibility study to design, installation, commissioning, operation & maintenance;
- Lack of knowledge & experience among national and local planning authorities in the field of local energy planning and heat planning in particular, a fortiori in terms of planning for district heating development.

Organizational

- Lack of any national or local organization with a mandate and authority to develop DH
- The ownership models for DH to date in Ireland have been single owner & consumer with different customers
- There is no experience of a DH entity selling heat to numerous properties.

Social

- There is little or no understanding of what DH is
- There is no understanding of the benefits of DH for the individual heat consumer
- There is no vision as to how a DH system could be achieved
- There may be resistance to connecting to a system for the long term

Physical

- There is a perception of low housing density in Irish towns compared to continental Europe

A summary of the main opportunities arising from the development of DH in Ireland is given in the following.

- Increasing local employment
    - DH is suited to local fuel supply from wood based biomass (short rotation coppice or commercial forestry)
- Reducing costs for heat consumers
    - DH allows use of low cost fuels such as biomass, which are not always suited to individual building heat
- Enables greater use of renewable energy
- High efficiency
    - DH typically more efficient than individual heating systems
    - DH enables combined heat and power generation, which will lower power distribution system losses
- Allows for greater integration of energy storage

2.2.1 Strategy and recommendations for improvement

The strategy for improvements consists of two objectives that are followed by several recommended measures. These are described in the following.

Objective 1: Improving the policy framework

- R1: Revise the National Spatial Strategy & Regional Planning Guidelines to empower local authorities supporting RES-DHC
- R2: Adopt a long-term vision for the transition to 100% RES supply, with RES-DHC as cornerstone of a future decarbonized energy system
- R3: Support investment in RES-DHC by facilitating access to low-cost finance and providing financial incentives
- R4: Reinforce the local energy planning framework (Local Renewable Energy Strategies, Heat Mapping, etc.), as pillar of Local Community & Economic County Plans
- R5: Establish a supportive regulatory framework including implementation of relevant articles of the EPBD &EED, promotion of EN technical standards and best practice in contractual agreements.

Objective 2: Building Capacity to Plan & Develop RES-DHC projects and define a methodological framework and develop a set of guidelines & tools for:

- R6: Feasibility study of RES-DHC projects
- R7: Design & engineering of RES-DHC systems
- R8: Urban planning of RES-DHC systems
- R9: Define business models, guidelines &tools for RES-DHC project development & operational management, including in the framework of co-operative ownership
- R10: Roll out education and training program on the above
- R11: Develop Irish web portal as repository of knowledge &tools as well as forum
- R12:Support indigenous R&D activity in the area of RES-DHC

2.3 Italy – Emilia Romagna

2.3.1 Description of the situation

In the following there is an overview of relevant and recently updated laws and regulations relevant for the development towards 100 % RES DHC in Emilia-Romagna.

In Italy, the European legislation that regulates the district heating sector has been implemented through specific national regulations (Legislative Decree no. 28 of 03/03/2011, Legislative Decree No. 102 of 4/07/2014). In addition, there are national action plans specifically oriented to the development and spread of renewable energy sources and energy efficiency for thermal use. From the regulatory point of view, at national level, there is no other.

At regional level, in Emilia Romagna, the energy aspects (including the district heating) are regulated by the Regional Law no.26 of 23/12/2004 and by the subsequent Regional Energy Plan (implemented through three-year plans and annual intervention programs). Recently, the Regional Law 26/2004 has been amended by the Regional Law no. 21 of 22/12/2011 and through the Regional Law no.7 of 27/06/2014, while the Regional Energy Plan is periodically updated through three-year implementation plans. Regarding the district heating and cooling systems, the key points of the Regional Law 26/2004 (as amended) are as follows (art. 25 decies):

- "In line with the national forecasts made as a result of the assessment of the article 14 of Directive 2012/27/ EU, the Emilia Romagna Region promotes the potential development of the high efficiency cogeneration and efficient district heating and cooling systems";
- "In the preparation of the urban and territorial planning tools, the municipalities make a preliminary assessment of the potential adoption of high efficiency cogeneration systems or efficient district heating and cooling systems, whose benefits outweigh the costs, also evaluating the effects on the air quality [...] ".

2.3.2 Strategy and recommendations for improvement

Therefore, in order to achieve the objectives of the SmartReflex project on the territory of the Emilia-Romagna region and considering the legal aspects and the synergies with the RES H/C SPREAD project, the most appropriate approach to support dissemination of heating and cooling systems powered by renewable sources consists on the implementation and the sharing within local authorities and stakeholders of practical tools, in particular:

1. Regulatory instruments: Regulatory indications in support of district heating and cooling also as decision and planning support;

2. Information tools: These tools could be of two types: tools implemented at the central level by the Emilia Romagna Region through the data collection and their digitization through Geographic Information Systems, or methodological approaches identified at the central level and offered to local authorities as support to the quantification of their potential. In particular, these tools are used to:
    - map at local level the thermal energy demand and supply (e.g. Heat Roadmap 2050, gas consumption, gas races, map of plants and energy facilities...);
    - map the potential of the different thermal renewable energy sources (biomass, geothermal, solar thermal, high efficiency cogeneration, efficient heating and cooling district);

- map the marginal areas;
- map the potential city-industry symbiosis;
- identify real and virtuous cases on the territory

3. Evaluation tools: These tools allow the assessments about the presence and/or the panning of district heating and cooling systems and the impacts on the territory. In particular, these assessments will be conducted through:
   - Indicators for the assessment the energy, economic and environmental opportunities (e.g. energy production, employment impacts, atmospheric emissions, costs, minimum benefits obtainable from the plant...);
   - Focus on particular areas of the region (e.g. presence of a heating and cooling district? stakeholders interest?);

4. Discussion and dissemination with the structural funds managing authorities: this tool allows the identification of the provided measures aimed to finance the implementation of operation on the territories (study, feasibility evaluation, construction, others).
   Currently, the choices made by the structural funds managing authorities still have sufficient intervention margins, also to make them coherent and consistent with the projects purposes.
   In particular, this tool will be achieved through:
   - Discussion with the structural funds managing authorities and with the stakeholders involved in SmartReflex and the RES H/C Spread projects;
   - Dialogue and dissemination of the contents of the operational plans and calls;
   - Dissemination of the tool (through news and events).

   Some meetings have already been conducted, in particular:
   - April 10th, 2015: The European funds for the territorial economic development. The regional development plan and the municipalities in the 2014-2020 European programming;
   - April 21th, 2015: Meeting with “Appennino Bolognese Local Action Group”.

5. Financial models and sources of funding: this tool will be realized through the creation of working groups with the aim to analyze the access mode to the thermal incentives and to verify the access mode through Energy Performance Contract or through PPP approaches, as defined by the Regulation 1303/2013 and by the Italian legal framework. Some meetings have already been conducted. Material available at the following links:
   www.anci.emilia-romagna.it/Aree-Tematiche/Economia-Energia-e-Turismo/Le-novita/Tavolo-Operativo-FESR-con-ESCo-e-Conto-termico
   www.anci.emilia-romagna.it/Aree-Tematiche/Economia-Energia-e-Turismo/Le-novita/Conto-Termico-per-i-Comuni-modello-senza-ESCo
   - February 23th, 2015
   - March 10th, 2015
   - March 17th, 2015
   - April 3th, 2015
   - April 20th, 2015

   The models that emerged can be used for small operations (single building) and for large projects (district heating) and the results are also useful for the RES H/C project.

   Finally, it is planned to launch further discussion on the Equity Crowd funding tolls (standardized and regulated in Italy).

2.4 Germany – Schleswig-Holstein

2.4.1 Description of the situation

In Schleswig-Holstein there is some experience with smaller district heating systems in rural areas and in some larger cities, they have to face similar problems. These problems are described in the following.

Consumer protection:

- Bad reputation for DH, especially because of high prices and missing possibilities to switch the heat supplier

Integration of renewables:

- Potential of biomass is limited and nearly exhausted
- Geothermal potentials are often too expensive
- ST potentials should be used to increase the share of RES in DH – building large heat storages will be necessary

Legal and financial frame have to be optimized for ST and large heat storages

Make municipalities, which have not been active so far, think about DH

2.4.2 Strategy and recommendations for improvement

The focus will be on two main points. On one side to tackle the question how to increase the amount of renewable in DH and on the other side how to use possible synergies.

Renewables in DH:

- Building up a long time task force
- “Wärmewendepakt” (heat transition covenant)
- Initiating a pilot project for solar district heating with seasonal heat storage in Schleswig-Holstein

Synergies and similar goals – Energy and climate protection initiative Schleswig-Holstein:

- Collect best-practice examples
- Counseling municipalities with the aim to develop municipal heat and cold plans
- Focus on expansion of DH in rural areas of Schleswig-Holstein

2.5 Germany – Baden-Württemberg

2.5.1 Description of the situation

As the state of Baden-Württemberg is no project partner within SmartReflex, SFZ Solites describes the situation by using the Integriertes Energie- und Klimaschutzkonzept Baden-Württemberg (IEKK), concluded in July 2014.

This Energy and Environmental Protection Plan is part of the Climate Protection Law. It points out goals, strategies and possible measures to reach the climate protection targets (reduction of greenhouse gas emissions by 25 % until 2020 and by 90 % until 2050). The addressed goals are the security of supply, cost certainty, climate protection, regional added value and the obligation of citizens. The document itself was developed by hearings with associations and public participation.

2.5.2 Strategy and recommendations for improvement

In the following the goals are described that are considered in the IEKK:

1. Goal – Develop a strategy for local district heating systems
   - Support the preparation of local and regional heating concepts
     (The creation of a heating atlas software-tool is planned)
   - Support the realization of heating and cooling plans. Base are the plans requested by the European Energy Efficiency Directive
     (The integration of heat demand densities in a potential atlas is planned to facilitate the realization of heating and cooling plans)
   - Support local authorities in realizing climate-friendly actions within the urban land-use planning, e.g. urban heat concepts
     (The legal basis will be optimized when needed)

2. Goal – Develop the use of solar thermal energy
   - Develop solar thermal district heating systems with seasonal heat storage
   - Support the application of large-scale ST collectors and storage concepts connected to heating networks; also cooperative models are promoted

3. Goal – Make use of environmental heat and geothermal energy
   - Develop the funding program for geothermal district heating systems
   - Develop investments in new heat supply projects basing on deep geothermal energy feeding into existing or new heating networks;
     promote the use of geothermal energy in ‘cold district heating systems’

4. Goal – Make use of industrial surplus heat
   - Develop a market model for the feed-in of surplus heat in DH systems
   - For the feed-in of industrial surplus heat in district heating systems of public utilities practical models have to be created to ensure a fair balance of interests between feed-in party and network operator

3. Conclusions and recommendations

In the following the experiences of the regional and expert partners regarding the build-up and management of a task force on regional level are described as well as the required activities that should be undertaken in parallel to implement the approach of SmartReFlex.

1. To assure a continuous commitment and involvement of all stakeholders and also a long-term sustainability of the actions a regional task force has to be set up. The implementation of such a task force in the participating regions has shown that a wide variety of members is needed. In most cases this includes planners, environmental experts, representatives of the energy department from public bodies, municipalities, biomass and other RES producers, DHC technical experts and managers, lawyers and financial experts as well as consumers.

   Furthermore it is important to not only have meetings with the whole task force but also specific area meetings where discussions can be more fruitful and might help to increase the willingness of the participants to report on their practical experience including best and worst practice examples.

   The task force members should also have a certain influence within the organisation they represent to effectively transmit and implement conclusions and lessons learned.

   Finally it is important to merge the most important ideas and goals of the stakeholders in the region to have a group of people with different know-how, experiences and needs but sharing the same idea of a sustainable energy future: an overarching goal to which everyone commits to.

2. Another important activity within the approach of SmartReFlex is to undertake capacity building activities that aim at involving the key stakeholders in the region and also at national level. This includes technical and managing staff from municipalities, regional authorities, DHC utilities, DHC industry, technical designers and city planners, DHC customers, cooperative unions, consumer protection associations, banks and financial institutes.

3. The third key element is to involve the implementing regional authority or an equivalent representative in the activities to guarantee a smooth development of the implementation.

4. Finally the stakeholders should learn from experienced consultants, also from abroad, that have e.g. a specific high-level know-how on policy advice at regional and local level, on DHC systems with high shares of renewables, etc.