

Market uptake of small modular renewable district heating and cooling grids for communities

Project No: 691679



***Involvement of Key Actors of  
District Heating and Cooling Projects  
and Experts in CoolHeating Activities***

**WP 2 – Task 2.2 / D 2.2**

**October 2017**

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691679. The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union nor of the Innovation and Networks Executive Agency (INEA). Neither the INEA nor the European Commission are responsible for any use that may be made of the information contained therein.

CoolHeating website: [www.coolheating.eu](http://www.coolheating.eu)

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## Abbreviations

AT	Austria
BA	Bosnia
BP	Best practice
DE	Germany
DH	District heating
DHC	District heating and cooling
DK	Denmark
EU	European Union
GE	Guiding example
HR	Croatia
MK	Macedonia
RE	Renewable energy
RES	Renewable energy sources
RS	Serbia
SDH	Solar district heating
SI	Slovenia
WP	Work package

## 1 Introduction – Involved Actors

The overall objective of the CoolHeating project is to support the implementation of small modular district heating and cooling (DHC) grids based on renewable energy (RE) for communities in South-Eastern Europe. This will be achieved through knowledge transfer and mutual activities of partners in countries where renewable district heating examples exist;

- Austria (AT)
- Denmark (DK)
- Germany (DE)

and in countries which have less development – the target countries;

- Croatia (HR)
- Slovenia (SI)
- Macedonia (MK)
- Serbia (SR)
- Bosnia-Herzegovina (BA)

In the target countries there are many opportunities for common learning and sharing of best practices on the cost-effective mobilization of new investments in renewable energy across the EU. The overall approach of the CoolHeating project is based on the involvement of partners from countries with different market status for small modular DHC systems.

Core activities of the CoolHeating project include techno-economical assessments, as well as measures to stimulate the interest of communities and citizens to set-up renewable DHC systems together with capacity building about financing and business models. The outcome will be the initiation of new renewable DHC grids in the above mentioned 5 target countries.

The purpose of this report is to summarize CoolHeating actions to involve key actors from the best practice and guiding examples in project activities. Key actors are persons who have already initiated and established small district heating and cooling grids. The idea was to invite these key actors to share their experiences in selected events in the target countries. This shall contribute to gain knowledge and to build capacity in the target countries.

### 1.1 Target and Follower Communities

There are five target countries in the CoolHeating projects. For these countries local partners are chosen where it is expected that new projects will be implemented through the CoolHeating project. In addition to the local partners at least 10 follower communities are involved in project activities. An important activity throughout the CoolHeating project is to disseminate the project results and thus stimulate the interest of new municipalities.

The target countries are listed below together with the target (in bold) and the follower communities:

Croatia

- **City of Ozalj**
- City of Osijek
- City of Velika Gorica

Slovenia

- **Municipality of Ljutomer**
- Municipality of Krizevci
- Municipality of Gornja Radgona

## Bosnia-Herzegovina

- **Municipality of Visoko**
- Municipality of Zivinice
- Municipality of Rorazde

## Macedonia

- **Municipality of Karposh**
- Municipality of Kisela Voda
- Municipality of Cair
- Municipality of Strumica

## Serbia

- **Municipality of Sabac**
- Municipality of Kosjeric
- Municipality of Pecinci

## 1.2 Guiding and Best Practice Examples

Guiding examples (GE), as well as Best Practice Examples (BP) of municipalities and projects which have implemented renewable small district heating and cooling grids were identified and described in various reports such as:

- Best practice report:  
[http://www.coolheating.eu/images/downloads/D2.1\\_Best\\_Practice.pdf](http://www.coolheating.eu/images/downloads/D2.1_Best_Practice.pdf)
- Guidelines on improved business models and financing schemes of small renewable heating and cooling grids:  
[http://www.coolheating.eu/images/downloads/CoolHeating\\_D5.1\\_Guideline.pdf](http://www.coolheating.eu/images/downloads/CoolHeating_D5.1_Guideline.pdf)

## 2 Key Actors Involvement

This chapter provides an overview on how the key actors and experts from the project partners have participated in the various project activities, including training courses and public events. Furthermore, several of the key actors were visited during the study tours in Germany, Denmark and Austria, where first corporations were established.

### 2.1 Bosnia and Herzegovina

Table 1: Involvement of key actors in Bosnia and Herzegovina

Key Actor Name, Country, Affiliation	Details of the event in which the key actor participated	Main lessons learnt from the key actor
Mr. Ulrich Bader, Biogas plant and DH grid owner, Germany	23.02.2017, Technical capacity building training course in Sarajevo	Mr. Bader presented how he planned and constructed a small DH grid which is supplied by excess heat from his biogas plant as well as from a woodchip boiler. He planned the system himself without an engineering company, but with the assistance of a heat pipe manufacturer (Rehau). About 60 consumers are connect to the DH system. Income is generated by a connection fee, a base fee, as well as by a heat tariff per kWh.
Mr. Jim Larsen, Manager of the Brødstrup DH system, Denmark	23.02.2017, Technical capacity building training course in Sarajevo	Mr Larsen presented the DH system in Brødstrup - the gradual construction of DHS and improvements made. He emphasized all the benefits from having different heat sources, like using periods of negative electricity price for heat production and storage. He presented a new concept of seasonal heat storage system comprising of 48 bore holes, heating 19000m <sup>3</sup> of ground. Consumers own the DH system. The heat price is affordable and relatively cheap.
Mr. Franz Jandrisits, BIO-toplina Güttenbach-Pinkovac, Austria	11.05.2017 Capacity building training course on financing and business models	Mr. Jandrisits presented the DH system BIO-heat Güttenbach with focus on business model and economic parameters of project. The system provides heat, domestic hot water and electricity for own consumption. DH system is organized as association (255 members) with General Assembly, Board of Directors and Managing Board. 73% of consumers from Municipality Güttenbach (total 350 households) is connected to the DHS. 20% of investment was financed by own capital and the rest by credit with some subsidies. The price for consumers consists of connection fee (€9000), annual basic fee (€ 300) and the price for heat (0.09 €/kWh)

## 2.2 Croatia

Table 3: Involvement of key actors in Croatia

Key Actor Name, Country, Affiliation	Details of the event in which the key actor participated	Main lessons learnt from the key actor
Mr. Torben Jørgensen, Bornholms Energi & Forsyning, Denmark	25.01.2017 Technical capacity building training course in Zagreb	Mr Jørgensen presented the business model of the DH system implementation on the island of Bornholm in Denmark and pointed out the importance of utilizing locally available resources. Furthermore, the involvement of the citizens in the whole process has been stressed out.
Mr. Christian Engel, Thermaflex, Austria	25.01.2017. Technical capacity building training course in Zagreb	Mr. Engel presented the practical knowledge on different aspects of distribution pipes. Therefore, both the economic and technical perspectives of different pipe materials have been compared, as well as different design factors. Real experience has been presented, giving the attendees a better insight into the main aspects of this crucial part of the district heating system.
Mr. Moritz Schubert, SOLID, Austria	01.06.2017. Capacity building on financing and business models in Zagreb	Mr. Schubert has given an interesting presentation on economics and financing of solar district heating systems. Valuable information has been provided for the costs of the system, giving specific recommendations for Croatia. Furthermore, business models for solar district heating have been presented, including the ESCO model, and different financing sources have been proposed.
Mr. Per Alex Sorensen, PlanEnergi, Denmark	01.06.2017. Capacity building on financing and business models in Zagreb	Mr Sorensen presented the Danish model for organising and financing of district heating systems. He gave an interesting insight into the background of the success story of district heating in Denmark and also provided real examples of different ways of ownership and organisation of these systems, concluding with some interesting remarks on financing and the development trends in Denmark.



## 2.3 Macedonia

Table 4: Involvement of key actors in Macedonia

Key Actor Name, Country, Affiliation	Details of the event in which the key actor participated	Main lessons learnt from the key actor
Mr. Per Kristensen, PlanEnergi, Denmark	30.05.2017, Capacity building training courses on financing and business models	Per Kristensen presented a number of best practice examples from Denmark in light of their business model and financing schemes. His presentation provided evidence that small renewable district heating systems have shown to be economically feasible and beneficial for the community.
Mr. Christian Engel Thermaflex, Denmark	16.03.2017, Organization of technical capacity building training course for involved actors	Christian Engel was a representative of Thermaflex and an expert in heat pipes. In his presentation he outlined the importance of following the EN13941-2 and AGFW FW401 standards, the cooperation with experienced companies, avoiding experimentation with cheap solutions and choosing certified and controlled systems. He came to these conclusions by comparing various pipes and sharing insight on their costs, technical aspects and possible problems (corrosion, calcination, heat losses) as well as the planning aspect of the DH grid.
Mr. Christian Doczekal, Güssing Energy Technologies GmbH, Austria	16.03.2017, Organization of technical capacity building training course for involved actors	Christian Doczekal gave three presentations on best practice examples, know-how and some practical experiences. He went through the most important steps of the planning process and focused on the importance of involving the citizens of the community in the planning process through open communication and transparency. Through the example of Güssing, he showed the benefits of developing an energy self-sufficient town – new jobs, green heat, local development etc.

## 2.4 Serbia

Table 5: Involvement of key actors in Serbia

Key Actor Name, Country, Affiliation	Details of the event in which the key actor participated	Main lessons learnt from the key actor
Mr. Jakob Worm, PlanEnergi, Denmark	1-2.06. 2017, Financial days in Belgrade and Sabac	Mr. Worm presented the Danish experience in district heating systems planning, laws, ownership models with lessons from island Samsø and small village Fons. In addition, he mentioned financing experience and potential for financing of project in Serbia.
Mr. Marcus Bohnert, Initiator of the DH in St. Peter, Germany	1-2.06. 2017, Financial days in Belgrade and Sabac	Mr. Bohnert presented the German experience in small district heating planning and commissioning from the perspective of citizens in St. Peter with financial details and business plan.
Mr. Jakob Worm, PlanEnergi, Denmark	21. 09. 2017. Second technical capacity building training course in Sabac	Mr. Worm presented an energy planning tool that can be useful for the optimal operation planning in the case studies for small district heating concept in target communities.

## 2.5 Slovenia

Table 6: Involvement of key actors in Slovenia

Key Actor Name, Country, Affiliation	Details of the event in which the key actor participated	Main lessons learnt from the key actor
Torben Jørgensen, Bornholms Energi & Forsyning, Denmark	24.1.2017, Technical capacity building training in Ljutomer	Mr. Jørgensen presented the Danish island Bornholm and its three focus development areas: Three main focus areas: -Self-sufficiency, -Sustainability and -Job creation. He put special emphasis on Bornholms Energy & Supply presenting various DH projects on the Bornholms island utilizing straw or wood biomass. He presented how they approach a development of a new DH system in Bornholm, how the develop the project idea in cooperation with the local community which is closely integrated in the development of the DH project. Furthermore, strategies for optimisation of the DH pipelines were presented and financing and ownership of DH projects in Bornholm was presented. There were many question for the speaker who had to explain e.g. how the cooperative form of DH ownership works in practice in Denmark.
Christian Doczekal, Gussing Energy Technologies GmbH, Austria	24.1.2017, Technical capacity building training in Ljutomer	M. Doczekal presented how to start a small district heating/cooling project. He showed advantages of a DH system and explained detailed steps in development of a DH project, from identifying the project and the people to the tender procedure, implementation and operation. The presentation included a lot of technical details, experiences from best practice examples and directions for successful development of new DH projects. Christian presented also the Handbook on Small Modular Renewable Heating and Cooling Grids. This was a separate very technical presentation which included technical inputs, considerations and experiences from DH projects fuelled by sun and biomass including heat storage (also including seasonal heat storage technologies). Christian also discussed cooling via heat technologies and presented important inputs for district density and other technical aspects of development of new DH projects.
Christian Engel, Thermaflex, Austria	24.1.2017, Technical capacity building training in Ljutomer	Mr. Engel is an expert in the field of DH pipes. The company Thermaflex has a lot of experiences in production of flexible DH pipes. Mr. Engel presented solutions for DH heating and cooling focusing on the heating grid. He presented the recommendations from the Heat Road Map Europe and produced a lot of technical inputs for designing the DH grids. He explained the heat and pressures

		used in various pipe types, comparisons of types of plastic tubes, impacts of corrosion and calcination on the pipes and above all provided a lot of knowledge on the DH grid planning, costs, implementation, safety and the future of DH grid networks including examples from real projects.
Per Alex Sørensen, PlanEnergi, Denmark	31.5.2017, Financial capacity building training in Ljutomer	Mr Sørensen has more than 30 years of experience in renewable energy and district heating. He presented the Danish model for Organising and financing of district heating. He showed the development of district heating in Denmark, The legal framework, examples of ownership and organization and financing of district heating in Denmark. At the end of the presentation some development trends were presented and discussed with the audience. Training attendant had a lot of questions on financing of DH for Mr. Sørensen. The discussion exceeded the presentation time and has continued in the catering pause.
Moritz Schubert, SOLID, GmbH, Austria	31.5.2017, Financial capacity building training in Ljutomer	Mr. Schubert is a consultant of the SOLID, GmbH Austria and was involved in development of some large solar district heating systems (. He presented Economics and financing of solar district heating systems at the financial training in Ljutomer. His presentation focused on price of solar thermal heat and financing and business models related to solar district heating. He showed that the specific system cost mainly depend on complexity, scope of supply, collector type, type of substructure (roof, ground-mounted) and system size. And that there are significant economies of scale effects possible. He also presented a plastic ESCo business model explanation including some examples.
Christian Doczekal, Gussing Energy Technologies GmbH, Austria	31.5.2017, Financial capacity building training in Ljutomer	M. Doczekal presented Know-How for Technologies for financing bodies and similar shareholders. He showed different technologies in district heating from simple solar and biomass heating to biomass gasification, cogeneration technologies and heating pumps. All technologies were presented with focus on impact on the project economy (investment costs, O&M costs and complexity, fuel availability, manipulation etc.) and risk.

### 3 Technical Knowledge Transfer and Capacity Building

This chapter provides an overview on technical knowledge transfer and capacity building in the CoolHeating target countries. Within the CoolHeating project technical training courses were organised in each target country to transfer the knowledge from key actors and project partners to Austria, Denmark and Germany to the stakeholders from the target countries.

The aim of the trainings was to support with technical know-how, cooperation with the industry (products and service for district heating utilities) and to give the participants the knowledge for developing their own concepts for small modular DH systems. The trainings included an overview for implementation of DHC systems, lessons learned, BP examples, how to start DHC projects, boilers, biomass logistics, DH pipes and heat transfer stations. Additionally, the knowledge from the free “Handbook for small modular district heating and cooling grids” was presented – link:

[http://www.coolheating.eu/images/downloads/D4.1\\_Handbook\\_EN.pdf](http://www.coolheating.eu/images/downloads/D4.1_Handbook_EN.pdf).

It was very useful that companies (for boilers, pipes, heating stations) presented the basics of the knowledge and the practical experience. In general, for further technical trainings it is recommended to include following topics:

- Best practice examples (speakers from Denmark, Germany, Austria)
- Practical experience: How to start a small district heating/cooling project
- Boilers and biomass logistic – practical knowledge
- District heating pipes – practical knowledge
- Handbook for small district heating/cooling
- Heat transfer stations – practical knowledge
- Lessons learned for district heating systems
- Networking: a short introduction round where the participants tell about their field of work (max. 2 minutes each)

It was very useful that there was a mixture of participants (technicians, manufacturers, municipality, project developers, etc.), especially for networking and understanding the needs of the others. The presentations from the technical trainings in the target countries and the handbook can be downloaded here: <http://www.coolheating.eu/en/news/8-news/41-5-successful-technical-trainings-about-district-heating.html>. Feedback and recommendations from the target countries about the technical training courses are given in the following:

What was the most important outcome of the technical trainings?	
Bosnia and Herzegovina	Networking, all chain links were at one place (industry partners especially), where new technologies and best practice examples were presented. Significant business links realized and new project ideas have been initiated
Croatia	The most important outcome of the technical training was knowledge and experience sharing from best practice examples in Denmark and Austria. That way, the participants had the opportunity to discuss all the aspects of such systems with people who participated in the transformation of fossil fuel based communities into sustainable communities, with the focus on renewable district heating implementation. Furthermore, technical aspects of such systems were presented by experts in this field, providing better insight into renewable district heating and enabling successful discussion.
Macedonia	The acquaintance of local companies and actors with representatives from GET, HERZ, Danfoss and Thermaflex as well as knowledge transfer and discussion of experiences.

Serbia	It was: building capacity of local actors about biomass as fuel, biomass supply logistic and handbook for small DHC.
Slovenia	High interest for cooperation within the industry sector and the technology providers due to a vacuum of no new DHC projects as a consequence of the implementation of a new energy law. The existing level of technical knowledge and competence is good and good cooperation with industry from best practice countries exists already. The key identified obstacle is the absence of new subsidies due to the new energy law and very low fossil fuel heating costs which make RES DHC projects uncompetitive.

Statements from the participants and organisers?	
Bosnia and Herzegovina	The topic was of the major significance and interest for all entities involved. The best practice examples should be promoted even to a greater extent in order to initiate similar projects. There is abundant potential and B&H entrepreneurs have a capacity and knowledge for their realisation.
Croatia	Participants were satisfied by the possibility to discuss technical aspects of renewable district heating systems with the leading experts in the field and commended the overall programme of the training, which provided important information on these systems. The organisers were satisfied by the participants' interest and active discussions, concluding that the training was successful.
Macedonia	It can be concluded that the participants found the presented information useful, although some expected a more hands-on training approach.
Serbia	All actors and other participants were satisfied that have adopted a lot of information on efficiently use of biomass. Also, the good cooperation between participants from developed countries is very important and knowledge transfer to local key actor could encourage them to develop biomass project and renewable energy projects on local level
Slovenia	Technical competence exists in SI. On the other side a strong support from the government and administration (on shortening and simplifying of the needed procedures) is needed as also a good cooperation and support from the local authorities (municipalities) is needed in order to develop projects which will be able to compete with low fossil fuel heating costs. For households the heating price is still the most important decision factor.

Proposals for technical trainings?	
Bosnia and Herzegovina	It would be beneficial to present the available renewables potential of some specific areas interesting for implementation of similar projects in target countries. The economic – financial assessment for such project in target country circumstances should be done.
Croatia	The overall program of the training was satisfactory, but future trainings could include a more detailed information on thermal storage (with the focus on seasonal thermal storage) and power to heat technologies, due to lack of

	such technologies in Croatia and the participants' interest. Furthermore, more BP examples should be included in the programme.
Macedonia	Design and software used for design of heating grids, heating plants etc. It would complement the previous training sessions.
Serbia	Following topics have to be included: The 4th generation of DHC, CHP that use renewable energy, Best practices of "green energy" in agriculture and food processing.
Slovenia	The trainings covered adequate range of topics and knowledge and networking. It would be hard to include additional topics as the format would expand beyond a technical training format. In general the knowledge part of presentations should really be state of the art and highly technical as technical experts attend the training.

How did the key actors contribute?	
Bosnia and Herzegovina	Best practice examples which were presented stimulated and roused interest of all actors, especially because they faced with similar problems at the beginning of the project development. This mainly refers to the legal framework incompleteness as well as the difficulties in issuing permits.
Croatia	Provided first-hand experience from the guiding examples, which initiated a successful discussion with the participants of the technical training.
Macedonia	The key actors gave presentations related to state of the art technologies and concepts implemented in small modular renewable DHC grids. They also took part in discussions with local actors and shared their practical experiences.
Serbia	They were very active in discussion during the training and they asked a lot of questions on presented topics.
Slovenia	There was a live debate after and in some cases also during speakers' presentations. Each participant introduced himself and explained his motivation for his appearance in the event. Based on that the networking part of the event was also successful as participants exchanged ideas and motives.

What are the recommendations for technical trainings for other organisers/hosts? Lessons learned?	
Bosnia and Herzegovina	The audience was from different branches. However, the technical staff would prefer presentation of more details concerning new technologies and technical solutions in DHC system, as well as the financial information for real applications.
Croatia	Described in the previous boxes

Macedonia	Although companies working in the field of DHC project should constitute the majority of the participants, it is recommended to include participants from local authorities and municipalities in order to broaden discussion topics.
Serbia	Training has to include presentations of owners of renewable DHC projects because their experience is most important. That mean it is important to invite more speakers who were involved in renewable energy projects. It is important to include representatives from civil sector.
Slovenia	It is hard to do technical training when technical experts are attending and listening to speakers. It is important to keep the presented content at a very high level (state of the art solution and best practice examples and very technical contents).



## 4 Capacity Building on Financing and Business Models

The CoolHeating project built capacity for participants in the target countries and to facilitate the deployment of improved business models and innovative financing schemes for mobilising investments in small modular RE DHC systems. Thereby, the following tools and measures were applied:

- Guideline of improved business models
- Developing an economic calculation tool for the target communities
- Guidelines for drafting heat/cold supply contracts between actors
- Developing individual business models for the target communities

The objective of the training courses on Financing and Business models was to build capacity and to facilitate the deployment of improved business models and innovative financing schemes for mobilising investments in small modular RE DHC systems. The Training courses were focused on local actors on financing, business models, and contracts and training courses for financing bodies and investors on technologies. Both trainings have specific target groups.

The first target group of the financial trainings were interested stakeholders, initiators and actors who initiate, develop and finance small modular DHC projects. Special emphasis was put on target groups that need training on feasibility assessments of DHC projects, on related business and ownership models. Engineering and consulting companies with elaborate knowledge on DHC systems and their development were not the main target group. The training was focused on target groups which require additional knowledge and information in order to develop new DHC projects. The Second target group of the financial trainings were financing bodies, and potential investors in small modular DHC projects who seek and information on financing options and innovative approaches to financing of for new DHC projects. Secondary target group includes also companies which provide financing for DHC projects (e.g. projecting/engineering and project development companies which also provide financing or DHC projects).

Based on the experiences of technical trainings, which were conducted before the financial trainings, national partners were given an option to conduct the financial trainings for both target groups in two consecutive days or in one event. Majority of the national partners decided to conduct both trainings in one event, only in Serbia trainings were conducted in two separate events. The decision to conduct both trainings in one event enabled project partners to reach larger critical mass.

Training for both target groups were successfully conducted in all 5 target countries. Each of the training events included interesting speakers including speakers from BP countries. The details on the training formats, speakers and outcomes are available in a dedicated report on the CoolHeating website (<http://www.coolheating.eu/en/publications.html>). Feedback and recommendations from the target countries about the technical training courses are found in the following boxes:

What was the most important outcome of the technical trainings?	
Bosnia and Herzegovina	Networking, knowledge share and new business potentials presentation (investment in renewables for heating/cooling purposes, not just electricity production)
Croatia	Similar to the technical training in WP4, the most important outcome of the training was experience transfer from Austrian and Danish BP examples in terms of business models and financial schemes for implementation of renewable DHC. Experience from Croatian BP example was also presented, enabling an elaborate discussion on this topic. Also, the important outcome

	was that the potential investors were presented with new ways of financing such projects in Croatia and all the participants were given a hard copy of the Croatian version of Handbook on small modular renewable DHC and BP examples report.
Macedonia	The multi-layered structure of participants allowed for a number of questions which need input from different actors to be discussed. The investors from the financing bodies were introduced to the technologies and the local actors were introduced to financing and business models.
Serbia	The most important outcome is exposure of a lot of useful information for stakeholders about business models. The knowledge transfer will help local authority to create energy service market.
Slovenia	Limited interest for joining the Financial trainings from the side of financial institutions, banks, etc. One of main outcomes of the training organised in Slovenia is that there will have to be additional efforts invested into attracting, motivating and informing financial institutions (national agencies, banks and other financing institutions) in promotional and awareness rising activities for DHC projects.

Statements from the participants and organisers?	
Bosnia and Herzegovina	The renewables potential should be employed in a greater extent, especially for heating purposes in order to decrease pollution in winter period. However, there should be adequate legal framework measures to stimulate investing in that sector.
Croatia	Participants were highly satisfied with the training programme and the received material, while the organizers were satisfied with the attendance and the interest for CoolHeating reports, which were handed out to the participants.
Macedonia	The participants showed particular interest in the information presented by the financing bodies and economic calculation tool. Some announced that they would analyse the tool in further detail and give feedback.
Serbia	They were satisfied on detail explanation of calculation of commercial indicators and they comment on evaluation of good practice examples. Based on discussion it would be concluded there is high interest in biomass and biogas project development in Sabac, in Kosjeric and Pecinci.
Slovenia	There was a lot of interest from the segment of municipal authorities and technical sector on the presented topics of representatives of national authorities responsible for implementation of policies and subsidies. Participants appreciated a presentation on design of business models (presented what business models are and the Canvas tool for business model development).
Proposals for technical trainings?	
Bosnia and Herzegovina	It should be fruitful to present more case studies for renewables potential utilization for some specific areas interesting for implementation of similar

	projects in target countries. The economic – financial assessment for such project in target country circumstances should be done.
Croatia	The programme of the technical training included all the relevant topics
Macedonia	Comparative analysis of various business models over a case study for a local community.
Serbia	The following topics have to be included: Creation of business plan for investment, full procedure (software, technical description and other necessary chapters). Presentation of financial schemes that are supported by Serbian banks and other financial institutions which are active in Serbia.
Slovenia	Focused on the target group of the event the training the trainings should include basic content like what is business model, how to develop a business model and tools for developing of business models for municipal authorities. And on the other hand the training could include more content prepared by national authorities (future policies, subsidies to be expected in future, key mistakes in development of DHC projects etc.).

How did the key actors contribute?	
Bosnia and Herzegovina	Best practice examples which were presented boosted the audience interest. However, examples from developed EU countries are different because the electricity and heat price is significantly higher than in B&H. Simple analysis showed that without external incentive, the investment in DHC systems based on renewables in some cases is not financially viable. All best practice examples realised in B&H, which were not financed by grant funds/donors, struggle with profitability.
Croatia	Due to interesting presentations from guiding examples, key actors started interesting discussions with the participants of the training, which increased the knowledge of the relevant stakeholders in Croatia.
Macedonia	Per Kristensen presented a number of best practice examples from Denmark and contributed to the analysis of how such examples could be implemented in the national and local framework conditions.
Serbia	Key actors contributed in discussion about financial models
Slovenia	National partners provided event organization, hosting and presentations. Project partners from best practice countries provided external speakers from best practice examples. All participants were involved in the training content (e.g. all participated in a live development example of the Canvas Business Model on an imaginary business) and were also involved in lively networking during the event.

What are the recommendations for technical trainings for other organisers/hosts? Lessons learned?	
Bosnia and Herzegovina	There should be more details provided for real investment costs for certain technical solutions for different DHC systems applicable in B&H.
Croatia	Described in the previous boxes.
Macedonia	Include key financing institutions and local actors which have had experience with the barriers of project financing in the past. Make the training more workshop-oriented if possible.
Serbia	It is necessary to obtain participation of experts who are coming from the financial sector also organisers have to include representatives from civil sector in next trainings and workshops.
Slovenia	It is important to develop content and motivation for financial institutions to attend the event and to connect them with other stakeholders. Providing a workshop-like presentation such as live development of a business model can present a nice break in the presentations, involve participants and “break the ice”.

## 5 Summary and Conclusion

Various activities in the CoolHeating project were organised in order to transfer knowledge and to bring expertise from key actors and project partners to the target countries. Besides the presentations from the key actors, several reports on technical issues and on framework conditions, as well as guidelines and handbooks have been presented and used in the trainings and workshops. As the comments from the participants of the training courses show, it seems that the combination of theoretical knowledge in combination with practical experiences from the key actors (e.g. presentations from the key actors of the GE and BP examples, but also presentations from manufacturers) was very fruitful.

In general, there seems to be good response to the trainings on both technical issues as well as finance and business models. The presentations from key actors on real experiences were important to show how the target country stakeholders can go from the initial technical idea to actual implementation through a planning process involving points such as:

- Creating interest and support in the community
- Data on heat demand
- Data on local resources
- Developing technical concepts
- Dimensioning of plants and networks
- Approvals and planning process
- Financing
- Connecting new customers

The inputs and reflections in this report are given by the five target countries. The inputs will be considered for the coming technical trainings during autumn 2017. Inputs on experiences and lessons learned can be used and be useful for other new projects that are starting the process on planning new DHC networks.