

LEGEND FINAL INTERNATIONAL PUBLICATION

2.2 Knowledge by the general population and stakeholders of geothermal energy in Adriatic area (maximum 10 pages)

Montenegro Green Building Council (GBC ME) is the lead partner for LEGEND project Work Practice 5, and was responsible for designing, collating and analysing collected research data from across the project region. The data are used to formulate Local policy recommendations for each country, as well as to formulate general recommendations for further development of the market space for geothermal energy in the Adriatic area.

METHODOLOGY

The analysis was designed around a questionnaire which each project partner distributed to key stakeholders in its area of responsibility. These included (but not only):

- national and local government agencies;
- chambers of commerce and similar industry groups;
- academia and professional institutions.

The questionnaire had four main sections:

- Policy and Legislation;
- Technical / Academic / Professional;
- Market / Economic;
- General

Each of these was split into 2 parts:

- Macro-level, dealing with overall government policy and national level issues;
- Micro-level, addressing local or individual site issues.

Questions were a mixture of:

- Multiple choice from a pull-down selection;
- Open-ended, requiring a descriptive answer;
- Ranked order of a given list.

In addition to the questionnaire, there was a 'Wish List'. The purpose was for the organisation or individual replying to give its list of changes it would like to be made to enhance the use of GCHP. The Wish List therefore helps to guide recommendations for policy and legislation changes which are part of the project's results. Full list of questions can be found in the ANNEX.

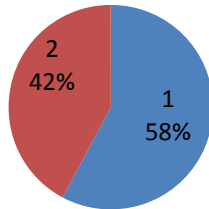
The questionnaire was analysed by GBC ME. The analysis ranked answers to each question to give an overall picture across the region covered by the project. The higher the degree of negativity for a specific factor the more needs to be done to make it positive. This ranking gives a first list of priorities for remedial action, which needs to be adjusted to take account of political and economic constraints.

RESULTS

Market research was collected between January and March 2014 by all twelve partners of the LEGEND project. In total they gathered 289 responses, of which 42% was general and 58% professional opinion from key individuals, institutions and market leaders in the Adriatic region. Looking at the knowledge of respondents, over 60% of respondents are 'informed' about or have 'above average' knowledge of geothermal heat pump systems. This is evidence that despite general lack of knowledge, which seems to be the prevailing answer particularly across the Western Balkan states, the participants are well selected and thus a good representation of the state of affairs in the chosen area. Overall there is a significant difference between markets and knowledge in Albania (AL), Serbia (SRB), Montenegro (MNE) and Bosnia and Herzegovina (BiH) and Croatia (HR), Slovenia (SI) and Italy (IT). The latter three have advanced experience and are leaders in the region regarding installations of heat pumps and research on geothermal energy. This is seen as an advantage in a sense that experience, good and bad practice can be transferred to the states where the market is at an earlier stage of development.

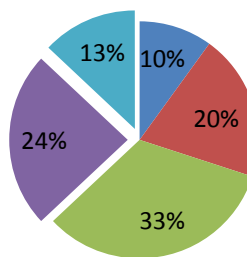
Categories of Respondents	no	%
1. Building product and equipment manufacturers and distributors	7	4
2. Utilities: Electrical, Energy Service Providers, ESCO's, Water and Sewer Utilities	11	7
3. Building Owners, Investors & Developers; Property Portfolio Owners & Managers; Property or Facility Managers; Building Operations and Maintenance; Occupiers	5	3
4. Real estate companies and brokers	1	0.6
5. Professional Services Firms	19	12
6. Construction Managers, Contractors, Subcontractors, Builders, Building Controls and Service Contractors	16	10
7. Financial Community and Institutions: Providers of Financial, Insurance and Legal Services to the Property Sector	3	2
Categories of Responders – Non-Commercial	no	%
8. Government at all levels, including agencies and regional government organisations	39	12
9. Environmental and Non-Profit Organisations; Trade Associations	13	8
10. Universities; other educational establishments and Technical Research Institutes	40	24
11. Professional Societies, Standards Organisations, Unions	6	4
12. Press and Media	3	2
TOTAL	161	100

Number of responses split by professional and general opinion



Knowledge about GCHP

- A lot - professional, or near professional level
- Above average, e.g. difference between open and closed loop systems
- Informed - know the principles of its operation
- Limited - have heard of it, but little else
- Never heard of it



Rankings by DON'T KNOW

There appears to be a general lack of knowledge and information about what geothermal energy means and how it can be used. In comparison to YES and NO answers, DON'T KNOW answers are the most common. Figure 1 shows the top ten questions to which 50% - 76% of respondents answered 'DON'T KNOW'. The majority of questions relates to policy and legal framework which is evidence of the weak state of affairs in this field, particularly in the four developing states (BiH, MNE, SRB, AL). Subsidies and other financial aids also appear to be an unknown factor. In general respondents are not aware of government subsidies and tax incentives that relate to GCHP investments. As explained below it becomes evident that financial aids for GCHP fit under the general topic of energy efficiency and climate change mitigation.

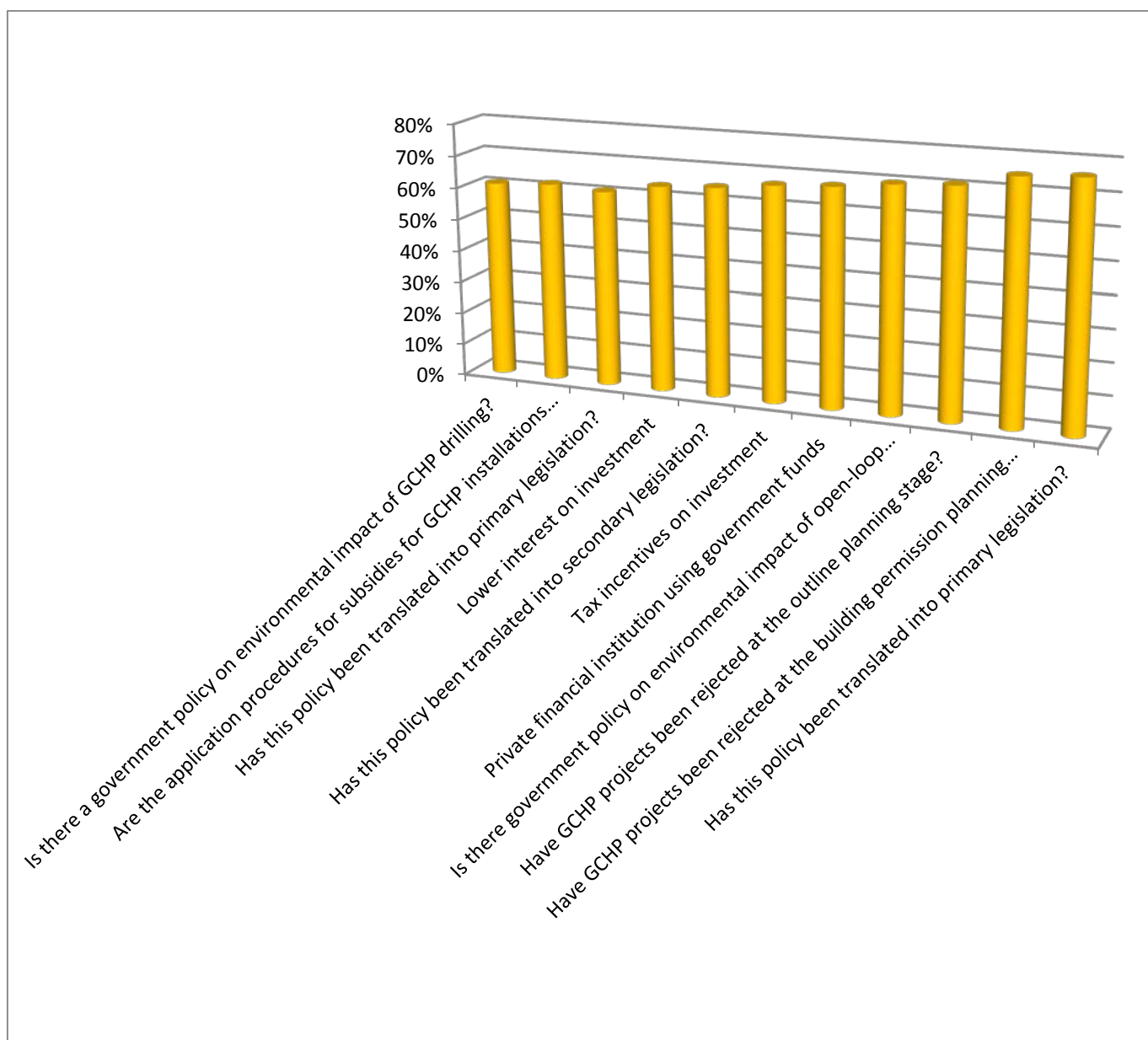


Figure 1: Rankings by DON'T KNOW

Rankings by NO greater than (>) YES

Figure 2 shows top ten questions which got the least number of YES responses, or namely the percentage by which NO answers were greater than YES answers. The actual number of NO responses doesn't go over 40%, because it is overridden by DON'T KNOW responses that go over 70%. Nevertheless, looking at the 'negative' NO answers, the results show us that initial training of architects and building engineers does not include training about GCHP, which indicates early gaps in the education system relating to this field of RES implementation. It also indicates a lack of primary and secondary laws that relate specifically to installations of GCHP (AL, BiH, SRB, MNE).

The 'positive' NO answers, show that applications for subsidies are no more complicated for GCHP than for other RES. Also projects with GCHP have not been rejected *per se*, although this should be interpreted with caution due to the lack of legislation that we find on the topic. This especially relates

to the lack of government policy for open-loop GCHP systems that can have an impact on the underground water sources by potentially raising its temperature by 5 to 10°C, as well as the risk of contamination of drinking water.

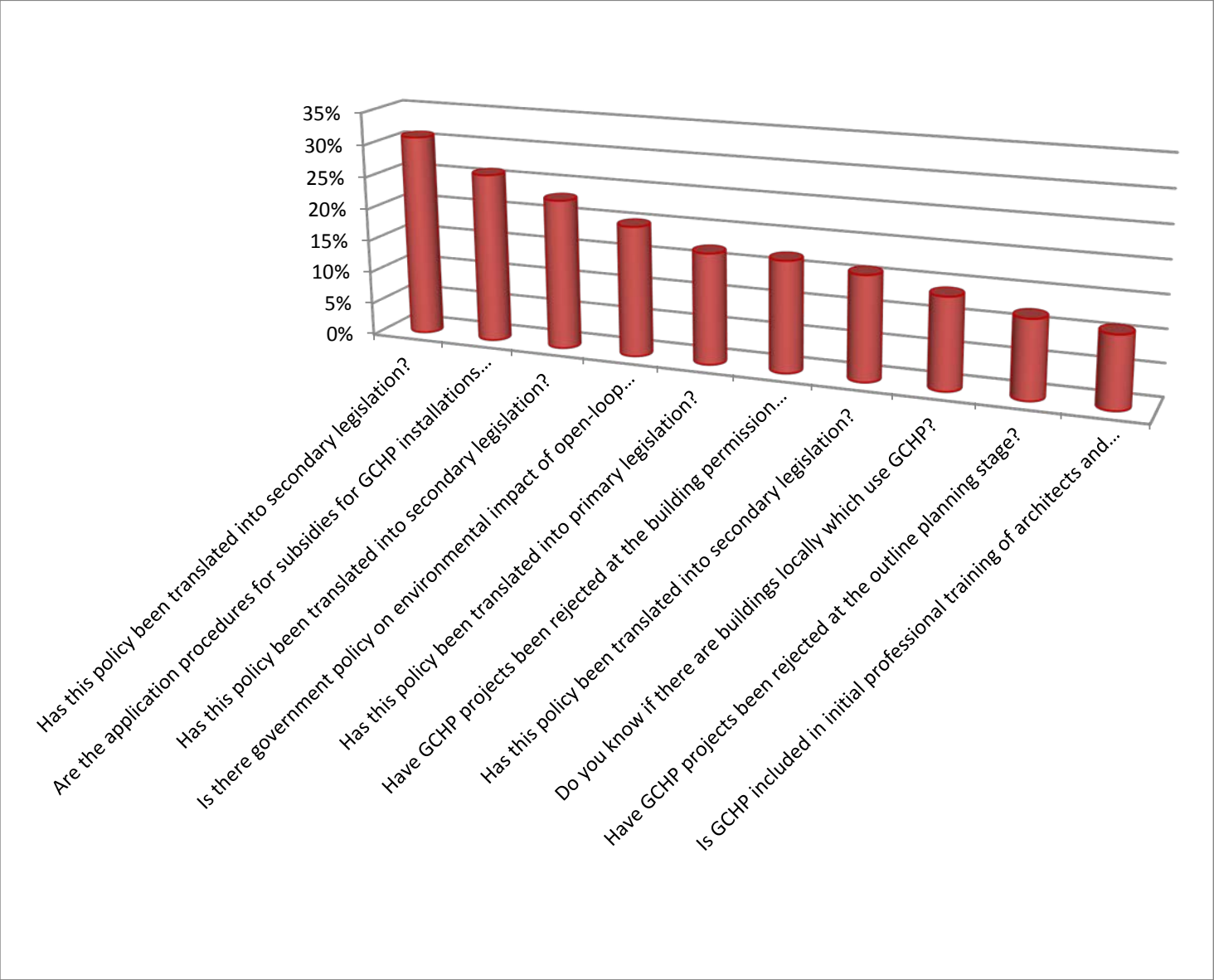


Figure 2: Rankings NO > YES

Rankings from YES greater than (>) NO

Figure 3 shows the greatest number of YES answers in comparison to NO answers, the highest of which relate to questions from the General Survey. The results show that 85% of respondents wish to use RES more and have a positive view of RES. These were also followed by comments from respondents that ranged from: *‘They are the future!’*, *‘They cannot run out’*, *‘We must use them to plan the future’*. There is also evidence that there are some misconceptions and also recommendations that can be taken from it. This is a comment from a respondent from Slovenia:

'My opinion about RES is positive, but GCHP cannot be for anyone, because there is not enough potential! Finding right energy mix is needed, which gives maximum benefits for minimum expenses simultaneously with low environmental impacts.'

And a comment from a respondent from Montenegro: *'Environmental aspects of the use of alternative energy sources are indisputable, but it is not a realistic expectation that they can cover a large percentage of energy needs. The exception is hydropower.'*

Across the region use of geothermal heating and heat pumps is covered in government policies that relate to sustainable development. In the case of Slovenia and Italy, policies have been translated into primary and secondary legislation, some of which is specific to GCHP installations.

In addition, YES responses indicate that government policies cover GCHP (70% of responses) and confirm the overall geological suitability of the area, alongside available subsidies and grants from EU and national governments. Also overall readiness of the regional market to supply, install and maintain heat pumps is also evident due to availability of skilled experts and companies that can maintain GCHP systems. These are obvious opportunities for further development of this technology in the region, and transfer of good practice from EU Member States.

Following the findings of the research gathered in June 2014 there were strong indications that lack of knowledge and information about GCHP and geothermal heating was the dominant response. As a follow up Montenegro Green Building Council furthered its research at the LEGEND workshop that took place in September 2014 during the Energy Fair in Budva, Montenegro. The idea was to engage the audience in Montenegro with the topic of Continuous Professional Development (CPD), which is currently not a mandatory requirement for professionals. In conclusion 86% of respondents who attended the event thought that CPD is necessary. However some voiced concerns that, without financial subsidies, this could be a burden to SMEs because the market is too small and thus any such requirements must be balanced out with the speed of development nationally.

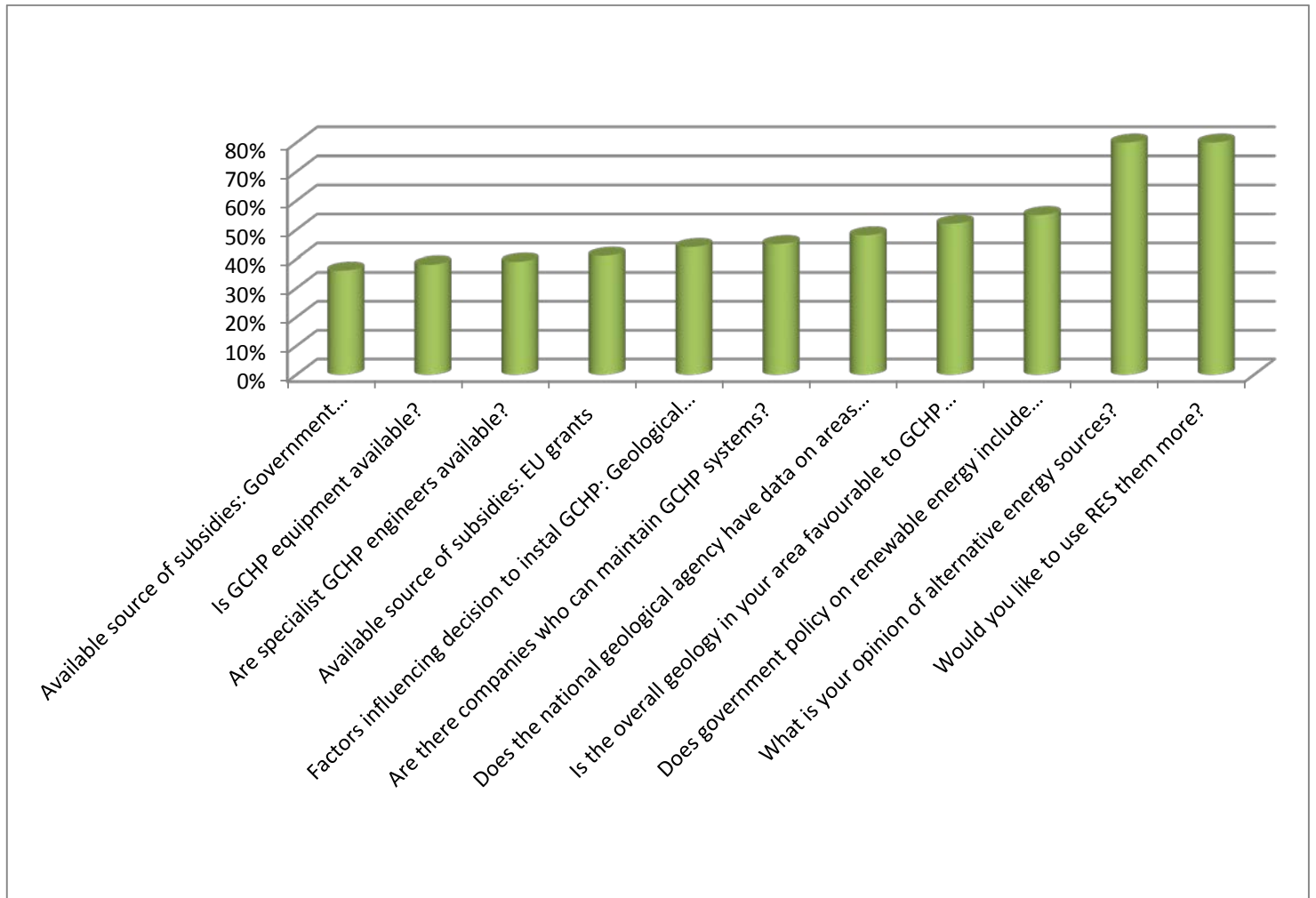


Figure 3: Rankings YES > NO

Questions with ranking factors

Some questions required ranking answers. Here they are split between those that can be seen as opportunities for development of GCHP in the region, and those that show weaknesses that must be mitigated.

Strengths and opportunities

- Across the region information and education about GCHP is available at higher education level, which gives a good start to expanding the knowledge further.
- These ranked as top 3 reasons for choosing to install GCHP:
 - cost of energy savings,
 - lower maintenance costs in comparison with fossil fuels,
 - and security of energy supply during the building's life.

These are also indicators of public opinion with regards to switching to RES in general and committing to sustainable investments in general.

- There is an overall presumption that the cost of investment compared to other renewable energy systems is 'about the same' (33% of respondents).
- There is a presumption that annual maintenance costs for GCHP system are lower than for fossil fuels (63% of respondents).

- In each project State, respondents identified buildings locally that use some form of geothermal energy and heat pumps, in total over 30 buildings were named (map?). This means that demonstration cases and case studies are available locally, which can be used to increase knowledge and raise awareness amongst the general public and professional stakeholders.

Weaknesses and threats

- There is a lack of knowledge about the legal framework regulating GCHP amongst respondents, local authority staff and inspectors, in particular in AL, BiH, SRB, MNE.
- Planning procedures for GCHP installations are more complicated than for fossil fuels based systems in States where GCHP is common (SI, IT). This is a weakness in a sense that it can deter investments. A balance is necessary in order to allow for investments but also to ensure adequate environmental protection.
- There is lack of technical and professional knowledge amongst technicians, planners, designers regarding GCHP systems in particular in AL, BiH, SRB, MNE.
- Investors are interested in low investment and high return, in particular in AL, BiH, SRB, MNE.
- Specialisation on the topic of RES, including GCHP, is available only as an optional subject in higher education (AL, BiH, SRB, MNE).
- Overall there is a small number of local companies who can maintain GCHP systems (44.3% of respondents don't know about any).
- Most respondents are not aware of the availability of subsidies (43% - 63%), which indicates that better information campaigns are necessary.
- Top three factors influencing decision to install GCHP are negative:
 - high price for drilling and
 - non-availability of subsidies/ Government incentives.
- According to 38% of responses the cost of initial investment of GCHP is higher than for systems based on fossil fuels. This compares to 29% that think it's 'about the same', and 9% that think it is lower.
- Financial hardship of the majority of the population (especially AL, BiH, SRB, MNE) leads to the need for a 'quick returns' on investment, thus being susceptible to the wishes of investors.
- Lack of, and poor, Government incentives (AL, BiH, SRB, MNE).
- There is general misconception that geothermal energy source refers only to hot underwater sources.
- Unregulated legal framework allows for environmental concerns about wastewater from open-loop GCHP (especially AL, BiH, SRB, MNE).

Recommendations

The following recommendations were drawn out of the Wish lists gathered during the research, and also as a consequence of the collated and analysed research findings.

Aimed at incentives and financial aids by governments:

- **Legislation** to include GCHP more specifically & to promote GCHP investment

- **Define technical guidelines** for use of GCHP (max. consumption from subsoil, also related to open loop and closed loop systems, and waste water pollution)
- **Simplify administrative procedures** for GCHP installation and for research permits
- **More uses in public buildings**, upgrading their energy efficiency
- Government should look at GCHP as **long term investment in infrastructure** and saving of tax payer's money.
- **Introduce subsidies**; tax incentives; utility bills and tariff concessions; non-refundable credits, both on the government and local government levels
- Ensure **stricter implementation of laws and regulation** through inspections

Aimed at technical and educational development:

- **Educate everybody**, from decision makers to final users about the benefits of GCHP systems and the benefits for individuals and for the community overall
- **Organise training courses** for architects, engineers, installers/ maintainers, designers (designers do not know enough about techniques so can't propose or implement GCHP systems)
- **Improve training in technical schools at all levels**: most training is at university/ master level, so new technicians enter the labour market with little/no knowledge
- **Organise training for local authorities' technical offices**: civil servants and government administrators are not aware of the potential of GCHP
- **Educate farmers and business stakeholders** about GCHP installations and RES in general

Aimed at sharing information and ensuring greater publicity:

- Encourage **cooperation** between specialized firms: provide know-how to local companies and subsequent development of a new market
- Offer **subsidies** for large-scale projects and innovative systems (ATES, BTES)
- **Media campaign** to inform the general public about advantages of GCHP & RES
- **Raise awareness** of professional firms who are able to install GCHP
- **Promote financial institutions** who give financing benefits for GCHP
- **Information campaigns** on the model of "public service announcement" at national and local level in which local professionals and representatives from academia and technicians introduce the use of GCHP technology

Aimed at further research and development of technology:

- **Develop methodology** for cost assessment in planning stage
- **Map out suitable sites**, in order to have a technical basis for promoting installations
- **Calculate geothermal potential** in the context of building permit documentation
- Solve the **problems with drainage** of extracted water
- Create a **catalogue of best practice** with all important parameters and indicators which would be useful for designers.
- Make/ buy **software that would serve as 'public domain tool'** for designing GCHP

ANNEX

1. Abbreviations

AL – Albania
B&H – Bosnia and Herzegovina
CRO - Croatia
CPD – Continuous Professional Development
GBC ME – Green Building Council of Montenegro
GCHP – Ground Coupled Heat Pump
GE – Geothermal energy
GTH – Geothermal heating
IT – Italy
MNE - Montenegro
RES – Renewable energy sources
SRB - Serbia

2. The research questionnaire

Policy and Legislation

Macro-level

1	Does government policy on renewable energy include GCHP?
1,1	Has this policy been translated into primary legislation?
1,2	Has this policy been translated into secondary legislation?
2	Is there a government policy on environmental impact of GCHP drilling?
2,1	Has this policy been translated into primary legislation?
2,2	Has this policy been translated into secondary legislation?
3	Is there government policy on environmental impact of open-loop versus closed-loop GCHP systems?
3,1	If yes, please describe it
3,2	Has this policy been translated into primary legislation?
3,3	Has this policy been translated into secondary legislation?
4	Do Building Codes cover GCHP installations?

Micro-level

5	Are planning procedures more complicated for GCHP installations than for fossil fuel-based systems (oil, gas, electrical)?
5,1	If they are, list the extra procedures
6	Are local authority planning staff familiar with GCHP technology?
7	Are local authority building inspectors familiar with GCHP technology?
8	Have GCHP projects been rejected at the outline planning stage?
8,1	If yes, give summary of why
9	Have GCHP projects been rejected at the building permission planning stage?
9,1	If yes, give summary of why

Technical / Academic / Professional

Macro-level

10	Does the national geological agency have data on areas most likely to be suitable for GCHP systems?
11	Is GCHP included in initial professional training of architects and building engineers?

12	Is GCHP included in Continuous Professional Development for professionals in the construction industry?
13	Are specialist GCHP engineers available?
13,1	If no, please describe where they come from

Micro-level

14	Is the overall geology in your area favourable to GCHP installations?
15	Are specialist GCHP drilling companies available locally?
15,1	If no, please describe where they come from
16	Is GCHP equipment available?
16,1	If no, please describe where they come from
17	Are there companies who can maintain GCHP systems?
17,1	If no, please describe where they come from
18	Do local academic institutions include GCHP in their syllabus?
	If so at what level (yes to all which apply)
18,1	Technician training?
18,2	First degree architect / engineering courses?
18,3	Post-graduate courses?

Market / Economic

Macro level

19	Are there subsidies for GCHP installations?
20	What is the source of subsidies (yes to all which apply)?
20,1	EU
20,2	Government department or agency
20,3	Private financial institution using government funds
20,4	Other (please specify)
21	What form do subsidies take (yes to all which apply)?
21,1	Cash grants
21,2	Loans at lower interest than market rates
21,3	Lower interest on investment
21,4	Tax incentives on investment
21,5	Other (please specify)

Micro-level

22	Are the application procedures for subsidies for GCHP installations more complicated than for other renewable energy sources?
22,1	If they are, list the extra procedures
23	Rank the factors influencing your decision to install a GCHP system (1 = most important, 9 = least important)?
23,1	Site suitability
23,2	Cost of sub-soil preparation (eg drilling) compared to fossil-fuel systems
23,3	Availability of financial subsidies
23,4	Environmental impact, including CO ₂ emissions
23,5	Energy cost savings
23,6	Availability of professional design expertise
23,7	Availability of experienced installation companies
23,8	Maintenance costs compared to fossil fuel systems
23,9	Security of energy supply during the building's life

General Awareness / General Public Survey

24	How much do you know about Geothermal Energy (Ground Coupled Heat Pumps - GCHP) as an alternative energy source?
24,1	A lot - professional, or near professional level
24,2	Above average, e.g. difference between open and closed loop systems
24,3	Informed - know the principles of its operation
24,4	Limited - have heard of it, but little else
24,5	Never heard of it
26	In your opinion, which do you consider to be factors limiting the use of geothermal (GCHP) technology? List all which apply.
26,1	Geological suitability
26,2	Availability of experience and skills needed to design systems
26,3	Availability of experience and skills needed to install systems
26,4	Availability of experience and skills needed to maintain systems
27	What is your opinion of alternative energy sources?
28	Would you like to use them more?
29	Do you know if there are buildings locally which use GCHP?
29,1	If yes, please identify: building name, location
25	Given your knowledge, how do you think it compares to other systems?
25,1	Cost of investment compared to fossil-fuel systems
25,3	Cost of investment compared to other renewable energy systems
25,3	Annual costs compared to fossil fuel systems
25,4	Annual costs compared to other renewable energy systems