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FUTURE-ORIENTED APPROACH FOR IDENTIFYING OPTIONS FOR GREENING THE MUNICIPAL ENERGY MIX IN SOUTHEAST EUROPEAN CITIES – THE CASE OF SOFIA, BULGARIA

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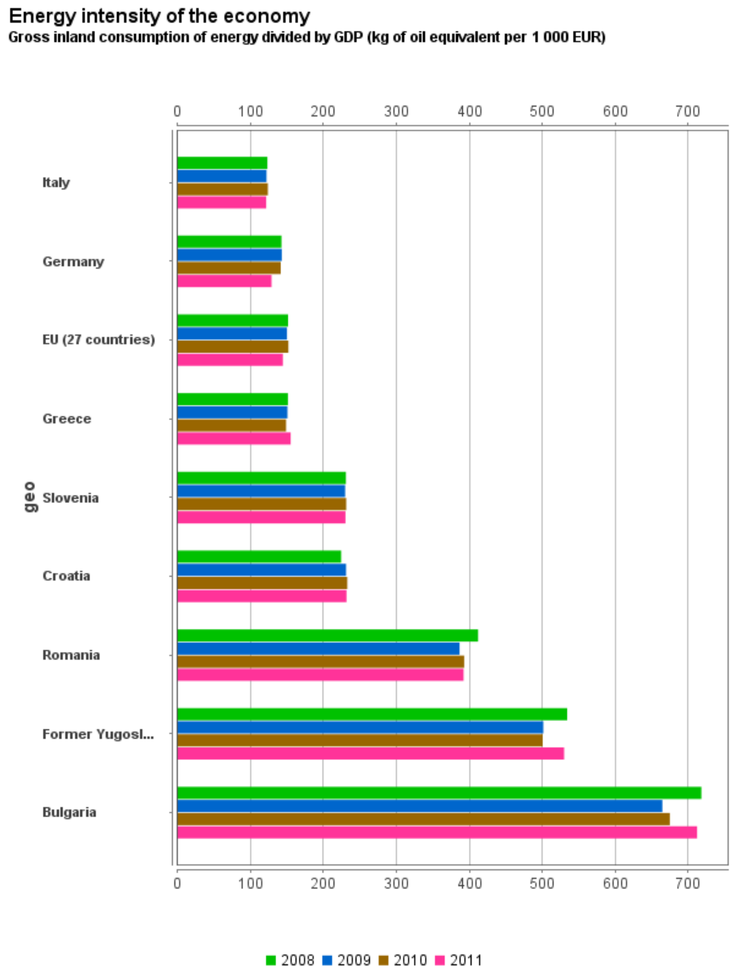
Introduction

According to Eurostat data from 2009, many countries in Southeastern Europe (SEE) have energy intensities which are over twice that of the EU-28. These include Bulgaria (5.1 times higher), Romania (3.5 times higher), FYROM (3.4 times higher), Slovakia (3 times higher), and Hungary (2.5 times higher). This, however, does not tell the whole story, as for in some areas in SEE, the energy intensities of their economies fall near the European average. As a result of these currently disparate levels across all countries, the potential exists for transnational efforts in the region to help achieve Europe's 2020 energy targets and meet national energy goals. The table below illustrates these differences, as the countries of Italy, Greece, Slovenia and Croatia are all within 100 kg of oil per €1000, while the energy intensities of other countries are significantly higher.



Source: Eurostat Database.

Figure 1. Energy Intensity of the Economy

According to a recent World Bank report, cities account for approximately 70 per cent of energy-related carbon emissions worldwide, and this is expected to grow to 76 per cent by 2030, much of which will come from China and India[1]. In Bulgaria, the population is expected to decrease across the country from 7.6 million people in 2008 to 5.4 million in 2060[2]. Despite this, the population of the capital city of Sofia is projected to grow

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[1] Hoornweg, Daniel; Freire, Mila. 2013. *Main report*. Vol. 1 of *Building sustainability in an urbanizing World : a partnership report*. Urban development series ; knowledge papers no. 17. Washington DC ; World Bank. http://documents.worldbank.org/curated/en/2013/07/18103108/building-sustainability-urbanizing-world-partnership-report

[2] Press Release, European Commission, August 26th, 2008. http://europa.eu/rapid/press-release_STAT-08-119_en.htm

until 2025[3]. Both of these trends suggest that a focus on the energy profile of cities would be well placed.

Given the Europe 2020 objectives of reducing greenhouse gas emissions by 20% compared to 1990 levels, and increasing renewable energy in final energy consumption by 20%, the current article presents an approach focused on improving efficiency and decarbonising the energy use in urban areas. It also fits within the priority areas of current and future cohesion policy, giving teeth to the Resource Efficient Europe Flagship Initiative[4].

The question that remains is how to identify options with the most potential to ensure a safe, clean and secure supply of energy to cities that also helps to achieve EU and global commitments. While the European Union periodically requires an update on the progress that is made in achieving these goals, it leaves it up to the Member States, based on the principle of subsidiarity, on how best to achieve their targets.

Member States have had seven years to achieve the first 20% of the renewable energy target, they have 2 years to achieve a further 10%, two years again to achieve an additional 15%, then 2 years for 20%, and 2 years to meet the target with an additional 35%[5]. It is clear from this, that progress is clearly measured over time and that the interim targets being set, become increasingly aggressive as 2020 approaches.

To ensure that the targets are met, forward-looking approaches can be used to prepare the necessary preconditions for action in this area. A foresight methodology has been developed and deployed within the EnVision2020 project to ensure that progress towards these goals is achieved.

EU Targets

Renewable Energy Targets

The following tables show the targets that the EU has created in meeting its objective for creating environmentally conscious economic growth.

Table 1. EU Renewable Energy Targets

	2020[6]	**2030[7]**	**2050**
Renewable Energy Target EU	20% share (57% of this expected from biomass)	30% share indicated by the EU's Energy Roadmap 2050.[8]	No targets have been set, but there is an EU goal to cut GHG emissions by 80-95% by 2050. The EU's Energy Roadmap 2050 shows the share being at least 55% on all scenarios to achieve climate goals.[9]

[3] State of the World's Cities 2008/2009 – Harmonious Cities, UN Habitat http://www.unhabitat.org.jo/en/inp/Upload/1052216_Data tables.pdf

[4] A Resource-Efficient Europe – Flagship Initiative of the Europe 2020 Strategy http://ec.europa.eu/resource-efficient-europe/

[5] Renewable Energy Progress Report, European Commission COM(2013) 175 final

[6] European Commission Communication, 'Limiting Global Climate Change to 2 degrees Celsius – The way ahead for 2020 and beyond' COM(2007) 2.

[7] A 2030 framework for climate and energy policies, COM(2013) 169 final.

[8] Debate is on-going regarding the 2030 Renewable Energy Target at the European Commission.

[9] Energy Roadmap 2050, COM(2011) 885 final.

Each Member State has its own renewable energy targets that contribute to the overall EU target, which are listed below in Table 2. It should be noted that this table only contains those countries that were targeted by the EnVision2020 project and not all countries in the South-eastern European area.

Table 2. Member State Renewable Energy Targets[10]

Member State	2005 RES Share	2010 RES Share	1st Interim Target 2011/2012	2020 RES Target
Bulgaria	9.4%	13.8%	10.7%	16%
Croatia	Acceded to EU July 1st, 2013			
Greece	6.9%	9.7%	9.1%	18%
Italy	5.2%	10.4%	7.6%	17%
Romania	17.8%	23.6%	19.0%	24%
Slovenia	16.0%	19.9%	17.8%	25%
EU	8.5%	12.7%	10.7%	20%

Energy-Efficiency Targets

The energy-efficiency target of the European Union is a 20% reduction in energy usage against a baseline.[11] This equates to a reduction of 370 Mtoe as compared to projections.[12] It is defined as a maximum of 1483 Mtoe primary energy or 1086 Mtoe final energy consumption in 2020. While the energy efficiency target is not binding like the renewable energy and emissions targets, it is a stated goal of the European Commission and could become binding during future debates.

Table 3. Member State Energy Efficiency Targets[13]

Member State	Energy Efficiency Target – 202014	Absolute level of energy consumption in 2020 [Mtoe] – Primary	Absolute level of energy consumption in 2020 [Mtoe] – Final
Bulgaria	25% against a baseline (5 million TOE saved) and 50% energy intensity reduction by 2020 compared to 2005 levels	15.8	9.16
Croatia	Acceded to EU July 1st, 2013		

[10] Renewable Energy Progress Report, European Commission COM(2013) 175 final.

[11] European Commission Communication, 'Limiting Global Climate Change to 2 degrees Celsius – The way ahead for 2020 and beyond' COM(2007) 2.

[12] Council Directive 2013/12/EU adapting Directive 2012/27/EU of the European Parliament and of the Council on energy efficiency by reason of the accession of the Republic of Croatia http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:141:0028:0029:EN:PDF

[13] Energy Efficiency – Reporting Targets. Retrieved on Oct 13th, 2013 from: http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

[14] Energy Efficiency Reporting Targets, European Commission DG Energy. http://ec.europa.eu/energy/efficiency/eed/reporting_en.htm

Member State	Energy Efficiency Target – 202014	Absolute level of energy consumption in 2020 [Mtoe] – Primary	Absolute level of energy consumption in 2020 [Mtoe] – Final
Greece	Final energy consumption level of 20.5 Mtoe	27.1	20.5
Italy	20 Mtoe primary energy reduction by 2020, 15 Mtoe final energy reduction by 2020	158	126
Romania	Reduction of 10 Mtoe (19%) in the primary energy consumption	42.99	30.32
Slovenia	10.809 GWh energy savings by 2020		
EU	20% (compared to projections for 2020)		

Greenhouse Gas Targets

The greenhouse gas reduction targets for 2020, listed in Table 4, are binding, while discussions regarding the 2030 and 2050 targets are on-going.

Table 4. EU Greenhouse Gas Reduction Target

	202015	**203016**	**205017**
GHG Reduction Target	20%	40%	80-95%

The individual greenhouse gas emissions targets are listed below. As can be seen, Bulgaria and Romania are projected to over-achieve their greenhouse gas emissions targets, while Greece, Italy, and Slovenia are projected to fall short of their targets. It is important to keep in mind that the emissions targets for Bulgaria and Romania for 2020 are actually increases on 2005 levels. One key difference between the targets for renewables and greenhouse gas emissions and the indicative targets for energy efficiency, are that the energy efficiency targets are not legally binding. However, they may become binding in 2014 if convincing progress is not made.[18]

[15] European Commission Communication, 'Limiting Global Climate Change to 2 degrees Celsius – The way ahead for 2020 and beyond' COM(2007) 2.
[16] A 2030 framework for climate and energy policies, COM(2013) 169 final.
[17] Energy Roadmap 2050, COM(2011) 885 final.
[18] European Parliament Website. http://www.europarl.europa.eu/news/en/news-room/content/20120227IPR39335/html/Energy-savings-committee-backs-binding-national-targets-and-CO2-set-aside-plan

Table 5. Member State GHG Emissions Targets[19]

Member State	GHG Emissions Target – 202020 (in %)	2005 non-ETS estimate consistent with the adjusted 2020 ESD Target (Mt CO2 – eq.)	2020 'ETS adjusted' ESD target estimate (Mt CO2 – eq.)	2020 non-ETS projections (Mt CO2 – eq.)	Gap (Mt CO2 – eq.)	Gap
Bulgaria	20	22.69	27.23	25.37	1.86	8.20%
Croatia	Acceded to EU July 1st, 2013					
Greece	-4	61.31	58.86	62.95	-4.09	-6.70%
Italy	-13	329.52	286.68	319	-32.32	-9.80%
Romania	19	70.24	83.58	76.88	6.7	9.60%
Slovenia	4	11.52	11.98	13.44	-1.46	-12.70%
EU	-20					

Foresight

Foresight in Europe emerged in the 1970's, when foresight activities have focused on identifying the linkages between science and technology development and society. The 1980's saw foresight begin to be tailored to specific fields, particularly in the Netherlands and France, where solutions were able to be better tailored to specific challenges[21]. During these years, it became clear that forecasting and trend extrapolation, while useful, were not sufficient to capture the complexity of global trends and interplays in an increasingly globalised world.

Since 1991, after which national boarders were further opened to financial flows and trade, the methods and practice of foresight have become more refined. In this context, economic, political, technological, environmental and social risks became even more contagious. In part, as a reaction to this, a renewed interest in the methods, tools, and validity of foresight has occurred.

Over the past decade, foresight activities have greatly expanded across the EU, following on the 'Thinking, Debating and Shaping the Future: Foresight for Europe' report written by the High Level Expert Group for the European Commission in 2002[22].

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[19] Greenhouse gas emission trends and projections in Europe 2012 – Tracking progress towards Kyoto and 2020 targets, European Energy Agency, 2012. http://www.eea.europa.eu/ publications/ghg-trends-and-projections-2012

[20] Decision No 406/2009/EC Of The European Parliament and of the Council, April 23rd, 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

[21] Ibid.

[22] Thinking, debating and shaping the future: Foresight for Europe – Final Report Prepared by a High Level Expert Group for the European Commission http://ec.europa.eu/research/social-sciences/pdf/for-hleg-final-report-en.pdf

This led to the development of the European Foresight Monitoring Network which later evolved into what is now the European Foresight Platform (EFP). The European Commission has been a driving force in foresight activities across Europe, through its various funding programmes.

Definition

The UNIDO Technology Foresight Manual describes foresight as „the process involved in systematically attempting to look into the longer-term future of science, technology, the economy and society with the aim of identifying the areas of strategic research and the emerging generic technologies likely to yield the greatest economic and social benefits."[23]

While foresight can include a battery of different activities and methodologies, a number of common goals emerge across foresight studies. These include:

- The exploration of future opportunities and potential pathways which may be informative in the identification of research priorities and directions;
- Redirecting scientific activities towards areas where products or services can be created to deliver economic and societal value that take advantage of existing strengths;
- While foresight can help illuminate areas of future opportunity for economic, environmental and social development and priority setting, it also allows for a forward-looking examination of the required public and private sector activities which support a high level of exploitation of identified opportunities;
- Foresight can serve to widen the circle of stakeholders that are involved in strategy formulation to include to a greater degree the citizenry (through groups such as minorities and the youth).
- Building new networks across scientific fields, economic sectors as well as around problems themselves in order to gain a new perspective on the way that future problems can be addressed or opportunities can be exploited.

While the goals of foresight indicated above may help in understanding the main objectives of foresight exercises, the Foresight for Regional Development Network (FOREN) guide to regional foresight identified some key components to achieving these goals[24]. They include:

- Considering projections of social, economic and technological (and environmental, political and ideological) developments and needs;
- Developing an opportunities and threats matrix through the use of participatory methods with a wide range of stakeholders;
- Developing new social networks;
- Developing a strategic vision for the future by stakeholders;
- Developing a future vision need not be utopic, but should recognise the constraints and challenges of reality at the same time as it helps directs actions towards a desired future state.

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[23] UNIDO Technology Foresight Manual, Organization and Methods, Vol. 1, United Nations Industrial Development Organization, 2005.

[24] Foresight for Regional Development Network: A Practical Guide to Regional Foresight, 2001. http://foresight.jrc.ec.europa.eu/documents/eur20128en.pdf

Foresight in Energy in SEE

The transition period from centrally-planned to market-based economies in many South-eastern European countries has been tumultuous. This has an impact on the ability for strategic planning to take hold both in the consciousness of policy-makers, as well as for strategies to be implemented over time across the changing political landscapes. It is no surprise that in such an environment, short-term thinking dominates.

However, it is for this very reason that efforts to inject longer-term considerations into the policy sphere are especially needed. This is as important as anywhere in the area of energy, where changes to the energy mix and infrastructure require significant amounts of time to change direction. In addition to meeting EU energy targets and reducing environmental damage, it can effect a transition in energy and can provide significant contribution to GDP and employment[25].

By being subjected to global markets, SEE European countries are also subject to economic, and resultantly, political pressures from their energy suppliers in Russia and Turkey.[26] An energy mix which is more flexible and diverse can help to spread the risk from future pressures from abroad and allow Bulgaria to make strategic orientations that are in its own national interests.

Foresight allows for the potential democratisation of public policy in the country. While all South-eastern European countries are, ostensibly, democracies, the Economist Intelligence Unit ranks all countries in SEE as 'flawed democracies'. The governments in Eastern Europe are formally democracies, but levels of political participation are very weak and are mainly centred on voting. This is largely due to the expectations of the transition period not being met and a lack of trust in political institutions and a plethora of short-lived political parties. Foresight, while not a panacea to these issues, can contribute to an improvement of these shortcomings, particularly when their outputs are given consideration in the political process. For this multitude of reasons, a foresight methodology is not without its merits.

The combination of the aforementioned energy objectives and targets of the European Union, combined with the energy intensities and political shortcomings of SEE countries, set the proper preconditions for an external intervention. It was the reflection of this context which stimulated the development of the EnVision2020 project. The projects theoretical basis assumed that the economic convergence of SEE countries with European averages would make the situation ripe for the redirection of energy consumption before energy capacity was expanded and „locked-in". Its methodology was designed to develop actionable recommendations on how to improve the energy mix for the individual cities and target regions as well as joint energy priorities spanning the projects consortium. It is the description of this methodology which follows.

Foresight Methodology

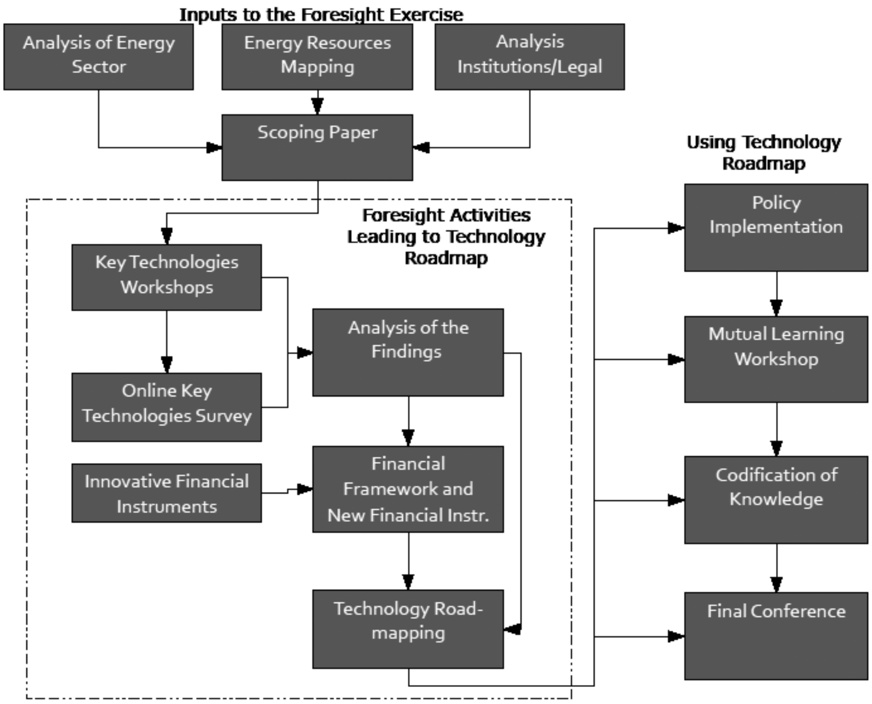
Overall Methodology

The foresight methodology presented below is divided into three parts. They include a preparatory phase, where an analysis of the energy sector in the target municipali-

[25] EmployRES – The impact of renewable energy policy on economic growth and employment in the European Union – ec.europa.eu/energy/renewables/studies/doc/renewables/2009_employ_res_report.pdf

[26] Center for the Study of Democracy, BULGARIA'S ENERGY SECURITY RISK INDEX, Policy Brief No. 40, September 2013.

ties, the available energy sources, and an analysis of the legal and institutional framework is conducted. These efforts take place for all target cities (including Sofia, the Bucharest-Ilfov Region, the region of Podravje, Thessoloniki, Fermo, Potenza, and Zagreb), and aggregated and synthesized into a synthesis paper. This paper aims to serve as a discussion document in the second phase of the methodology, constituting the foresight activities themselves. Here, it is used as an 'information feed into the key technologies workshops in each target city (these workshops are described below)[27]. Identified technological options, which emerge from the key technologies workshops, are validated in an online key technologies survey of between 100-120 energy and city planning experts in each of the target cities. In this second phase, financial instruments will be identified which have the potential to bring these technologies into use. Finally, a technology roadmap is created, which places particular technological and policy recommendations on a timeline. The various actions to be taken by relevant stakeholder groups are also included. The third phase of the methodology includes the implementation of the roadmap in the form of implemented policies, actions by stakeholders and the sharing of experiences. This process is described in Figure 2 below.



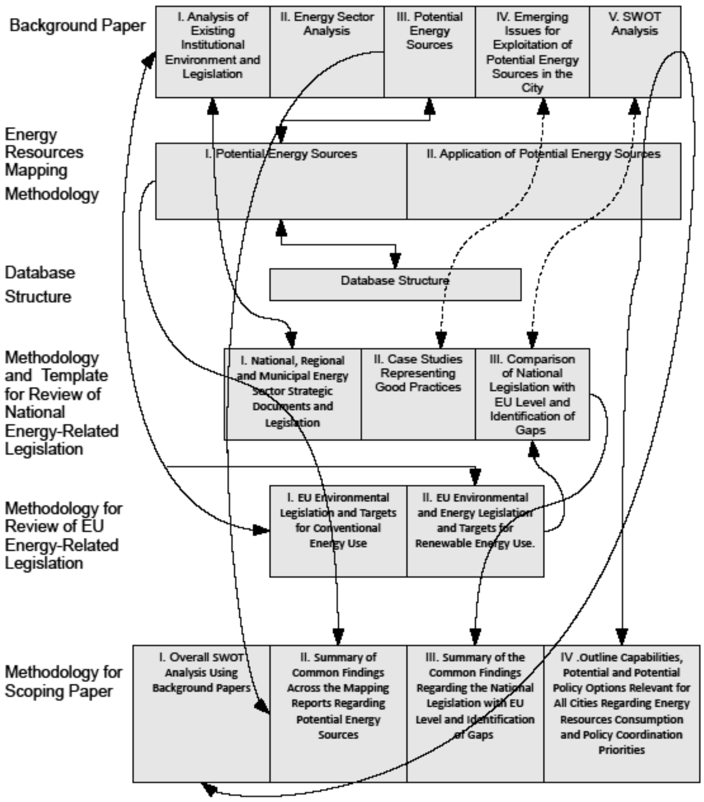
Source: EnVision2020 Foresight Guide.

Figure 2. Logic of the Foresight Activities

[27] Key Technologies are defined here as technologies which have a strong potential to influence national competitiveness and quality of life. This definition is taken from the UNIDO Technology Foresight Manual, Organization and Methods, Vol. 1, United Nations Industrial Development Organization, 2005.

Preparatory Work for the Foresight Exercise

The preparatory phase of the foresight exercise starts with the analysis of the energy sector in each target city. This includes a description of the main issues with energy production and supply, and a review of the energy mix and usage of the city. It also includes an overview of the legislative framework in place, including municipal programmes and action plans regarding the energy system. This assessment describes the current use and further potential for RES in the city as well as of the current conventional, bio, and alternative energy technologies that are used. A mapping of local stakeholders and energy-related events is also elaborated here. All findings from this phase are presented in a background paper for each city. In order to ensure the validity of the findings of these background papers, 10-12 interviews of local energy experts are conducted. These activities are rounded up by undertaking an analysis of the institutional environment and legislation of the target countries, and how they are affected by European level legislative developments. This is done to identify existing gaps in the legislative framework at all levels and the discrepancies between the priorities at various governance levels. The information from the energy sector analysis, the potential exploitation analysis, and the legislative analysis, is validated during local consultative workshops with stakeholders. The logic of this process is graphically represented in Figure 3.



Source: EnVision2020 Foresight Guide.

Figure 3. Logic of Preparatory Work for Foresight Methodology

Foresight Exercise

Key Technologies Workshop

The heart of the innovative elements of the foresight exercise begins with the Key Technologies Workshop (KTW). The purpose of the KTW is to further discuss energy technologies identified in the previous activities with experts, and to identify further technologies other than those listed in the Background Papers. The technologies to be identified at the KTW will be those that are (i) considerably upgraded existing energy technologies; (ii) new technologies which have a lot of potential, but haven't been applied in real life conditions yet or have just had their first industrial application; (iii) completely innovative technologies (up to the partners to decide whether to include this group, depending on the expertise of the participating experts). The inputs to the KTW include a Foresight Methodology Guide which outlines the theory and tools of foresight, the Background Paper developed in the previous activity, and list of technologies produced during the energy mapping activity in the preparatory phase.

The workshops themselves aim to bring together 25-30 energy experts.[28] The KTW is designed to last for one full day and is divided into 3 working groups. These working groups are organised around: conventional energy technologies, bioenergy, and renewable energy. These workshops can be further subdivided or a particular energy source highlighted within one energy group if it is seen to be important for that municipality as a result of the Background Paper. The discussion in each working group is guided by a moderator. The groups go through various sessions throughout the course of the day. The First Session consists of a plenary meeting where the project, the foresight methodology and the key technologies methods are presented. Energy trends, drivers, technological developments and existing challenges are also presented based on the results of the background papers.

In the Second Session, the participants work in their thematic groups. They discuss European and global technological developments in the energy field and the identification of leading European/global key energy technologies. They also perform this task for local/regional key technologies and identification of local/municipal energy technologies.

During the Third Session, the participants elaborate profiles of the energy technologies that they have identified during the previous session for the European/global key energy technologies.

During the Fourth Session, the participants are tasked with elaborating the profiles of the local and regional key energy technologies that were initially identified during the Second Session.

Online Key Technologies Survey

These lists of elaborated technologies are then used as inputs in the development of an Online Key Technologies Survey. This survey aims to help prioritise the identified key technologies for each target area and assess the potential impact that they would have across a number of social, economic and environmental indicators. For each target area, between 100 and 120 prominent experts are to be solicited to participate in the survey, with an overall target of 600 respondents from science, civil society organisations, policy

[28] Requirements to the participants in the workshop: to have a relevant background; experience in the energy field of at least 7 years; good knowledge of English. It is thus expected that the experts will mainly belong to industry and research.

makers and industry. The result of this survey will be:

A prioritised list of key energy technologies and the related energy sources;

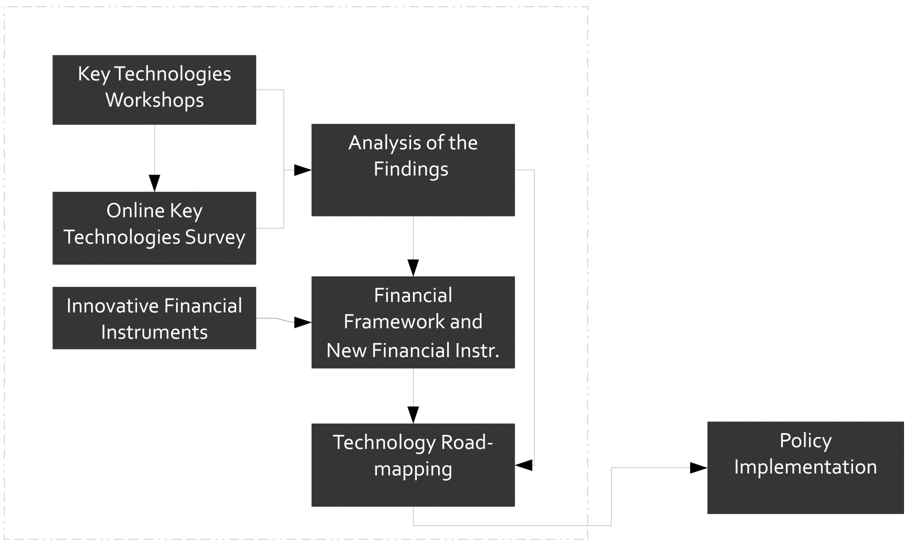
A short report providing comparative statistical analysis of the survey data, including the current level of development, position of the SEE in regards to the development and application of the technology and the potential impacts of the technology on employment, growth, health and other issues of social concern.

Analysis

After the organisation of the key technologies workshops and the online survey, the results will be analysed by energy experts. As a result of the analysis, issues regarding the future energy resources consumption in the participating cities, which will need to be addressed by policy-makers, the scientific community and experts, will be identified. These issues include topics which are relevant to identified legislative gaps, under-researched areas, and the social concerns that are expected to emerge in relation to the application and roll-out of new energy technologies. This analysis will serve as the foundation for the identification and development of policies and financial instruments needed for the development of the energy sector in the respective target territories.

Preparatory Work for the Technology Roadmap

Policies and programmes rely on the mobilisation of capital for them to be implemented in practice. The next phase of the foresight methodology calls for the identification of EU-level and national level financial practices and instruments which can help to stimulate an increased use of renewable energy as well as more efficient technologies for the use of existing energy sources.



Source: EnVision2020 Foresight Guide.

Figure 4. Logic of Preparatory Work for the Technology Roadmap

After this, consultancy workshops are organised in all target cities in order to identify the financing needs of potential users, and the particular dynamics of the financial instruments needed to fulfil these needs. The financial instruments which are elaborated are meant to be in the form of schemes supported by public stakeholders through national or structural funds programmes and/or banking products developed by banks and financial institutions to encourage the implementation of RES and new forms of energy. These financial frameworks will be verified by the business and financing communities in the corresponding partnering cities in a final consultancy workshop.

Technology Roadmap

Following the finalisation of the financial framework, all of the necessary documents for the development of the technology roadmaps will have been developed. The technology roadmapping activities can then commence. The roadmapping process used within the EnVision2020 process has a time horizon of 7-8 years and the outputs will provide a basis for setting concrete targets and strategies for target SEE cities until 2020. This is when the countries must reach their binding EU targets for greenhouse gas emissions and renewable energy mixes. These roadmaps will serve as the basis for strategic decision-making in the energy and urban planning spheres. Similar energy roadmaps produced by the International Energy Agency will serve as guidance for this activity. [29]

The International Energy Agency defines a strategic roadmap as a „dynamic set of technical, policy, legal, financial, and market and organisational requirements identified and agreed to by all stakeholders involved in its development."[30] In the development of these roadmaps in South-eastern Europe, each partner city will organise one workshop, in order to develop their own energy roadmap, building on the outputs from the previous activities. Each workshop will gather 20-25 experts to develop the visions for future energy resources developments of citizens, researchers, policy-makers, private sector representatives and other relevant actors. In order to ensure the achievement of the steps laid out in the roadmaps, they will be accompanied by implementation plans that include the concrete steps on how to attain them in each partnering city. These documents are then made available for public review and criticism for a predefined period of time (generally 1 month).

Following the development of the roadmaps, they are then sent for written feedback and approval to relevant stakeholders and institutions in each partnering city. After the feedback is incorporated, a high-level meeting is organised in order to endorse the roadmaps and produce policy recommendations at the municipal and national levels to activate them.

Making Use of Technology Roadmap

Given the recurrent problem of formalised strategies not achieving their full potential, it is important to undertake activities which help ensure that the Technology Roadmaps gain traction in the target cities. Such activities are foreseen by organising mutual learning workshops where common priorities among the target cities will be identified, and a list of joint policy priorities will be developed by the participants.

In addition, the knowledge obtained and the methodology refined throughout the course of the activity, will be codified in a final report which will provide guidance on mainstreaming the methodology to other contexts.

Findings and Modifications to Methodology

The application of the methodology, in the Southeast European context, has led to its refinement. The assumption that short-term policy development and a dearth of politi-

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[29] International Energy Agency – Technology Roadmap – Bioenergy for Heat and Power, p. 39
[30] Ibid. p. 7

cal inclusion, which has clearly dominated the post-Communist political landscape in South-eastern Europe, would make the area receptive to foresight approaches is questionable. Initial results from the implementation of the methodology have shown, rather, that the regions public institutions are, in some cases, not efficiently managed and also, in some cases underfunded. This, apparently, makes their engagement with innovative policy-development tools low on their list of priorities in practice.

Knowing this, the impetus for the introduction of innovative policy development tools, such as foresight, is put on non-governmental actors in collaboration with the private sector. The public and municipal institutions are of course important, but their engagement with these practices is, based on the experiences listed here, tenuous. They should, rather, be viewed as active recipients and stakeholders of a foresight process, at least in the early stages, rather than as the cornerstone of such implementation.

An effective implementation of foresight requires a very high level of active engagement in the foresight process itself. A prerequisite to the successful implementation of the methodology requires a high level of dedication to the development of quality inputs into the KTW and the online survey and the ability to attract interested persons to consider the usage of the analyses which result from them.

The original foresight methodology also foresaw the development of visions of citizens, policy-makers, business actors and academics in the development of alternative futures for the target cities. Given that target countries all fall within the EU energy targets for 2020, it was decided that it was not necessary to duplicate efforts by elaborating parallel objectives. Rather, efforts were focused on identifying possible ways for the cities to meet these energy targets through the identification of policies and financial instruments in specific technological areas.

Innovative Elements

The use of systematic foresight methods is increasingly being applied to new areas of social, technological, environmental, economic and political spheres. The use of foresight in the context presented here is novel in that it applies some of the tools in the foresight toolbox to a context limited in sectoral and geographical scope, while also aiming to improve the energy profiles and energy security of cities through the achievement of EU policy targets. Foresight in Bulgaria is not common relative to other European countries. According to a 2009 foresight mapping report funded by the European Commission, of 1470 cases of foresight conducted in Europe (and analysed by the report) only 4 emanated from Bulgaria.

Sub-Sectoral Approach

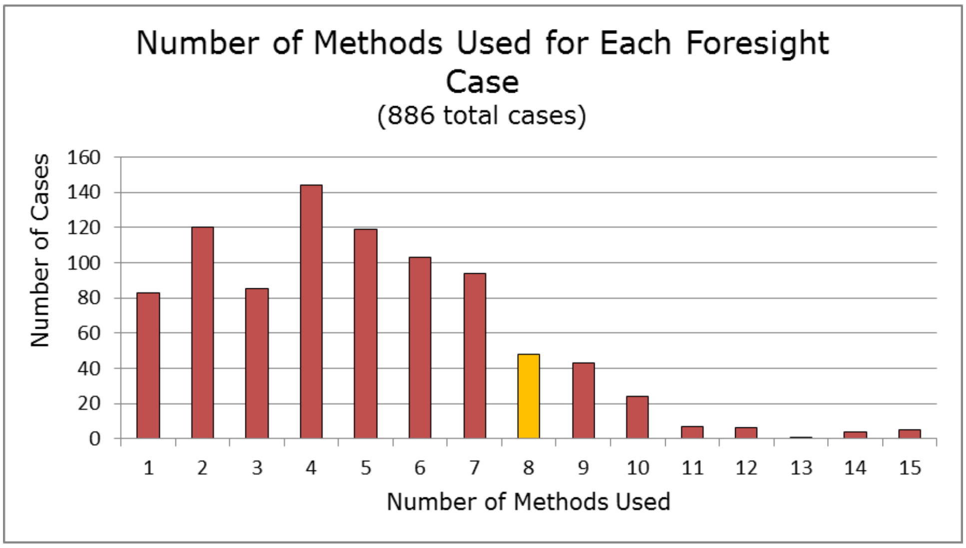
The sectoral approach to foresight is not necessarily new in Europe, but combined with the geographical and multi-country joint priority perspective, as well as the target groups, it can be seen as novel. In 2009, the European Foresight Monitoring Network released a report which helped to break down the percentage of foresight exercises conducted in various economic areas[31]. Around 15% of all identified foresight exercises were conducted in the Primary Sector (consisting of Agriculture, hunting, and forestry – 53%, Fishing – 32%, and Mining and quarrying – 14%). The Secondary Sector had 31% (Manufacturing – 47%, electricity, gas, and water supply 37%, and Construction 16%) and the Tertiary Sector, consisting of a number of services, had 54%. The report mentioned that growing anxiety about energy and the EU's aggressive policies on greening

[31] International Energy Agency – Technology Roadmap – Bioenergy for Heat and Power, p. 39

the economy help to explain the relatively large share of foresight activity in the energy sphere. Of all of the 871 cases analysed, 27% were conducted in the 'electricity, gas and water supply' sector.[32]

Methodological Approach

The combination of methodological approaches was also designed to bring the most value to the South-eastern European context. Again, by referring to the European Foresight Monitoring Networks report, we can see that in all 886 foresight activities reviewed many of the methods used overlap with the methodology described above. These include: Literature Review, which was used in 54% of cases, Expert Panels in 50%, Futures Workshops in 24% of cases, Interviews in 17% of cases, Questionnaire/Survey in 15% of cases, Key Technologies in 15% of cases, Technology Roadmapping in 8% of cases and Stakeholder mapping in 5% of cases.[33] Clearly, the EnVision2020 methodology combines some of the more commonly used methods with some of the less commonly used ones. It used eight different methods, which is on the high end of foresight activities in general (See Figure 7 below).



Source: Mapping Foresight EFMN and Own Additions.

Figure 5. Number of Methods Used for Each Case

Municipal Approach in a Multi-Country Perspective

Both municipal foresight and bilateral/multilateral foresight activities, conducted separately, are not rare. It was decided however, that regional challenges overlapped quite substantially in the target countries and cities and that a multi-country perspective, coupled with a municipal approach would be productive in this case. Similarly to the Covenant of Mayors, this foresight activity aimed to bring together municipal authorities

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[32] International Energy Agency – Technology Roadmap – Bioenergy for Heat and Power, p. 39
[33] Ibid.

in jointly developing and implementing action plans to learn from the successes and the failures of each other in striving towards their obligations to the EU and to their citizens. The group effort is meant to encourage each city to push the others forward on this important issue. In Europe, and indeed in all regions, the most common geographic scale for a foresight exercise is at the national level. This is followed by the subnational level and only to a slightly smaller degree, to the supranational level.[34] Given this typology, it is presumably the case, that a combination of scales as is the case with the methodology described above, is quite rare.

Conclusion

Rather than undertaking its own scenario-building workshop, the foresight activity was found to be an opportune activity given the codification of European Union level energy targets for 2020. Since goals and targets had already been established for the Member States to achieve, and progress was seen to have room for improvement, a foresight activity was designed to help optimise this process. No technology roadmaps at the municipal level existed in Sofia, despite the clear signal that there is an overwhelming domination of energy consumption by cities. Following the implementation of the methodology, such roadmaps, and the action plans to implement them, will exist. While political and financial hurdles to the implementation of energy measures remain, these are issues which all the municipalities within the target group will face, together.

The methodology aims to help address the 'Grand Challenge' identified within the framework of the Horizon 2020 Programme of the EU entitled 'Climate action, resource efficiency and raw materials". Anthropogenic climate change is a near certainty and efforts at mitigating its drivers have been highlighted by the institutions of the EU.[35] The EU strategies until 2020, and on-going deliberations until 2030, recognise that long-term thinking is needed to achieve real progress. The approach presented within this paper aims to help translate the aspirations of Europe into actionable activities in the SEE region until 2020. It was developed while keeping in mind the potential that it might have beyond SEE, given the need for Europe to cooperate deeply in order to have a hope of meetings its energy and climate ambitions. Its novel elements require a piloting in order to assess its merits. Its refinement throughout its application will allow it to be mainstreamed in other contexts in Europe and beyond.

List of Abbreviations

EnVision2020 – 'Energy Vision 2020 for South East European Cities' project
EU-28 – The twenty-eight Member States of the European Union.
GHG – Greenhouse Gasses
KTW – Key Technologies Workshop
MToe – Million ton oil equivalent
SEE – South-eastern Europe

[34] International Energy Agency – Technology Roadmap – Bioenergy for Heat and Power, p. 39
[35] Intergovernmental Panel on Climate Change, Working Group I Contribution To The IPCC Fifth Assessment Report Climate Change 2013: The Physical Science Basis, 2013.

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ПОДХОД ЗА ИДЕНТИФИЦИРАНЕ НА ВЪЗМОЖНОСТИ ЗА ПОВИШАВАНЕ НА ЕКОЛОГОСЪОБРАЗНОСТТА НА ЕНЕРГИЙНИЯ МИКС В ГРАДОВЕТЕ ОТ ЮГОИЗТОЧНА ЕВРОПА – ПРИМЕРА НА СОФИЯ, БЪЛГАРИЯ

Резюме

Държавите от Югоизточна Европа имат едни от най-високите нива на енергийна интензивност (брутно вътрешно потребление спрямо брутен вътрешен продукт) на икономиката в Европейския съюз. Тъй като Европейският съюз е сред лидерите в областта на политиката за опазване на околната среда в световен мащаб, през последните две години бяха приетиамбициозни цели за повишаване на екологосъобразността на енергийния микс на държавите членки.

По принцип градовете са най-големите консуматори на енергия във всички държави – членки на ЕС, поради което и мерките за подобряване на енергийния микс и повишаване на дела на възобновяемите енергийни източници са особено важни. Има мерки, които могат да бъдат приети и приложени в голяма част от градовете в ЕС, но в същото време трябва да бъдат взети под внимание и местните специфики, които правят по-подходящоизползването на един или друг енергиен източник.

Настоящата статия изследва ползата от приложението на набор от методики, които са предназначени да идентифицират най-добрите възможности за намаляване на екологичния отпечатък от градове в Югоизточна Европа. Цялостната методология е разработена и се прилага в рамките на проект „ЕнВижън 2020 – Енергийнавизия за градовете от Югоизточна Европа" (EnVision2020). Първоначалнотоприложение на методологията за гр. София показа, че макар и да е полезна, има рискове, които трябва да бъдат взети под внимание при нейното използване.

Ключови думи: прозрение,картографиране на пътища; изменението на климата; възобновяема енергия; енергийна политика; енергийна стратегия; България; енергия; Европейския съюз; Югоизточна Европа

FUTURE-ORIENTED APPROACH FOR IDENTIFYING OPTIONS FOR GREENING THE MUNICIPAL ENERGY MIX IN SOUTHEAST EUROPEAN CITIES – THE CASE OF SOFIA, BULGARIA

Abstract

South-eastern European countries have some of the highest energy intensities (energy input versus economic output) in the European Union. As the European Union is one of the leaders in the environmental policy field, it has proposed aggressive targets for greening the energy mix of its Member States. Also, since cities consume such a large share of energy across all countries, measures to improve the energy mix in cities are particularly needed. While there are some measures which all cities can take to improve their energy profile, there are also local specificities which can make the exploitation of a particular energy source more suitable for a specific city. This paper explores the utility of a suite of methodologies which have been designed for identifying the best options to reduce the environmental footprint of cities in South-eastern Europe. This suite has been developed and refined within the 'Energy Vision 2020 for South East European Cities' (EnVision2020) project. Initial use of the methodologies for the city of Sofia has shown that while it is useful, there are certain risks which must be considered in its implementation.

Key words: Foresight; Roadmapping; Climate Change; Renewable Energy; Energy Policy; Energy Strategy; Bulgaria; Energy; European Union; South East Europe