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A Novel Approach to Development of Renewable Heating Support Policies in Turkey

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ABSTRACT: In Turkey, potential of renewable energy for both heating and cooling systems remains mostly untapped. Turkey's energy demand is met to a great extent by imported energy sources which constitutes a substantial economic burden for Turkey. The main types of supporting financial mechanisms are limited to feed-in tariff for electricity production. The first aim of this paper is, to analyze current best practice policy design and harmonization of support schemes for renewable heating technologies in European countries. Secondly, the paper proposes a two steps model to develop support mechanisms for renewable heating technologies in Turkey. The paper analyzed the impacts of different policy harmonization options in the field of renewable energy heating and cooling, taking into account various determinants such as survey of current best-available RE policies in Europe, available national RE potential, data on different regional characteristics of Turkey, accompanying regulations, laws and implementation measures, support policies with regard to domestic RE technologies. Based on the bottom-up modeling, the scheme shows that a harmonized use of different inputs would generate a comprehensive policy instruments, such as subsides, regulations and local targets.

Keywords: Renewable energy, Energy economics, Renewable heating technologies, Policy design, Global warming
JEL Classifications: Q20; Q28; Q48; Q58

1. Introduction

According to the various estimations, Turkey possess huge amount of untapped renewable energy sources which can be utilized for heating and cooling purposes. On the other hand, current situation of Turkey, both in terms of increasing population and industrialization, highlights the fact that the country's energy demand will increase rapidly in the near future.

According to the figure of Turkish Statistical Institute, as of 2013, the population of Turkey is 76 million and expected to reach 93.4 million in 2050. Turkey's GDP is forecasted to increase 6.4% annually until 2020 (Balat, 2010). For Turkey, rising population and growing economy mean increasing energy consumption. As can be observed from the figures, Turkey has been and will be one of the fastest growing countries in the World. Along with other figures, total final energy consumption is also expected to rise with a pace of 5.9% annually between 2011 and 2020 (Evrendilek and Ertekin, 2003). Although the existing RE potential represents a substantial energy source, Turkey's energy production could meet only 27% of its primary energy demand. Figure 1 illustrates the distribution of the final energy consumption by sector.

According to the figure 2, the renewable energy collectively provides 9.5% of primary energy demand. As can be seen from the figures, Turkey's renewable energy potential both for heating and cooling systems is mostly untapped.

Utilization amount of available renewable energy (RE) sources, namely solar energy, geothermal energy, biomass, hydropower, wind power and biogas in Turkey are illustrated in table 1. However, current rate of RE utilization represents only a minor part of the overall RE potential in Turkey.

Figure 1. Distribution of final energy consumption by sector (Sözen, 2009)

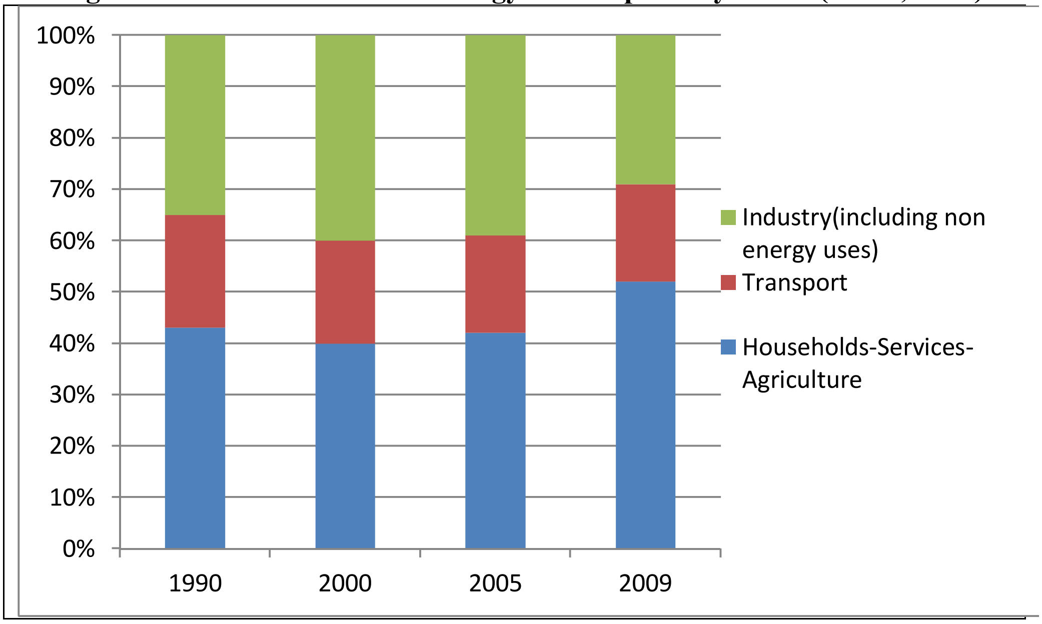
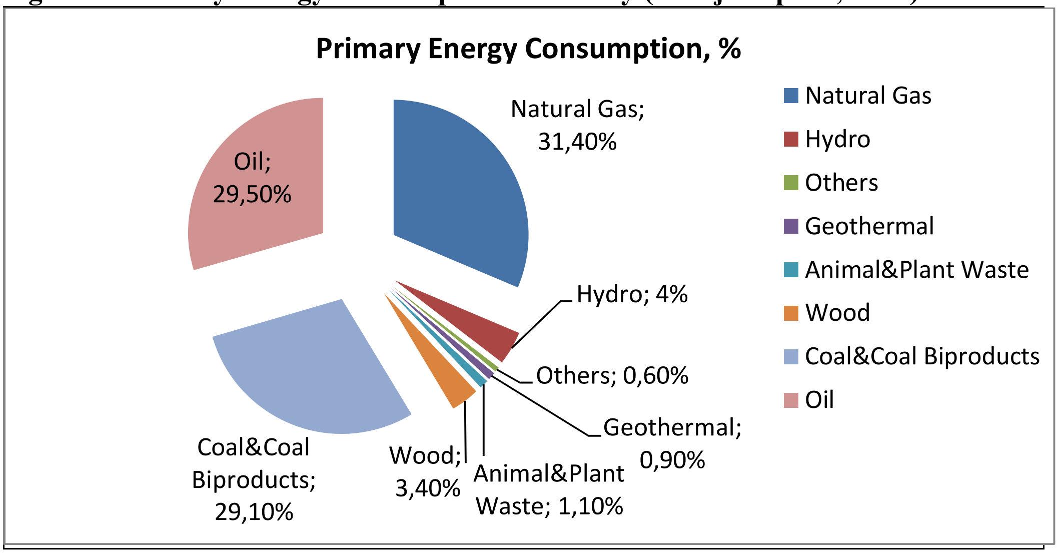


Figure 2. Primary Energy Consumption in Turkey (Enerji Raporu, 2011)



In order to realize the capacity of renewable heating, there are tough tasks to be addressed. In this paper, we will firstly investigate the current potential of renewable energy sources in Turkey. After that, current best renewable heating support systems of EU countries will be evaluated. Lastly, the paper will propose a set of support options for the renewable heating systems in Turkey.

2. Sources of Renewable Heat

This section analyzes the potential of renewable energy sources in Turkey. In Turkey, main sources of RE for heating and cooling are solar power, geothermal energy and biomass.

a. Biomass

Turkey's biomass potential is mostly untapped. Economically feasible biomass energy potential is composed of mainly agricultural residues, farming wastes, forestry, wood processing residues and municipal wastes (see the table 2). Firewood is the most common biomass source in rural regions. According to the IAE figures, in 2008 total biomass consumption was 5.0 Mtoe which constitutes only 30% of total economically recoverable biomass energy potential (IEA, 2010). The aggregated recoverable biomass potential of Turkey is estimated to be about 16,9 Mtoe which includes mainly agricultural residues, livestock farming wastes, forestry and wood processing residues, and municipal wastes (Gokcol et al., 2009). The table 2 illustrates the potential of different types of biomass energy sources.

Table 1. Renewable Energy Utilization in Turkey (TURKSTAT, 2012)

Renewable Energy Utilization in Turkey (1000 toe/year)							
	2001	2002	2003	2004	2005	2006	2007
Total energy demand	71609	75465	79402	81999	85340	94663	101510
Total energy production	25161	24648	23873	24212	23626	26540	27279
Supply by RE	9424	10077	10036	10783	10131	10541	9604
Biomass and wastes	6303	6039	5783	5550	5332	5162	5023
Wood/wood waste	6297	6032	5775	5542	5325	5133	4994
Biogas	6	7	8	7	7	8	15
Municipal solid waste	-	-	-	-	-	-	-
Biofuels	0	0	0	0	0	21	14
Wind energy	5	4	5	5	5	11	31
Solar energy	287	318	350	375	385	402	420
Hydro energy	2064	2896	3038	3963	3402	3804	3083
Geothermal energy	764	820	860	891	1007	1162	1048
Share of RE	13.16 %	13.35%	12.64 %	13.15 %	11.87 %	11.14%	9.46%
Biomass and wastes	8.80%	8.00%	7.28%	6.77%	6.25%	5.45%	4.95%
Wood/wood waste	8.79%	7.99%	7.27%	6.76%	6.24%	5.42%	4.92%
Biogas	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Municipal solid waste	-	-	-	-	-	-	-
Biofuels	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	0.01%
Wind energy	0.00%	0.001%	0.01%	0.01%	0.01%	0.01%	0.03%
Solar energy	0.40%	0.42%	0.44%	0.46%	0.45%	0.42%	0.41%
Hydro energy	2.88%	3.84%	3.83%	4.83%	3.99%	4.02%	3.04%
Geothermal energy	1.07%	1.09%	1.08%	1.09%	1.18%	1.23%	1.03%
Source: TURKSTAT							

b. Municipal waste

In Turkey, rising population, urbanization, industrialization and robust economic development in the last decade lead to growing amount of waste in Turkey. Turkish Statistical Institute has been compiling statistics on waste quantities and compositions since 1994. However, the official statistics are raw estimations which does not include illegally and uncontrolled disposed wastes (Turan et al., 2009). According to the State Statistical Institute, 24.36 million tons of waste was generated in 2008 (TURKSTAT, 2011). Daily waste generating was 1.16 kg per capita and 1.13 kg for summer and winter seasons accordingly. The composition of municipal solid waste in Turkey is given in the table

3. The OECD study states that the waste generation in rural areas is lower than in urban regions (OECD., 2009). According to the estimations, urban regions generate more paper and plastic wastes while the share of organic wastes is slightly lower (Hamatschek et al., 2010).

Table 2. Annual Recoverable Biomass Energy Potential in Turkey

Type of Biomass	Energy Potential (Mtoe)
Animal Wastes	2.3
Dry agricultural residue	4.5
Firewood	4.1
Forestry and wood processing residues	4.3
Moist agricultural residue	0.2
Municipality wastes and human extra	1.3
Total	16,9
Mtoe: million tons of oil equivalent	

Source: Gokcol et al. (2009).

Table 3. Solid Waste Disposed in Turkey (TURKSTAT, 2011)

Year	Total Amount of Annual Generated Waste	Metropolitan municipality's dumping site (tonnes)	Municipality's dumping site (tonnes)	Another municipality's dumping site (tonnes)	Controlled landfill site (tonnes)	Composting plant (tonnes)	Burning in an open area (tonnes)	Burial (tonnes)	Other (tonnes)
2001	25 133 696	3 770 586	10 125 442	673 812	8 304 192	218 077	343 591	481 683	1 115 378
2002	25 373 133	3 929 354	11 636 724	743 945	7 046 961	383 120	220 549	499 891	715 762
2003	26 117 539	3 967 816	11 843 832	754 837	7 431 760	325 944	258 527	597 042	709 295
2004	25 013 521	3 795 643	11 832 021	788 104	7 001 523	350 744	101 623	426 474	562 655
2006	25 279 971	2 553 398	11 822 158	565 598	9 428 323	254 929	246 548	144 459	194 730
2008	24 360 863	2 276 540	10 052 659	347 943	10 947 437	275 737	239 291	100 486	73 085

3. Solar

Geographically, Turkey lies in a quite sunny belt between 36˚ and 42˚N latitudes with yearly solar radiation of 3.6kWh/m2-day and total yearly radiation of about 2640 hours (IEA, 2010). Although the geographical condition of the country offers a favorable environment for solar thermal applications, aside from flat-plate solar collectors, other forms of advanced solar energy technologies are not widely used. Figure 3 and table 4 shows the solar radiation potential of different regions in Turkey. As is seen, the solar resource is abundant in Turkey, but greatly diverse in various regions.

The usage of solar energy for heating purposes amounted to 0.4 Mtoe in 2008 (Kotcioglu, 2011). Two-thirds of this was utilized in the residential sector and the remaining part in industry. Current figures suggest that a significant potential remains untapped since Turkey's current 12km^2 of solar collectors utilize only 1% of the total aggregated technical potential (Gençoğlu, 2002). Economical development potential of 131,000 GWh/a corresponds to approximately 300 million m2 collector area (Yuksel and Kaygusuz, 2011). Small scale solar collectors are widely utilized to supply domestic hot water in Turkey.

In Turkey, as a result of its geographical position, the cooling demand in buildings is very high in south regions of the country in the summer season. Despite this fact, there is no concrete data on the implemented solar assisted cooling technologies in Turkey. It is assumed that the potential of solar energy for cooling purposes remains mostly untapped.

Figure 3. Annual Solar Radiation in Turkey (Kaygusuz, 2011)

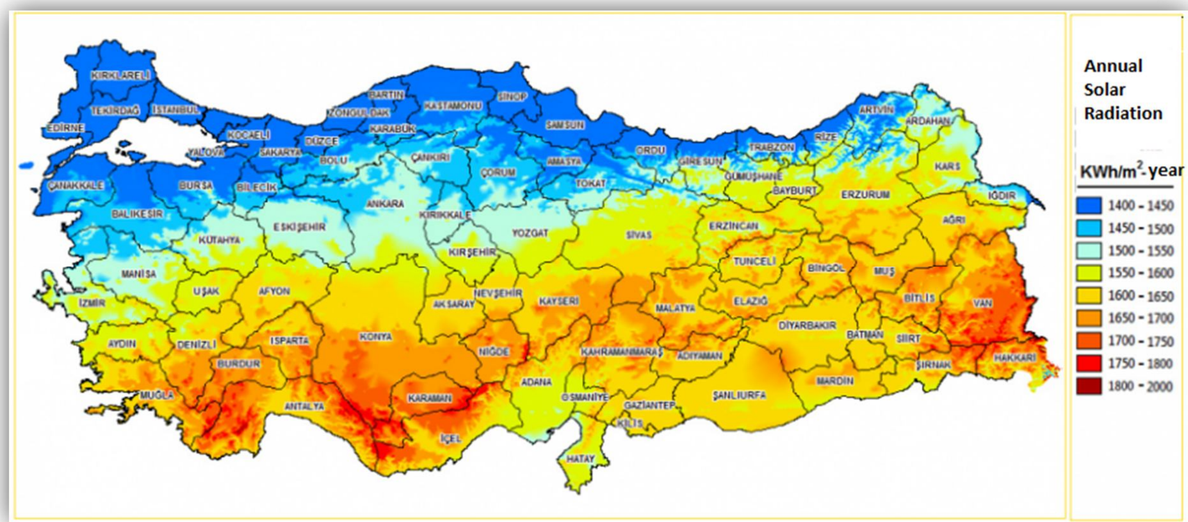


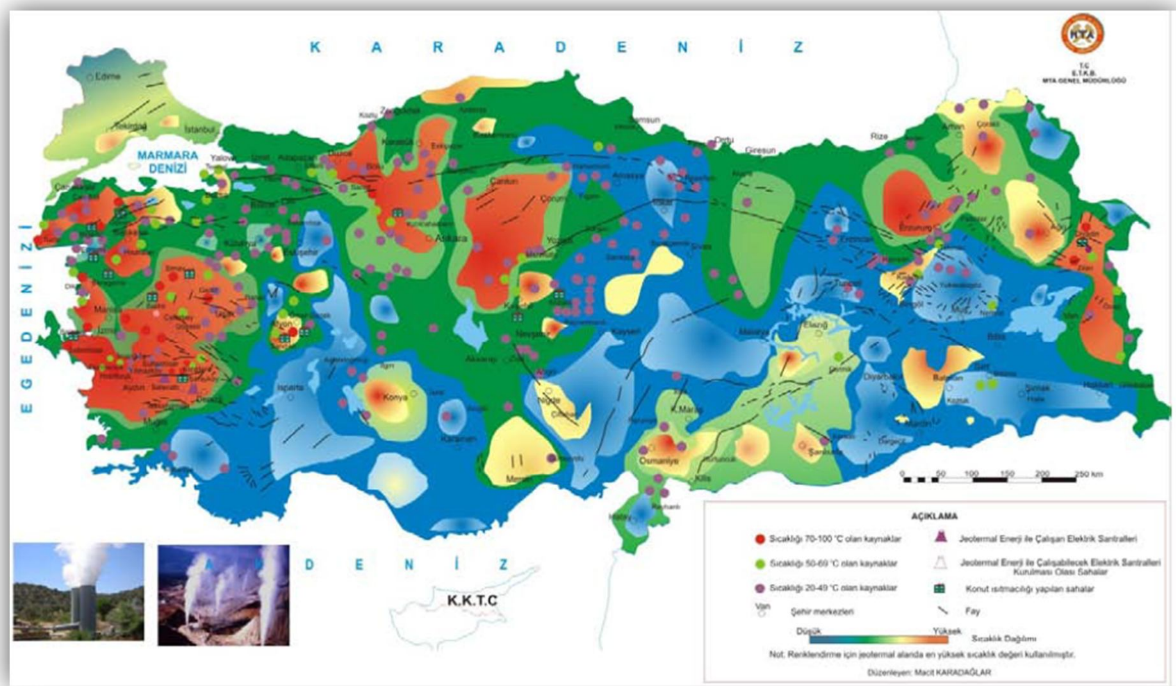
Table 4. Solar energy potential for seven regions and some cities in Turkey (Yüksel, 2008)

Region	Radiation energy			Sunshine duration period		
	Average (kWh/m^2 year)	Maximum (kWh/m^2 year)	Minimum (kWh/m^2 year)	Average (Hour/ year)	Maximum (Hour/ month)	Minimum (Hour/ month)
Southeast Anatolia	1492	2250	600	3016	408	127
Mediterranean	1453	2112	588	2924	360	102
Central Anatolia	1434	2112	504	2712	381	98
Aegean	1407	2028	492	2726	371	96
East Anatolia	1395	2196	588	2694	374	167
Marmara	1144	1992	396	2528	351	88
Black Sea	1086	1704	408	1966	274	84

4. Geothermal Energy

After Biomass, Geothermal energy is seen as the second biggest renewable energy source for the heating in Turkey. Turkey's technical potential corresponds to 31.5 GWth. According to the reports of Mineral Research & Exploration General Directorate of Turkey (MTA), there are nearly 300 geothermal resource areas and about 1500 hot and mineralized natural springs and wells exist in Turkey (Serpen et al., 2010). In accordance with the ongoing formal procedure, MTA explores and assesses geothermal prospects and publishes the geothermal resource inventory in Turkey (Türkiye Jeotermal Kaynaklari Envanteri) which also includes geothermal map, temperatures for each location that has been explored by the MTA. As is seen in the figure 4 of hot spring surface temperatures, the western regions of Turkey pose greater potential than elsewhere in terms of geothermal resources, which is consistent with the current focus of activities.

Figure 4. Hot Spring Temperatures in Turkey



5. Best Practices: Current Renewable Energy Support Mechanisms of European Countries

a. Introduction

With a rate of 70%, energy consumption for heating purposes constitutes an important part of household energy consumption in European countries (Cansino et al., 2011). With respect to EU-27 countries, approximate household energy consumption for 2007 in million tons of oil equivalents was as follow; space heating (300), water heating (50), cooking (10) and lighting (50)(Lapillonne and Eichhammer, 2009). With 68.8%, space heating holds the largest end-use energy share in the European countries. Space heating is followed by water heating, lighting and appliances and cooking, which accounts for 13.8% and 12.8% and 4.6% energy consumption accordingly (Cansino et al., 2011). Not only household, but also the service sector consumes a large amount of energy, 474 Mtoe.

When it comes to sources of heating energy, natural gas plays an important role. Service sector and households consume 35% of EU-27's total natural gas. According to the reports, most of the space and hot water heating energy demand is met by natural gas. Reliance on natural gas as the main source of energy represents also a big strategical burden for European Union since the natural gas is supplied mainly via Russia. On the other hand, environmental concern is another factor which leads increasing supply of renewable energy throughout the European countries. In the wake of post Kyoto, increase in share of renewable energy for heating means less greenhouse gas emission for European countries.

In order achieve the European target of 20/20/20, which means 20% reduction in EU greenhouse gas emissions from 1990 levels; raising the share of EU energy consumption produced from renewable resources to 20% and 20% improvement in the EU's energy efficiency, European Union has to undertake comprehensive measures. In line with these targets, main EU strategy has been directed towards promoting more energy-efficient building designs, convenience of households and service sectors to increase share of renewable energy (Cansino et al., 2011). Related laws and regulations also resulted in new building standards which consequently lead reduced energy requirements for heating in newly built properties. According to Odyssee-Mure project, new buildings require 60% on average less energy for heating than those of buildings built before 1990 (Schlomann and Eichhammer, 2011).

b. RES H&C Support Mechanism in the EU-27 Countries

Along with the above-mentioned regulations, most of the European countries have proposed various subsidies and promotion for the renewable energy systems for heating and cooling (RES H&C). In this section, we will investigate those of measures introduced by EU-27 countries and contributed to an increase of renewable energy for heating and cooling systems.

International energy agency highlighted recently that it is not coincidence that in those of countries with strong policy support toward renewable energy have big share of renewable energy system employed for heating and cooling. Over the last few years, most of the European countries have introduced a range of incentives to promote the use of RES H&C to increase national targets for renewable heat generation (Cansino et al., 2011).

The details of subsidies and supports provided by some European countries for RES for H&C are illustrated in the table 5. As seen, each country has introduced different kind of support mechanisms for different renewable energy sources. This differentiation is the result of the fact that each country has varying indigenous nature in terms of fiscal condition, availability of renewable energy source, previous experiences and governmental policies. On the other hand, particularly in the old EU member, EU's regulation and directives with regard to RES facilitated the rise of renewable energy share in total primary energy consumption.

Table 5. EU Countries that use subsidies to promote RES H&C (Cansino et al., 2011)

EU Member States that use subsidies to promote RES H&C				
Country	**All RES**	**Solar thermal**	**Geothermal**	**Biomass-only boiler station**
Austria	N.A.	Up to 30%	20 - 40% (for private investment)	
Bulgaria	20%	N.A.	N.A.	N.A.
Czech Republic	Up to 75%	N.A.	N.A.	N.A.
Ireland	N.A.	Up to 30%	Up to 30%	Up to 30%
Italy	N.A.	Up to 30%	N.A.	Up to 30%g
Latvia	N.A.	N.A.	N.A.	Up to 40%
Luxemburg	N.A.	50%	40% (geothermal heat pumps) 50% (geothermal heat exchanger)	25 - 30%
Malta	N.A.	25% (max 233 €)	N.A.	N.A.
Netherlands	N.A.	Subsidy not expressed as a percentage	N.A.	Subsidy not expressed as a percentage
Portugal	35%	70%		
Slovenia	N.A.	20 -50%	20 - 50%	Up to 20% of investment cost
Spain	N.A.	Up to 60% (public sector, fims and households<7 m2 collector)	N.A.	Up to 60% (including wood pellet burners)
Sweden	N.A.	800 € per household. 30% in the case of public buildings	3500 € when electric heating is removed.	N.A.
Turkey	There is no subsidy for RES H&C.	There is no subsidy for RES H&C.	There is no subsidy for RES H&C.	There is no subsidy for RES H&C.

When it comes to the biomass, according to this table, 16 out of 27 countries have introduced special measures to flourish the consumption of biomass for the heating purposes. The most used technology is that of biomass micro-cogeneration systems which consist mainly of boilers that are required to meet certain energy efficiency conditions (Cansino et al., 2011). Interestingly, irrespective of the geographical position, most of the EU member countries have a support measure for the solar energy. Geothermal is supported particularly by those countries with adequate geothermal supply.

In the coming part of the paper, we will analyze each support mechanism, namely tax deductions, tax reductions, tax exemptions, reduced tax rates, feed-in tariffs and low interest loans, which has been employed by the EU-27 countries and can be considered as appropriate policy examples for the Turkey.

With the mean of tax deductions, six EU countries are encouraging their nationals to utilize RES for heating and cooling purposes. The countries which have employed tax deduction policy are Belgium, Finland, Greece, Italy, The Netherlands and Sweden. In Belgium, for all RES and CHP (*combined heat and power*) installations, companies can receive a tax deduction of 13.5% for all investments in equipment used to reduce energy consumption (Cansino et al., 2011). With respect to tax exemptions, there are many examples where countries exempt the heating plants and biomass fuels from tax.

The method of reduced tax rates for the electricity is also very common in European countries (Del Rio and Gual, 2004). However, only three country, namely Italy, France and UK have so far introduced reduced value added tax for the heating and cooling systems (Cansino et al., 2011).

Another mean of RES support is low interest loans. This method is relatively new compared with other support mechanisms and therefore, more and more countries employ the low interest loan strategy to increase the share of RES for heating and cooling. For the time being, only four EU countries are introduced low interest loans.

Feed-in tariffs, a method for the promotion of RES application, is largely utilized for the electricity generation from RES (Ritzenhofen and Spinler, 2013). However, Austria introduced first feed-in tariffs for the heating derived from solid biomass for CHP (Cansino et al., 2011). Other countries, such as Estonia and Luxemburg have followed Austria on this path with varying amounts.

6. Policy Recommendations for the Enhancement of REH Technologies in Turkey

There are numerous IEA documents, which put emphasize on the importance of RES subsidies both for the heating and electricity generation purposes. According to one document of IEA, the answer of the question “Should renewables be subsidised” is as follows (Agency, 2013);

“The IEA believes that further growth of renewable energy is essential for a secure and sustainable energy system. Transitional economic incentives that decrease over time are justified. Incentives are sometimes needed to stimulate cost reductions through technology learning, such as improvements in manufacturing, increased technology performances, economies of scale and larger deployment. Incentives may also be justified to secure additional energy security and environmental benefits. Current policies have started to deliver in this respect.”

On the other hand, related studies suggest that first step of the RES subsidies should be a common agreement on targets for future RES deployment. According to the strategic plan 2010-2014of the Ministry of Energy and Natural Resources and in the Vision 2023 agenda, Turkey’s strategic plan covers mainly energy supply security, regional and global influence in the area of energy and environmental protection. The same report highlights that, in the long-term, by 2023, Turkey should generate at least 30% of electricity from renewable sources. Unfortunately, Turkey has no binding targets for primary renewable energy supply as EU’s 20/20/20 plan. Current Turkish law and regulations with regard to renewable energy sources are mainly dealing with the utilization of renewable energy resources for the electricity generation purposes, without considering the potential of renewable energy sources for heating and cooling purposes. As outlined, setting target for the renewable heating and cooling is seen as the driving force behind deployment of subsidies, grants and concerning regulations. Unfortunately, for the time being, Turkey does not have specific legislative framework covers solar thermal and biomass energy for heating and cooling purposes. Nor does Turkey have a comprehensive strategy for the promotion of thermal energy form solar and biomass energy despite the huge renewable energy potential.

In the light of these facts, we will try to develop a guide/scheme for Turkey, which would assist decision makers by introducing new legislations and subsidies in to renewable heating and cooling technologies. As explained in the previous chapters, there are numerous best-practice policies which have helped those countries to flourish renewable heating and cooling technologies.

For Turkey, supporting REHC-technologies could provide many advantages, such as more security of energy supply, increase of value added products and related job opportunities, reduction of greenhouse gases etc. Main advantages of supporting RE systems for H&C are illustrated in the table 6 below.

Table 6. Main advantages of supporting RE systems for H&C

Advantages of supporting REHC-technologies in Turkey	Sub-advantages
More security of energy supply	Renewables increase diversification within the energy mix which is important for an import dependent country like Turkey.
	Fossil fuels will reach peak production globally within this century. Due to needed but time-consuming structural changes (up to decades) it is essential to initiate these changes as soon as possible.
	Local energy sources are independent from geopolitical risks and global markets interruptions.
Economically more favorable in the long term	In view of probably increasing fossil fuel prices and equally probable price reductions among renewable energy technologies a change to Renewables is economically more favorable in the long term.
Increase of value added especially in "weaker" regions	Green jobs are created by strengthening local renewable energy technologies.
	Especially in structurally weak regions green jobs could be created by developing biomass potentials.
Reduction of Greenhouse gases	All renewables are either CO2-free (solar etc.) or CO2-neutral (biomass etc.), if they are supplied in a sustainable manner.
Technical Improvements of REHC are relevant for Growth and Sustainability	The building up of a strong national REHC-sector, which is one of the aims of the proposed support schemes, will create jobs and therefore will make a contribution not only to ecological sustainability but also to economic and social sustainability in Turkey.
Decentralization of political and economical power	The renewable energy sector is (and will be for a long time) much more dominated by small and medium-sized businesses than the current oil, gas, coal and nuclear economy.

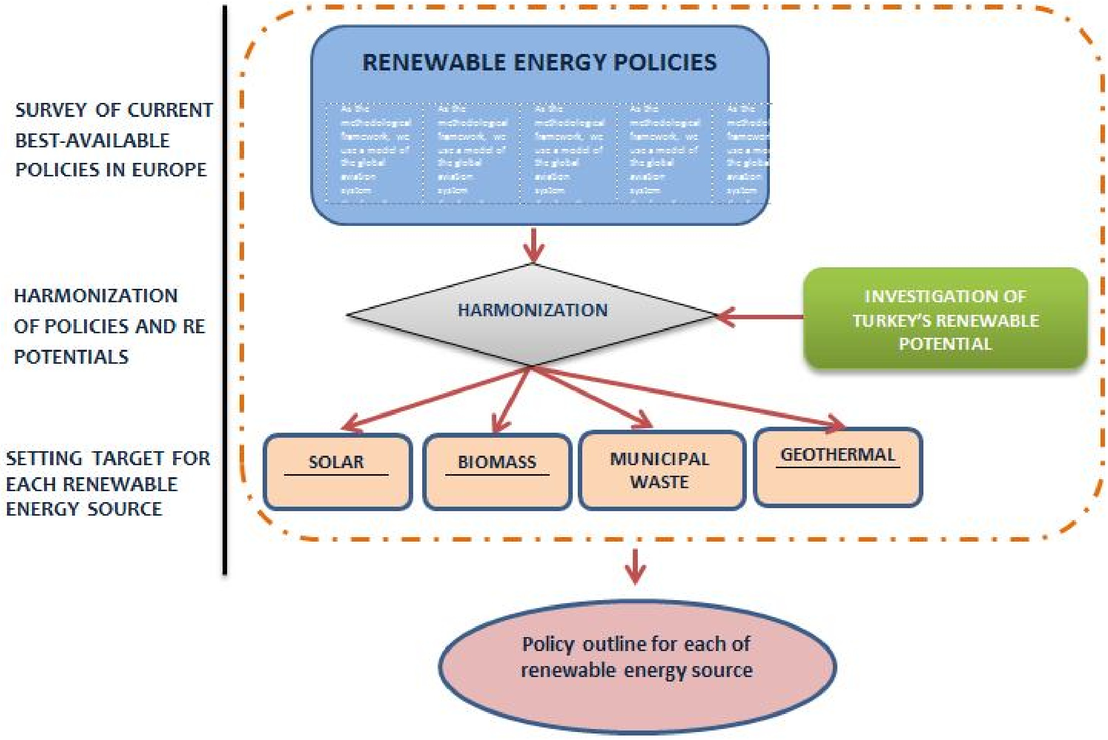
Before suggesting different support mechanisms for Turkey, we should not forget the fact that promotional measures have not been implemented by EU countries in the same way since each country has its own characteristics, infrastructure, policy, weather etc. which are crucial determinants in setting public policy measures. IEA report also support this idea by stating that government-implemented measures should be specifically related to the RES H&C features of the areas where they are applied, which is also a case in Turkey. For instance, Turkey's main differences form the EU countries can be counted as below;

- Growing number of building complex (siteler)
- Tall apartments
- Development pace of the cities, particularly in the urban areas and in Anatolia
- Movement from towns to city centers
- Big amount of houses without insulation
- The pace of population growth

As seen, Turkey has different characteristics from the EU countries. That means, the subsidies and support schemes for renewable heating in EU countries would not produce desired output and Turkey should develop its own strategy to flourish RES H&C appliances in Turkey. With that aim, we have developed a "guide", which would assist decision makers in promoting RES H&C technologies. On the other hand, proposed scheme supports the utilization of national renewable resources for the heating and cooling purposes.

Proposed model comprises two main processes. As figure 5 illustrates, the main aim of the first process is to determine policy outline for each of renewable energy source, namely solar, biomass, municipal waste and geothermal energy. In order to do that, decision makers or relevant governmental body is expected to conduct a comprehensive survey of current best-available RE policies in Europe.

Figure 5. Determining policy outline for each of renewable energy source



Parallel to that, real renewable heating potential of Turkey should be investigated since current available publications with respect to RE potential does not provide reliable information on the renewable energy potential of the country. Most of the available data contradict with each other. After harmonization of available RE potentials and current policies of EU countries towards enhancement of RE application, policy outline and targets for each of renewable energy source are determined.

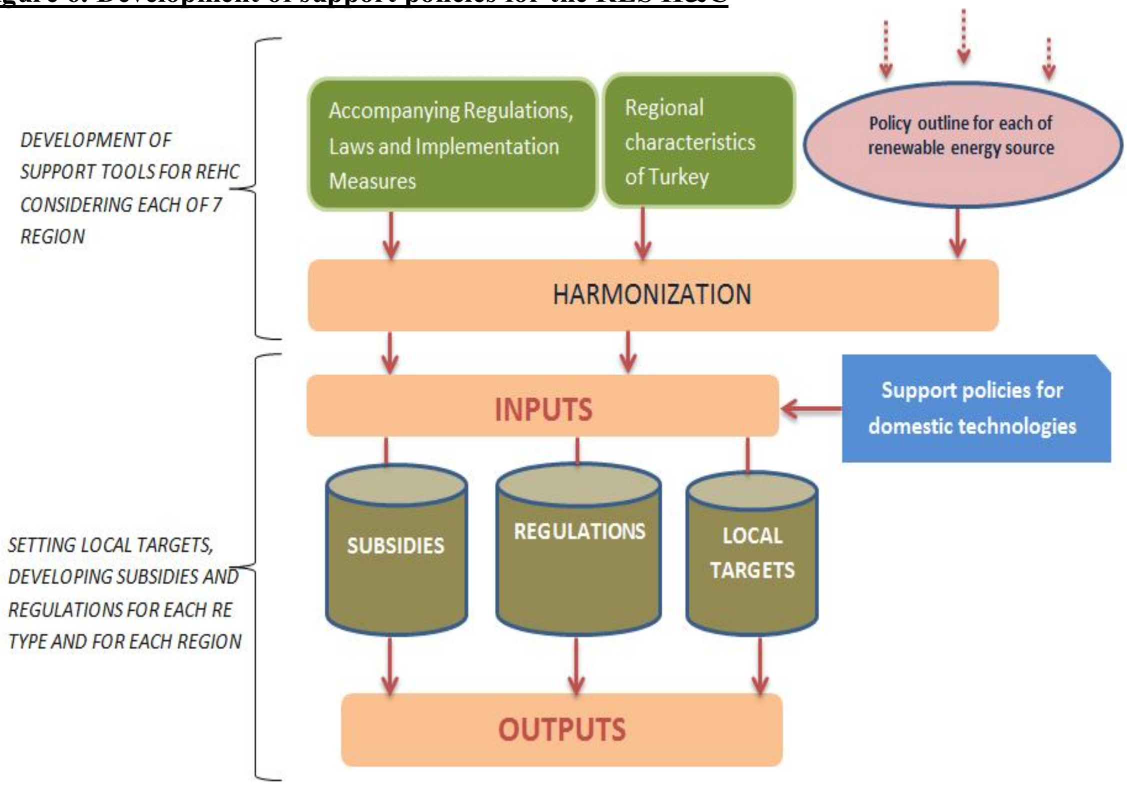
At the second stage of out model, as illustrated in the figure 6, output of the first stage is utilized as one of the main source of second stage. Additional to that, second stage of the model requires comprehensive data on different regional characteristics of Turkey and accompanying regulations, laws and implementation measures. Support policies with regard to domestic RE technologies are also considered in the model. After harmonization of all inputs, the model is expected to produce mainly three outputs, namely subsidies, regulations and local target for each RE type and each region.

Possible outcomes of the model are given below:

- A new legislation about the biomass stove standard should be introduced and replacement of the old biomass stoves already installed with new and more efficient technology should be supported.
- Subvention for fossil fuels which is embedded in Turkish tax system shall undergo a critical review
- A certain amount of grant should be provided for the biomass production, processing and distribution industry.
- Different kinds of financial support (e.g. low interest loans) should be offered for the investments into B2C (Business to Consumer)-Technologies
- Targets on agricultural residues, biomass sources, solar thermal installations
- Grants for the specific training costs for the development of human resource
- Subsidies to the investment costs and additional planning costs for the Solar Cooling Installations, first applications of solar process heat in SMEs or Industry
- Incentives for the development of domestic heat pump technologies
- The “EU Building Directives“ (2002/91/EG and 2010/31/EU) on energy performance of buildings can be seen as guidelines for further development of Turkish policy

- The Obligation shall mandate that a specific percentage of the overall heating and cooling demand of a building must be covered by renewable energies
- Assistingthe qualification of planners, installers and other relevant professionals by supporting training courses, planning costs and demonstration projects
- A National Energy Agency as well as Regional Energy Agencies should be founded and supported.

Figure 6. Development of support policies for the RES H&C



7. Conclusion

According to the International Energy Agency, it is not coincidence that in those of countries with strong policy support toward renewable energy have big share of renewable energy system employed for heating and cooling. Over the last few years, most of the European countries have proposed various subsidies and promotion for the renewable energy systems for heating and cooling. Each country has introduced different kind of support mechanisms for different renewable energy sources.
Unfortunately, current Turkish law and regulations with regard to renewable energy sources are mainly dealing with the utilization of renewable energy resources for the electricity generation purposes, without considering the potential of renewable energy sources for heating and cooling purposes. As outlined, setting target for the renewable heating and cooling is seen as the driving force behind deployment of subsidies, grants and concerning regulations. For the time being, Turkey does not have specific legislative framework covers solar thermal and biomass energy for heating and cooling purposes. Nor does Turkey have a comprehensive strategy for the promotion of thermal energy form solar and biomass energy despite the huge renewable energy potential.

In the light of these facts, the paper strives to develop a guide/scheme for Turkey, which would assist decision makers by introducing new legislations and subsidies in to renewable heating and cooling technologies. For Turkey, supporting REHC-technologies could provide many advantages, such as more security of energy supply, increase of value added products and related job opportunities, reduction of greenhouse gases etc.

In this paper, we have proposed a model for the development of national renewable heating support policy. Since each country has its own characteristics in terms of geography, available renewable energy source, available technology and financial means, there should be model which would be followed by the respective country to form its own policy towards utilization of renewable energy for heating and cooling purposes. The paper analyzed the impacts of different policy harmonization options in the field of renewable energy heating and cooling, taking into account various determinants such as survey of current best-available RE policies in Europe, available national RE potential, data on different regional characteristics of Turkey, accompanying regulations, laws and implementation measures, support policies with regard to domestic RE technologies. Based on the bottom-up modeling, the scheme shows that a harmonized use of different inputs would generate a comprehensive policy instruments, such as subsides, regulations and local targets.

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