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Environmental challenges in developing societies

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EDITOR'S NOTE

Analytica is proud to present the second issue of Analytical for 2008. With this issue we round the first year of publishing of our electronic journal – Analytical – a milestone worth celebrating. Just as with other pioneering projects, the first volume of Analytical saw many challenges, but we are happy to have overcome them and completed the second issue of Analytical. Moreover, we are now even more determined to continue with our efforts and look forward to preparing more and better issues of Analytical – with ever more challenging topics and good quality research.

In Analytica, 2008 was a year devoted to environment. We launched our Environment, Agriculture and Rural Development programme and with the support of the European Fund for the Balkans started a project on building national capacities in the environmental sector in Macedonia. Therefore, devoting the second issue of Analytical to environmental issues was the next logical step to complement the other activities undertaken in the Environment and Agriculture programme. The topic of this issue of Analytical is "**The Environmental Challenges in Developing Societies**" – a topic of sufficient latitude to encompass the different types of environmental challenges faced in developing states as well as the variety of potential answers to those challenges. The papers featured in this issue of Analytical display the wide range of aspects students and practitioners take when discussing environmental challenges.

Jadranka Ivanova discusses the scarcity of natural resources in the context of sustainable development. The main solutions to the challenge posed by resource scarcity are seen in proper implementation of regulatory mechanisms – EIA, SEA, as well as the use of renewable resources and better waste management. Olgica Micevska and Katica Taseska examine waste management practices in Macedonia and discuss the possibilities of reducing green-house gases by employing landfill gases to alternative purposes. They analyze two scenarios: a base-line and ecologically improved scenario, to illustrate the potential effects of such measures. Jefto Otovic approaches environmental challenges from a local perspective. He discusses how sustainable economic development can be achieved by applying environmentally-friendly policies at local level through a case study of Surcin – a rural municipality in Serbia. Nguyen Tien Hung brings an entirely different regional perspective to environmental challenges in developing societies. His is a study of the geothermal resources of Vietnam, an evaluation that can be used in developing renewable energy potential. Finally, in our Interns' Section, we publish the research conducted by Maxence Boutet, Analytica's intern during Spring 2008, who looked into energy efficiency challenges in South Eastern European countries and discussed the need to improve energy efficiency at local level, by examining other regions' best practices.

We hope you find our selection of papers relevant and engaging. Enjoy reading this issue of Analytical and do not hesitate to share your thoughts, comments and suggestions with us at: journal@analyticamk.org.

Best wishes for the upcoming year 2009,

Analytical Editorial Committee

WE NEED MORE NOW OF WHAT WILL BE USED TOMORROW?

Jadranka Ivanova

INTRODUCTION

In circumstances of scarcity of natural resources, predominantly those of the natural energy, the power of a country is being more and more evaluated by its natural treasures. Recognizing this, states are concentrating more on identifying measures which contribute to natural resources sustainable usage. However, this policy is more characteristic for developed countries rather than for developing countries. The latter, driven by the need for a fast economic growth ignore the influence that such a growth can have on wildlife and on natural resources.

The EU and its Member States, in the process of European integration and within their provided economic support include the mechanism of environmental impact assessment, which on its own cannot result in an implementation of the concept of a sustainable growth if not used entirely as a process and not only as an administrative procedure.

The sole fact that natural resources are getting more and more exhausted and debates stimulated because of it, caution is recommended in terms of searching for alternative or renewed resources and sources of energy. The waste represents an obvious source of resources as long as it is implemented as an integrated waste management system within a country. The definition of waste implies a concept of inclusion of the material which for someone was waste yesterday and could be raw material for another today. For this reason, the policy of waste management planning should be seen as an instrument for boosting a new economic branch of development in the country.

The administration of a state and its capability of implementing different policies and strategies take up a significant part in the economic growth. Integrating the policy of environmental protection in other policies is a precondition for insuring a balanced usage of natural resources of the state and its economic growth.

Natural resources and their shortage

The ever increasing need for more resources on daily basis is being elaborated in almost all possible ways, through media, public debates, reports, and even the common citizens discuss it as their every other domestic - policy topic.

The voice of need for new resources, obviously, has grown everywhere, which in ideal conditions would mean that every stakeholder in the society should have by now shaped their usage in a way which will enable a better utilization of whatever we have now. But, is it really so?

Let us see the way the modern human works. The conclusion drown out of this exercise is that the contemporary humans, as never before, are concerned more about satisfying their own present needs. The concern whether the next generations will have the same opportunity to satisfy their needs is mostly seen as a policy that is self-declarative rather than as a policy truly implementing itself.

Using natural resources with an intensity which surpasses the rational worry for the future generations is determined mostly by two elements:

- the need for a rapid economic growth, which is being exploited as a topic for a long-term strategy in almost every developing country, and
- the economic power of the business sector, which through its own instruments of influence, imposes actions which lead toward generating a constantly growing profit, not taking into consideration the requirements of natural resource.

At first glance, everything seems justifiable; in theory there already exists a believed opinion that the developing countries have the same right of using their natural resources, as the developed countries had before. Nevertheless, this naive justification gives basis for the ones bringing the decisions within a developing country to justify their decisions for taking over actions which lead to over-usage of natural treasures in such a way they exceed the demand of the sustainable development. Such a shortsighted way of thinking, without taking into consideration the motives behind it, in reality still sets a system within a country which can be significantly negative, especially in the case of a developing country. Even more, it can block its long-term economic growth because of the impact it can have on the environment, as well as on social security of the population.

The most significant impact of execessive usage of natural resources is made on the living environment of the country. This can be seen through many examples, as excessive usage of water, which endangers the survival of water dependant species. Ultimately, the execessive usage ends up in a total depletion of certain natural good, up to the point when that good is eliminated for the future generations. This is done without taking any care of the impact made on biodiversity which exists in a country. The fact that a species is in extinction is presented as a topic to be dealt with by science, and not politicians. The impacts caused by decisions brought are seen as a local issue only, without taking into consideration their global meanings. As for example, extinction of one rare endemic species which exists only in one country is taken solely as that country's issue, not taking into consideration the fact that the extinction of that species from that country means that it is actually extinct from the whole world. In fact, it does no longer exist anywhere in the world.

We are witnesses of the change of natural landscapes degraded because of the urban development. Many landscapes that used to be a subject of our relaxation have turned into sights dominated by urban elements. The importance of nature in the social behavior of humans is not taken seriously, actually it is rather neglected. Closed within an urban surrounding, humans can no longer predict the influence of their decicions outside the urban environmet. Due to the lack of contact with nature, humans, as social beings, simply remain limited within the opportunities offered by urban settlements. In such a constelation, the nature of decisions taken on all levels of authority are not a bit strange. Humans became hidebound, capable to know and identify only their personal needs.

How to proceed?

The need for sustainable development, which was initially experienced by developed countries, is now spread over in developing counties. Namely, the developed countries have broadened the sustainable development concept and insisted on its introducing in developing counties as part of their strategy for economic cooperation. On European level, the EU and its Member States have the biggest influence and contribution in the promotion and implementation of this concept.

However, the sustainable development can be expected to be implemented only by introducing the instruments which will enable corrective opportunity in the decision making process related to the use of the natural resources of a state.

EU has succeeded to impose the Environmental Impact Assessment (EIA) instruments as mandatory in the frame of the European integration processes and in the economic assistance process.

The Environmental Impact Assessment instruments have opened the door for public participation in the decision making process, thus opening a door for promotion of the sustainable development. At one level, the EIA has imposed the need to review the impacts that might be experienced in the environment, caused by the enactment of different development plans by one state. This is known as Strategic Environmental Assessment (SEA). At another level, EIA has enabled the possibility to review all impacts during the approval for execution of a project, which may range from a construction of a housing complex to construction of a mine. Both instruments, first know as SEA and the second as EIA[1] have been introduced in the Republic of Macedonia.

EIA represents a procedure through which the different alternatives are reviewed by all involved stakeholders, with the objective to foresee the negative impacts on the environment in the earliest stages of a plan or project development. The assessment of the negative impacts within itself incorporates also an assessment of the aspect of over-exploitation of natural resources.

The most significant element in the EIA is public participation in decision making process related to enactment of the decision for approval of a plan or approval and execution of a project. The public, in a certain sense, is equalizing its decision making power with the government. Although this may sound a bit strong, a set of sound and argument supported recommendations provided by the public may significantly contribute towards correction of the decisions made by the government towards their higher sustainability.

In the intertwined relations of social living where all stakeholders have a need to act on different levels, however the question remains whether this instrument is sufficient for sustainable use of the natural resources, if observed solely as an administratively executed procedure exclusively by relevant administration. Viewed solely as an administrative procedure, EIA may be understood as a bureaucratic tool that fails to introduce the concept of sustainable development. This could be perceived, above all, from the current practice where the implementation of the EIA is done exclusively through administrative instruments.

To overcome this, it is utmost important to raise the meaning of EIA on highest level and needs to be implemented by government, from central to local level. Consequently, the EIA concept needs to be accepted also by the business sector. This is of essential importance due to the fact that the project development decisions are most commonly made within the business sector. In the process of developing environmental legislation in developing countries inspired by the EU legislation, the responsibility of the private subject does not lay solely in the restoration of the environmental damage but also in the nuisance caused to the people due to the execution of the project which has negative impacts on the environment. The locality doctrine concept[2] imposes the need to assess the nuisance suffered by individuals most closely located to a certain activity. The integrated product policy, which as policy is implemented on an EU level, places the core importance of the decision on the responsibility of the producer, which more often as principle is integrated in the basic EU documents.

[1] Introduced in the Law of Environment (SEA – chapter 10, EIA – chapter 11) (Official Gazette of the Republic of Macedonia Nos. 53/04, 81/04, and 24/07)
[2] Stuart Bell and Donal McGillivray, "Environmental Law" – Sixth edition, Oxford University Press, Great Clarendon Street, Oxford ox2 6DP, 2006

As a conclusion, the biggest responsibility in the use of the natural resources and the approval of the same lays in the responsible behavior of the government and its understanding and implementation of the sustainable development concept and the EIA instrument. If properly understood and comprehended, the government is to have a tool that will provide it with a possibility to make decisions enabling economic development, while taking into consideration the needs of the environment. Provided that these instruments are adequately applied, they will be recognized by the business sector, regardless of their size, and thus applied in the every-day activities.

Are there any other alternatives?

The discussion of the over-exploitation of natural resources has resulted in intensified requests for alternative resources. In a very short period of time, both the science and the public have shifted their attention towards the development and use of renewable resource and energy sources. As a result, new areas of economic activity have emerged, solely focused on providing more renewable based resources.

In this area, the central focus belongs to the waste use process. Namely, the waste use is directly linked with the sustainable development concept, which can be observed from the viewpoint of the fact that a specific classification of materials considered a waste yesterday are today resources for use by someone else. The identification of the definition "what is considered to be waste" viewed from a EU legislative aspect, is even more significant, especially considering that what one considers to be waste, another one may see as useful component, raising the question: is this a waste? Further more, the possibilities for use of the useful components of the waste are immense. The question whether something that has been left by someone can be considered a waste, for example abandoned vehicle or computer which could be used as source for spare parts, is the basis for establishment of the system for integrated waste management. If we add here the question whether the remaining from a production can be re-used, most commonly referred in Macedonia as waste resources, it seems that the identification of the definition on what is waste, is not at all a simple task, but very important for providing a resource which in the future can be used and by that can be protected and preserved.

The practice shows that developing countries, occupied by their needs for economic development, do not recognize the importance of establishing a good waste management system, which may give a significant contribution to the process of providing resources. The waste management is still observed as a branch which requires additional costs, and not as economic branch that can provide development. Due to the lethargy of the administration, it seems that it cannot keep up with the reality and the degree of the scientific and technological development. Actually, the waste is observed as "dirty" reality which needs to be dealt with, not as process of economic planning which starts from the moment of designing a product, its packing, advertising and its treatment after the use.

The answer to the question whether we have other alternatives is of course positive and we need to look for it in the adequate management of the environment and all its media and areas. As most significant is the waste management, where establishing an integrated waste management system is needed, which will enable each stakeholder to find its area of action. This means that the waste management must not be understood one sided, thus in practice this will mean both minimization of waste production and increase of waste utilization. Namely, the produced waste may pollute natural resources, but if used properly it will prevent/reduce their exploitation. As a conclusion we can say, the region that we live in is not wealthy enough so that we could allow ourselves to through away the useful components of the waste.

The search of alternative sources is a complex issue which demands an establishment of communication, including the decision makers, the business sector and the science community. Via

integration of their interests, one may expect building of a policy for development of a country, based on the principles of the sustainable development. The promotion of the integration of the decision making process shall enable at the same sound-time planning of the business sector development, which will significantly increase its input in the development of the respective country.

What are the next steps?

The key for the economic development of a developing country still lays in its government. Unfortunately, the impact from other structures in the society are shaped and their power is adjusted to the needs of the government. The needs of the government, largely depend on its capabilities to comprehend the concept of sustainable development and by that determineded desire to implement the concept.

The establishment of a good system for environment management, as never before, is critical for the development of a country. The strength and the integration of this system are in large scale reflected in the economic development of the country. The management of the environment does not only mean establishment of a system on a central level of government, but actually, by its nature, means establishment of a system for management by the local government as well. The last one, by its nature, more or less is depending on the central government, which imposes that the environment policy is extremely important to be established on a very high level of the political life in the country. Of course, this does not mean management or protection of a single part of the environment such as protection of air or water, but this demands to observe the environment as an area in which all interests need to be integrated. And by interests, we refer to economic, social and environmental interests.

The Government of the Republic of Macedonia has made a positive step forward through introduction of the Regulative Impact Assessment (RIA), which as a mandatory procedure is to be applied from January 2009 for each law enacted by the Government.

However, the impact of this procedure may be positive only if the procedure is seen as a mechanism for improvement and correction of the proposed decisions, not as mechanism for providing wider platform for confirmation of the same decision.

In this sense, the implementation of any mechanism, procedure or policy, will mostly depend of the capacity of the administration to handle the same. The capacity of the administration, as a consequence may have significant impact over the identification of the intensity of the proper natural resources use. If we have an administration that sees and observes the issue one-sided, and does not take into consideration all impact that one decision can have, unfortunately we will have procedures which may serve only as advertisement tools resulting probably in slowing down of the economic development.

Having in mind the above, it is necessary to view the environment management as a principle that needs to be integrated into other remaining policies of the state, such as the one for economic, tourism, agriculture development and alike. If this is achieved, the negative impacts on natural resources and on the environment as a whole will be adequately decreased proportionally with the level of integration.

Having in mind the aspirations of the Republic of Macedonia for EU integration, especially considering the obligations resulting from the Stabilization and Association Agreement, the Republic of Macedonia is obliged to approximate its legislation with the EU legislation, as well as to provide full implementation in a period of 10 years from the enactment of the Agreement. All countries from the region are included in this process. The implementation of the legislation means implementation of the EU policy, where the integration of the environment policy in the other policies is one of the principles of the core EU

agreements. The conclusion may state that the use of natural resources is expected to be sustainable in the future, providing their protection and finding renewable sources which will decrease the need of exploitation of natural resources.

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SCENARIO FOR DECREASED GREENHOUSE GASES EMISSION IN MACEDONIA BY SUCCESSFUL MUNICIPAL SOLID WASTE MANAGEMENT

Micevska Olgica
Taseska Katica

INTRODUCTION

Trough history, capability of people to live in harmony with nature, was related with their access to energetic sources. Civilization is thermodynamic system that grows proportionally with energy consumption.

As a result of technological revolution past 200 years, we are witnesses of a rapidly increased population, which leads to limited access to the available energy sources and therefore of misbalance in natural equilibrium. So it is difficult to imagine today's world without energy.

Human activities contribute significantly to increased concentration of greenhouse gasses in the atmosphere. They intense the greenhouse effect and that results in increased temperature on the surface of the planet and atmosphere, with negative consequences to natural ecosystems and humanity generally. According the official report of Intergovernmental Panel on Climate Change (IPCC) prognosis are showing possibility of increased global temperature from 1,4 to 5,8 degrees in period till 2100.

By some assessments (IS92a scenario and IPCC), annual average temperature in Macedonia till 2100 might be increased up to 4,6 degrees and average summer temperature of up to 5,1 degrees. Republic of Macedonia has relatively high level of energy consumption and high emission of greenhouse gasses by GDP unit. In the emission of greenhouse gasses, the main role and dominant place has energetic sector with 71%, than agriculture, waste, industrial processes and forestry.

At this moment in Republic of Macedonia, level of waste production is very high, despite low level of economic development and financial situation of the citizens. Emission of greenhouse gasses from waste sector is consisted of methane (CH_4) and nitrogen oxide (N_2O), which are releasing during the process of decaying of waste in anaerobic conditions.

Greenhouse gasses inventory for waste sector consists three subsectors:

-Municipal solid waste (MSW)

-Waste water treatment (populated areas and industrial waste waters)

-Sewerage waste

The main part of the emission approximately 90%, is generated from municipal solid waste landfills.

The European policy framework for municipal solid waste management

Waste management is one of the key priorities of EU environmental policy and the framework in this area has been progressively put in place since the 1970s. The amended Waste Framework directive, final adoption of which is expected by 2009, will be an important step towards further coordinating efforts in this area. The Sixth Environment Action Programme (2002-2012) set the level of ambition for the further evolution of European waste management policy when it called for: significant reduction in volumes of waste generated, quantity of waste going to disposal, and reduction of volumes of hazardous waste produced. From this point of view was established and proposed Thematic Strategy on Prevention and Recycling (2005), when it stated that: '**The long-term goal for the EU is to become a recycling society that seeks to avoid waste and uses waste as a resource'.**

Over the course of the period since the Sixth Environment Action Programme was adopted, Europe's leadership on policies to tackle climate change has strengthened. The then fifteen EU Member States (EU-15) agreed under the Kyoto Protocol to a 8% reduction of total greenhouse gas (GHG) emissions by 2008-2012 from base year, while the twelve Member states which joined the EU in 2004 and 2006 (EU 12) have individual reduction targets. In 2005, greenhouse gas emissions from waste management represented about 2% of the total emissions in the European Union.

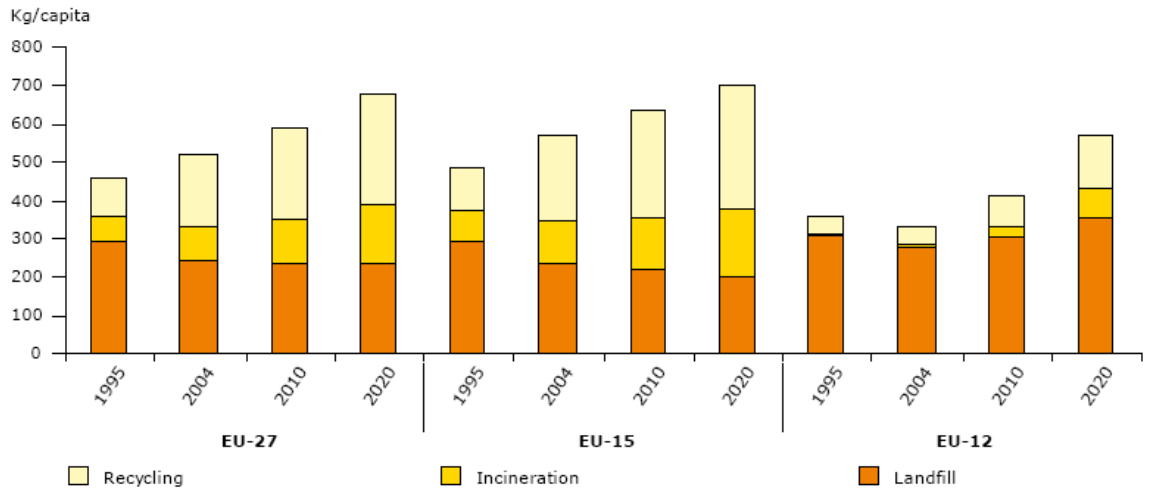
The EU Landfill Directive (1999) can therefore help in achieving EU targets on GHG emissions reductions, for example through methane recovery and diversion of biodegradable municipal waste from landfill.

Waste generation trends are driven by several factors, such as economic activity, demographic changes, technological innovations, life-style and patterns of production and consumption. It is clear, however, that municipal waste volumes are on the rise.

On average, each European citizen generated 460 kg municipal waste in 1995. This amount rose to 520 kg per person by 2004, and a further increase to 680 kg per person is projected by 2020, if some measurements are not realized. In total, this corresponds to an increase of almost 50% in 25 years.

Over the entire period, more than 80% of the total municipal waste was generated in the EU-15, and new members of EU (EU -12), since period 2004 – 2006 when they become part of EU have generated the rest quantity of municipal solid waste. If produced volume of municipal solid waste till 2020, waste is represented mathematically, summary will be 340 millions of tones produced municipal solid waste.

Generation and management of municipal waste in Europe (per capita)



Source: Eurostat and ETC/RWM.

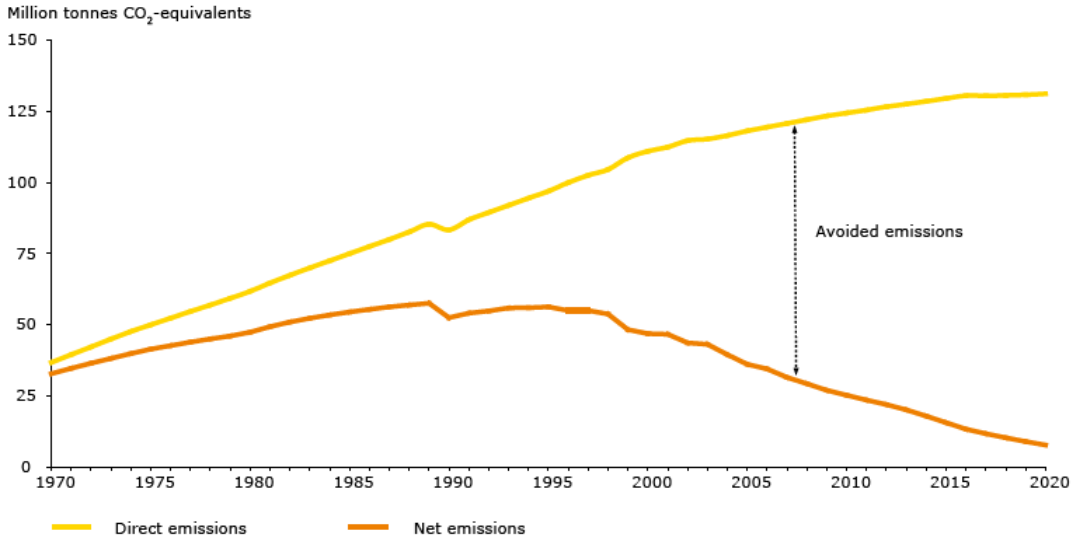
Current EU waste policy is based on the so-called waste hierarchy. This means that, ideally, waste generation should be prevented or reduced, and that which is generated should be recovered by means of re-use, recycling and other recovery operations, thus reducing disposal operations.

In municipal waste management, disposal of untreated waste is generally the worst option for the environment because of its emissions of methane, its long-term emissions to atmosphere will affect or indicate increasing of greenhouse gases.

These past and expected trends are in part the result of dedicated policies which aim to increase the recycling and recovery of packaging waste (e.g. 1994 Packaging Directive) and to divert biodegradable municipal waste away from landfill (e.g. 1999 Landfill Directive). Net emissions of greenhouse gases from the management of municipal waste are projected to decline from a peak of around **55 million tones CO2-equivalents per year in the late 1980s to 10 million tones CO2-equivalents by 2020**.

On the one hand, waste quantities that enter management facilities are projected to continue to grow as waste generation per capita increases and waste collection is further improved. This pushes direct emissions of greenhouse gases from the waste management sector up. On the other hand, recycling and incineration are increasingly being used and this is projected to continue. This represents savings (or avoided greenhouse gas emissions). Recycling contributes 75% of total avoided emissions by 2020 and incineration almost 25%.

Trends and projections of greenhouse gas emissions from management of municipal waste in the European Union



Source: ETC/RWM.

Note[3]: *On the Y-axis, the positive section represents direct emissions, e.g. methane emissions from landfills or CO2 emissions from incineration, recycling and waste collection; the negative section represents the avoided emissions due primarily to recycling of secondary materials and incineration of waste. Life-cycle information allows calculating these avoided emissions or 'savings' that represent the benefit of recycling and incineration for manufacturing products (e.g. plastics, paper and metals) and producing energy instead of using fossil fuels and raw materials. Landfilling also contributes to avoided emissions when methane is recovered and used as an energy source substituting fossil fuels.*

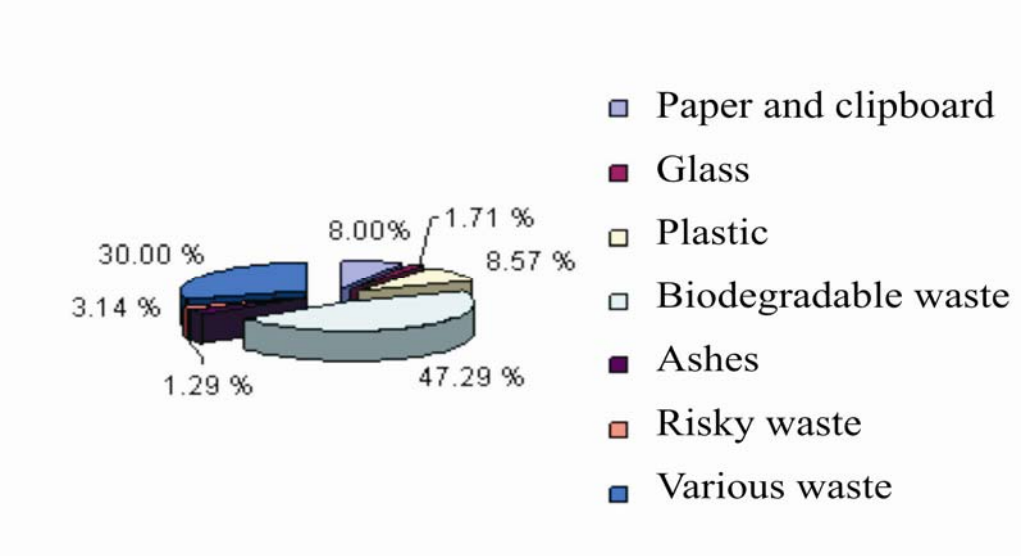
In conclusion, we can say that improved municipal solid waste management in Europe will reduce emission of greenhouse gases and environmental impact.

Generated Municipal solid waste in Macedonia

In Republic of Macedonia it is estimated that 570 000 tones of municipal solid waste are generated every year, and average per capita 250 – 315 kg are generated. From total waste generated in Macedonia municipal waste has a significant part.

Typical municipal solid waste consist of: 3,14% ashes, 8% paper and cardboard, 47,29% biodegradable waste, 1,71% glass and 21,29% other types of waste. Municipal solid waste includes: household waste together with garbage from streets and yards, commercial waste and industrial waste similar to household waste. Household waste participates with a large percent in municipal solid waste.

[3] The results reported above are based on the 2006 IPCC guidelines, which are used to model emissions for each EU- 27 Member State.



When MSW is disposed of in a landfill, naturally occurring microorganisms (bacteria) degrade the waste. The amount of water in and the temperature of the MSW control the rate of degradation. This process turns the organic portion of the waste into methane (a primary constituent of natural gas) and carbon dioxide in about equal proportions. The degradation process also generates very small quantities of organic compounds.

If generated, gas from this process immigrates in to the atmosphere and if it isn't properly captured, it affects environment and human health.

Utilization of landfill gas

Landfill gas, released from degradation processes of municipal solid waste, is an option to gain renewable energy.

Possible benefits from capturing landfill gas:

1. Direct reduction of greenhouse gasses – Municipal solid waste landfills are the biggest methane emitters, so it is much more logically to capture this particular gas, and use it to generate electricity from it, than to let emission of this gas in to the atmosphere.
   Methane is one of key gasses affecting on climate changes (with 21 higher GWP - global warming potential that carbon dioxide), and has short life cycle in the atmosphere, approximately 10 years. Avoided emission of methane from landfills, is one way to accomplish positive impact for environment, principally in mitigation of climate changes.
   It is estimated that from landfills, 60 – 90% of methane can be captured, that depend upon the design of that system and his efficiency. Captured methane, can be converted into water and carbon dioxide that can be used to generate electricity.
2. Reduction of air pollution with lower usage of non-renewable energy sources Energy production from landfill gas decreases the dependence on fossil fuels such as oil, coal, natural gas. If this is accomplished, than also emission of sulfur dioxide can be avoided (it can cause acid rain, if it is emitted in big quantity in the atmosphere), than emission of some particles (that can affect health and respiratory organs), also azoth oxides and other dangerous substances can be reduced.

3. Other indirect benefits – With collection of landfill gas and than his utilization for electricity generation, air quality can be improved and odor that is spreading from landfills can be eliminated. Combustion process can eliminate emission of non methane organic compounds that are present in traces, so all negative effects on health are eliminated. With gas collection, explosions and fire can be avoided. Electricity generation from landfill gas is an efficient way, that allows building new capacities for renewable energy generation. These capacities will be beneficial to local communities.
4. Benefits to local economy - Big benefit to the local economy would be distribution and sell of landfill gas. Opening new jobs for designing, construction and work in installations that generate electricity from landfill gas.

Realization of installation for electricity generation from municipal solid waste, will bring profit to municipalities.

Under federal Clean Air Act standards, larger modern landfills with estimated uncontrolled emissions of 55 tons per year of GHG or more are required to install a gas collection and destruction system, to prevent the emission of gasses in to the atmosphere. Landfills with smaller capacity to prevent GHG emission, also can install a gas collection system on free-will base.

To avoid and reduce emission of GHG from municipal solid waste, in this paper two scenarios are going to be considered: Base – line scenario (without measurements) and ecologically improved scenario (with implementation of certain activities in order to reduce the emission of GHG). Adequate emissions of greenhouse gases are calculated for period from 2006 till 2025.

Selected technologies for reducing GHG emission

The last studies[4], which are made in waste department, are showing that production of electricity/heat from landfill gas in Macedonian conditions is not possible. As a result, it can be supposed that the reducing of GHG emission in this department can be accomplished, and might be based on landfill gas capturing and than combusting it. This technology will be implemented on several landfills.

With the aim to reduce GHG emission from waste degradation, technology for collection and combustion of methane is considered. With this technology methane can be converted into CO_2.

For ecologically improved scenario it is considered that this technology will include following landfills in Macedonia: “Drisla“ – Skopje, “Krasta” – Kumanovo, “Meglenci” – Bitola, “Sapkar” – Strumica, “Buardere” – Veles, “Sipnica”– Gostivar, “Trestena skala” – Stip, “Belski pat” – Kocani, and “Leski”– Vinica (selection of these landfills is based on performed preliminary analysis in function of possible CDM projects).

The chosen technology applied on the mentioned landfills is evaluated with GACMO2 model[5]. Data for ecologically improved option are taken from relevant national studies. This option is compared with basic/reported scenario, which assumes that disposed municipal solid waste and the other organic materials are left to decompose on the landfills, so in absence of system for collection, methane will be emitted in to the atmosphere.

The efficiency of the system for landfill gas collection is getting lower, during the life cycle of the project. Because of that, the average value of 35 % as a collection factor is considered. For costs of this

[4] Feasibility study: Utilization of Methane Gas at a Landfill Site in Skopje, Shimizu Corporation, March, 2007
[5] Fenham , J., *Introduction to the GACMO mitigation model* in: Economics of Greenhouse Gas Limitations. Handbook reports, UNEP, Riso National Laboratory, Denmark, 1999 ISBN: 87-550-2574-9

system, price of 12 USA $ per disposed tone of municipal solid waste on landfill is considered (this value is in accordance with data that are shown in the Study [6]).

To calculate GHG emission from municipal solid waste landfills, input data are: the total annual quantity of municipal solid waste disposed on the landfills in the overview year, and the value of rate for generated methane per waste unit [kt CH_4/ kt municipal solid waste] typical for the overview country. The main input data for calculation of the total quantity of municipal solid waste are: number of population, and fraction of municipal solid waste disposed on landfills. This mathematically shown is as kg /person/ per day. Values for suitable corrective factors and fractions are chosen in accordance with IPCC instructions for GHG national inventory since 2006 year. Reduced GHG emission can be shown as difference between the elementary emission (when methane is released in to the atmosphere, not treated) and the estimated emission (collected CH_4 and than transformed into CO_2, plus residual CH_4).

Evaluation of the technology that decreases methane emissions in selected landfills

Landfill	Disposed municipal solid waste (t/year)	Annual reduced emission (t CO_2-eq.)	Annual costs (USA $)	Total investments (USA $)
Skopje("Drisla")	150 000	77 760	221 333	1 800 000
Kumanovo ("Krasta")	36 500	18 921	43 086	438 000
Vinica ("Leski")	7 500	3 888	11 067	90 000
Kocani ("Belski Pat")	7 900	4 095	11 657	94 800
Stip ("Trestena Skala")	29 000	15 034	42 791	348 000
Strumica("Sapkar")	24 800	12 856	36 594	297 600
Veles ("Bunardere")	18700	9 694	27 593	224 400
Gostivar("Sibnica")	9 800	5 081	14 461	117 606
Bitola("Meglenci")	29 200	15 137	43 086	350 400

According to these calculations, and under assumption that the chosen technology is implemented on these landfills, total expected reduced emission would be 162,47 (kt CO /eq), which specify the potential of waste department for reduced carbon units. This value matches with 18 % of the total emission of GHG from this department. Potential should be realized progressively with the implementation of this technology on different landfills.

As a conclusion, results of the evaluation are showing that the technology for collection and combustion of landfill gas can have positive influence on the environment, with a relatively high potential for reduced methane emission. In addition, with this technology odor can be avoided, gases that can cause explosion and fire are reduced, as well as negative influence to wild flora and fauna is eliminated.

[4] "Assessment of the projects' potential in the fields of renewable energy sources, energy efficiency and forestry management, in the framework of Clean Development Mechanism of the Kyoto Protocol for the Republic of Macedonia", Italian Ministry for the Environment, Land and Sea, May 2007.

Ecologically improved scenario

Ecologically improved scenario can be presented as time framework, for implementation of this chosen technology for GHG reduced emission from overviewed landfills. Criteria according to which this time framework is defined are including: the potential for reduced emission, than geographical position of landfills, financial and technical capacities of communities etc.

One possible ecologically improved scenario is shown in Figure1.

Figure. 1 Situation for implementation of technology for reduced emission (ecologically improved scenario)

	Landfill	Annual reduced emissions (t CO_2-eq.)	Year of implementation
1.	Skopje ("Drisla")	77 760	2009
2.	Veles("Bunardere")	9 694	2010
3.	Gostivar("Sibnica")	5 081	2010
4.	Kumanovo("Krasta")	18 921	2011
5.	Bitola("Meglenci")	15 137	2012
6.	Strumica("Sapkar")	12 856	2013
7.	Stip("Trestena skala")	15 034	2014
8.	Kocani("Belski pat")	4 095	2014
9.	Vinica("Leski")	3 888	2014

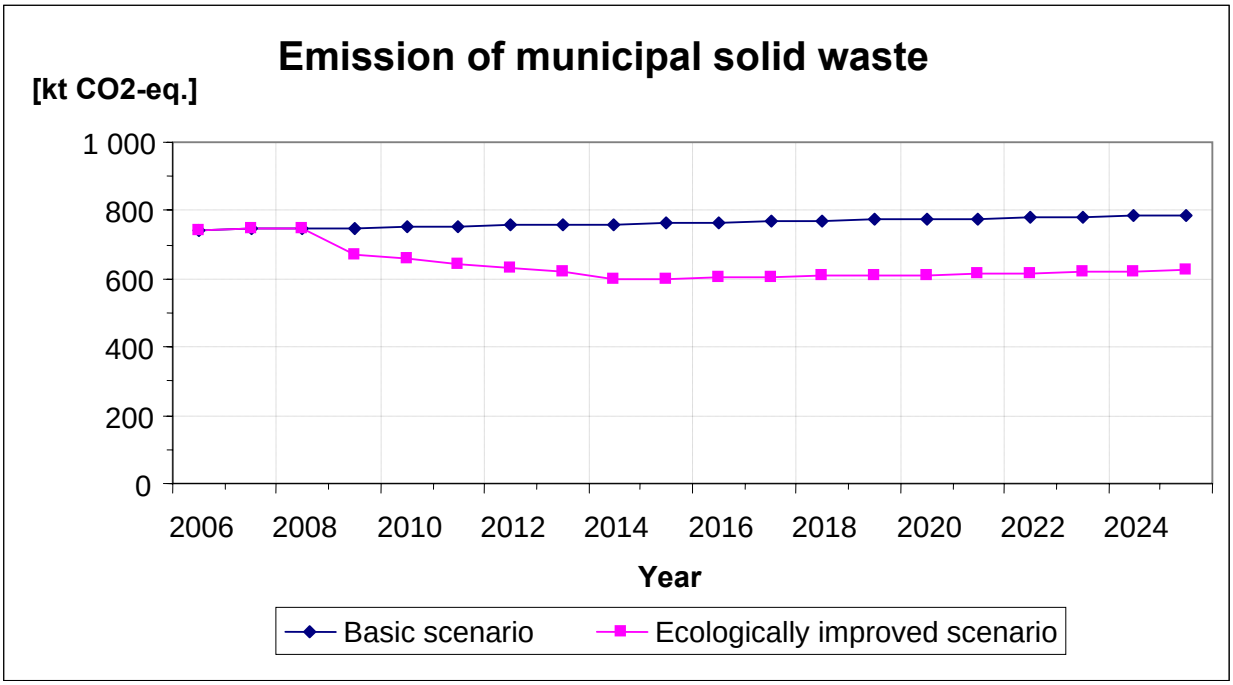
Drafts for GHG emission from MSW

According to previous calculations, it is obvious that in Macedonia, bigger GHG reduction from waste sector might be accomplished with combustion of methane from municipal solid waste degradation.
Emission drafts are made for two scenarios:

-Base line scenario (methane is releasing in to the atmosphere; with aim to assume demographic growth, annual rate of growth (0,3 %) is considered, starting from 2002);

- Ecologically improved scenario

Evaluated values for estimated emission (kt CO_2-eq.) for two scenarios are shown on diagram below (Picture 1) .



Picture 1. Total emission of GHG from municipal solid waste

Conclusion

Direct GHG reduction in the atmosphere with collection and combustion of landfill gas can be useful on global level. Usage of this technology, beside reduced GHG emission, has other ecological benefits, such as avoided health risks from explosions, toxins that can be released in the area from waste degradation processes are eliminated, and odor from this degradation is decreased. Reduced GHG emission, from environmental aspect and environmental protection will contribute to lower waste production, than increased economical development (usage and application of more efficient technologies which are less harmless for environment), lower dependence of energy import, positive financial impacts, improved social situation (new work places, equal distribution of incomes etc)

Beside mention above, from this technology economical benefits might be accomplished, because projects like these can be chosen for implementation of Clean Development Mechanisms (CDM). From reduced carbon units by CDM projects country can make profit. In Macedonia big differences in proportion between economical development and GHG emission, brought out the requirement of potential CDM projects. With investment of 1 $, lot of reduced carbon units might be accomplished. From point of view of CDM and carbon markets, projects for utilization of landfill gas are very beneficial, because they are not capital-intensive with short period of implementation and they use granted and best available methodologies and technologies. In addition, implementation of project like this, would be beneficial for our public services, and for local workers, so they would be trained to work in modern installations, and to maintain the system. Finally we can make a conclusion that CDM projects are very important for social communities, and social conditions are improved. According to previous mentioned, projects for collection and combustion of landfill gases are in accordance with Macedonian efforts to accomplish Sustainable Development.

Public should be informed with trends of global reduced GHG emission by local CDM projects, so these projects could get public support.

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SUSTAINABLE DEVLOPMENT – application on local level, Municipality Surcin, Belgrade

Otovic Jefto

I Introduction

Over the last few decades the concept sustainable development has became accepted as a way of living in harmony with the environment. It is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Sustainability, 1987). Basically, sustainable development is a process of inside changes, when exploitation of resources, guiding investments, orientation of the technological development and institutional changes are in harmony with each other, enabling utilization of present and future potentials, for it can satisfy human needs and aspirations. This concept has been recognized as a key concept of the development policy in the European Union (EU) and United Nations (UN).

For reaching sustainability of the national development, strategic approach is a must, which is long-term and it integrates or unites different processes of development, for they can be as much sophisticated as the challenges of development are complex.

For achieving certain economical and social development alongside with preserving and protecting the environment, the local authorities in Serbia are willing to unite all their efforts in the direction of achieving development that is in harmony with the principles of sustainable development trough:

• developing participatory democracy,
• efficient and effective management,
• taking over responsibility for protection, preservation and securing equal approach to common natural resources,
• rational management of resources that secure sustainable production and consumption,
• creating favorable economic conditions and possibilities of employment in harmony with preservation of the environment,
• urban planning that rushes towards securing social, economic and ecological standards,
• promoting sustainable models of life, health and welfare of citizens, through involvement in all the processes in the community.

II Targets and directions of activities

Having in mind the significant role of the local authorities in securing sustainable development and at the same time facing the challenges of cooperation with all other levels of governance, the local government in Serbia is realizing their efforts in terms of sustainable development trough activities in the framework of their competencies and above all in the field of:

- Infrastucture,
- Spatial and urban planning,
- Economic development and employment,
- Social development,
- Protection of the environment,
- Decrease in poverty.

The local governments have significant role in implementation of the targets of sustainable development. Demands for energetic and better integrated approach in formulating the practical policies at local level trough harmonization of social, economic and ecological targets are aimed at the performance of the local authorities in Serbia.

At the same time, efforts in direction of improvements in living conditions at local level must not jeopardize the same conditions for people in other parts of the world or for future generations.

III Biomass, resource for production of bio-fuels

Biomass is an organic mater from animal or vegetable origin which trough different processes is turned into useful energy. The energy with plant origin represents -through the photosynthesis process – accumulated sun energy, that has transformed into chemical energy. During photosynthesis the plants utilize carbon dioxide from the air and water with the aim of producing carbohydrates, representing the basic constitutional elements of the biomass. This energy can be exploited in different ways.

On the other hand, basic source of biomass from animal origin is natural liquid manure. The utilization of biomass or fuel and waste materials attained from biomass as energy source requires their combustion, which releases heat that moves the generators for producing electricity. The energy accumulated in the biomass is chemical by nature, therefore with its exploitation there is not any interruption of the process, which can be observed at production of solar or wind energy. From this aspect, biomass has more characteristics of fossil fuels than of renewable energy source, with understandable reason, because fossil fuels are in fact the fossil form of biomass.

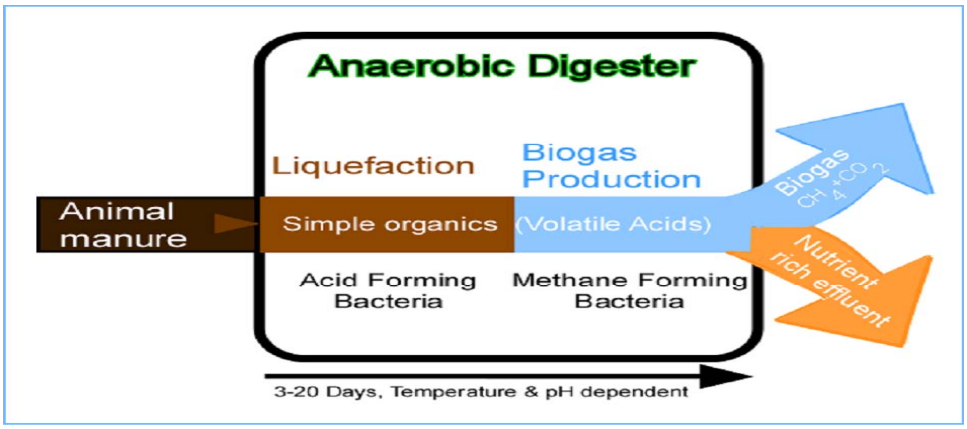
From a historical aspect, the biomass has been the basic energy source for mankind, mainly in the form of tree used for heating and preparing food, while in the industrial revolution the primary position has been taken over by fossil fuels.

Biomass can be used as food, fertilizer, for the production of paper and as fuel. Although many experts consider that the biomass can be cultivated exclusively for energy purposes, its two-sided or three-sided role can not be disregarded, including the role of secondary products of harvest. Conditions should be made in the agriculture sector, consequently the agriculture farms can utilize more and more

of their own leftovers of biomass for the production of energy, i.e. stimulating the establishment of greater number of energy independent farms.

Finally, there is a need for opening the question of change in the structure of the agriculture production in the process of adjusting to the conditions of the EU, that as well can be oriented at the production of fast growing plants, suitable for exploitation in the energy production processes.

Graph 1.Production process of biogas from animal manure

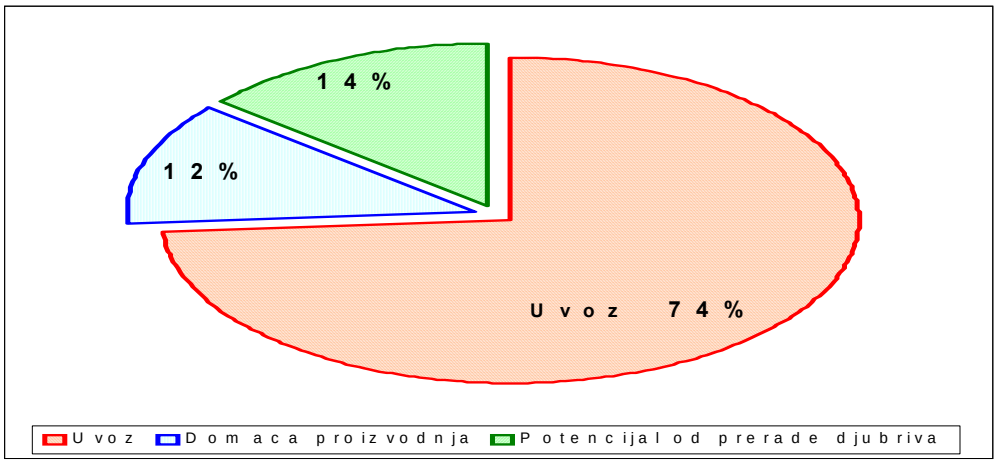


Biomass *which is utilized as a resource for biofuell production can be attained from different sources like in the following table::*

Agriculture leftovers	*Crops*	*Energy plants*	*Forest waste*	*Leftovers from industrial production:*
Straws	Beetroot	Oil rape	Tree leftovers	Food stuff
Leaves, fruit tree parts	Sugar cane	Potato	Wooden logs	Fodder
Liquid and solid manure	Corn, oat, rye	Soybean	Wild trees	Alcoholic and non-alcoholic beverages

For the production of bio-fuel mostly raw materials rich in ***starch*** and ***sugar*** are used (beet root is most favorable for the production of bio-diesel).

Graph 2. Structure of source consumption of gas in Serbia: *red-import; blue-household production; green- potential of fertilizer processing*



In Serbia, 74% of the total consumption of gas is imported and only 12% is household production. The possible potential biogas is only 14% which can be attained by fertilizer processing.

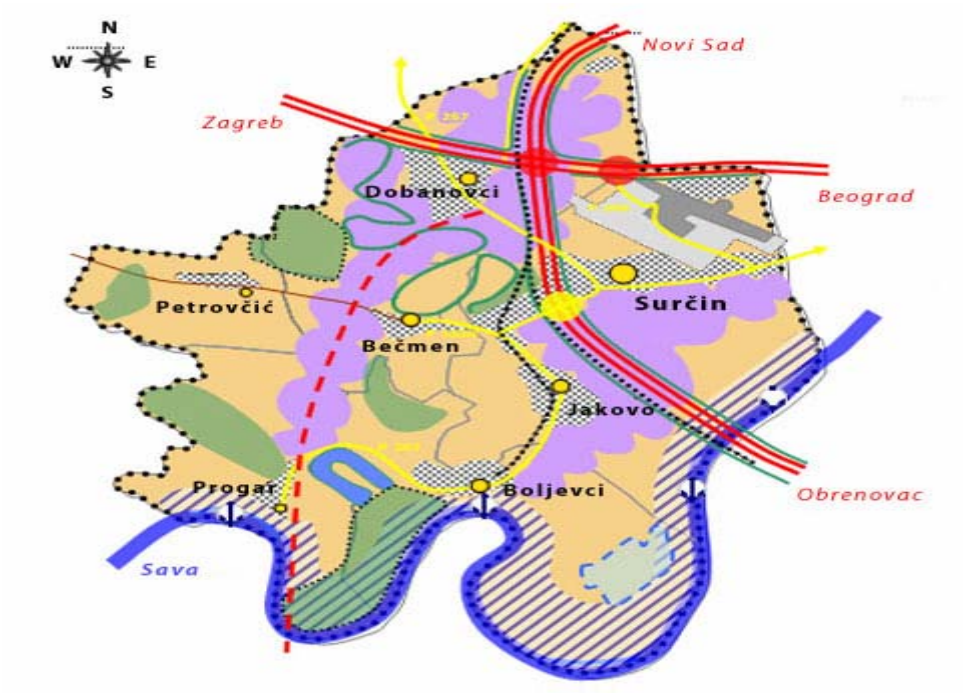
IV Resources, possibilities and potentials for bio-fuel production in the Municipality Surcin

The Municipality Surcin has an area of 350 km^2 and is inhabited by 55 000 people. The area of the municipality is intersected by the 30 km of Obrenovac and Zagreb highways. It has seven forests with total area of 3 200 km^2. The river Sava passes through the municipality in total length of 40 km. Building of several landing-places for nautical and mainland, rural and eco-tourism has been initiated. As well the airport
"Nikola Tesla" is in the vicinity of the municipality. There are 18 000 ha of arable land and 200 ha fish-ponds.

The municipality is ecologically clean. The nearby capital -Belgrade- of two million inhabitants, as well as the market and cultural centre is of immense significance to the municipality.

The city municipality Surcin is formed by the rural communities of:
Surčin, Prograr, Jakovo, Bečmen, Dobanovci, Boljevci and Petrovčić.

Graph 3. Location of Municipality Surcin.



Surcin is a district with large agriculture surfaces. In the structure of crop production the corn dominates with around 55 %, wheat with 32 % and rest of the planted crops is 13 % (soybeans, barley, oat).

Besides plant production which is dominated by farmers production, there is also a livestock production with six large farms for intensive (two farms are cattle producers, two are pig and piglets producers and two with poultry production).
Besides the large farms, significant number of household farms exists from incomes of the livestock production and crop production on smaller scale.

This concludes that Municipality Surcin has good possibilities and potential of resources for production of bio-fuels.

The production of bio-fuel features production of biogas, bio-ethanol and bio-diesel from renewable natural resources and above all from biomass.

The biogas has around 70% methane (CH_4), and the rest is carbon dioxide, carbon monoxide and nitrogen. This relative ratio of gases depends of the raw material and the processing procedure. The biogas has significant energy value of around 7 kWh/m^3 making it beneficial and a universal fuel far more cost-efficient than other fossil fuels.

Picture 1. Central refinery for finalization of the product-bio-fuel

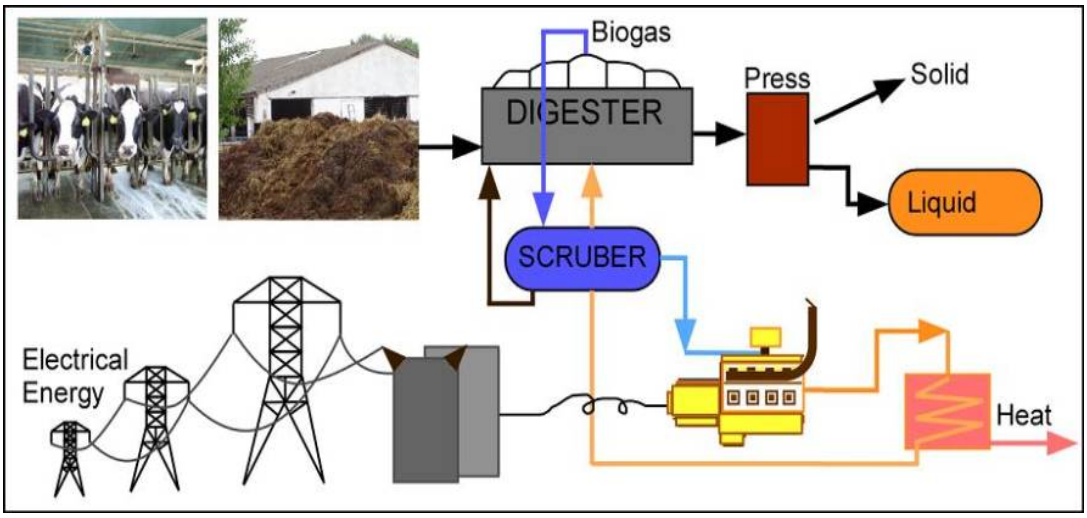
V Concept for future development of bio-fuel production in Serbia

The basic dilemma around which most discussions revolve is: Should wheat and cereals be used as raw materials in bio-fuel production?

It is by all means absurd to use fertile soil and wheat as raw materials for bio-fuel production, especially in times of great crisis and famine/food shortages from which many countries suffer.

Therefore, experts suggest that by-products are used instead, as well as middle-products such as waste created in agricultural production, or use instead less fertile soils with modest potential for bio-mass production. In addition, experts suggest using hybrids which would yield good result and good harvests on even marginal agricultural areas with low fertility and limited investments, as those are very limited agro-technical measures.

The most frequently used organic material for bio-gas production is farm manure. The primary advantages of bio-gas production from farm manure are: natural recycling, creating good-quality fertilizers for further use in agriculture and avoiding the unpleasant odours of the manure. Apart from the above primary advantages, bio-gas is also useful as a by-product used in other processes.



Graph 4. Illustration of the entire process of bio-gas production and its usage

The concept for future development of capacities for bio-fuel production provides for construction of one Central Refinery which would perform the final processing of raw bio-ethanol. This means that each rural household would perform their own primary processing of bio-mass and would produce raw bio-ethanol, which would be delivered in the central utility (Central Refinery) for final production of bio-fuel.

The main advantage of this concept is its cost-efficiency: no major investments are required from farmers because for the primary stages of bio-fuel production a cauldron used for making brandy (serb. *rakija*) would suffice, and this is an item most households already posses. An additional advantage is the creation of side-product *"dzibra"* during the process of bio-ethanol production, which can be used for feeding livestock, as fodder. Naturally, before all this can take place, the potential bio-ethanol producers need to be educated and trained in the specificities of this process, which would require establishing a service that would provide all the necessary information on time and perform monitoring and control.

This is an acceptable concept for Serbia and one that can be applied at the local level. However, the government and the Ministry of Agriculture need to provide necessary subsidies as well for the producers of bio-mass which would serve as a raw material in the production process and would further motivate the farmers to join this global concept and contribute to environment protection and sustainable development.

One potential measure that the Ministry of Agriculture and Ministry of Energy can jointly undertake is to offer the farmers certain amount of petrol/oil as a replacement for the oil rape, or else allow farmers to buy petrol at subsidized prices. These measures would contribute to the development of bio-fuel production, would stimulate the farmers to produce biomass necessary for bio-diesel production, and most importantly, would prevent inefficient use of subsidized fuels and their abuse, such as re-sale.

Larger farms or several smaller livestock farms could provide for themselves continuous supply with electricity through a small electrical plant consisting of motor ran in bio-gas and electro-generator.

Serbia presently uses only 1.5% of its potential for bio-fuel production. For a greater usage of its potential for bio-fuel production more decisive and more energetic activity of the government is necessary. The relevant ministries need to accept this concept as a priority for future regional and rural development.

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OVERVIEW OF GEOTHERMAL RESOURCE EVALUATION OF BANG-LE THUY-QUANG BINH

Nguyen Tien Hung

Introduction

Vietnam is the country in the Asian Southeast region, has been seen the market economy since Vietnamese Government implements it' policy to open. In general, Vietnam likes many countries all the world, has been experienced a shortage of energy in recent years. Many renewable resources such as hydro plant, solar, wind, wave, biomass and geothermal etc., have been planned to develop in the coming 10 years economic development plan. Geothermal resource of Bang in Quang Binh has been seen the potential geothermal resource to develop the pilot binary cycle geothermal power plant in Central Part of Vietnam. Many investors have carefully considered if they should invest into the pilot binary cycle geothermal plant in the Central province or not, because Vietnam has not got any renewable energy laws. Germany experts advise this geothermal resource should be directly used by installing the pipe line from Bang to the coastal Sun Spar Resort of Dong Hoi city. View of geothermal water direct use has been strongly supported because it has been used for bathing, tourism, canning rightly in Quang Binh.

Geothermal resource of Bang

Bang geothermal resource is rightly located in Kim Thuy commune, Le Thuy district, Quang Binh province. In 1977 – 1980, Survey Institute of Water Resource Design of Water Resource Ministry investigated the hydrogeology, geology- engineering characteristics of this geothermal resource in detail. Institute drilled to reach up the depth 50m and measured the temperature and the water flow of borehole. In 1995 – 1998, Research Institute of Geology and Mineral Resources of Ministry of Resources and Environment implemented the project to do survey Bang geothermal resource and calculated the temperature of host reservoir by geothermometry method. In 2006, geothermal experts of J-Power of Japan and Research Institute of Geology and Mineral Resources of Vietnam did survey and reported to show up Vietnamese Government.
Bang geothermal resource is occurred in many points to run along the stream valley on the left of Kien Giang river. The valley widens about 100 m and runs 2km.

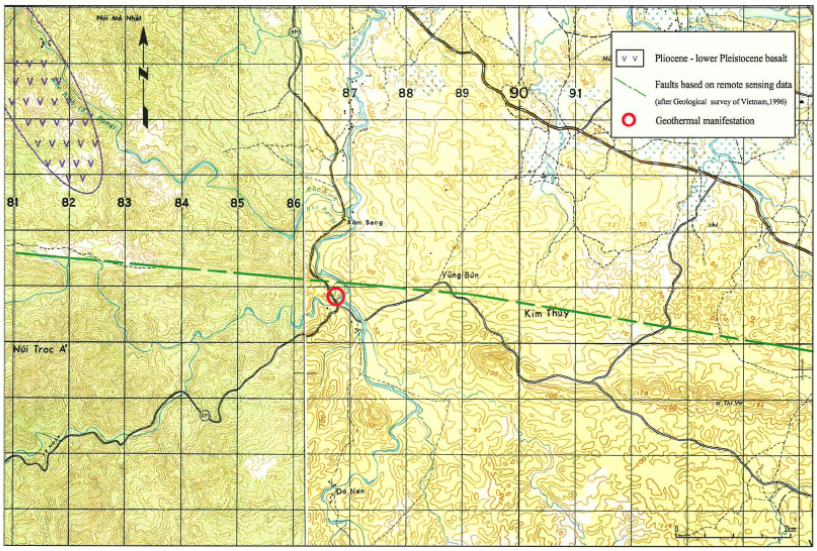

Figure1: Red circle is the location of Bang geothermal resource, will be intended to explore (according to data of J-Power).

Geological characteristics

Stratigraphy:

Upper Ordovician- under Silurian formation (O_3-S_1*la*): includes sandstone, siltstone, clay stone and shale imbedded each other, some time interbedded in the old extrusive. The formation accounts for more than 90 % area of Bang geothermal resource around.

Quaternary formation (Q): includes the density massive, dark- brown colored basalt strongly sheared to distribute in the Northwest direction of Bang geothermal resource, far from the resource mentioned above about 6 – 10 km. Some geothermal experts confirm the resource can be related to the young basalt.

Deluvial mixed soil (el Q_{III-IV}) is distributed on the hill escarpment to thicken up 1-3m

Alluvial (a Q_{IV}) includes of sand, grit and pebble distributed along the stream terraces and the valley.

Fault system: On the area of Bang geothermal resource to exist two faults developed according to North West – East south and North south direction.

North West – East south fault is developed to cut across the hot water occurred area of Bang geothermal resource to form the quartz breccias containing sheared zone widened up 15m to run along the valley. This fault has been seen the geothermal resource related one of Bang.

North south fault is seen the minority one to cut across the Bang area to create the favor condition of the development geothermal resource.

Geothermal manifestation of Bang geothermal resource.

The geothermal water – containing zone in the sheared zone is distributed along the stream valley to lengthen 250 m to form three small areas with many silica and travertine dunes. The dunes have diameters about 1-1, 5 m.

The first area: The hot water that is occurred in many continuously linked points distributed equally in the area 350 m^2.

The second area that is near the firs area has 17 hot water points occurred in the stream bed in the area 300m^2.

The third area has only the hot water occurrence point. The hot water is strongly discharged and has the higher temperature than other areas.

The hot water and gas have H_2S sulfur gas, neutral pH. Total minerals degree gains 530mg/l, has been listed Na-HCO3.Total flow of hot water is measured about 50l/s. There is the borehole to reach up the depth 24 m. The temperature in the borehole is measured to reach up 105^oC.

Photo 1: The geothermal water exploitation borehole location of Quang binh Coservo Company.

Photo 2: The location of geothermal water and gas discharge in the breccias zone in the stream line.

Geochemical characteristics of Bang geothermal resource

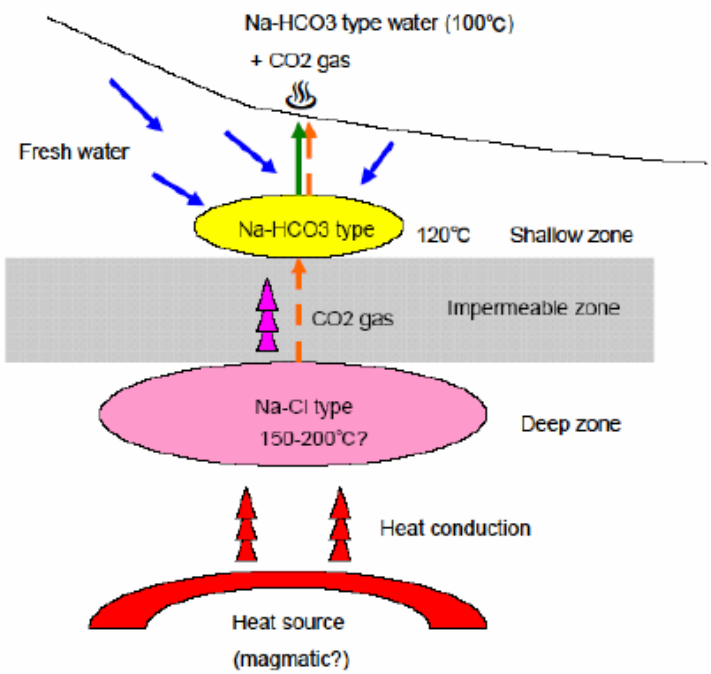

Figure 2: The geochemical modeling of Bang geothermal resource (according to data of J-Power).

Hot water of Bang geothermal resource that has low total mineral degree to be mixed with ground water and surface water. In chemical composition of hot water that includes Na content 157mg/l to account for 90% e. Content K accounts for 4% e, content Ca^{2+} to change about 2%. HCO_3 has tmd 405g/l to account for 83% e. Content Cl^- and SO_4^{2-} is very small only to account for 10% e. Content Li has highly relative (0,02 mg/l). Content B is 0,15mg/l. Based on the hot water analyzed results to show up the estimation of Bang geothermal reservoir at two different levels; the depth from 200 m to 300m to

has temperature about 120 – 130°C including Na- HCO3 mainly. The under part of geothermal reservoir (the more depth level) has the depth from 450 to 700m, to be estimated to has temperature from 138,1 to 214,0 (based on geothermometry of Quartz and Fournier & Potter 1982, Na-K-Ca of Fournier & Potter 1979). The under part of geothermal reservoir has been seen the objective to develop the pilot geothermal plant of Vietnam in Central Part.

Table 1: Calculation table of three elements Cl- SO_4 – HCO_3

No	Location name	K- Na-Mg			Cl-SO_4 – HCO_3		
		Mg (%)	Na/1000 (%)	K/100 (%)	HCO_3 (%)	Cl (%)	SO_4 %
1	Bang	71,65	16,26	12,09	93,54	1,95	4,50

Primary potential estimation.

Estimation method.

There are many calculation methods applied to the exploration stages of geothermal resources raised up in order to estimate the geothermal resource energy reserve of Bang in Le Thuy- Quang Binh. We have used the estimation method of geothermal energy reserve for Bang geothermal resource that has been used by US (UGS, 1979).

The calculation elements for the reservoir mass, area, thickness, permeable degree of Long Dai formation, temperature have been shown up. Every calculated element has been calculated in minimum, in average, in maximum based on the survey data, the exploration data in the past and modeling of the geothermal resource.

Potential calculation.

The calculation methods include:

- The reservoir temperature: It has been calculated based on the geothermometry: Minimum: 138, 1 ^{o} C; Maximum: 214,0 ^{o} C.
- The reservoir area: There is no any sounding data of geophysics measured in the geothermal resource. There are some boreholes drilled in Bang but their borehole depth from 40 m to 55m. The purpose of boreholes to collect the geothermal water for COSERVO Mineral Water Company. The data mentioned above can not be used to calculate the reservoir area. The reservoir area of Bang has been calculated based on the geology data, the geological structure data, the topography data and the compared geothermal manifestation in all Vietnam.

Minimum: (70m x 50m x 600m) 1/3 + (30 x 10 x 600m) 1/3 = 0,76km^2.
In average: (70m x 50m x 600m) 1/2 + (30 x 10 x 600m) 1/2 = 1,14km^2.
Maximum: (70m x 50m x 60m) + (0 x10 x 600m) = 2,28km^2.

- The reservoir thickness: The thickness is the important parameter to estimate the geothermal resource. There is no the depth drill data in this area, the reservoir thickness has been calculated based on the geological data, the structure geology data and the compared data of some geothermal resources in Vietnam. Minimum: 600m, Maximum: 800m.
- The rock porosity: The rock porous value is generally used: Minimum: 3%, Maximum 7%.
- The recover factor: United State Geological Survey (USGS, 1979) has used the recover index to estimate the circulation system reserve of geothermal resource: 0, 25. Minimum: 10%, Maximum: 25%.
- Specific Heat of Matrix and Density of Rock Matrix. Both values are used based on representative values: 0,972 kj / kg ^{o} C and 2500 kg/ m^3.
- Rejection temperature: It is used based on the average annual ambient temperature (25°C).

- Utilization factor: about 0,4 for the binary cycle modern geothermal power generation system is used from USGS (1979)
- Plant Capacity Factor: 0,9 are used for the typically modern geothermal power plant all the world.
- Plant Power Life: 25 years are used in the general standard

From the mentioned calculation above, we can invest to build the pilot binary cycle geothermal power plant in Le Thuy – Quang Binh with minimum capacity: 4,129 MW (90% probable), maximum capacity: 13,678 MW (50% probable). The calculated results have been raised up as the same as the J-Power calculated results in 2006.

Conclusion and recommendations

Conclusion.

Bang geothermal resource is closely related to structural features like faults and fractures that they cut across Long Dai formation.

The Quarternary basalt rock mass on the NW direction is seen too old to heat the geothermal resource.

The geothermal manifest ions in Bang like hot grounds, sinter mounds, sulphur gas and some alternated zones have shown up that this geothermal resource temperature is not so high and is only suitable with the small binary cycle geothermal power plant.

The primary calculated results has shown up that this geothermal resource needs to explore in detail by deep drill boreholes to decide the reservoir volume, the temperature, the pressure and the discharge.

Recommendation.

Before drilling the detailed exploration wells in the Bang area needs to measure the geophysics sounding to decide the reservoir.

Based on the geophysics data to decide the exploration drill wells how to cut across the reservoirs. The faults in the Bang area have been estimated to cut across the reservoir in subsurface. The exploration drill wells needs to drill rightly on the faults.

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THE NEED TO IMPROVE ENERGY EFFICIENCY AT THE LOCAL LEVEL IN SOUTH EASTERN EUROPE

Maxence Boutet

INTRODUCTION

Energy issues are becoming over the years more and more constructive part of the international relations. Providing energy security is dominant in the states' policies. Political discourses are always claiming the importance of sustainable development but still few real initiatives are undertaken. The European Union (EU) is conditioning its aid to developing countries with environmental questions, so it is interesting to observe the behaviour of developing countries to fulfil these requirements. The situation in Balkans' countries, hoping to join the EU in a near future, is very relevant because they have to develop quite fast in a context imposing restrictions on production processes with high level of pollution. Balkans countries having the highest energy intensity in Europe, so one wonders what are the concrete measures taken to improve energy efficiency? If there are any, at which level would it be worth to act? We will see that transferring the decision power to local municipalities regarding Energy Efficiency (EE) could be far more reliable than the actions undertaken by the states of the region. Furthermore, the gap between talks and their application is always huge but we will try to evoke some recent working initiatives, including funding facilities, and their limits in the Balkan's context.

The general context

We must be aware of the serious threats over mankind if emerging economies follow the industrialization path adopted by developed economies. According to the forecasts of the International Agency of Energy (IAE), the final consumption of primary energy would reach 50 billions of tonnes equivalent to oil (TOE) to 2030[7]. This equals five times the actual consumption. This is not only unsustainable but it is simply impossible to reach, in terms of resources, economic costs or environmental damages because we would need five planets Earth and eight times more resources to feed around ten billions people.

IAE claims that in 2030, 80% of the energy needs will still be covered by oil, gas and coal. Indeed, the dependence on oil would increase because of the weight of transports in final energy consumption, 33% of the consumption in comparison with 29% today.
Apart of the environmental damages' aspects, the following of this consumption model is not leading to development and tends to increase the gap between developed and developing countries: the poorest countries are the ones to suffer the most of the rising of energy prices. Furthermore, it is in the poorest countries that available energy is used in the less efficient manner, and the little of commercial energy they can use at a high price is consumed by low yield equipments and the loss of energy is very important.

Energy is linked to development and the provision of an accessible, high performance and economically competitive energy is essential for the growth of developing countries. Since several years, the international community is aware that this energy must also be sustainable and the international development aid is conditioned with sustainable development aims. This can be considered by the developing countries like a kind of protectionism from the developed countries fearing of losing influence in the global economy, but it is not only because of that : the gains in energy efficiency can be greater in transition economies.

[7]" World Energy Outlook 2007", International Agency for Energy

Balkan Context

In that perspective, it is interesting to observe what can be done in the Balkans, the region in Europe where the energy intensity is the highest, it means where the price of converting energy into Gross Domestic Product (GDP) is the highest. So, there is really the need to improve the energy efficiency in the Balkans and this can be achieved because it can be applied to all sectors of activity in all countries.

Every country of the region integrated energy efficiency aims in their energy policies but nonetheless in reality the preoccupation is short-sighted and the priority is given to unsustainable fossil fuel projects such as pipelines or to nuclear, whereas Balkan countries have high potential for developing energy production from renewable energy sources: sun, water, wind, biomass, and geothermal energy. But this would need a long time framework and strong political will: even in western countries where there is the know-how for the implementation of energy efficiency measures and the technical knowledge to develop renewable energy, still a few initiatives are taken, so why should it be expected that transition countries have to develop in a sober and efficient way? One of the possible answers would be to change the paradigm regarding the energy approach: the dominant manner of considering energy issues is to take only in consideration the supply of energy but it is proved that it would lead to a dead lock if nothing changes on the demand side. A new approach would consist in considering the energetic system including the energy sector (supply), the consumption (demand) and to insure its development to obtain the system with optimal conditions for resources, economic and social costs, and also damages on environment[8].

The control of the consumption is also very important like for example with insulation of buildings, efficient lightning, etc. The most important change in this theory is the end of the hegemony by energy companies, which control production, transport and distribution of energy. They imposed to users only a passive role by only paying the bills. In this new system, every stakeholder (energy producers, architects, mayors, NGO's) should be involved in the definition of a strategy regarding energy. The states have to become the regulator and not only decision-maker. This has to be the re-appropriation of the energy question by citizens: there is a need for change of the behaviours for consumers but also of the political representative, national and local, urbanism and management of the territory are important for the control of the demand. And this is really achievable in a decentralization process, with greater power given to municipalities in the decision making process, like it is the case in the Balkan countries.

Balkan countries are to increase their energy consumption for their growth and the comfort of the population but they can and must do it in a sober and efficient way. Indeed, pursuing the path adopted by western countries would lead to growing insecurity of supply and an increase of greenhouse gas emissions. This is problematic because climate change or other environmental hazards and security of supply will for sure become huge obstacles for peace and development if energy consumption follows such an impossible path[9].

Reliable analyses[10] show that the consumption can be reduced by 20 or 30% for an equal or better service in South Eastern Europe (SEE) and the potential is even higher especially in the former Soviet space. The implementation of the policies in developing countries in the next decade will be decisive. Balkans countries will have high growth and several elements are going in the sense of the control of energy: low resources in hydrocarbons and the increasing price of oil, high potential in new infrastructures (housing, transport), development of renewable energies is the most promising way

[8] French Development Agency (AFD), "Prospective and world energetic stakes", January 2008.
[9] Idem
[10] European Commission, " Green-book on energy efficiency", 2005.

because it would be a mix between the know-how of developed countries and the opportunity to or real capacity of inventing a new energy model, which will be an advantage in the future.

Considering the state as the main actor?

A regional cooperation on issues pertaining to energy between the European states is supposed to emerge since the launch of the Athens process resulting into the energy community treaty in 2005. The Energy Community (EC) treaty[11] is supposed to be a key of the EU policy in SEE and it is aiming for a liberalization of the energy market, a reliable supply, a reduction of the costs of energy products and to energy efficiency in order to integrate progressively the SEE energy markets to the EU one. In that scope, every politician claims the importance and the need of energy efficiency strategies but in reality, not a lot is done on a state level and there is no concrete ambition to create a regional energy market by harmonizing the prices of energy for instance. Furthermore, the situation between the countries is very heterogeneous:

At the national level, the power sector in Bosnia-Herzegovina is very fragmented and there are three different energy companies acting as monopolistic in their exclusive ethnically based service territory. In Albania and Macedonia, the authority in charge of energy is a small department within the Ministry of Economy whereas Serbia has a Ministry for Mining and Energy. In Slovenia, the ministry of environment and spatial planning is supporting NGO's and companies dealing with rising awareness for energy efficiency by renewable energy sources. The creation of national energy agencies, which are small structures, is not sufficient because there is an evident lack of funding and lack of capacities to drive entire and efficient energy policies[12].

In theory, the EU policy towards Balkans is supposed to enhance the regional cooperation and EU is also fixing the framework for the candidate countries. On the other hand, countries have their own preoccupation and they have to find a balance between regional cooperation and a future adhesion to EU. It turns out that it can be difficult in a tensed regional context with unsolved issues like the recognition of Kosovo or the name of the Republic of Macedonia. The regional context is also characterized by disparities in the funding: in Bulgaria, Romania and Slovenia several initiatives have been implemented thanks to EU funds, so even if the other countries of the region had real intentions of improving energy efficiency, they would clearly lack of funds. That is really a pity because regional cooperation in energy could lead to a stronger overall regional cooperation and so initiated the European integration with the European community for coal and steel. Nevertheless, it is less political but some cooperation already exists among states for environmental issues, like between Albania, Macedonia and Greece for the promotion of ecotourism in the Galicia Park Ohrid - Prespa[13].

This fragmentation of the space regarding energy is really damageable, especially at a time when Balkans is considered as a very strategic transit hub for the transit of oil and gas from the Caspian region into Western Europe. This would be ideal, but the countries of the region should really unify their energy policies so as to be able to negotiate as a bloc and in a strong position with EU for the Nabucco project and with Russia for the South-stream project in order to make profit of its geographical situation. The lack of a real regional cooperation in energy is leading to small bilateral initiatives like the wish of the Albanian minister of economy, Genc Ruli, to create a common Albanian-Kosovar energy system for seven

[11] The contracting parties are : UE 27, Croatia, Serbia, Montenegro, Macedonia, Bosnia-Herzegovina, Albania and Kosovo. Norway, Ukraine, Moldova, Turkey and Georgia have the status of observers.
[12] Better Integration for Sustainable Energy (BISE), see the reports on each country
[13] See the Alliance for Lake Cooperation in Ohrid and Prespa (ALLCOOP)

million people[14]. For sure, the two countries would gain from the unification of their market but this project is not to be realizable in a near future because of the lack of common legislation between them, for example on tax policies.

Lastly, even if most of the states of the region can be considered as weak and the energy markets are supposed to be liberalized, states play a very important role by indirectly subsidizing energy pricing in order to keep them artificially low. Of course, it is better for the consumers but it creates markets distortions and it is contradictory in term of energy efficiency thinking because there is no need for awareness to save energy when it is cheap. For instance, in Macedonia, if the market was properly liberalized, it should be up to the Austrian company EVN[15] to cover the entire electricity needs. But in 2008, the Macedonian state will import electricity, in complement from EVN, for an amount of 800 thousand euros in order to keep the price low. It is obvious that this amount could be spent in more helpful projects.

For all these reasons, it is more relevant to consider the municipalities to be the most able actor to improve energy efficiency in the Balkans. First, for a very simple reason, which is the funding of the projects: municipalities are more restricted by money and it is very important that they become aware of the advantages of the implementation of small scale energy efficiency projects. For instance, only a quarter of Macedonian municipalities are aware that being efficient with energy would contribute to lower their budget.

Improving energy efficiency at the local level

Energy efficiency projects can bring greater benefit to local communities and small businesses. They are much more labor - intensive, they can create new services in the local economy and increase employment, while decreasing inefficiency and dependency on costly resources from import. Moreover, energy efficiency leads to improved industrial environmental performance by changing industrial processes and reduced pollution from energy generation by decreased energy consumption with positive social and health impacts.

Within the decentralization process, municipalities can become energy consumer, supplier, regulator and motivator. Thus means that the strategy of municipality has impact on the public and on the private sector. It is far much easier for any company to collaborate at a local level in order to improve the industrial process. For example, in Germany, municipalities are working with companies to re-use 80% of the waste created during the production process. The city of Martigny in Switzerland manages all of the nets (electricity, gas, heating, water supply and purification, tv-networks) as a unique network to optimize their use so that any action concerns the entire network.

It is also much easier to decide at a local level whether (re)constructions should be energy efficient, which is a very important stake in Serbia which lost a lot of its industrial capacities after the NATO bombing campaign from 1999. But this still raises the problem of awareness or education on energy efficiency. In Macedonia, there is a very dynamic building sector, but none of the new buildings are built without taking account energy saving manners. Even lots of Macedonian engineers think that “changing a window is sufficient to improve insulation of housing.”

[14] Le Courrier des Balkans, extract from Revista Mapo, “Kosovo: an underground worthing gold?”, March 2008.
[15] EVN Makedonia AD is an electricity supplier and distributor in Macedonia. It belongs at 10% to the Macedonian state and at 90% to the Austrian Company EVN.

That leads us to an very important topic which is the transfer of technologies because the implementation of energy efficiency measures and the development of renewable energy sources corresponds to a long-term objectives and it is quite obvious that Balkan countries will be unable to handle the entire technical, financial and operational burden on their own. The experience of developed countries could be effectively transferred gradually and they must offer a long term help by extending financial and technical support to local authorities else the three "20%" from the European Commission will be for sure unreachable.

Even if the amount of actions for a better use of energy is still limited in Western Europe, there is the technical knowledge or organizational tool to improve efficiency in housing and services, which represented 57% of the final electricity consumption in 2006 in comparison with 42% for industry. In Germany, energy partnerships in building are an efficient model for contracting for energy savings with performance to attain. The French cities of Besançon and Clermont-Ferrand after energy audits reduced by 40% the energy consumption in public buildings with better insulation procedures. Frankfurt am Main[16] succeeded to decrease by 30% the primary energy consumption with small scale combined heat and power (CHP). The common point between these cities is that they acted with defined territorial energy planning or with municipal energy plans, which integrate energy efficiency issues into every municipal project. For sure, these cities did not become model in one day, there are a lot of long steps to overcome but their experience and the transfer of technologies could help Balkans municipalities not to skip the steps, but maybe to enhance the rhythm of the transformation of building or production processes.

Actually, a few initiatives going in that sense already exist with the support of the French environment and energy management agency (ADEME) or the network "energies-cites" with programs such as RUSE (Redirecting Urban areas development towards Sustainable Energy) or the BISE forum (Better Integration for Sustainable Energy) on intelligent energy in municipalities of the new member states and the candidate countries.

It is obvious but it is far much easier to promote networks at a local level because there are less political stakes. Networks can be promoted either by the European Commission like the Black Sea Regional Energy Centre trying to encourage energy co-operation, or either by localities on their own like the Union of Bulgarian Black Sea Local Authorities, which aim to assist and promote cooperation with other European partners and support the establishment of joint ventures and transfer of technology. By benchmarking policies, Slovenia is also benefiting from the neighborhood with Austrian municipalities which developed successful renewable energy sources projects.

Even if there are several initiatives undertaken to develop networks in Balkans, they consist mostly in exchanging information or sharing experiences on topics such as the development of capacities in managing the use of energy resources, sustainable development of municipality energy sector or increasing the quality of public services. It is a good start and these initiatives are not to blame but concretely they have no influence on the field even municipalities have the will to improve energy efficiency. This is differing throughout countries for several reasons:

-In general, even if governments elaborate legislation concerning energy efficiency, most of the time the legislation is incomplete;

[16] See the ADEME / Energie - Cités reports on each city

-Competent authorities, energy states agencies or municipalities, do not have sufficient people and qualified people to work on energy issues. This subject is partially covered by NGO's activities, like for instance the Macedonian Centre for Energy Efficiency (MACEF) but they are not receiving any support from the state;

-The state inability to promote energy efficiency also hinders the capacities of municipalities even in a decentralization process: energy saving measures are like any development policy, they have to be include in the broad and general development policy elaborated by the country to be efficient. There can be investment at a municipal level, with a proactive behavior like the Macedonian city of Kocani, has with a program for the energy rationalization of the geothermal system, but municipalities still have obligations toward the state and if the state doesn't have a clear and long term development policy, the actions undertaken by municipalities won't be as efficient as they should be. For instance, in 2007, the Macedonian government claimed the importance of energy efficiency but a concrete measure it wished to implement was subsidizing the installation of 500 solar panels at an individual level but limiting the amount of solar panels is contradictory to a long term development vision. Municipalities will take initiatives only if they feel that their action will be useful and in the scope of the government development policy on a long time scale, but energy efficiency programs are not well implemented because of short times election frameworks in sight.

This has to change, because municipalities have to profit from decentralization to impose a bottom-up approach to help the change the mentalities so that many innovative initiatives, with an opening for new technologies and pilot projects, could be confronted. We must have in mind that the two oil shocks from 1973 and 1979 contributed to create new behavior thanks to elaborated policies including research and development for better industrial process, regulations on energy consumption (obligation of energy audits for high consumers for example), creation of ruling institutions. This is also the case now at a moment when the price of the oil barrel is reaching 130 US dollars. The EU commission considers that the technical potential on final energy consumption can be reduced by 40% and that the economic potential is about 20%[17]. It means there is a high potential in educating children to energy efficiency like donors' program try to do in Balkans (World Bank, USAID, EBDR) but it is for sure worth on a long time scale because the awareness for environmental issues is reduced in Balkans countries to technical workers, except in Slovenia and Croatia.

How to finance EE projects?

Until now, the dominating supporting measures to finance EE projects in Romania, Bulgaria and Slovenia are the structural funds from the EU. Nevertheless, other financing possibilities exits in member and non member states: in Slovenia, municipalities are subsidized for measures in EE[18]. In Croatia, the funds for energy efficiency and international donors (UNDP, IBDR) are playing an important role. The main sources of funding in Macedonia is the ministry of ecology, USAID and EBRD but sometimes the money dedicated to EE can't be used because there is no functioning agency to really manage the money. In Bulgaria, the Energy Efficiency Fund is a revolving mechanism for financing commercially viable EE projects, the fund having an initial capitalization of 10 million Euros.

[17] European Commission, "Green-book on energy efficiency", 2005.
[18] BISE reports

Governments should also develop better schemes to help small municipalities to support financially their projects because banks are not ready to give loans for EE projects. **This is why municipalities have to be innovative in finding ways of financing.**

Municipalities can choose either on the supply side for the improvement of the energy efficiency by using new technologies or either on the demand side and obtain gains with a short payback period like the refurbishment of housings or energy efficient modernization of the street lightning system. For example, the Bulgarian city of Varna issued municipal bonds to modernize the street lightning system, the bonds have been proposed to 50 potential investors and they have been sold in one day with a payback period from 2 years and 9 months[19]. Usually, municipalities in Balkans are limited in financing, so they must take into consideration innovative methods for investment such as leasing, the resort to an Energy Service Company (ESCO) or to Public Private Partnership (PPP). Of course, the impetus for such local investments should be in the frame of the national legislation or could be urged by related incentives. The ESCO market is really at a development stage in Macedonia, there are only two companies (Fonco and Esco) but cooperation exists with Croatia and Slovenia to improve the market. It is fine in theory but in reality, it will very hard to develop an efficient ESCO market in Macedonia because of the state of the banking system, banks are only interested in very short term profit : the new fast growing housings have to be profitable within less than three years else the bank can appropriates itself the building. These buildings are only built for a quick sell, so that also explains the fact that there is no take into account of energy efficiency. Macedonia is in a bad position in comparison with Bulgaria or Croatia where more money is in circulation, banks, even with short payback period aims, can more allow themselves to make this kind of cooperation with municipalities and ESCO's.

An other innovative way to finance EE projects could be the use of remittances from diasporas. Emigrants could get inspired by the situation in the countries they are living in and decide to finance small projects in their villages.

It is really at a municipal level that there is the need of a change of mentalities in the definition of the policies and they are the only ones to force the landlords of new buildings to make construct the new housings with energy savings devices. Indeed, at an individual level, people are limited with money so they use the minimum they can use. We already mentioned that the influence of government's state was limited and in the facts energy efficiency programs are only done with financial supports of international donors with the help of NGO's for their implementation and that is definitely a procedure that municipalities should need to be more aware of.

Municipalities should not forget that they play at one and the same time the role of consumer, producer and advisor in energy issues, that make all implemented actions important. This is truer in Balkans where certain defiance exist between states, which hinders cooperation and also defiance from citizen toward their states' initiatives. We have seen that the conditions for better local energy markets and services are not so close to reach a critical mass but it is very important that municipalities understand that they have to play the game of the decentralization process, which is kind of imposed by EU, to become the leading actors in energy efficiency projects.

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[19] Intelligent Energy Europe, "New forms of financing municipal sustainable energy projects"

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