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Editor's Note

After two successful editions of ANALYTICAL in 2008, Analytica is happy to announce the second volume of our E-Journal. Continuing with the good practice of targeting important and ongoing issues, the third edition of ANALYTICAL is dedicated to Climate Change and Energy.

Since 2008 Analytica is active in the field of Energy, conducting policy analysis on prompting energy issues in Macedonia and the region of Southeast Europe. As a consequence of the growing importance of issues in connection to energy and climate change in the world, in March 2009 Analytica organized its First Graduate Student Workshop on the topic of "Energy and Climate Change – Southeast Europe in focus". Our aim with this event was to show that in the time of global concern over the issues of climate change, energy security and environment protection, Macedonia and the SEE region are not lagging behind. The participants at the workshop were lecturers, PhD candidates and post-graduate students from Macedonia, Poland, Czech Republic and Austria, giving presentations on the topics of Climate Change Mitigation, Renewable Energy Technologies, Energy Efficiency and Regional Cooperation. In this edition of ANALYTICAL we are publishing part of the papers presented at the workshop. The papers treat the issue of Energy and Climate change from different aspects, both from the social and from the natural sciences.

Josefine Kuhlmann in her paper looks at the legal status of the Treaty for establishing the Energy Community of Southeast Europe. She compares the provisions of the Treaty to similar issues found in relations between the EU and the EFTA within the EEA, aiming to assess how the Energy Community could develop within the EU's external relations regime. The Treaty for establishing the Energy Community in Southeast Europe is the main topic in the paper of **Piotr Bogdanowicz**, analysing whether the notion of "energy security" is condemned to be only a carrier notion in political discussions and empty words in legal texts, or whether it truly deserves to be one of the pillars of energy policy in the European Union, by referring to the Treaty establishing the Energy Community. **Kadire Murati** and **Lulzime Pajaziti** write about the use of clean technologies, commercially available, for achieving more success in reducing the greenhouse gases emissions and local air pollution. In their study they refer to the energy efficiency in public institutions, taking as case study of one university and one primary school. **Maja Barisic** writes about the obstacles in public participation in energy decision-making in Southeast Europe. In her paper she gives a comparative overview of obstacles to public participation in three energy projects in three states of Southeast Europe, namely Bulgaria, Croatia and Bosnia and Herzegovina. **Andrea Naumoski** brings an entirely different perspective to the climate change. Coming from the field of natural sciences he focuses on the machine learning techniques into ecology that have proven to be useful into obtaining knowledge for certain problems. In his paper, by using a dataset collected from different measurement stations placed in Lake Prespa, he explains the application of machine learning in ecological modeling, more specifically, applications of modeling diversity indices. **Jakub Maščuch** and **Edmond Zeneli** concentrate on the energy outlook of the Czech Republic - domestic energy sources, imported sources, energy safety and future of nuclear energy, which represents important section in electricity production - and the policy choices for reducing of the GHG emission and the environmental pollution in the country.

Besides the papers presented at the workshop, in this issue we are publishing the paper of our external associate **Ljubica Dzabirova** who is targeting the topic of the risks and challenges in the process of implementation of the EU Climate package. In her paper she discusses the reactions towards the new EU package of measures, the new challenges and the possible scenarios in the process of its implementation.

In our Interns' Section we publish the research conducted by **Sonja Risteska**, Analytica's intern during Spring 2009, who looks into the development of the energy market in the Western Balkans. She wants to answer the question of how to sustain market growth when the world biggest economies are going into a crisis.

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.

THE ENERGY COMMUNITY OF SOUTH EAST EUROPE HAS ANOTHER EEA BEEN BORN?

Josefine Kuhlmann

1. INTRODUCTION

In June 2002 the South East Europe Electricity Regulation Forum (SEEERF) agreed on 'the creation of a competitive regional electricity market in South Eastern Europe (SEE) based on the rules currently in force and being developed in the European Union and integrated within the European Union's Internal Electricity Market'[1]. Another four years later, on 1 July 2006, the Treaty establishing the Energy Community (TEnC or 'the Treaty')[2] entered into force. It outreaches the SEEERF's intention by creating an integrated market in electricity *and* natural gas in SEE. Time and again the Energy Community has been compared to the European Coal and Steal Community because of their alleged similar historical importance in uniting countries that used to wage war against each other.

As the most important step the SEE parties to the Energy Community[3] are implementing relevant legal acts of the *acquis communautaire* as defined in the Treaty. Furthermore, a single mechanism for the operation of network energy markets and a single energy market within the SEE region shall be established. Questions remain about how to extend the EU's internal market or parts of it. The issues connected to this expansion appear somewhat similar to those identified in relation between the EU and the European Free Trade Association (EFTA) countries associated in the European Economic Area (EEA). Whereas the EEA Agreement[4] and relevant literature provide ample information about how to deal with issues such as effective remedies, the adaptation of European Community (EC or 'Community') legal acts, the role of the European Court of Justice (ECJ) and its interpretation monopoly, the Energy Community, more than two years after its establishment, has attracted little academic attention despite many open legal questions that have to be examined.

Another similarity of the two organisations, are their implications for the EU's neighbourhood policy. During the first years of the EEA opinions were legion presenting the EEA concept as a replacement for full EU membership not only for the EFTA states but also for the now new EU member states.[5] With the EU currently at odds with the Lisbon Treaty ratification and searching for new forms of association with its neighbouring countries the Energy Community has to be considered as

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[1] Item 1 of European Commission DG for Energy and Transport, *Conclusions of the First South East Europe Electricity Regulation Forum (SEEERF)*, (TREN/C2/CA D(2002) 10787, 28 June 2002). The participants of this forum were the representatives of the countries of South East Europe (Croatia, Bosnia and Herzegovina, FR Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Greece, Albania, Bulgaria, Romania), the European Commission, the international donor community, the region's national energy regulators, the region's national transmission system operators, the Stability Pact, ETSO, CEER, UCTE, Eurelectric, United Nations Mission in Kosovo (UNMIK), and others.

[2] Treaty establishing the Energy Community, OJ L198, 20 July 2006, 18.

[3] Albania, Bulgaria, Bosnia and Herzegovina, Croatia, FYROM, Montenegro, Romania, Serbia, and UNMIK.

[4] Agreement on the European Economic Area (EEA Agreement), OJ L1, 3 January 1994, 3 (http://www.efta.int/content/legal-texts/eea/).

[5] See e.g. Marise Cremona, "The 'Dynamic and Homogenous' EEA: Byzantine Structures and Variable Geometry," *European Law Review* 19 (1994): 508 and Steve Peers, "An ever closer waiting room? The case for Eastern European accession to the European Economic Area," *CMLRev* 32 (1995): 211.

an alternative to full membership – not for its current parties but for the countries outside of the Internal Market and unsatisfied with the instruments of the European Neighbourhood Policy (ENP).

This paper will, as a starting point, describe the Treaty and its most important provisions. In a next step, open questions concerning the Treaty are going to be outlined together with possible approaches referring to similar issues found in relations between the EU and the EFTA within the EEA. In a final step, a brief assessment on how the Energy Community could develop within the EU's external relations regime will be followed by a terse conclusion.

2. THE ENERGY COMMUNITY OF SOUTH EAST EUROPE

The founding process of the Energy Community started in June 2002 in Athens where the SEEERF held its first meeting. The 'Athens Memorandum 2002'[6] signed later that year provided for the establishment of an integrated regional electricity market and its integration into the EU's Internal Electricity Market. Only one year later, in December 2003, the 'Athens Memorandum 2003'[7] was signed, which deals with the establishment of an integrated regional *energy* market including also natural gas. The most important milestone to date in this so-called 'Athens Process' is the establishment of the Energy Community, which was strongly endorsed by the Council as part of the Thessaloniki Agenda[8] (recital 4 TEnC) and by the Stability Pact for South Eastern Europe[9] (recital 6 TEnC). The TEnC was signed in October 2005 by the European Community together with Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYROM, Montenegro, Romania, Serbia, and UNMIK and came into force on 1 July 2006.

The Energy Community's task is the creation of a legal and economic framework with regard to the electricity and gas sectors falling within the scope of the Electricity Directive (2003/54/EC) and the Gas Directive (2003/55/EC). Consequently, these two directives, together with twelve other acts of Community secondary legislation on energy, environment, and renewables are to be implemented by the contracting parties (Article 3(a) and Title III TEnC). Parts of EC primary legislation are included into the Treaty itself by similar phrased provisions (e.g. Articles 18 and 19 TEnC on competition protecting trade of network energy between the parties)[10]. Additionally, the implementation of several 'Generally Applicable Standards of the European Community' as defined in Articles 21 through 23 shall enable technical functioning of energy transmission and provision.[11]

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[6] Memorandum of Understanding (MoU) on the Regional Electricity Market in South East Europe and its Integration into the European Union Internal Electricity Market, Athens 2002 (http://www.energy-community.org/pls/portal/docs/36296.PDF).

[7] MoU on the Regional Energy Market in South East Europe and its Integration into the European Community Internal Energy Market, Athens 2003 (http://www.energy-community.org/pls/portal/docs/36297.PDF).

[8] General Affairs and External Relations Council, *2518th Council meeting – External Relations* (Luxembourg, 10369/03 (Presse 166), 16 June 2003, 19).

[9] See www.stabilitypact.org. The Stability Pact of SEE was founded in 1999 after the end of the Yugoslav wars. Its objectives were the promotion of peace, democracy, human rights, the rule of law and economic prosperity through regional co-operation and integration into European and transatlantic structures. In February 2008 the Regional Co-operation Council (www.rcc.int), a regionally owned framework, took over the tasks of the Stability Pact focusing on issues determined by the regional actors.

[10] Reaffirming their provenance, Article 18 TEnC resorts to criteria established with Articles 81, 82 and 87 TEC to evaluate practices contrary to the competition rules stipulated.

[11] http://www.energy-community.org/pls/portal/docs/89929.PDF.

The Ministerial Council of the Energy Community may decide upon the implementation of further European Community legal acts by unanimity and even extend the scope of the Treaty to other energy products, carriers, or network infrastructures (Article 100 TEnC). The European Commission acts as a co-ordinator regarding the partial extension of the *acquis communautaire* and the Internal Market (Article 4 TEnC). Any amendments to the part of the *acquis* to be introduced into the national laws of the SEE parties shall be implemented 'in line with the evolution of European Community law' (Article 25 TEnC), which is also what the EEA aims at[12]. Pursuant to Articles 3(a), 5 and 24 TEnC, however, the extension of the *acquis communautaire* is to be subject to adaptations to both the institutional framework of the Energy Community and the specific national situations of the parties. The TEnC does not elucidate the scope of or possibilities for such an adaptation; but drawing on the relevant provisions of the EEA Agreement might shed some light on this issue (see section 3.).

The implementation of EC legislation shall attract investments in necessary energy infrastructure eventually leading to enhanced security of supply for the region and its neighbours, an improved environmental situation, and competition in the single regulatory space developed (Article 2 TEnC). The obligation to adopt parts of the *acquis* is politically deemed as a step further towards accession[13], but the TEnC itself determines that accession negotiations and the obligations deriving from the TEnC are to be kept strictly apart (Article 103). Member countries of the EU may be permitted as participants pursuant to Article 95 TEnC.[14] Hence, the Energy Community's stakeholders include not only the contracting parties, but also participants as well as observers and donors. Observers are third countries that may be accepted upon reasoned request (Article 96 TEnC). Until now observer status was granted to Georgia, Moldova, Norway, Turkey, and Ukraine. As another step further Article 100(iv) TEnC provides for the accession of third countries as parties. So far no enlargement has taken place, although Moldova and Ukraine already filed their applications for membership.

Title III of the TEnC (Article 29 through 39) is concerned with the 'creation of a single mechanism for the cross-border transmission and/or transportation' of gas and electricity[15], which explains its applicability to the territories of the neighbouring EU members. Austria, Greece[16], Hungary, Italy, and Slovenia by sharing their borders with the newly founded community are most directly affected by certain measures taken under the TEnC (Article 27). Provisions under this title further deal with

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[12] Marise Cremona, "The 'Dynamic and Homogenous' EEA: Byzantine Structures and Variable Geometry," *European Law Review* 19 (1994): 509.

[13] The member states of the Energy Community are either already EU members (Bulgaria, Romania) or were awarded candidate (Croatia, FYROM) or potential candidate status (Albania, Bosnia and Herzegovina, Kosovo under the UNSCR 1244, Montenegro and Serbia).

[14] Austria, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, the Netherlands, Romania, Slovakia, Slovenia, and the United Kingdom are participants to the Energy Community. The legal status of Bulgaria and Romania changed from contracting party to participant following their accession to the EU in 2007.

[15] The physical necessity for cross border transmission and transportation was the resynchronization with UCTE (Union for the Co-ordination of Transmission of Electricity), which was completed on 10 October 2004 undoing the split into two zones in autumn 1991. Compare UCTE, *Annual Report 2004*, 6-11 (http://www.ucte.org/_library/annualreports/report_2004_3.pdf).

[16] By extending the Internal Energy Market to the Western Balkans, Greece will for the first time be connected to the continental energy market of the other EU members (Council of the European Union, *Council Decision of 29 May 2006 on the conclusion by the European Community of the Energy Community Treaty*, OJ L 198, 20 July 2006, 15).

security of supply issues, the provision of energy to citizens (within the limits of public service obligations)[17], harmonisation (in terms of market design and mutual recognition of licenses), renewable energy sources and safeguard measures[18].

An even more far-reaching geographical applicability is stipulated in Title IV (Article 40 through 46 TEnC), which concerns the creation of a single energy market. It applies to all EU member countries and all SEE parties to the TEnC. The ultimate aim is a single market for network energies without internal barriers encompassing EU territory and the countries of the Western Balkans including the territory under the jurisdiction of UNMIK. The provisions concerning the internal energy market are similar to Articles 28 through 30 of the Treaty establishing the European Community (TEC).[19] The mutual assistance obligation (Articles 3(c) and 44 through 46 TEnC) stipulated is rather vague[20] but introduces the concept of solidarity into a region where countries used to fight rather than help and support each other. Albeit the TEnC had not entered into force then, assistance was already provided by FYROM to Albania during its electricity crisis in 2005.[21] The possible achievement of a common external energy trade policy as part of the single energy market to be developed is mentioned in Articles 3(c) TEnC. Article 43 TEnC specifies that external trade policy measures may be implemented to ensure basic environmental and safety standards. However, the EU itself does not pursue a common external energy trade policy.[22] Its energy relations with third countries are fragmentary and mostly regulated by different general agreements (e.g. Partnership and Cooperation Agreements) and by several bilateral or multilateral energy initiatives, like the EU Russia Energy Dialogue[23].

The main institution of the Energy Community is the Ministerial Council (MC; Article 47 through 52 TEnC) consisting of one representative of each SEE party and two of the European Community. It is *inter alia* responsible for general policy guidelines, the budget, and dispute settlement. In decision-making the MC is supported by the Permanent High Level Group (PHLG; Article 53 through 57 TEnC), which also consists of one representative of each SEE party and two of the European Community. The institutionalised co-operation between the European Community and the other

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[17] Article 32 TEnC authorises the Energy Community to adopt measures allowing for the universal provision of electricity, but not for gas. This limitation is also found when comparing the Gas Directive with the Electricity Directive, which obligea the EU member states to guarantee universal service to household customers only for electricity (Article 3 (3) Electricity Directive). Compare Christopher W. Jones, vol. 1 of *EU Energy Law* (Leuven: Claeys & Casteels, 2006), 234.

[18] The safeguard measures outlined in Articles 36 through 39 TEnC are modelled after Article 24 Electricity Directive and Article 26 Gas Directive. Together with these provisions the two directives (Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment and Council Directive 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply) on safeguard measures are to be implemented by the parties of the Energy Community.

[19] Electricity, although not tangible, was considered as a good within the meaning of Article 28 TEC by the ECJ (Case C-393/92 *Municipality of Almelo v Energiebedrijf Ijsselmij* [1994] ECR I-1477) 'by virtue of its function as an energy source' (Opinion AG Fennelly in Case C-97/98 *Peter Jägerskiöld v Torolf Gustafsson* [1999] ECR I-7319, para 20). The same applies to gas, which consequently also comes under the provisions governing the free movement of goods.

[20] The MC is going to decide on the procedural act to be adopted pursuant to Article 46 TEnC on 11 December 2008.

[21] For a detailed discription see: http://www.energy-community.org/pls/portal/docs/36408.PDF.

[22] See, Javier Solana, "An External Policy to Serve Europe's Energy Interests, European Council," S160/06, 2006. The EU pursues three policy objectives in the field of energy: sustainability, security of supply and competitiveness, all of which to be achieved by internal and external policy measures. The EU's competences in the field of energy are, however, limited.

[23] http://ec.europa.eu/energy/international/bilateral_cooperation/russia/russia_en.htm.

parties adds to the unique character of the Energy Community which clearly distinguishes it from other Community initiatives in the energy sector.[24] The Regulatory Board (RB; Article 58 through 62 TEnC), which comprises of a number of regional energy regulators, prepares recommendations for the MC and the PHLG on regulatory, statutory and technical issues. Additional advice for the Energy Community is provided by the Gas and Electricity Fora (Article 63 through 66 TEnC) which are composed of interested stakeholders and modelled after the Madrid and Florence Fora[25]. The secretariat (Article 67 through 72 TEnC) of the Energy Community is situated in Vienna and is equipped with comprehensive competence *inter alia* in the dispute settlement procedure (Article 89 through 93 TEnC)[26].

Dispute settlement decisions lie within the sole responsibility of the MC. The pre-dispute settlement procedure is carried out by the Secretariat upon notification of a party or the RB or upon complaint by natural or legal private persons. After this preliminary procedure, the MC decides on (serious and persistent) breaches of obligations of the Treaty or of decisions addressed to the party. In case of serious and persistent breaches provision is made for the MC to impose sanctions for a determined period of time. The dispute settlement procedure does not provide for legal remedies for the parties concerned. Complaints or notifications against EU member states are forwarded to the European Commission, which may then initiate an infringement procedure pursuant to Article 226 TEC.

3. THE EEA CONCEPT FILLING THE GAPS OF THE TEnC?

Before discussing any of the issues addressed above and comparing them with similar provisions of the EEA Agreement, it shall shortly be explained why a comparison between the EEA and the Energy Community seems to be a promising idea. 'The objective of establishing a dynamic and homogenous European Economic Area[27], based on common rules and equal conditions of competition' determined in the preamble to the EEA Agreement, could also serve as a description of the Energy Community albeit limited to the electricity and gas sectors. Both treaties are agreements under international law, they are both forms of enhanced multilateralism, and they both deal with the enlargement of (parts of) the EC Internal Market. What makes them special is their strong and at the same time dynamic connection with the development of and changes in (parts of) European Community law. The notion of the EEA Agreement, however, is in many ways different to the TEnC as cooperation between the EFTA countries and the European Union is much more intense and covers many different policies. As a result, the TEnC and the EEA Agreement are based on different legal provisions. The former is based on 'Articles 47(2), 55, 83, 89, 95, 133 and 175, in conjunction with the first sentence of the first subparagraph of Article 300(2) and the second subparagraph of Article 300(3)'[28] TEC, whereas the latter is solely based on Article 310 TEC[29]. This distinction alone reveals the different purposes of the two agreements. The TEnC constitutes a sectoral agreement de-

[24] Jörg Walendy, "Stabilität durchs Netz?" *Osteuropa* 54 (2004): 263.
[25] For details on the two fora, see http://ec.europa.eu/energy/gas/madrid/index_en.htm and http://ec.europa.eu/energy/electricity/florence/index_en.htm.
[26] The dispute settlement procedure is specified in the Procedural Act No. 2008/01/MC-EnC of the Ministerial Council of the Energy Community of 27 June 2008 on the Rules of Procedure for Dispute Settlement under the Treaty.
[27] Throughout the EEA Agreement emphasis is placed repeatedly on homogeneity.
[28] See Council of the European Union, fn 16.
[29] At that time Article 238 of the Treaty establishing the European Economic Community.

termined to develop a common energy market including the Union and its south eastern neighbours and is therefore limited to only a couple of policies. The EEA Agreement on the other hand established an extensive 'contractual association'[30].

Having roughly established their common and differencing features, we would like to ascertain that these two agreements are sufficiently similar to draw analogies between the TEnC and the EEA Agreement to better understand the first. But we stumble over several principles of EC and EEA law that cannot be ignored with homogeneity leading the way. Whereas homogeneity is a central element of the EEA Agreement, it is not mentioned in the TEnC. The implementation of several or even a myriad of EC legal acts into another legal system does not automatically guarantee the homogenous application and interpretation of those acts. Legislation in one sector is often dependent on legislation in several related fields. What is more, EC law is indivisibly connected to its underpinning principles like direct effect or primacy. *Norberg et al.*, however commenting on the EEA founding process, state 'that in practice it would not be possible in several areas to achieve equal treatment with the EC Member States in the internal market by concluding an agreement taking over the EC rules for a particular sector only'[31].

The Energy Community is confined to fourteen legal acts of secondary legislation concerning the energy sector and similar provisions to Articles 81, 82 and 87 TEC stipulating the EU's pivotal competition rules. Can these rules taken from the *sui generis* legal order of the EC have direct effect in the SEE countries? In other words, could a SEE country national invoke and rely on provisions of the *acquis* in proceedings before a national court? The only possibility for natural or legal private persons provided by the TEnC under the Dispute Settlement Procedure is a complaint with the Secretariat. This kind of remedy falls short of what is granted on EU level to EU citizens. However, before the *Van Gend en Loos*[32] case the protection of rights of individuals was also limited to a complaint with the Commission.[33] Whereas *Sevón* and *Johannson* easily applied the *Van Gend en Loos* reasoning to the EEA Agreement[34], a similar application to the TEnC seems hard to achieve. Despite the TEnC being a historic agreement with unique scope and content, its objectives do not come close to those of the TEC or the EEA Agreement. While the EEA Agreement repeatedly refers to its importance for and commitment to individuals, consumers, and economic operators[35], the preamble to the TEnC mentions citizens only in connection with public service obligations (recital 12 TEnC). Fittingly, reference to social issues within the scope of the Energy Community can only

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[30] The term and the scope of such an association is not determined in the TEC. Kirsten Schmalenbach ("Article 310" in *EUV EGV*, 3rd ed., ed. Christian Calliess and Matthias Ruffert (München: Beck, 2007) para 10) describes it as a contractual relation according to international law aiming at continuity and processual development, equipped with special institutions competent to regulate issues falling within the scope of the relevant agreement. This definition, however, could likewise apply to the TEnC.

[31] Sven Norberg et al., *The European Economic Area – EEA Law – A Commentary on the EEA Agreement* (Stockholm: Fritzes,1993), 53.

[32] Case 26/62 *Van Gend en Loos v Nederlandse Administratie der Belastingen* [1963] ECR 1.

[33] Damian Chalmers et al., *European Union Law* (Cambridge: Cambridge University Press 2006), 366-67.

[34] Leif Sevón and Martin Johansson, "The protection of the rights of individuals under the EEA Agreement," *European Law Review* 24 (1999): 380.

[35] Together with several recitals in the preamble, part V of the EEA Agreement on horizontal provisions relevant to the four freedoms focuses on social policy, consumer protection and company law. The relevant Community *acquis* is stipulated in the corresponding annexes.

be found in a legally non-binding memorandum of understanding[36] on Social Issues in the Context of the Energy Community. Furthermore, there is no explicit reference to homogeneity in the TEnC. The commitment to develop the Energy Community's *acquis* 'in line with the evolution of European Community Law' (Article 25 TEnC) and to interpret terms and concepts taken from European Community law in conformity with the ECJ and the Court of First Instance (Article 94 TEnC) do not provide for the same kind and scope of homogeneity established on EEA level[37].

In the EEA homogeneity in the field of jurisdiction is ensured by the dispute settlement procedure with its institutional framework mirroring the ECJ (EFTA Court) and the European Commission (EFTA Surveillance Authority) and a system of exchange of information. The twin-pillar model avoids legal imbalance and most importantly ensures the homogenous application and uniform interpretation of Community law. In the field of legislation the EFTA countries are basically norm takers with only consultative competence. Immediately after the adoption of an EC legal act by the Council of the EU, the EEA Joint Committee is informed and must then 'take a decision concerning an amendment of an Annex […] as closely as possible to […] the corresponding new Community legislation'[38].

Most of EC secondary legislative acts and non-binding instruments are integrated into the EEA Agreement trough the reference technique used in the annexes. Horizontal adaptations probably concerning all legal acts are implemented pursuant to Protocol 1 On Horizontal Adaptations. Sectoral or specific adaptations for one or more EFTA states are included in the specific annexes. Several of the legal acts being part of the *acquis* of the Energy Community were also included in Annexes IV (Energy) or XX (Environment) of the EEA Agreement. Some of them were subject to adaptations according to EEA rules and can serve as models for adaptations pursuant to Article 24 TEnC. They are mostly limited to exchanging Community specific terms with the corresponding EEA terms (e.g. Annex IV item 22 (a) through (c)[39]). Country specific adaptations, which is also provided for within the scope of the TEnC ('adaptation to the specific situation of each of the Contracting Parties'), could assume the shape of e.g. item 19 of Annex XX[40].

Similar to Article 10 TEC and Article 3 of the EEA Agreement, the TEnC includes the principle of loyal cooperation (Article 6) stipulating the parties' obligations to actively work towards the fulfil-

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[36] MoU on Social Issues in the Context of the Energy Community (http://www.energy-community.org/pls/portal/docs/36242.PDF).

[37] See Roman Petrov, "Exporting the *Acquis Communautaire* into the Legal Systems of Third Countries," *European Foreign Affairs Review* 13 (2008): 38.

[38] Article 102 (1) EEA Agreement.

[39] **32003 L 0054**: Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC (OJ L 176, 15.7.2003, p. 37).
The provisions of the Directive shall, for the purposes of this Agreement, be read with the following adaptations:
(a) in Article 3(2), the words "provisions of the Treaty, in particular Article 86 thereof" shall read "provisions of the EEA Agreement and in particular Article 59 thereof";
(b) in Article 3(8), the words "The interests of the Community" shall read "The interests of the Contracting Parties";
(c) in Article 3(8), "Article 86 of the Treaty" shall read "Article 59 of the EEA Agreement".

[40] **32001 L 0080**: Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (OJ L 309, 27.11.2001, p. 1) […]
At the time of incorporation of the Directive into the Agreement, Iceland and Liechtenstein do not have in operation any large combustion plants as defined in Article 1. These states will comply with the Directive if and when they put into operation such plants.

ment of and abstain from any measure capable of jeopardising the objectives of the Treaty. Article 10 TEC among others supported the ECJ's interpretation of the rule of primacy of Community law[41]. It comprises the contracting parties' obligation to withstand from applying any national rules running contrary to the objectives to be achieved by the applicable legislation and goes beyond the prohibition of behaviour contrary to the EC.[42] In the EEA this interpretation also applies pursuant to Article 6 EEA Agreement and is affirmed by the provisions of Protocol 35 on the implementation of EEA rules[43]. The reasoning behind the *Costa/ENEL* ruling was the ECJ's conviction that the Community had 'created its own legal system'. While the same holds true for the EEA[44], we must refrain from awarding this special status to the Energy Community despite its unique set-up and scope. Nevertheless, it was a courageous and clever move to found this Energy Community. Much more academic and practical work will have to be done to fully understand and evaluate its merit and the opportunities it provides, especially for the neighbouring countries as parties-to-be.

4. THE ENERGY COMMUNITY – ALTERNATIVE TO RU MEMBERSHIP?

One of the reasons for the establishment of the Energy Community was to foster regional cooperation between the countries of the Western Balkans. Destroyed by wars and to a large extend dependent on the international community, economic independence and at the same time regional interdependence was pivotal for the development of these war-ridden countries. Energy scarcity appearing in regular power outages was another central impediment to development. By integrating the energy markets of the SEE countries with the EU's Internal Energy Market investments in infrastructure should follow and eventually lead to more security of supply for all parties.

Despite these obvious advantages, the Energy Community strictly focuses on energy issues and leaves any kind of conditionality apart. There are neither carrots nor sticks but a partnership eventually leading to a single energy market. This is more than any other co-operation in the field of energy like e.g. the Baku Initiative[45], offers. Hence, it comes as no surprise that participation in this organisation is highly motivating and interesting for other countries in neighbouring regions. Of the four observers to the Energy Community Georgia, Moldova, Turkey, and Ukraine, two already filed their membership applications. Judging from today, membership in the Energy Community and simultaneously in the Internal Energy Market might be as close as they will (now or in the near future) get to integration with the EU. The main incentive of non EU member states to participate in the Energy Community is to belong to a huge market materialising economies of scale, investment incentives, productivity gains, and the opportunity to trade with energy importing countries; and all that without additional human rights, democracy or rule of law requirements.

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[41] Case C-6/64 *Flaminio Costa v E.N.E.L* [1964] ECR 585 at 593.

[42] Stefan Griller, "Gesamtänderung durch das EWR Abkommen?" *ecolex* 3 (1992): 541-42.

[43] Its sole article reads: 'For cases of possible conflicts between implemented EEA rules and other statutory provisions, the EFTA States undertake to introduce, if necessary, a statutory provision to the effect that EEA rules prevail in these cases.'

[44] This was also held by the EFTA Court in Case E-9/97 *Erla María Sveinbjörnsdóttir v The Government of Iceland* (10 December 1998): 59.

[45] http://ec.europa.eu/external_relations/energy/baku_initiative/index.htm.

For the (potential) candidate countries of SEE the obligation to adopt the fourteen legal acts of the TEnC is yet only another step in the process of gradual integration into the EU structures[46]. For countries currently associated with the EU by its ENP it is much different. They do not belong to the group of (potential) candidate countries and for politicians in these countries it would be hard to sell to their electorate another implementation of EC legislation without any membership perspective.

From the EU's and its member states' perspectives access to Caspian natural resources is crucial and membership of Black Sea countries in the Energy Community would establish a wider Internal Energy Market with common rules and standards attracting (infrastructure) investment and competition; eventually leading to security of supply for all consumers.

5. CONCLUSION

Summing up we can clearly establish, that the Energy Community is no new European Economic Area. They are essential differences between their objectives, their institutions and their organisations. But as *Blockmans* rightly described, the Energy Community is just the beginning and cooperation in other fields could follow.[47] If the neighbouring countries, which applied for membership in the Energy Community, will follow and will make this organisation and the EU as a whole a bigger player in the field of energy will have to be seen. The Energy Community, however, leads the right way and has the potential to be more than just 'one of those EU initiatives'.

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[46] Cooperation in the field of energy is also stipulated in the Stabilisation and Association Agreements with the countries of the Western Balkans. See e.g. Article 101 of the *Stabilisation and Association Agreement between the European Communities and their Member States, of the one part, and the Republic of Croatia, of the other part*, OJ L 26, 28 January 2005, 3.

[47] Steven Blockmans, "Consolidating the Enlargement Agenda for South Eastern Europe," in *Reconciling the Deepening and Widening of the European Union*, ed. Steven Blockmans and Sacha Prechal (The Hague: T.M.C. Asser Press, 2007), 80.

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ENERGY SECURITY IN A LEGAL CONTEXT

SOME REMARKS IN THE LIGHT OF COMMUNITY LAW AND TREATY ESTABLISHING THE ENERGY COMMUNITY IN PARTICULAR

Piotr Bogdanowicz

1. INTRODUCTION

The process of creating an integrated market in electricity among Member States has nearly reached completion[1]. The internal energy market should be subject to, among other things, common minimum standards respected by all Member States, and there should be common objectives with respect to "three pillars of the energy in the European Union", i.e. security of supply, environmental protection and equivalent levels of competition[2].

At the same time, the notion of "energy security", understood in general as adequacy of energy supply at a reasonable price[3], is becoming an issue of increasing importance to the European Union. What is more, Member States view energy security not only in an economic or political context but also perceive it from a legal perspective. The problem is that the multi-faceted nature of energy security, involving its legal (e.g. definitions and regulations), political (e.g. dependence of the European Union on supplies from outside sources) and technical (e.g. physical availability of energy, satisfactory operation of the grid) aspects, makes it very difficult to provide a definition of energy security that is accepted by all[4].

The main aim of this paper is to analyse whether the notion of "energy security" is condemned to be only a carrier notion in political discussions and empty words in legal texts, or whether it truly deserves to be one of the pillars of energy policy in the European Union. A good illustration of this issue seems to be the Treaty establishing the Energy Community concluded on 25 October 2005 between the European Community, on the one hand, and several countries of South East Europe, including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Republic of Macedonia, Montenegro, Romania and Serbia, as well as the United Nations Interim Administration Mission in Kosovo (as Kosovo representative under resolution of the Security Council no. 1244), on the other (hereinafter referred to as the "Energy Treaty"). It is because one of the main tasks of the Energy Treaty is to organise relations between the parties in order to enhance the security of supply of the single regulatory space. However, the Energy Treaty does not contain any operational measures in this respect. Furthermore, although the signatory states undertook to adopt in prescribed terms certain EU

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[1] See T. Skoczny, *Energetyka* [in:] J. Barcz (ed.) *Prawo Unii Europejskiej. Prawo materialne i polityki*, Warsaw 2005, p. II-712.

[2] See: E. D. Cross, *EU Energy Law. The Treaty Framework* [in:] M. Roggenkamp, C. Redgwell, I. del Guayo, A. Ronne (ed.), *Energy Law in Europe. National, EU and International Regulation*, Oxford 2007, p. 228.

[3] See: S. S. Haghighi, *Energy Security and the Division of Competences between the European Community and its Member States*, "European Law Journal" 2008, vol. 14, no. 4, p. 461.

[4] *Ibidem*.

single market regulations, called the "*acquis communaitare* on energy", these regulations did not concern, for instance, any document, with respect to the development of energy security.

Before the issue of energy security in the Energy Treaty is addressed, it seems necessary to review the notion of "energy security" in the Community law, relationship between energy security and energy market liberalisation and, finally, legislation on the energy security in the Community law.

2. "ENEGY SECURITY" IN THE COMMUNITY LAW

2.1. Notion

There are many definitions of "energy security", however, only few of them are legal ones. One of such legal definitions, although very general, was proposed in the Directive 2003/54/EC of the European Parliament and of the Council of 26 July 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC (hereinafter referred to as the "Directive 2003/54"). In accordance with Article 2 point 28 of this Directive 2003/54, (energy) "security" means security of supply and provision of electricity, and technical safety. In order to define notion of "security of supply" we have to refer to Article 2 (b) of Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment (hereinafter referred to as the "Directive 2005/89") which defines "security of electricity supply" as the ability of an electricity system to supply final customers with electricity. At this stage, it should be noted that the Energy Treaty also uses notion of "security of supply".

"Security of supply" and "energy security" cannot be treated as synonyms – the latter seems to be broaden one. However, even if we assume that "security of supply" is part of "energy security" only, we have to admit that it constitutes the most important part of "energy security". Therefore, the presented understanding of "energy security" which defines it as "adequacy of energy supply at a reasonable price" constitutes a definition of "energy security" in a narrow sense. Of course, one should bear in mind that many factors may constitute the notion of "adequacy of energy supply": diversification of sources, development of energy renewable sources and consolidation of an energy industry are only a few examples. Similarly, many other elements may constitute the notion of "energy security", including for instance network security. In such case, one will deal with definition of "energy security" in a wide sense.

Also, definitions proposed by representatives of legal doctrine or appearing in non-binding documents of international organizations or institutions seem to correspond to narrow understanding of energy security. For instance, in 2000 the United Nations Development Programme defined energy security as "the continuous availability of energy in varied forms, in sufficient quantities, and at reasonable prices"[5].

[5] See: *World Energy Assessment: Energy and the Challenge of Sustainability*, New York 2000, p. 113.

2.2. Energy security and the energy market liberalisation

One authors state that the question of energy security (security of supply) arises in the context of market liberalisation, consequently, it is not clear that security of supply was truly guaranteed in the past [6], whilst others prove that the issue of energy security was dealt since the Funding Treaties, i.e. long time before the process of market liberalisation has started[7]. Undoubtedly, integration of national energy markets into internal energy market could substantially increase energy security of Member States. Therefore, one cannot be surprised that energy security considerations have risen to the forefront of the European Union agenda at the same time the debate over energy market liberalisation has increased[8].

Directive 2003/54 points out "security of supply" as one of its aims. Moreover, it contains some measures that are aimed at ensuring Member States' energy security.

i. Firstly, in the interest of security of supply, the supply/demand balance in individual Member States should be monitored. The construction and maintenance of the necessary network infrastructure, including interconnection capacity, should contribute to ensuring a stable electricity supply. In accordance with Directive 2003/54, the maintenance and construction of the necessary network infrastructure, including interconnection capacity and decentralised electricity generation, are important elements in ensuring a stable electricity supply (see Article 4). It should be underlined that the European Commission is also obliged to monitor the energy market. The European Commission must submit an overall progress report to the European Parliament and the Council on an annual basis. The report must cover among other things an examination of issues relating to system capacity levels and security of supply of electricity in the European Community, and in particular the existing and projected balance between demand and supply, taking into account the physical capacity for exchanges between areas (see Article 27).

ii. Secondly, Member States shall ensure that technical safety criteria are defined and that technical rules establishing the minimum technical design and operational requirements for the connection to the system of generating installations, distribution systems, directly connected consumers' equipment, interconnector circuits and direct lines are developed and made public. These technical rules shall ensure the interoperability of systems and shall be objective and non discriminatory (see Article 5).

iii. Thirdly, Member States shall ensure the possibility, in the interests of security of supply, of providing for new capacity or energy efficiency/demand-side management measures through a tendering procedure or any procedure equivalent in terms of transparency and non-discrimination, on the basis of published criteria. However, one should remember that these procedures can only be launched if on the basis of the authorisation procedure the generating capacity being built or the energy efficiency/demand-side management measures be-

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[6] See: G. Luciani, *Security of Supply for Natural Gas markets. What is it and What is it not?,* available on the website : http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm), pp. 2-3.

[7] See: S. S. Haghighi, *Energy Security…*, pp. 466-468.

[8] P. Belkin, *The European Union's Energy Security Challenges*, "CRS Report for Congress", Washington 2008, p. 24.

ing taken are not sufficient to ensure security of supply (see Article 7). Transmission System Operator (hereinafter referred to as "TSO") is an entity that contributes to security of supply through adequate transmission capacity and system reliability. Moreover, TSO shall, within its competence, be responsible for dispatching the generating installations in its area and for determining the use of interconnectors with other systems. However, a Member State may, for reasons of security of supply, direct that priority be given to the dispatch of generating installations using indigenous primary energy fuel sources, to an extent not exceeding in any calendar year 15 % of the overall primary energy necessary to produce the electricity consumed in the Member State concerned (see Article 11).

In September 2007 the European Commission presented a proposal of the directive amending Directive 2003/54[9]. Presented draft emphasises that the safeguarding of energy supply is an essential element of public security and is therefore inherently connected to the efficient functioning of the EU electricity market. However, in principle, it does not introduce new measures aimed at ensuring of supply security. It only points out that amongst the regulatory authority's duties shall be the following: monitoring network security and reliability, and reviewing network security and reliability rules, as well as monitoring investment in generation capacities in relation to security of supply (which particularises monitoring undertakings of the Member States on the ground of the Directive 2003/54).

2.3. Energy security and the Directive 2005/89

Main frameworks within which Member States are to define transparent, stable and non-discriminatory policies on the security of electricity supply, compatible with the requirements of a competitive internal market for electricity are established in Directive 2005/89. This Directive establishes measures aimed at safeguarding the security of electricity supply so as to ensure the proper functioning of the internal market for electricity and to ensure: (i) an adequate level of generation capacity; (ii) an adequate balance between supply and demand; and (iii) an appropriate level of interconnection between Member States for the development of internal markets.

Directive 2005/89 also defines "operational network security" which, as mentioned above, could be more widely defined in terms of "energy security". Thus, "operation network security" is the continuous operation of the transmission and, where appropriate, the distribution network under foreseeable circumstances. Member States or the competent authorities shall ensure that transmission system operators set the minimum operational rules and obligations on network security (see Article 2 (c)).

Member States must take appropriate measures to maintain a balance between the demand for electricity and the availability of generation capacity (and consequently enhance energy security).

i. In particular, Member States must encourage the establishment of a wholesale market framework that provides suitable price signals for generation and consumption and require transmission system operators to ensure that an appropriate level of generation reserve ca-

[9] See COM (2007) 528 final. As of 1 April 2009, amendments are still under consideration.

pacity is available for balancing purposes and/or to adopt equivalent market based measures (see Article 5).

ii. Furthermore, Member States must establish a regulatory framework that provides investment signals for both the TSO and distribution system operators to develop their networks in order to meet foreseeable demand from the market and facilitates maintenance and, where necessary, renewal of their networks.

iii. Finally, Directive 2005/89 provides that Member States must ensure that the report from the monitoring carried out under Directive 2003/54 (see above) covers the overall adequacy of the electricity system to supply current and projected demands for electricity, comprising operational network security, the projected balance of supply and demand for the next five-year period, the prospects for security of securing electricity supply for the period between five and 15 years from the date of the report and the investment intentions, for the next five or more calendar years, of TSO and those of any other party of which they are aware, as regards the provision of cross-border interconnection capacity.

2.4. Energy security and the Lisbon Treaty

At the current stage of Community law, the issue of energy security appears neither in the Treaty establishing the European Community, nor the Treaty on the European Union. The situation will change with the entry into force of the Treaty of Lisbon of 13 September 2007 amending the Treaty on the European Union and the Treaty establishing the European Community (hereinafter referred to as the "Lisbon Treaty")[10].

The Lisbon Treaty will not only be the first document introducing a legal basis for the activities of the European Union in the energy sector, but will also contain provisions regarding energy security. The Lisbon Treaty establishes a new Article in the Treaty on the Functioning of the European Union (being the legal successor of the Treaty establishing the European Community) (hereinafter referred to as the "TFEU"), according to which in the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to ensure the security of energy supply in the Union. The European Parliament and the Council shall establish the measures necessary to achieve this objective. These measures will not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply (see Article 194 of the TFEU)[11]. The insertion of this limit was most likely the result of pressure on the part of countries, such as the Netherlands, Den-

[10] As of 1 April 2009 the Czech Republic, Ireland and Poland were the only countries that have not ratified the Lisbon Treaty.

[11] However, the Council shall adopt measures significantly affecting a Member State's choice between different energy sources and the general structure of its energy supply (see Article 192 of the TFEU).

mark and Great Britain, which sought to reserve the right to regulate the methods of exploiting their reserves[12].

Some authors underline that Article 194 places the issue of "energy security" in its broader context because the European Union can undertake activities to secure energy flow at any time, i.e. these activities are no longer limited to times of crisis[13]. In fact, such regulation is justified by the provision of Article 122 of the TFEU, which allows the Council, on a proposal from the European Commission, to decide, in a spirit of solidarity between Member States, upon the measures appropriate to the economic situation - in particular, if severe difficulties arise in the supply of certain products, notably in the area of energy.

3. ENERGY SECURITY AND THE ENERGY TREATY

The Energy Treaty represents a major step forward in the development of the internal market policy in the European Union and its extension to its neighbours[14]. It extends the European Union internal energy market to several countries of southeast Europe. In fact, the European Commission by means of the conclusion of this Energy Treaty, in a sense creates a precedent by extending the *acquis communautaire* of the internal market in the field of electricity and gas to the contracting parties to the Energy Treaty[15].

What is more, an analysis of relevant provisions of the Energy Treaty could help to answer the question whether the internal energy market in the European Union is only a step towards the internal energy market throughout Europe[16]. It also seems that through its actions the Energy Community can make a large contribution to the security of supply in wider Europe.

At the official website of the Energy Community[17] one can read that a regional approach to energy security offers significant advantages both in terms of improved utilisation of existing supply and production capacities as well as optimising future investments. Therefore, the *raison d'être* of the Energy Community was to facilitate this process.

One of the recitals to the Energy Treaty provides that the parties thereto by signing the Treaty desired to enhance the security of supply of the single regulatory space by providing a stable regulatory framework necessary for the region. Consequently, in accordance with Article 2 of the Energy Treaty, one of the tasks of the Energy Community shall be to organise relations between the Parties and create a legal and economic framework in relation to Network Energy (defined as electricity and gas sectors falling within the scope of Directive 2003/54 and Directive 2003/55/EC of the

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[12] See: S. S. Haghighi, *Energy Security…*, p 470.

[13] *Ibidem*, p. 471.

[14] See: Ch. W. Jones and W. Webster, *EU Energy Law. Volume 1. The International Energy Market*, Leuven 2006, p. 361.

[15] See: European Parliament resolution on the conclusion by the European Community of the Energy Community Treaty; P6_TA(2006)0225

[16] See: P. Bogdanowicz, *Traktat ustanawiający Wspólnotę Energetyczną – w stronę europejskiego wspólnego rynku energetycznego?* [in:] A. Kołtunowska, W. Maciejewski, A. Zawidzka (eds.), *Prawo europejskie w dobie reform. European Law Towards Reform*, Warsaw 2008, p.174

[17] See: http://www.energy-community.org/portal/page/portal/ENC_HOME

European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas) in order to enhance the security of supply of the single regulatory space by providing a stable investment climate in which connections to Caspian, North African and Middle East gas reserves can be developed, and indigenous sources of energy such as natural gas, coal and hydropower can be exploited. Unfortunately, in my opinion, at the current stage the Energy Treaty does not provide relevant measures in order to implement this task.

i. First of all, amongst the activities of the Energy Community for the purposes of all the tasks specified in the Energy Treaty, there are no activities to be carried out in order to enhance energy security.

ii. Secondly, the Energy Treaty does not provide parties thereto with any operational measures. Without such measure, contained for instance in Directive 2005/89, parties to the Energy Treaty are only obliged to update "security of supply" statements every two years, describing in particular diversity of supply, technological security, and the geographic origin of imported fuels. The statements have to be communicated to the Secretariat and are made available to any party to the Energy Treaty. The Secretariat gives guidance and assistance with respect to such statements (see Article 29)[18]. It should be emphasized that as of today these updates constitute the sole mechanisms concerning security of supply in the Energy Treaty.

iii. Thirdly, as mentioned above, although the Energy Treaty provided that the signatory states must adopt in prescribed terms certain EU single market regulations, called the "*acquis communaitare* on energy", initially these regulations did not concern the development of energy security. In particular, it related to such important documents as the abovementioned Directive 2005/89 (adopted after the signing of the Energy Treaty, however, a few months before its entry into force) and Directive 2004/67 concerning measures to safeguard the security of natural gas supply (adopted before the Energy Treaty). Fortunately, in December 2007 the Ministerial Council of the Energy Community decided to extend the *acquis* on electricity to Directive 2005/89 and Directive 2004/67 and agreed to implement these Directives prior to 31 December 2009. Undoubtedly, this is a very important step towards fulfilling the task of enhancing the security of the supply of the single regulatory space.

iv. Finally, the Energy Community may adopt measures to foster development in areas of renewable energy sources and energy efficiency, taking into account their advantages with respect to, among other things, security of supply (see Article 35). However, there are no clear rules on how such issues as security of supply should be taken into account in this process. Additionally, it seems that the European Commission should review inclusion of provisions and programmes to replace energy infrastructure and support renewable energy by parties to the Energy Treaty, notably to reduce widespread energy poverty, energy/hydrocarbon import dependence and the harmful environmental impact of energy production, transport and use, with a more active attitude. It could help to develop renewable energy sources in the countries of the Energy Community at the Communitarian level.

[18] One should bear in mind that Article 29 does not imply a necessity to change energy policies or purchasing practices (see Article 30 of the Energy Treaty).

4. CONCLUSION

The main aim of this paper was to analyse whether the notion of "energy security" constitutes empty words in legal texts only, or whether it truly deserves to be one of the pillars of energy policy in the European Union. I decided to answer this question in a twofold way: (i) after an analysis of the regulation of energy security in Directive 2003/54 - being the most important act of secondary Community law regarding the issue of energy, Directive 2005/89 - being the most important act of secondary Community law regarding the issue of energy security, and the Lisbon Treaty - introducing for the first time a legal basis for the activities of the European Union in the energy sector and (ii) after an analysis of the energy security issue in the Energy Treaty, in the light of the abovementioned legal acts. In my opinion, the Energy Treaty constitutes a good illustration of the way of thinking in the European Union on energy security.

On the one hand, the enhancing of energy security is one the tasks of the Energy Community, on the other, except for the obligation to update every two years the security of supply statements there are no separate operational measures to safeguard the security of energy supply in the text of the Energy Treaty. The same situation was present for years with the energy law in the European Union. On the one hand, there is a process of energy market liberalisation; and an integration of national energy markets into internal energy market could substantially increase the energy security of Member States. On the other, for a long time there were no operational measures that could enhance future energy security.

This can be described as "one step forward, two steps aside" - the European Union policy on energy security. Fortunately, with the adoption of Directive 2005/89 and the future ratification of the Lisbon Treaty, the situation may change substantially. It would be of benefit to the internal energy market not only in the European Union but also throughout Europe. However, to make it more real, the European Union should also support the energy security in the territory of the Energy Community.

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ENERGY EFFICIENCY IN PUBLIC INSTITUTIONS

Kadire Murati
Lulzime Pajaziti

1. INTRODUCTION

We use energy to do work, energy lights our cities, powers our vehicles, trains, planes etc, we also use energy to warm our homes, for cooking, and a lot of other activities. Energy from the sun gives us light during the day. Energy is defined as: "the ability to do work".

The European Union nowadays imports 50% of the energy it consumes, which costs nearly 204 billion euros per year. If nothing changes until 2030 up to 70% of the energy in the EU will need to be imported. A lot of countries are facing unprecedented energy challenges resulting from increased import dependency, concerns over supplies of fossil fuels worldwide and a clearly discernable climate change. In spite of this, Europe continues to waste at least 20% of its energy due to inefficiency. The EU can and must lead the way in reducing energy inefficiency, using all available policy tools at all different levels of government and society.

Electricity consumption in the Europe has continued to grow in the last years despite numerous energy efficiency polices and programs at EU and national level. Total electricity consumption in the residential sector in the Europe has grown by 10.8% in the period 1999-2004, at almost the same rate as the economy (GDP). Despite increasing and the consequent impact on CO2 emissions, there is little knowledge at European level, where the electricity is used what is the status of efficiency of the installed and sold equipment and what is the likely impact of the past, present and planned policies.

Global challenges, climate change, peaking oil production and thus increasing concerns for energy security and climbing oil prices revealed that our current energy intensive, ‘business as usual’ practices are unsustainable. This is unprecedented problem and in our country because is a state in growth, that’s why we have non efficiency in using electricity.

Schools and universities are facing the problem of using energy in more efficient way. More schools and universities are designing their learning spaces to take advantage of daylight, but they still need electric lights to provide illumination when the sun does not. As education institutions determine what kind of electric lighting is needed in their facilities, the principal objective is to turn off as many electric lights as possible.

2. ENVIRONMENT AND ENERGY EFFICIENCY

Nowadays energy trends are not sustainable and a better balance between the three Es – energy security, economic development and protection of the environment must be found. It is very important to use technologies and practices that are currently commercially available and to promote clean technologies to achieve more success in reducing the greenhouse gases emissions and local air pollution.

The earth absorbs heat from the sun during the day, but much of it is radiated back towards space. However, the earth has a natural blanket of gases in our atmosphere, which traps a lot of the radiated heat. Without this natural "greenhouse" blanket the temperature on earth would be too low for us to survive. On planets and moons that do not have an atmosphere like the earth, the temperatures at night are well below freezing.

Burning fossil fuels causes this greenhouse blanket to thicken, trapping in even more heat from the sun. This causes the average temperature of the world to rise, which can make life uncomfortable for us if it is not stopped.[1]

Some of the energy we can use as a replacement to fossil fuels is called renewable energy. These include solar, wind, geothermal and hydro energy. These types of energy are constantly being renewed or restored. But many of the other forms of energy we use in our homes and cars are not being replenished. Fossil fuels took millions of years to create. They cannot be created over night. And there are finite or limited amounts of these non-renewable energy sources. That means they cannot be renewed or replenished. So, we must all do our part in saving as much energy as we can.

Energy security can also profit from improved energy efficiency by decreasing the reliance on imported fossil fuels. The citizens are aware of their crucial role in reaching these goals and if they resolve to introduce changes in their daily habits to save energy and help tackle climate change. Every small energy saving change of behavior counts - we must bear in mind that our individual decisions on how we live, how we work and how we move are all central to the way energy is used.

3. ENERGY AND ITS FORMS

Energy exists in all things. It cannot be created or destroyed, but it can be changed from one form to another. Energy that is stored and waiting to be released is called *potential energy*. The energy of a moving object is called *kinetic energy*.[2]

Forms of potential energy

- Chemical energy – food stored as fat in the body or power in a battery.
- Nuclear energy – the stored energy in an atom.
- Biomass energy – energy stored in a piece of firewood or dung that will be released as chemical and heat energy when the wood is burnt.

Forms of kinetic energy

- Mechanical energy – the energy of one object or substance moving another object or substance.

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[1] *Sejfullai Latif &Memeti Havzi, Pollution and protection from pollution of the environment/Tetovo 2005.*
[2] *http://www.ftexploring.com/energy/enrg-types.htm*

- Thermal energy – energy associated with heat.
- Sound energy – the energy of compression waves.
- Electrical energy – the energy of moving charged atomic particles.
- *Radiant* energy – the energy of electromagnetic waves, including light and heat from the sun.
- Light energy – light from a source such as a flame or bulb.

4. ENERGY POLICY

Working towards sustainable energy policies requires cooperation with all departments of the local and regional government. It is also important to get all local players - public and private - involved. Energy issues should be seen as everybody's responsibility; the sustainable energy policy works best, when energy issues are mainstreamed into all activities of the authority. Integrating energy requirements into already existing sustainability strategies or environmental policies of the authority might be the easiest way forward. Energy policies defines conditions for energy efficiency and promotes use of renewable energy resources

- Macedonia plans to harmonize its policies, including the ones on environment, with those of EU so as to promote closer integration with other European countries.[3]
- In order to increase the awareness for protection of the environment for students of primary and secondary schools Macedonia organizes campaigns as

  Car Free Day Campaign, public campaigns, educational events in primary and

  secondary school.

In December 2005, Macedonia was granted the status of a candidate for membership in the European Union. In the Council Decision of 30 January 2006 on the principles, priorities and conditions contained in the European Partnership with the Republic of Macedonia the Energy sector is listed with following priorities:

- Begin to align the legislation on the internal electricity and gas markets, energy efficiency and renewable energy sources with acquits in order to gradually open the energy market to competition.
- Strengthen the independence of the Energy Regulatory Commission.
- Start implementing the Energy Community Treaty.
- Enhance administrative capacity in all energy sectors.

[3] *http://www.eva.ac.at/enercee/mk/energypolicy.htm*

Macedonia has signed the Treaty for the establishment of a European Energy Community in October 2005.

5. TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

Efficient energy use, sometimes simply called energy efficiency, is using less energy to provide the same level of energy service. An example would be insulating a home to use less heating and cooling energy to achieve the same temperature. Another example would be installing fluorescent lights and/or skylights instead of incandescent lights to attain the same level of illumination. Efficient energy use is achieved primarily by means of a more efficient technology or process rather than by changes in individual behavior.

Energy efficient buildings, industrial processes and transportation could reduce the world's energy needs in 2050 by one third, and be crucial in controlling global emissions of greenhouse gases, according to the International Energy Agency.[4]

Technologies that capture and store carbon dioxide emitted from power stations and industrial processes could contribute to about one fifth of emission reductions possible by 2050, says the International Energy Agency (IEA). Fostering energy technology innovation is a central part of the IEA's work. Development and deployment of safer, cleaner, more efficient technologies is imperative for energy security, environmental protection and economic growth. IEA experience has shown that international collaboration on these activities avoids duplication of effort, cuts costs and speeds progress.

The IEA's Technology Collaboration Programme deals with technologies for fossil fuels, renewable energy, efficient energy end-use and fusion power, as well as electric power technologies and technology assessment methodologies. IEA Implementing Agreements offer the framework for collaborative research projects. Benefits include pooled resources and shared costs, harmonization of standards and hedging of technical risks. Among the many areas covered by Agreements are bio energy, solar heating and cooling, wind turbine systems, advanced fuel cells and electric vehicles.

6. ENERGY EFFICIENCY IN SCHOOL AND UNIVERSITY CAMPUSES

Everything starts with education. School and university campuses need lighting — for security, safety, aesthetics and navigation. Except lighting students use different kinds of energy resources for other activities such us heating and warm water. That's why students need to be more energy conscious using energy sources.

The main goal of the school staff is to reduce energy consumption when there is no need, in this manner they also reduce pollution because environmental problems caused by emission of CO_2 need to be solved as soon as it is possible.

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[4] *N. Daci (1998): Chemistry of ambience, Industrial polution-prevention,Department of Natural Sciences, Book 5, Prishtina.*

Students need to be more energy conscious. Some schools need to reduce light pollution and promote the value of high-quality nighttime lighting and they have adopted to improve their energy conservation include photovoltaic panels that collect solar energy and convert it to electricity. Effective day lighting strategies, used with lighting controls and dimming systems, can reduce or eliminate the need for electric lights during the school day. Day lighting also reduces the demand on cooling systems. To achieve these goals we need to work all together – teachers, maintenance staff and students.

Schools and universities should build and operate their facilities more efficiently and continually to look for ways to reduce energy use. One of the easiest and most effective components of energy management is lighting control. Many schools can install lighting controls that significantly reduce unnecessary lighting usage.

No school is identical, but most have comparable spaces and lighting needs. For these spaces, lighting-control professionals can identify specific control strategies that will provide appropriate lighting and minimize unnecessary lighting. If the lighting process is not properly managed, lighting can become a maintenance problem.

Even if we are aware that the education starts in the early years in the way how we manage the use of electricity, all we know that institutions are the key for achieving better education and how to use energy in more efficient manner.

7. PRESENTATION OF THE RESULTS FROM THE INTERVIEW MADE IN THE SEEI AND PERPARIMI

The interviews made in these two institutions gave us a review that shows a big difference in using energy and energy efficiency, although they are too close in distance. We made the interview with the Facility Directors in both institutions and we are going to present these results:

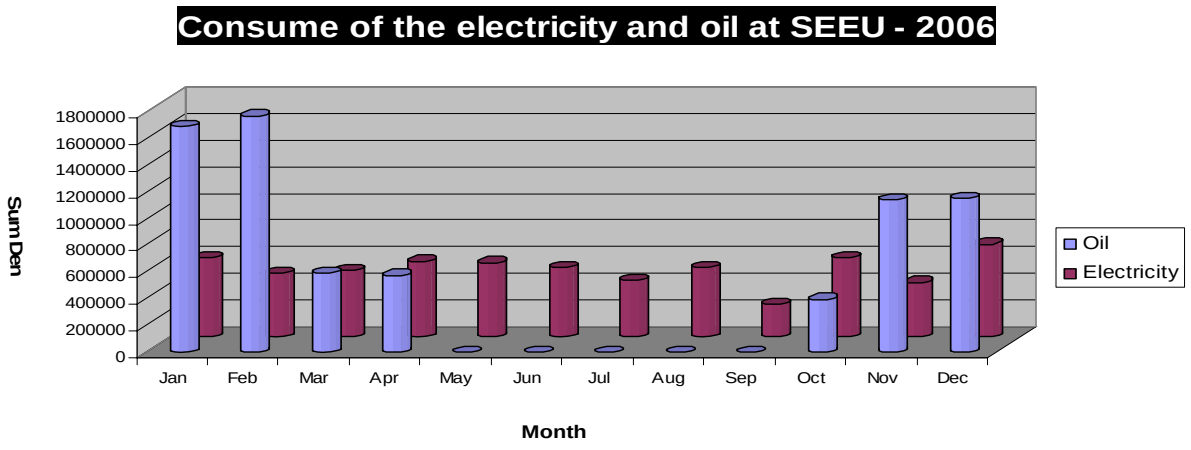
The result from the SEE-University:

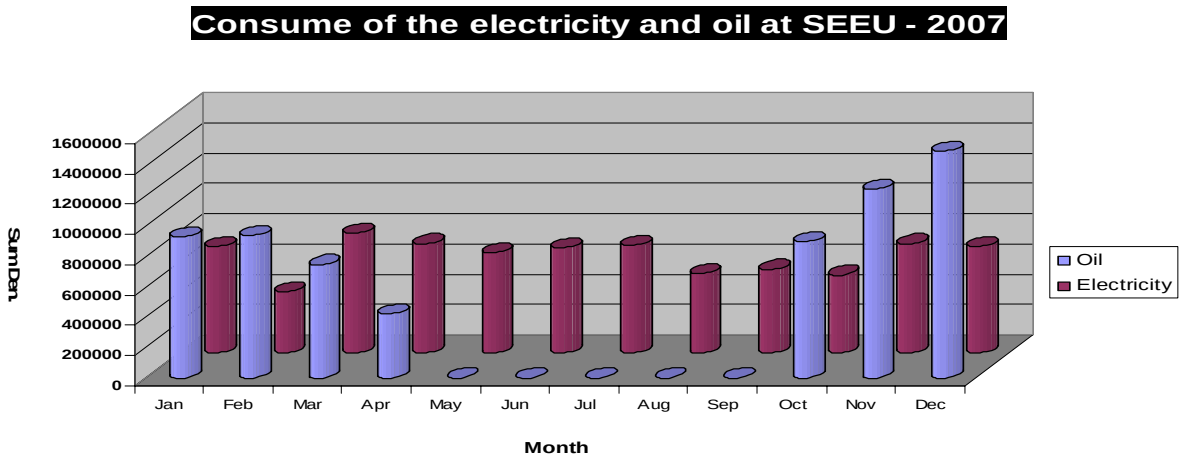
- The need for energy at SEEU is for lighting, warm water, heating, cooling and other electrical appliances (which are from the latest generation products that increase electrical efficiency), but in the new building, central cooling system contributes for more efficiency.
- We have two types of insulation in the building: prefabricate elements (made according to standard with high coefficient of isolation) and classical structure (made from bricks). In the first group are inclusions 58% of all building area, and in the second group 42%. All construction is made in that way to have more windows in buildings and to have maximum natural light.
- The lightning is from fluorescent materials which gives high efficiency, the outside lightning is automatic with non affect of human factor and they are from last generation, with high lightning and less spending of electricity – metal halogen. Till the night the light aglow is in minimum, which is refund with security system.

- The building areas covers 29 000 m^2 and all of them are heated with oil-central heating, so we use technology with manual system for regulation of energy. The dormitory buildings cover 24% of all building area, and are heated non-stop. The other areas are heated with quote practice through the day, and in night they are leaving in standby.

- The purpose of the activity of saving and efficient use of energy is the unique way for doing better in this important field. In SEEU there are plans to install metering center for following the active, reactive energy and maxi Graf. For attending consume of electricity and heating energy they need to develop SCADA system (Supervisory Control and Data Acquisition) which will help every time to do the "ironing" of the maxi Graf to have permanent control for consumption of the energy. This system of data acquisition should work in cooperation with specified organs such as switch-plugs, cut-outs etc. to manage the overcharge of the electricity. The management will proceed with hardware installation which might be one of these grid systems: MODBUS, PROFIBUS, CANOPEN, TCP/IP ect, with support of software system, in the level of the expert system in the section of artificial intelligence, which is expressed by neuron grids or genetically algorithm.

The year consumption of the electricity and oil are shown below and we can see that the difference between two graphics is evident, because in 2007 we have the new building with 5000m^2 which affects in the yearly bills.

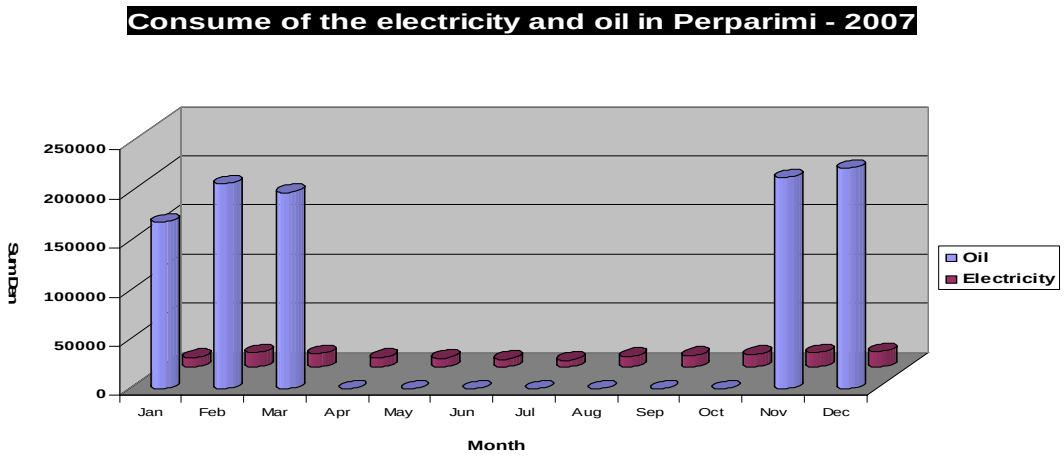




The result from the Primary School - Perparimi:

- The need for energy in Perparimi is for lighting, heating, and some electrical appliances (for heating some offices-radiator, refrigerator), which are not efficient, because they are old and most of them damaged and this is the reason for higher electrical consumption.
- The building is made from walls of classical structure (made from bricks), 100% of building area is covered by this type of walls, and also a part of windows and doors are made from wood and are old and damaged. In this case we could not have efficient energy use.
- The lightning is from electrical bulbs (non fluorescent) so that do not have high efficiency, the outside lightning is damaged and few of the bulbs are in good condition. The heating energy is used during the day and at night they are switched off.
- The building areas covers 931 m^2 and all of them are heated with oil-central heating, so we use technology with manual system for regulation of energy. The central heating is active during the day and in night they are switched off.

- The year consumption of the electricity and oil is shown in the graph below and we can see that the electricity consumption is higher due to inefficient insulation and inefficient energy use.



8. CONCLUSION

From the interviews made in this two institutions we can conclude that there is a big difference between them, although they are near in distance but very far in efficient energy use.

One of the reasons is inappropriate education for saving the environment and inappropriate energy use. There are lots of simple things that we can do to save energy right now, which will reduce carbon dioxide emissions and help fight climate change. The same thing can be done and in school buildings if energy consumption is under control. The schools are responsible for managing their energy and that is why they need to do it in an efficient way.

The first and most important thing that these institutions can do is to give a little attention to controlling energy costs or to give energy management a higher priority.

Schools can improve the present conditions by motivating staff and pupils to adopt good housekeeping practices ensuring that the heating system is running at optimum efficiency and that there is a regular program of checking thermostats and time switch settings, boiler maintenance and so on identifying where investment can achieve worthwhile energy savings, eg more energy efficient light fittings, and better controls for the heating system.

That is why pupils and students need to be educated and informed about the environment problems and they should be more conscious about their behaviour. All of us need to contribute in energy sector, which is the biggest polluter of the environment, but also is the most important factor and necessary in our every day life.

We hope that in nearly future, we will do the right step to use renewable resources which are available in our region, and with this we can contribute in energy efficiency and will save energy for future generations with no use of non-renewable resources.

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Interview made with Facility Director in Perparimi (February, 7th 2008).

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OBSTACLES TO PUBLIC PARTICIPATION IN ENERGY DECISION-MAKING IN SOUTHEAST EUROPE

Maja Barisic

1. INTRODUCTION

Public participation sets a system of checks and balances, facilitates sustainable development and equitable wealth distribution[1] and safeguards healthy environment. By having *access to information*, by *participating* in energy projects that affect their environment, and by having *access to justice*, citizens increase the accountability and transparency of decisions taken by their governments, companies and intergovernmental institutions.

This paper will give a comparative overview of obstacles to public participation in three *energy projects* in three states of Southeast Europe, namely Bulgaria, Croatia and Bosnia and Herzegovina. The presumptions among investors and state bureaucrats[2] is that publics are either not interested or not educated enough to participate in highly technical policy-making, or even that greater participation would lead to inefficiency and chaos.[3]

EU approximation of Southeast European countries implies strengthening of legislative provisions for public participation, but not their implementation in energy decision-making.

Environmental organizations of Southeast Europe lack local experience and expertise, at the same time having the prevailing attitude of governments as opponents, rather than partners. Governments see environmental NGOs as an unproductive or even counterproductive part of the society, due to the post-socialist political culture that stands no critique; *higher public (state) interest*; or corruption bonded to energy projects. Low public awareness about energy projects and environment contributes to incompliance of competent authorities. Relations between energy projects and participatory democracy are complex to the extent that the list of obstacles can hardly be exhaustive. Publics have a recognized right to participate in energy decision-making, which gives impetus to exploring and mitigating these obstacles.

2. PUBLIC PARTICIPATION IN CONCEPT AND THE LAW

Public participation can be defined as "any interaction between governments, companies or international agencies and civil society […] including the process by which stakeholders enter a discourse, create partnerships, share information, and otherwise interact to create, implement and evaluate de-

[1] Barry Barton, "Underlying Concepts and Theoretical Issues in Public Participation in Resources Development," in *Human Rights in Natural Resources Development – Public Participation in the Sustainable Development of Mining and Energy Resources*, eds. Donald Zillman, Alastair Lucas, and George Pring (Oxford: Oxford University Press, 2002).
[2] Ibid.
[3] David W. Orr, "US Energy Policy and the Political Economy of Participation," *The Journal of Politics* 41 (1979): 1027-1056.

velopment policies, projects and programs."[4] From a process-based point of view, it raises public awareness, fosters a sense of empowerment in participants, strengthens local communities and other groups, reduces conflict among competing interests, facilitates governmental accountability and contributes to the legitimacy of decisions. Substantively observed, public participation contributes to equitability of results; it is more environmentally protective, more reflective of local needs and public values.[5] Public participation consists of the right to access to information, right to public participation in environmental decision-making, and right to access to justice. All three pillars of the concept are best protected on regional levels, especially North American and European.[6]

When talking about regional instruments of environmental law, *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters* (Aarhus Convention) is the most elaborated instrument in terms of all three pillars. Even though mainly European, States Parties to the Convention are also US, Canada and Israel, as well as the European Community.[7] Aarhus Convention entered into force in 2001 and since then, Union is transposing the three main pillars of the convention into EU legislation.[8] The pillar of access to justice has not been transposed into the Community Law and these obligations are to be exercised by the Member States, parties to the Convention themselves.[9] Apart from the Aarhus Convention, UNECE has adopted the *Convention on Environmental Impact Assessment* [EIA] *in a Transboundary Context* in 1991[10] and an additional *Protocol on Strategic Environmental Assessment* [SEA] in 2003, both of which the European Community is a Party to as a legal entity since 1997 and 2005 respectively.[11]

Bulgaria has ratified the Aarhus Convention in 2003 and fully reflected it in the national legislation through the *Access to Public Information Act*, and the *Environmental Protection Act*, while access

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[4] George Pring and Susan Y. Noe, "The Emerging International Law of Public Participation Affecting Global Mining, Energy and Resource Development," in eds. Donald Zillman, Alastair Lucas, and George Pring (Oxford: Oxford University Press, 2002), 15.
[5] Ibid. 22
[6] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 19.
[7]United Nations Economic Commission for Europe, *Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*, 25 June 1998.
[8] "Directive 2003/4/EC of the European Parliament and the Council on public access to environmental information of 28 January 2003 and repealing Council Directive 90/313/EEC" *Official Journal of the European Union*, 2003, L 41/26-32, and "Council Directive 2003/35/EC of 26 May 2003 amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC" *Official Journal of the EU*, 2003, L 156
[9] "Council Decision 2005/370/EC of 17 February 2005 on the conclusion on behalf of the European Community of the Convention on access to information, public-participation in decision-making and access to justice in environmental matters." *Official Journal of the EU*, 2005, L 124/0001 - 0003
[10] "United Nations Economic Commission for Europe Convention on the EIA in a Transboundary Context of 25 February 1991," and "Protocol on the SEA to the Convention on the Environmental Impact Assessment in a Transboundary Context of 21 May 2003," *United Nations Economic Commission for Europe*, http://www.unece.org/env/eia/welcome.html
[11] "Council Directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment," *Official Journal of the EU*, 1997, L 73, and "Council Directive 2003/35/EC of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programs relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC," *Official Journal of the EU*, 2003, L 156

to justice is available only under the Administrative Procedure Code.[12] In the European Community Law, access to justice pillar falls under the competence of the Member State, but in Bulgaria this pillar is not regulated extensively enough, being surely a challenging segment of the Convention's implementation.

Croatia ratified the Convention in March 2007 and transposed it into several national regulations and by-laws, including the *Law on Environmental Protection*,[13] *Freedom of Access to Information Act* (FOIA),[14] having also the regulations on EIA and SEA.[15]

Regulation, especially in respect to EIA, is still deficient in Bosnia and Herzegovina.[16] Access to information is covered by FOIA, on state and entity levels.[17] Specific provisions of public participation are given in entities' environmental legislation, namely the *Law on Protection of Human Environment* of Republic of Srpska[18] and Federation of BiH laws on protection of air, waters, environment and nature.[19] Entity environmental protection laws define mechanisms for public participation in plans, programs and strategies, but also in the EIA procedures for investment in energy sector. However, participation in drafting of energy regulations is limited, if any, even though guaranteed under *Rules on Consultations in Legislative Drafting*.[20] Notable progress was made when the country finally ratified the Aarhus Convention in July 2008.

3. UNEMPLOYED LEGISLATION, DEPLOYED GEOPOLITICS

Southeast European countries, with respect to different stages of EU approximation, are found in economically, administratively, politically and legally differing circumstances. EU approximation implies strengthening of public participation in energy decision-making in legal terms, but not in terms of implementation of the provisions, at least initially.

4. LEGAL FRAMEWORK AND POLITICAL BOUNDARIES

"Even though environmental conditionality is more stringent towards candidate countries than old member states, in order not to make environmental issues a main obstacle to enlargement, candi-

[12] Bulgaria, Ministry Of Environment And Waters, *National Implementation Report*, UNECE Applications web site, May 7, 2008 http://apps.unece.org/ehlm/pp/NIR/listnr.asp?wf_Countries=BG&wf_Q=QA&Quer_ID=NIR8&LngIDg=EN.
[13] *Republic of Croatia Official Gazette*, 110/2007, 25 Oct 2007, http://narodne-novine.nn.hr/
[14] *Republic of Croatia Official Gazette*, 172/2003, 29 Oct 2003, http://narodne-novine.nn.hr/
[15] *Republic of Croatia Official Gazette*, 64/2008, 4 Jun 2008, http://narodne-novine.nn.hr/
[16] European Commission**,** Commission staff working document, "Bosnia and Herzegovina 2008 Progress Report" accompanying the Communication from the Commission to the European Parliament and the Council, *Enlargement Strategy and Main Challenges 2008-2009*, (EUR-Lex Publications Office, Nov 5, 2008), http://eur-lex.europa.eu/SECMonth.do?year=2008&month=11
[17] *Bosnia and Herzegovina Official Gazette* 28/2000, 17 Nov 2008; *Federation of BiH Official Gazette*, 32/2001; *Official Gazette of Republic of Srpska*, 20/2001.
[18] *Official Gazette of RS*, 28/2007
[19] *FBiH Official Gazette*, 33/2003
[20] *BiH Official Gazette*, 81/2006

dates were excused for non-compliance,"[21] Bulgaria being one of these countries. Implementation mechanisms and compliance of state authorities in this new member state are lacking. Reports on compliance are compiled by government officials,[22] and rarely include input from non-state actors. The extensive regulatory framework in Croatia, for an individual citizen, is a labyrinth that requires lawyer's knowledge, especially in a politicized and highly technical area such as energy. Access to information is too often denied by the administrative bodies under the clause of *higher national interest*, within which oil and gas pipelines are probably right next to army facilities. One obvious problem to be expected in BiH that just accessed the Convention is the lack of expertise in environmental NGOs to use legal procedures when these rights are violated, correlated to the lack of environmental law experts in BiH.

Even though environmental protection in Croatia is under competencies of two ministries,[23] and in Bulgaria even more, administrative challenges in these two countries are similar to any other European state. Political system of Bosnia and Herzegovina, its politically difficult legacy and political boundaries make the issue more complex. Several layers of government hold competence over environmental protection. Apart from the state *Ministry of Foreign Trade and Economic Relations*, entity ministries have greater competence and authority, to the extent that entities can use the mechanisms of *Espoo Convention*[24] in managing inter-entity relations concerning environmental protection. The transboundary context of BiH rivers creates difficulties in managing water resources in sustainable and harmonized manner.[25] One aspect where both entities' ministries (of environment and of energy) will have to master the joint efforts is a common *Energy Strategy of BiH* in the making.

To summarize, when it comes to provisions of the Aarhus Convention being transposed into the national legislation, access to information and public participation in decision-making are extensively elaborated on in all three cases. In case of access to justice, if wanting to challenge a decision on refusal of providing information on energy or environment, legal paths do exist, though not so often used in the area of energy. Legal routes require capacity of the organization, environmental law expert, in some cases bylaws are lacking, while sustainable management of natural resources is even more difficult in a transboundary context, between, and within countries.

5. ENERGY MARKET AND ACCOUNTABILITY

Vacuum in implementation of environmental legislation in Balkan countries makes these markets attractive for Eurasian energy investors, because the legislation itself, combined with lack of re-

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[21] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 44

[22] Bulgaria, Ministry Of Environment And Waters, *National Implementation Report*, UNECE Applications web site, May 7, 2008
http://apps.unece.org/ehlm/pp/NIR/listnr.asp?wf_Countries=BG&wf_Q=QA&Quer_ID=NIR8&LngIDg=EN

[23] Ministry of Environmental Protection, Physical Planning and Construction and the Ministry of Culture

[24] "United Nations Economic Commission for Europe Convention on the Environmental Impact Assessment in a Transboundary Context of 25 February 1991," *United Nations Economic Commission for Europe*, http://www.unece.org/env/eia/welcome.html.

[25] Miralem Variscic, *Rijeka bez povratka – Ekologija i politika velikih brana* [*River without Return – Ecology and policies of large dams*] (Konjic: Organization for environmental protection Green Neretva, 2006), 19.

sources of a country to fully obey it, and lack of public interest to exercise scrutiny over the issues, enables smooth investment. Free-market economy argues that environmental and social injustices are not a matter for a state to compensate, but the economic growth will result in trickle-down effect from which the poor and their environment would, eventually, benefit.[26] Unfortunately, "environmental externalities are not always internalized in the costs of goods and services, meaning that the investment costs do not reflect the full societal costs."[27]

Part of the pressure on Balkan environment comes from geopolitical constellations on the energy market of Europe and United States. To decrease its dependency on Russia, EU is developing a strategy of *diversifying sources and routes of supply*. Global climate change effects require immediate action through *decreasing GHG emissions without endangering economic growth and levels of employment*.[28] Crude oil is still the primary source of petroleum and other derivates used for transport and industry of EU, while dependency on imported energy resources rate amounts to 54.[29] From SEE, EU expects regulated internal energy markets, ownership unbundling and interconnectedness. Beyond this, attracting investment and becoming a transit zone for oil and gas supplies is best Balkans can gain, having no significant energy resources of their own. The imperative of EU accession, combined with the imperative of economic growth, and interests of national governments to stay in power, all interlink in energy projects.

Among numerous oil and gas pipelines constructed or planned across the Balkans,[30] two projects have created impetus for public participation in energy projects. *Burgas - Alexandropoulos Pipeline* (BAP line) is a trilateral agreement between Russia, Bulgaria and Greece,[31] designed to connect the Bulgarian Black Sea port of Burgas with the Aegean Sea port of Alexandropoulos for transport of Russian oil delivered to Burgas port by tankers. "Russia's 51 % interest in the project gives her control over the entire oil pipeline, and this is the best guarantee of uninterrupted flow of Russia's crude oil to Europe."[32] The project should alleviate Bosporus and Dardanelle congestion, where the demurrage of tankers costs more than investment into new pipelines.[33] The construction works will start in 2009 and should finalize by 2011, while the costs have risen from the initial 800 million to 1.5 billion Euros.[34] Bulgarian revenue from oil transit, estimated at 35 to USD 50 million a year, forms about 10 percent of the overall revenues from fisheries and tourism, Burgas gulf's main sec-

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[26] David W. Orr, "US Energy Policy and the Political Economy of Participation," *The Journal of Politics* 41 (1979): 1027-1056, 1049

[27] "Impact Assessment," Annex to the communication of the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, *Thematic strategy on the sustainable use of natural resources*, Commission of the European Communities, SEC (2005) 1683, http://ec.europa.eu/environment/.

[28] "Green Paper - A European Strategy for Sustainable, Competitive and Secure Energy," Commission of the European Communities, 2006, 105, http://ec.europa.eu/energy/green-paper-energy/index_en.htm.

[29] Aldo Spanjer, "Russian Gas Price Reform and the EU-Russia Gas Relationship: Incentives, Consequences and European Security of Supply," *Energy Policy* No.35 (2007), 2892.

[30] "INOGATE Map of Natural Gas Pipelines - Portal" and "Map of Crude Oil Pipelines – Portal" *About INOGATE – Portal*, http://www.inogate.org/en/resources/map_oil (accessed December 8, 2008).

[31] Agreement was signed in March 15, 2007 after a decade of negotiations, mainly focused around the issue of shares in the project. On the May 31, 2007, Bulgarian parliament ratified the agreement, without consultations. The parliamentary opposition boycotted the voting for the lack of information on the issue.

[32] Transneft, "Balkan Transit," Transneft, April 15, 2007, http://www.transneft.ru/press/

[33] Ibid.

[34] "Bulgaria: 9 Banks Keen to Advise Burgas-Alexandroupolis Pipeline Project," seeurope.net, http://www.seeurope.net/?q=node/16173.

tors, while it might seriously endanger both.[35] Project is lead and initiated by Russians, and signed by the socialists - led government.

Druzhba – Adria Pipeline Integration Project connects the Russian oil pipeline Druzhba (Russian Samara – Belarus – Ukraine - Slovakia – Hungary) to the Croatian part of Adria pipeline, which would have to be reversed in order to transport the Russian oil to the Adriatic deep-water terminal of Omisalj. Six states signed the *Agreement on Cooperation* in 2002,[36] but national parliaments have been reluctant to ratify it, especially those of Croatia and Ukraine. In 2005, the Croatian commission set up to assess the EIA conducted by investor - hired experts, rejected the study for being deficient for public hearings procedure. Though Russians temporarily gave up on the project, at *2007 June Energy Summit* in Zagreb, and *2009 April Energy Summit* in Sofia both sides reaffirmed their interest. Due to Croatia's high oil and gas import dependency, and its eagerness to participate in South Stream,[37] Croatian Government is sending unambiguous message to its citizens that Croatia is ready to take on the route Putin wants.

Bosnia and Herzegovina's chance to expand its energy generation system lies, as is predominantly seen by entities' governments, in hydropower potential. Among numerous small and medium scale hydropower plants (HPP), those planned for the upper flow of *Neretva River* are, by definition, not renewable sources, because of their own emissions and low efficiency.[38] In September 2006, FBiH Government adopted a decision on proclaiming HPP Glavaticevo, Bjelimici I and II, among other, projects of *higher public interest*, obliging competent entity authorities to grant the concession to the investor *Intrade Energija*.[39] FBiH Ministry of Energy, Mining and Industry (FMEMI) officially started negotiations with *Intrade Energija* on planning, construction and utilization of three HPP on Upper Neretva in 2008.[40] The investing consortium conducted the feasibility study and the preliminary study of environmental impact for the project of *Hydropower System Gornja Neretva*.

Common European approach towards the suppliers is still in the making, while pressures on SEE governments are exercised by former EU Member States' officials chairing the shareholders' committees of oil and gas companies, and by Russian presidential -prime ministerial figure himself. Energy Commissioner's positive nod to highly lucrative, but environmentally rather questionable projects such as oil pipelines, is there. The fact that transit countries of SEE are still internalizing democratic governance principles, such as transparency and accountability, leaves practically no institute on watch over environment.

6. DIFFERING OBJECTIVES WITHIN PUBLICS

Transition to market economy, though initially producing severe socio-economic consequences, had rather positive impact on environment, due to state-owned industrial polluters' collapse. Economic

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[35] "BSP Pomorsko opposes declaration in support for referendum about Burgas – Alexandropoulos pipeline," *Focus New Agency* 22 July 2007
[36] Transneft, "Druzhba Adria Pipeline Integration Project," Transneft 2002, www.transneft.ru/Projects.
[37] Gazprom, "South Stream Project," Gazprom http://www.gazprom.ru/eng/articles/article27150.shtml
[38] Jin-Li Hu TaichenChien, "Renewable Energy and Macroeconomic Efficiency of OECD and Non-OECD Economies" *Energy Policy* 35 (2007): 3615.
[39] Government of FBiH, "Zakoni," Government of FBiH http://www.fbihvlada.gov.ba/bosanski/zakoni/index.php.
[40] *BiH Official Gazette* 40/2008, http://www.sllist.ba/oglasi/2008/federacija/broj40/broj40.htm

recovery, privatization and elimination of state monopoly in public services led to, once again, environmental degradation. Increasingly, environmental movements in SEE are searching for their place in decision-making, having to overcome a variety of obstacles to public participation.

6.1. Bulgaria

EC Directive on EIA states: "Member States shall ensure that any request for development consent and any information gathered pursuant to Article 5 are made available to the public within a reasonable time in order to give the public concerned the opportunity to express an opinion before the development consent is granted."[41] Therefore, in the case of BAPline, the EIA had needed to be conducted and deliberated with publics concerned before the ratification in the parliament, which was not the case.[42]

Environmental NGOs, e.g. *Za Zemiata*, disapprove of the pipelines in general. They are concerned with the sustainability of energy consumption, with the impact of pipelines on environment and the region in which the choices are being made in favour of economic growth against environmental sustainability.[43] Profits are distributed unevenly, while pipelines can have adverse impact on human health, environment and social conditions.[44] The organizations are members of the transnational, *Central East European Bankwatch Network*, watching over transparency, accountability and sustainability of financial institutions' investment.[45] Being skilful as advocates and watchdogs of influential transnational networks, government does not look at them benevolently. On several occasions, interrogative,[46] intimidating and life-threatening[47] methods have been exercised over members of these NGOs, by state and non-state actors.

As part of the strategy to launch public debate on the question, Bulgarian members of the CEE Bankwatch, in cooperation with Burgas branch of *Ecoglasnost* and *Ecological Committee for Protection of Burgas and Vromos bay*, set up a public hearing for local stakeholders, with guests from Azerbaijan and Georgia, to share experiences and opinions.[48] From that initial public hearing, an idea of local referendums was born.[49] Up to this point, two referendums with support from the municipal councillors were held in the Burgas gulf's municipalities of Burgas and Sozopol, facing in-

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[41] "Council Directive 1997/11/EC of 3 March 1997 amending Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment" Art.6/Par.2, *Energy Community EU Legislation on Environment*, www.energy-community.org

[42] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 61-8

[43] Fidanka Bancheva McGrath, *Za Zemiata Sofia*, interview by author, Sofia, Bulgaria, July 18, 2007.

[44] Petko Kovachev, *Institute for Green Policy Sofia*, interview by author, Sofia, Bulgaria, August 3, 2007.

[45] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 61-68.

[46] Elitsa Grantcharova, "Defining 'environmental terrorism' - News news," Bulgaria News, Sofia News: The Sofia Echo, http://www.sofiaecho.com/article/defining-environmental-terrorism/id_24556/catid_5.

[47] Jan Haverkamp, "Leading Bulgarian anti-nuclear activist receives death threat," *Social Rights Bulgaria* 8 March 2005 http://www.socialniprava.info/article1053.html.

[48] The public debate was held on 23 July 2007 in Burgas, with presence of representatives of NGOs active in the Baku-Tbilisi-Ceyhan pipeline, local environmentalists, politicians and media.

[49] Manuk Manukyan, *Ecoglasnot*, Burgas, interview by author, Burgas, Bulgaria, 23 July 2007

sufficient turnout, but those that cast their vote were predominantly against the pipeline construction.[50] Unfortunately, "international matters could not be resolved with municipal referendum, […and] results in Burgas [and Sozopol] only showed the need for strict environmental measures for the pipeline construction."[51] In November 2008, the *Trans Balkan Pipeline* consortium that will construct the pipeline was to hold a presentation of the project in Burgas, but the event was interrupted by a rally of around fifty individuals busting into the conference hall.[52]

Environmental organizations from Sofia are more advocacy groups than epistemic communities and by default hold less influence in decision-making. They certainly have capacities to take a more epistemic approach to energy investment, as members of these organizations are also competent experts, but in function they represent a critical mass that monitors, informs, starts the debate, activates and promotes the essence of public participation, even in circumstances of silent oppression or passive oblivion.[53] This is precisely the role that environmentalists from Sofia played in the process, even though information on the project was (purposefully) deficient from the start, though public was not given the opportunity to dismiss the project, but only to modestly modify it, and even though objectives of other stakeholders were different.

Local stakeholders oppose the pipeline project because they were excluded from decision-making, no clear guarantees for environmental conservation were given, while doubts about how profitable this investment is for the local community are the most often used arguments, reaffirming that public is rather reluctant to accept environmental risks without compensation for opportunity costs.[54] Local population assumes that little benefit and most of the unaccounted costs will fall on their shoulders, partially because Russia initiated, and the leading Bulgarian Socialist Party signed the contract.

6.2. Croatia

With the already existing approximately 500 tankers that enter the Adriatic Sea every year, the problem of ballast waters was one of the main objections that ecologists held against the reversal of the Adria pipeline.[55] With the reversal of the pipeline, the tankers would be entering the Adriatic with ballast waters from the ports of departure, and discharging them in the sea, together with new

[50] "Bulgaria: void referendum in Bulgaria's Burgas rejects overwhelmingly oil pipeline," *Sofia News Agency* http://www.novinite.com/view_news.php?id=90495.
[51] Ibid.
[52] "Protesters cause cancellation of presentation of Burgas- Alexandroupolis project" *Sofia News Agency* http://www.novinite.com/view_news.php?id=98820
[53] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 61-68
[54] Andy Gouldson, "Risk, Regulation and the Right to Know: Exploring the Impacts of Access to Information on the Governance of Environmental Risk," *Sustainable Development*, 12 (2004) 136-149. Scholars Portal E-Journal Browse, http://scholarsportal.info
[55] Ibid. 66-69

species and pollution from the ports of departure, but also the risk of oil spills in the shallow northern Adriatic, for which it would take years to recover, would increase.[56]

Local NGO *Eko-Kvarner* and *Green Action* from Zagreb with support from transnational networks managed to attract the attention of publics. Due to public pressure, Ministry for Environmental Protection required the EIA to be carried out prior to the ratification of the agreement in the parliament. At that time, *Green Forum Network*, an umbrella association of 32 environmental organizations was created, and managed to collect 50,000 signatures against the project in a national campaign.[57] In spring 2004, a *Committee for Protection of the Adriatic Sea* was formed, which slowly facilitated involvement of academics, economists, journalists, scientists, artists and religious organizations. In 2005, a campaign for proclaiming the Adriatic a *Particularly Sensitive Sea Area* started, with the support from transnational environmental NGOs and international research institutes.[58] These activities influenced further development of the project and participation of general public.

Jadranski naftovodi (JANAF, Adriatic Oil Pipelines) submitted the EIA in July 2004, with certain parts of the study being omitted from public access, provoking more distrust towards politicians.[59] The secrecy clause was misused in this case because JANAF is a joint stock company, in which the leading shares hold the state and its institutions, which makes requirements for accountability even higher. Publics have the right to any information that might facilitate a competent decision.[60]

According to opinion polls, 54 percent of population, mostly coastal, whose livelihoods depend on fisheries and tourism, opposed the project.[61] "According to the agreement, […] JANAF would earn between USD 50 and 80 million annually. Compared to more than USD 4 billion which comes from tourism, revenues from the pipeline are too small to take the risk. In addition, Croatia currently earns USD 163 million from fish exports, twice as much as the pipeline would bring even in the best case scenario."[62]

Depleting oil reserves, constant encouragement from the EU to secure resources and routes, and the Russian interest, bring the Croatian Government back to the beginning of the process. Putin demands the exact same route as per the initial project, and publics already categorically said *no*.

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[56] Nenad Mikulic, "Presentation by the Head of Environmental Impact Assessment Department of the Ministry of Environmental Protection" 8 April 2005, North Atlantic Treaty Organization – Science for Peace and Security, CCMS Plenary Session http://www.nato.int/science/2005/070405-brussels/

[57] "Public Participation in Croatian Environmental Impact Assessment Procedures," *Zelena Akcija – Friends of the Earth* 2 (2005)

[58] Davor Vidas, "Particularly sensitive sea area (PSSA) for the Adriatic Sea" *Fridtjof Nanses Institute, Norway* (2005) http://www.fni.no/projects/pssa_adriatic.html

[59] Maja Barisic, "Public Participation – Balkans at the Crossroads of Energy Security and Environmental Sustainability" (Unpublished Master Thesis, Sarajevo and Bologna: European Regional Masters in Democracy and Human Rights, 2007), 66-9.

[60] Davor Vidas, "Particularly sensitive sea area (PSSA) for the Adriatic Sea" *Fridtjof Nanses Institute, Norway* (2005) http://www.fni.no/projects/pssa_adriatic.html

[61] "Publics about Druzhba Adria," *Gfk Center for Market Research* September 13, 2004, www.gfk.hr

[62] Ivona Malbasic, "Druzba – Adria Pipeline," *South East European Environmental Information* 2 (October 2003), www.see-environment.info

6.3. Bosnia and Herzegovina

Hydropower System of Upper Flow of Neretva River is a project with possible severe ecological and societal consequences on local communities, as argued by environmental NGO *Green Neretva* from Konjic. They have taken the *Campaign for the Protection of Neretva River* to a country level, including numerous civil society organizations from both entities. Green Neretva published two expert analyses of possible consequences of large HPP, which include adverse impact on river tourism; deterioration of habitat of autochthonous species of fish; sinking of 406 hectares of land and loss of 18 kilometres of river; exacerbated seismic sensitivity of the area by the water reservoirs' pressure; and increased air humidity.[63]

In October 2006, the organization launched a petitioning campaign against large HPP on Neretva, with civil movement *Dosta!* (Enough!) petitioning in capital Sarajevo, and five organizations in Mostar, a town in Herzegovina whose economy largely depends on Neretva.[64] All together, 56 organizations of civil society have petitioned against,[65] and 15 thousand signatures were sent to the government of FBiH on several occasions, always returning to the sender.[66] The petition was successfully ignored by highest state officials,[67] but it provoked significant media attention and support from citizens.

Konjic municipal officials organized two round tables with representatives of three competent ministries, and several public enterprises, the investing consortium, local officials and *Zeleni Neretva*.[68] In cocnclusion, the municipality expected to be a part-owner of the HPP facilities, receiving 10 % of revenues, and reinvestment of profits' percentage into the municipality's economy.[69] The final objective of the non-environmental publics concerned was not to stop the construction, but rather to secure gains for the local population, in order to alleviate possible socio-economic and environmental consequences. Efforts of environmental organizations in this case had positive impact on raising awareness of local population and elected officials, through firstly monitoring, informing the wider publics and decision-makers of their attitude, advocating, and petitioning.

However, HPP on Neretva were proclaimed projects of *higher public interest*, the concession was given to the investor *Intrade Energija*[70] and negotiations initiated in 2008.[71] The divide between the

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[63] Amir Variscic, ed., *Nas pogled na hidroenergetski system Gornja Neretva* [*Our Perspective of Hydropower System of Upper Flow of Neretva River*], (Konjic: Organization for Environmental Protection Green Neretva, 2007), 7-8

[64] "Bitka za Neretvu: Potpisivanje peticije za sprjecavanje izgradnje hidrocentrale na Neretvi, [Fight for Neretva: Petitioning against Construction of New Hydropower Plants on Neretva River]," *Bljesak – BH Internet Magazin* November 17, 2006, www.bljesak .info.

[65] "Peticija protiv izgradnje brana na Neretvi," ["Petition against construction of hydropower plants on Neretva River,"] *Green Neretva*, December 4, 2006, www.zeleni-neretva.ba

[66] "Udruzenje Zeleni Neretva demantiralo izjave Harisa Silajdzica" [Organization Zeleni Neretva Confuted the Statements of Haris Silajdzic], *Communication Art*, June 11, 2008 http://www.comart.mapabih.com/a2/index.php/nw/8168.html

[67] "Reagovanje: Dezinformacija ili skrivanje istine," [Reaction; Disinformation or Hiding the Truth], *Green Neretva*, February 5, 2008 http://www.zeleni-neretva.ba/index.php?option=com_content&task=view&id=111&Itemid=1

[68] "Presentation of the Hydro-Energetic System Upper Neretva Project," *Intrade Energija*, http://www.intrade.co.ba/intrade-energija/index.php?subaction=showfull&id=1161191096&archive=&start_from=&ucat=&

[69] Ibid.

[70] "Decision on determining the public interest, commencing of preparation works, selection of strategic partners and concession granting," *FBiH Official Gazette*, 60/2006.

[71] *BiH Official Gazette* 40/2008, http://www.sllist.ba/oglasi/2008/federacija/broj40/broj40.htm

ruling coalition partners put an end to the project. As opposed to the interests of local population, political support and private interests of key politicians play a more important role in any project's future in BiH. Environmentalists helped to disclose these interests to publics, but the official attitude towards public participation still remains as an obstacle.

7. CONCLUSIONS

Balkans' environment is under pressure of degradation due to imperatives of economic growth and energy security, exacerbated by unaccountability of governments and investors, and only modestly safeguarded by local communities and environmental organizations. Aarhus Convention was not ratified in Croatia and BiH at the time when Druzba – Adria and HPP on Neretva became interesting for their governments, unlike is the case in Bulgaria. Bulgaria is the closest one to the project realization, but studied influences indicate that it is only a matter of time when Druzhba-Adria will enter the process of construction. Being a party to the Aarhus Convention does not safeguard in itself the realization of public participation rights, nor does EU approximation. What these three states are lacking are externally strong and internally accountable governments, implementation mechanisms, expertise with environmental organizations and, truly, higher public interest in energy resources.

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INFLUENCE OF CLIMATE CHANGE ON DIATOMS DIVERSITY INDICES IN LAKE PRESPA

Andreja Naumoski
Kosta Mitreski

1. INTRODUCTION

Applying machine learning techniques into ecology have proven to be useful into obtaining knowledge for certain problems. Using these diversity indices (DIs) it will be very useful to model the specific diatom communities which are known to exist only in definite environmental conditions. This property is used to model the abiotic environment influence on diatoms.

Using the diatom relative abundances into account, a diversity index depends not only on species richness but also on the evenness, or equitability, with which individuals are distributed among the different species. Diversity indices provide important information about rarity and commonness of species in a community. The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure (River diatoms: a multiaccess key). Understanding how these indexes interact with physical-chemical parameters of the given environment is very useful to know. Parameters like temperature, dissolved oxygen, pH, ammonia and others are one of the few that are vital for diatom survival (Reynolds. C. S., 1998). This is why we build models to see how diatoms diversity indices response on the changes of these parameters.

In order to extract this knowledge from the ecological data we use machine learning techniques. The most researched type of machine learning is inductive machine learning, where the experience is given in the form of learning examples. Machine learning (and in particular predictive modelling) is increasingly often used to automate the construction of ecological models (Džeroski, 2001), (Joergensen, 2001). Most frequently, models with regression trees of diversity indices and population dynamics are constructed from measured data by using machine learning techniques. The most popular machine learning techniques used for modelling diversity indices include decision tree induction and rule induction.

In this paper, we focus on applications of machine learning in ecological modelling, more specifically, applications of modelling diversity indices. We will use a dataset, which has been collected from different measurement stations placed in Lake Prespa, as a part of the EU project TRABOREMA (TRABOREMA Team, 2005-2007). Several important parameters are measured, which reflect the physical, chemical and biological aspects of the water quality of the lake. From

these measurements, several diatoms (algae) belonging to the group Bacillariophyta) will be considered for estimating a relationship between their relative abundance, and then calculated their diversity indices and the abiotic characteristics of the habitat. Diatoms are known to be almost ideal bio-indicators of the environment in several studies (Van Dam H., 1994).

The paper is organized as follows. Section 1 introduces with idea of the diversity indices modelling and the main purpose of this paper, the diversity indices models for Lake Prespa, in Section 2 we give an overview of the diversity indices modelling and introduction to machine learning, with a briefly description of the approach to machine learning that is often used in this kind of modelling: decision tree induction and rule induction. The measured data, the main diatom bio-indicators and data collection procedures are presented in Section 3, while Section 4 describes the diversity indices models which were built for several diatoms from lake and rivers measurements. Section 5 concludes and gives directions for future work on this subject.

2. DIVERSITY INDECES MODELLING

The output of a diversity indices model is some property of the population of the target group of organisms at the spatial unit of analysis. There are two degrees of freedom here: one stems from target property, the other from the group of organisms studied. In the simplest case, the output is just the presence/absence of a single species (or group). In this case, we simply talk about diversity indices models.

The input to a DIs model is a set of environmental variables, which in our case are two different kinds. The first kind concerns abiotic properties of the environment, e.g., physical and chemical characteristics. The second kind concerns some biological aspects of the environment, which may be considered as an external impact on the group of organism under study. In our case the biological aspects of the environment are the diversity indices of diatoms abundance.

2.1 Machine learning for diversity indices modelling

The input to a machine learning algorithm is most commonly a single flat table comprising a number of fields (columns) and records (rows). In general, each row represents an object and each column represents a property. In machine learning terminology, rows are called examples and columns are called attributes (or sometimes features). Attributes that have numeric (real) values are called continuous attributes. Attributes that have nominal values are called discrete Attributes. The tasks of classification and regression are the two most commonly addressed tasks in machine learning.

They are concerned with predicting the value of one variable from the values of other variables. The target variable is called the class (dependent variable in statistical terminology). The other variables are called attributes (independent variables in statistical terminology). If the class is continuous, the task at hand is called regression. If the class is discrete (it has a finite set of nominal values), the task at hand is called classification. In both cases, a set of data is taken as input, and a predictive model is generated. This model can then be used to predict values of the class for new data. The common term predictive modelling refers to both classification and regression. Given a set of data (a table), only a part of it is typically used to generate (induce, learn) a predictive model. This part is referred to as the training set. The remaining part is reserved for evaluating the predictive performance of the learned model and is called the testing set. The testing set is used to estimate the performance of the model on new, unseen data.

2. 2 Decision Trees

Decision trees are hierarchical structures, where each internal node contains a test on an attribute, each branch corresponds to an outcome of the test, and each leaf node gives a prediction for the value of the class variable. Depending on whether we are dealing with a classification or a regression problem, the decision tree is called a classification or a regression tree, respectively.
Model trees, where leaf nodes can contain linear models predicting the class value, represent piecewise linear functions. Most algorithms for decision tree induction consider axis-parallel splits. However, there are a few algorithms that consider splits along lines that need not be axis-parallel or even consider splits along non-linear curves. A commonly used procedure for estimating the performance on unseen cases is cross – validation.

2.3 Diversity indices for physical-chemical modelling

Diversity indices provide important information about rarity and commonness of species in a community. The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure. By taking relative abundances into account, a diversity index depends not only on species richness but also on the evenness, or equitability, with which individuals are distributed among the different species.
In this paper we present two indices which have the greatest correlation between the index of the diatoms and the abiotic parameters of the environment: Shannon diversity and Shannon Evenness using the WEKA and CLUS systems for machine learning. These indices are important to estimate

dominance of the spices in the community, evenness and richness of the community. In this way, every index is important and depends only of the questions we ask about the species that are enrolled in the experiment. We are interested to model the diatoms community, which latter will be used as bio indicator of the environment.

Nevertheless, we have taken into the experiment several other indices, but most of the testing correlation coefficients are very low. The influences of the abiotic factors on the community structure are captured using the regression trees from both systems.

3. DATA FOR LAKE PRESPA

3.1 Data acquisition methods and instruments

This section provides information about the instruments and procedures used for measuring data. The physical parameters: Temperature, Conductivity, pH, Transparency and Dissolved Oxygen are field measured with HANNA instrument (TRABOREMA Team, 2005-2007). The Oxygen Saturation and the Oxygen Deficiency are obtained by mathematical analysis, while the BOD is obtained by the HANNA instrument. The chemical aspect of water quality is represented by measuring NH4, NO3, NO2, Total_N, Organic_N, Inorganic_N, Total_P and SO4 obtained by a spectroscope from an analytical set. The rest of the chemical elements: K, Na, Mg, Cu, Mn, Zn are measured analytically with AAS by wet digestion, while the chlorophyll data are obtained with an analytical procedure from the spectroscope, following the extraction. Samples for analysis were taken from the surface water of the lake at several locations.

In the usual environmental monitoring and screening (like the one during the TRABOREMA project) diatom cells are collected by a planktonic net or as an attached growth on submerged objects (plants, rocks or sand and mud), preserved in 4% formaldehyde, treated for cleaning of the cell content in laboratory and preserved in permanent slides mounted in Naphrax (i.d. 1.73). Diatom species composition and abundance in the sample is determined under a light microscope (Nikon Eclipse E-800) and obtained by counting of 200 cells per sample (slide). The specific species abundance is then given as a percent of the total diatom count per sampling site (Levkov Z., 2006). Following the basic postulate (Washington, 1984) that the species composition of a given bio-indicator reflects the state of the environment in a given sample, both spatial and temporal, the dominant diatom community determined at a specific site is expected to be directly related to the measured environmental

parameters (abiotic component) if a good correlation is obtained, the correlation can be used as reliable indicator.

3.2 Bio-indicators of the water quality

The data used in the study came from EU project TRABOREMA. The data covers one and a half year period, from 3.2005 to 9.2006. In total, 320 water samples were available, 224 from the lake measurement stations and 96 from the river stations, on which both physical/chemical and biological analyses were performed, the former provided the environmental variables for the habitat models, while the latter provided information on the relative abundance of the studied diatoms. The diversity indices are calculated by the mathematical formula of the indices that is used widely in the literature (Meredith, 2007).

These diatoms are more or less influenced by the following physical and chemical parameters (water properties): temperature dissolved oxygen, oxygen saturation, oxygen deficit, transparency, conductivity, pH, nitrogen compounds (NO2, NO3, NH4, Total_N, Inorganic_N, Organic_N), phosphorus compounds (Total_P), SO4, Na, K, Mg, Cu, Mn, Zn. The datasets for each diatom contain 224 measurements from the lake sampling stations.

4. DIVERSITY INDICES FOR LAKE PRESPA

The DI models presented in this paper model/predict the diatom diversity indices which are influence by the physical-chemical parameters of environment for Lake Prespa. We have selected the Shannon Diversity Index and Shannon Evenness to be the most suitable for building the models with the abiotic characteristics. These 2 diversity indices have largest correlation with the physical-chemical parameters. These four (two from WEKA two from CLUS) models will help us to find a correlation between the diatoms diversity indices and the characteristics of the sampling sites. The models with greatest correlation gain from the 10-fold cross-validation procedure will be presented below.

To build a regression trees that will reflect the diversity indices and their influence of the diatoms habitat, the M5P algorithm implemented in CLUS and WEKA are used (J.R., 1992), (M. Garofalakis, 2003), (Witten, 1999).

Table 1. Correlation coefficients gained by the M5P algorithm using CLUS and WEKA systems – Lake Single Target

Diversity Indices – Lake Data	Training set Lake	Testing set Lake
Shannon Entropy DI - CLUS	**0.7806**	**0.618**
Shannon Evenness - CLUS	**0.839**	**0.69**
Diversity Indices – Lake Data	Training set Lake	Testing set Lake
Shannon Entropy DI - WEKA	**0.6216**	**0.4942**
Shannon Evenness - WEKA	**0.645**	**0.5216**

Table 2. Correlation coefficients gained by the M5P algorithm using CLUS and WEKA systems – Rivers Single Target

Diversity Indices – River Data	Training set Rivers	Testing set Rivers
Shannon Entropy DI - CLUS	**0.8671**	**0.2141**
Shannon Evenness - CLUS	**0.8595**	**0.1891**
Diversity Indices – River Data	Training set Rivers	Testing set Rivers
Shannon Entropy DI - WEKA	**0.5502**	**0.0861**
Shannon Evenness - WEKA	**0.5412**	**0.1424**

The results from the experiments conducted on the diversity indices are given in Table 1 and 2, both from lake measurements data and rivers measurements data, respectively. Presented correlation from the both WEKA and CLUS system with 10-fold cross-validation correlation shows that CLUS system predicts the relationship between the biological and abiotic factors with greater precisions.

4.1 Diversity indices model for diatoms Shannon Evenness - WEKA system

The regression tree constructed for Shannon evenness is given on Fig 1. From the regression tree it is obvious to see that the most influence parameters on the diatoms evenness according Shannon formula is NO_3. Secondly important physical-chemical parameters are temperature and Deficit of Oxygen (DefiO). According to the generated Linear Models (LM) 1 and 6, has largest value for Shannon Evenness. They are achieved if NO_3 > 2.718 mg/l and DisO > -1.74 mg/l for LM1 and plus if Total Phosphorus concentration is smaller than 26,925 mg/l.

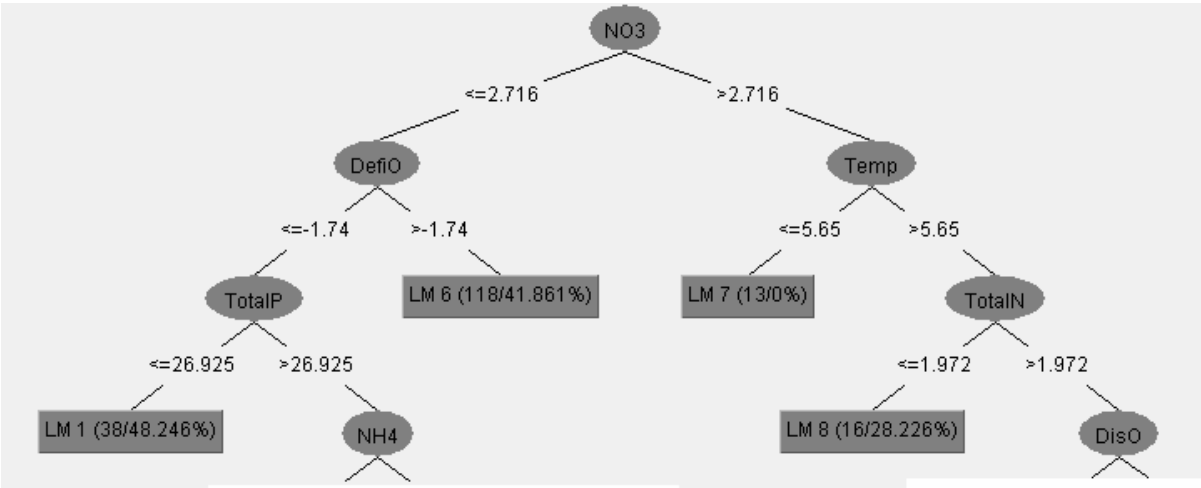

Fig. 1 – Regression tree predicting the most influence parameters on the diatoms Shannon Evenness for the Lake Prespa

The model obtained from the river measured data didn't show build any prediction tree between this diversity index and the river physical-chemical parameters. The evaluated performances of the models are summarized in Table 2.

4.2 Diversity indices model for diatoms Shannon Evenness - WEKA system

The regression tree constructed for Shannon Evenness is given on Fig 2. From the regression tree it is obvious to see that the most influence parameters on the diatoms evenness according Shannon formula is Temperature. According to the generated regression tree model, 94% of the instances taken into account are predicted to be where temperature is higher than 5.5 °C. What this means for the index? The Shannon Diversity Index commonly used to characterize species diversity in a community, which means that if the temperature > 5.5 °C, Conductivity < 240 µS/cm and Zn concentration is lower than 17.1 mg/l and Dissolved Oxygen of the water is lower than 11.2 mg/l we have 0.75 indices of Shannon. This environment according the model is suitable from diatoms existence. In contrast, if the concentration of the Zn in greater than 17.1 mg/l we have lower score for

this diversity index is 0.16. This is expected, because the Zn concentration negatively influences on the diatoms. Most of the high concentrations of the heavy metals like Zn are toxically for the diatoms. Only strict concentrations of this chemical element are allowed to coexist with the environment of the diatoms.

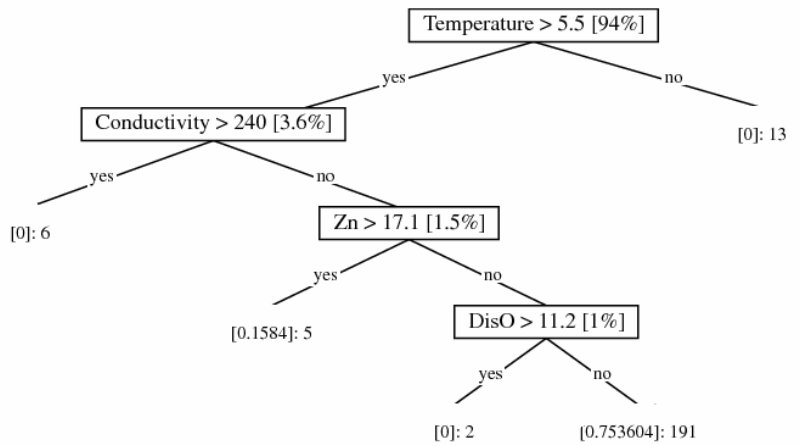

Fig. 2 **–** Regression tree predicting the most influence parameters on the diatoms Shannon Evenness for the Lake Prespa

Yet according to the biological expert, diatoms can be used to reconstruct patterns of water temperature, pH and values of eutrophication patterns (Svetislav, 2007).
While the models obtain from the river measured data didn't show produce any decision tree between this diversity index and the river physical-chemical parameters.

4.3 Diversity indices model for diatoms Shannon DI - WEKA system

The previous indices show the evenness of the diatoms in the lake and the rivers, while the Shannon index will present the diversity entropy of the diatoms in Lake Prespa. The generated model is shown on Fig 3.

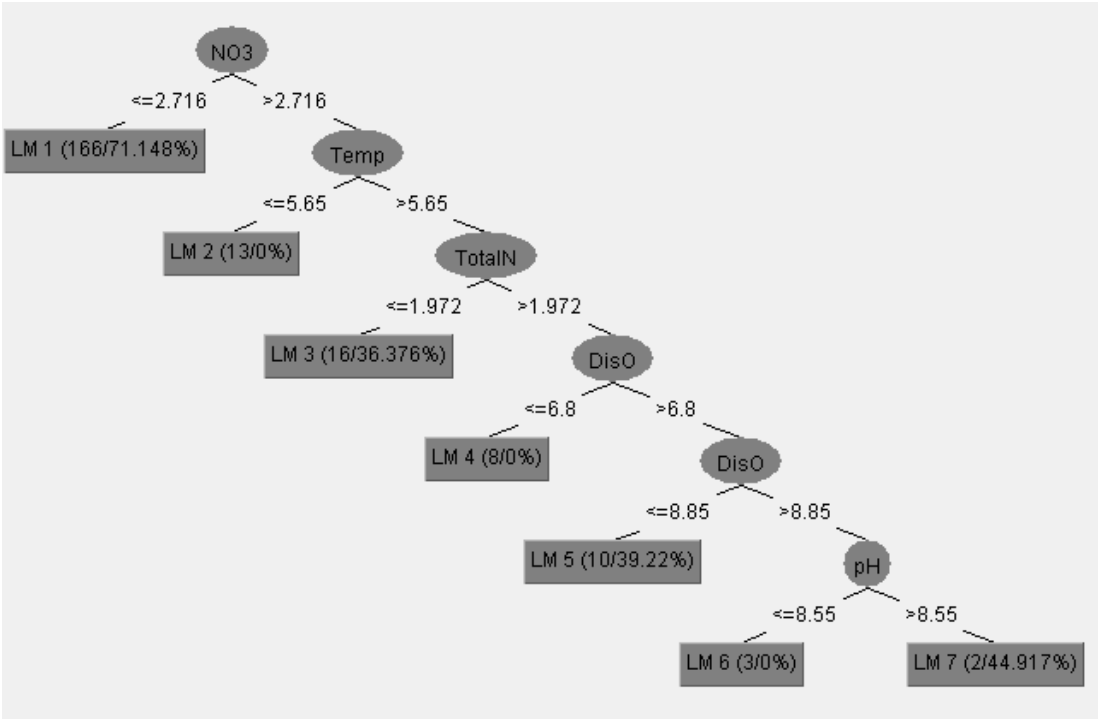

Fig. 3 **–** Regression tree predicting the most influence parameters on the diatoms Shannon Diversity Index for the Lake Prespa

The model shows that NO_3 is the most important environmental parameter, while the Temperature is second. This model is very similar to the case for the Shannon Evenness model. According the LM (Linear Model) prediction, LM1 have largest value, while the LM2 have the lowest value.

4.4 Diversity indices model for diatoms Shannon DI - CLUS system

The previous sections we present various indices of the Lake Prespa diatoms, while the Shannon evenness index is presented in this section. The generated model from the entire lake diatom structure is shown on Fig 4.

The model shows that temperature is the most important environmental parameter, while the Conductivity is second. This model is very similar to the previous presented indices. The lowest values for this index is 0.29 under temperature > 5.5 °C and Zn > 17.1 mg/l, while the highest values of Shannon diversity index of 2.25, if the temperature is greater than 5.5 °C. From the state above, we can conclude that positive influence on the diatom diversity indices we have if the environment temperature is greater than 5.5 °C. But, if the concentration of Zn is greater than 17.1 mg/l we have negative influence of the environment on the diatoms.

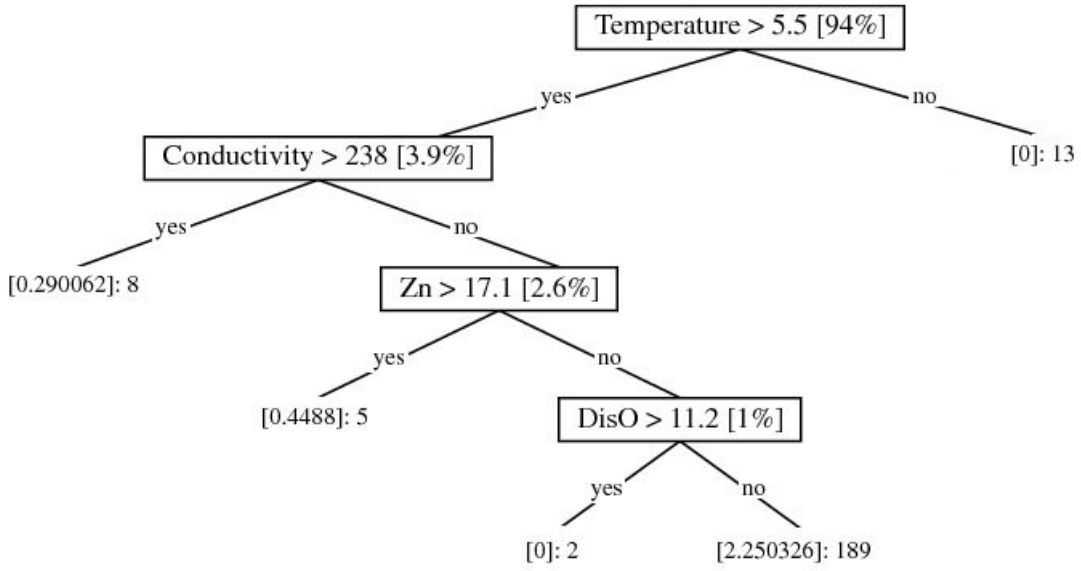

Fig. 4 **–** Regression tree predicting the most influence parameters on the diatoms Shannon Diversity Index for the Lake Prespa

This is expected because the Zn – heavy metal is toxic in the water for the diatoms life cycle. With this model we conclude the diversity modelling experiment and rule inductions.

5. CONCLUSION

In this paper, we applied machine learning techniques to learn a predictive model for two diversity indices of diatom species in Lake Prespa. Regression trees, which are piece-wise constant functions, are learned from measured data gained from the lake and river sampling stations, for the entire Lake Prespa, acquired within the monitoring programme of the EU project TRABOREMA. For comparison, we also developed linear regression models.

The learned models show that the most important factors influencing the diatoms diversity indices are the temperature and NO_3, while the Zn and Dissolved Oxygen (DisO) are second important. All the models given in this paper are first attempt to model the diversity indices of the diatoms in Lake Prespa. With these models we try to reveal some of the eutrophication patterns that exist in the Lake Prespa using the diatoms as bio-indocators (Moss, 1973), (Levkov, 2007).

Important to note here, that variable of the temperature and NO_3 concentration highly depends from outside factors. Nitrogen loading from the human activates - industry, while the temperature from the human activity - CO_2. As the climate models shows the temperature in the next 50 years will increase, which puts in danger existents of the diatoms according these presented models.

The experiments showed that machine learning tools can extract some valuable knowledge in a relatively comprehensible form, even when the application area is so extremely complex also for humans and the data are far from being perfect. Note that, any ecosystem cannot be fully described with all its inside process, because the model will be complex for any analysis to be performed.

Our work shows that certain rules for the diversity indices are possible to extract by using machine learning techniques. Consequently, the decision makers could improve the waste water management policy to prevent the future deterioration of the environment and the related biota.

We plan to conduct further investigation for the other diatoms in Lake Prespa and more diversity indices with more sampling data. Later we can divide the datasets via distributions: one distribution of the abundance from site to site, and other time distribution by months. In this way we will see, how the diversity indices will change in space and time. More importantly, we plan to build models predicting the structure of the community, i.e., the relative abundance for all diatom species simultaneously. For this purpose, we intend to use the machine learning methodology of multi-objective regression trees.

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Andreja Naumoski is born in 1983 in Struga, Republic of Macdonia. In 2006 he gained a University Degree from Faculty of Electrical Engineering and Information Technologies in Skopje, Macedonia as Electrical Engineering. In 2008 was awarded a Degree of MSc in Computer Science specialized in area of Eco-informatics with his MSc Title Thesis "Dynamic and habitat suitability models of Lake Prespa". He is currently working on 2 projects at the Faculty of Electrical Engineering and Information Technologies in Skopje, Macedonia. From April 2008 he start his work on his PhD Thesis titled "New classification algorithms for analysis and knowledge discovery using diatoms as bio-indicators of aquatic ecosystems" improving the ecological knowledge about the diatoms community used as bio-indicators with state-of the art information technologies, methods and algorithms of data mining methodology.

ENERGY POLICY AND RESOURCES: THE CZECH REPUBLIC CASE

Jakub Maščuch
Edmond Zeneli

1. INTRODUCTION

Currently, a political and experts discussion about situation in the sector of energy takes place in the Czech Republic. The points of interest are questions of domestic energy sources, imported sources, energy safety and future of nuclear energy, which represents important section in electricity production. Our contribution is focused on consequences published in professional papers and does not aims on analysis of economical and political conditions that are often highly unprofessionally influenced by the Green party.

2. BASIC FACTS ABOUT CZECH REPUBLIC

The Czech Republic (CR) is an inland state with total area of 78 864 km^2 and a population of 10.2 million inhabitants. Since the 19th century the country has become highly industrial, and during the 20th century the industry played the most important role. Between 1948 and 1989 the country belonged to Soviet Union's (S.U.) place of interest, which led to strong market connection at S.U. In these years mainly heavy industry was being developed. After the change in 1989 the country went through great economical change caused by losing Soviet markets. Today economy still remains export-oriented and the industry produces particular part of the GDP. It means relatively high energy consumption per unit of GDP compared with other EU-countries, shown on following figure. Some of the best known trademarks in abroad are e.g. Škoda Auto, Škoda Plzeň, ČKD and Tatra.

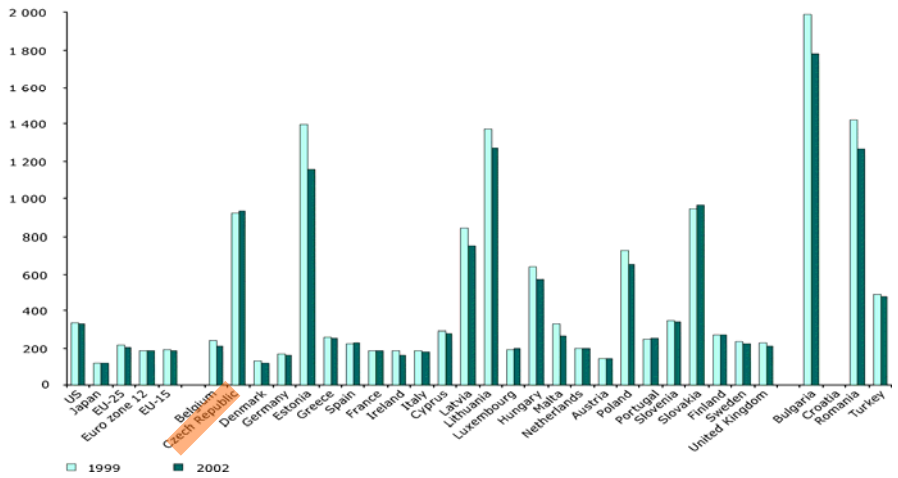

Figure 1- Gross inland consumption of energy divided by GDP, Kgoe per EUR 1000 (European Environment Agency, 2006)

3. PRIMARY ENERGY SOURCES

In the beginning, it is necessary to give an overview of primary energy sources distribution in the Czech Republic. The most important source for industry and energy production is lignite coal, followed by hard coal and natural gas. In transportation, the main source is oil. Natural gas and oil are almost 100% imported from abroad.

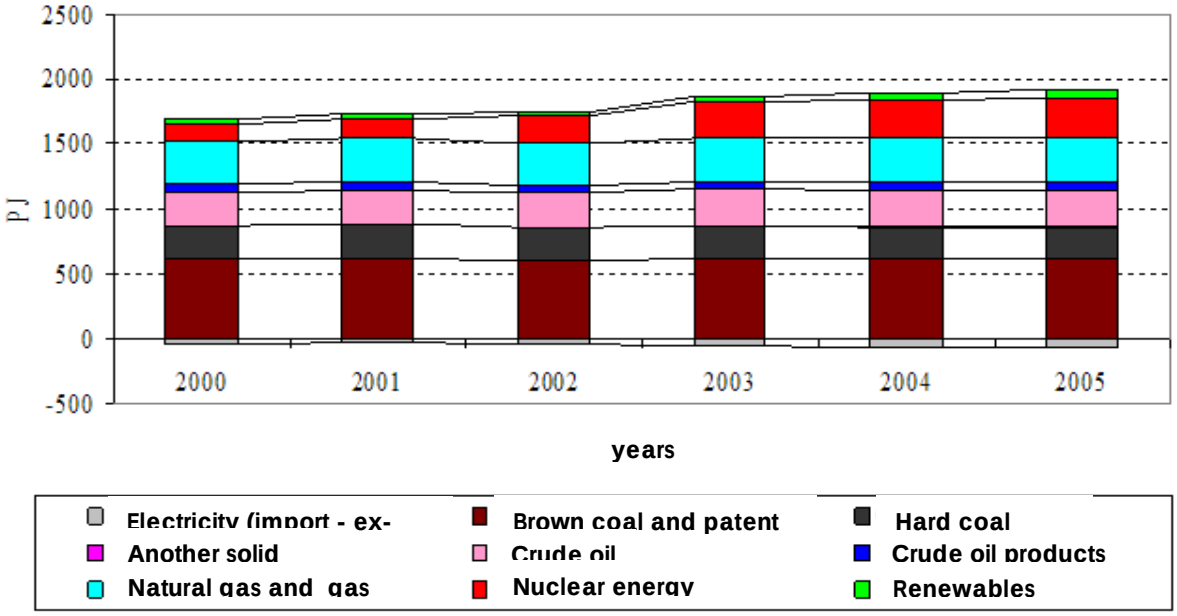

Figure 2 – Energy consumption by sort of primary energy sources (PES), (Vupek-economy 2005)

In the following part of the paper we will focus only on the energetics. The term "energy" includes energy for industry, production of electricity and production of heat and warm water for households. Energetic issues can be divided into following topics:

- electricity production;
- energy supply for industry;
- district heating system (district heating system with cogeneration plant);
- local (individual) heat production in households.

3.1. Electricity production

The most important source of electricity are thermal power plants using lignite coal (in smaller extent hard coal), the second one are nuclear power plants. These are complemented by large hydropower plants and combined steam and gas cycles. Renewable energy sources in electricity genera-

tion represent only negligible part with share of 3.87% gross production in 2007, (see following figure)[1].

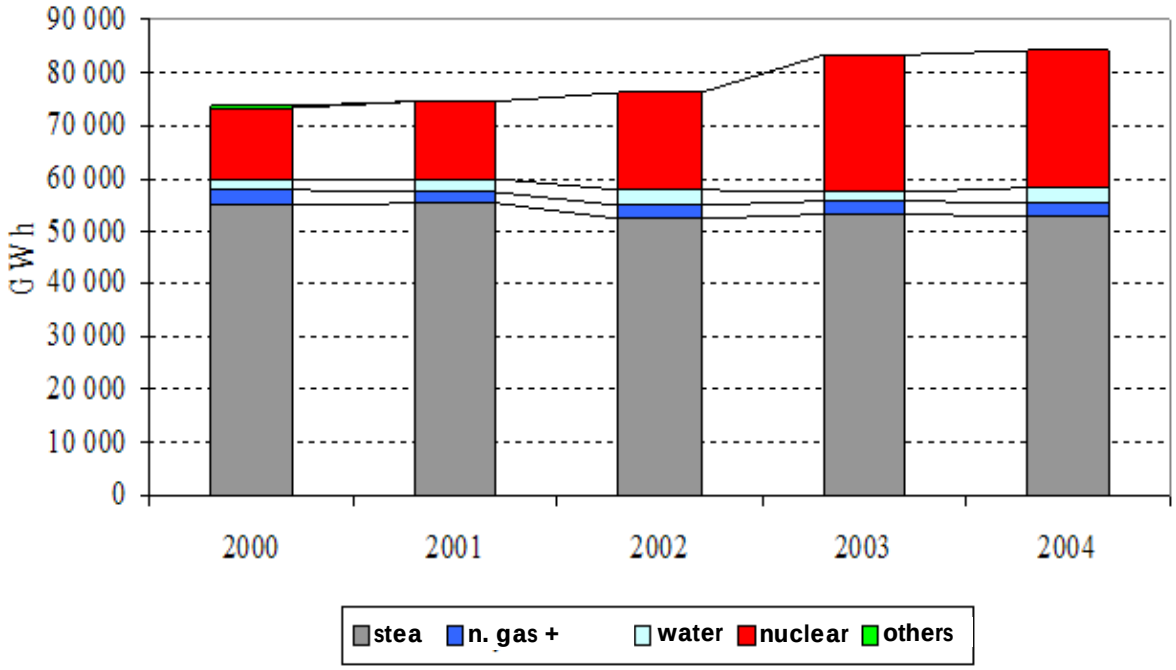

Figure 3 – Gross electricity production (Vupek-economy 2005)

3.2. Energy supply for industry

Industry is the most important energy consumer in the CR. It uses all kinds of primary energy sources (PES) and energy stocks. Large industrial companies use mainly lignite coal and hard coal, medium size companies mainly natural gas and rarely biomass. Large companies usually uses electricity self-supply by means of CHP, medium size and small companies usually buy electricity on the market.

3.3. District heating systems (District heating systems with Combined Heat and Power)

The heat supply for households is significantly ensured by CHP. The heat generation in CHP is important energy product. However, big problem of the CHP plants is fixed orientation on utilization of lignite coal, with small share of hard coal. Currently it increases the share of natural gas and biomass for energy generation.

[1] N. gas + comb. includes natural gas fired power stations and power stations with combined cycles.

3.4. Individual heat production

In this section are presented all sorts of PES including lignite, hard coal, natural gas and biomass, which are particularly used in rural areas.

Further in the text several PES issues will be discussed, particularly lignite coal, situation in nuclear energy and renewable energy sources.

4. LIGNITE COAL

Lignite coal is the most important PES. In the beginning of 90's, there have been introduced territorial ecological limits that mean limits for lignite coal exploitation by legislation. By the time going it turns out to be clearly political and energetically inconvenient decision.

Large energy companies that operate important production sources near the lignite coal mines do not expect any fuel supply failures in the following 40 years, because they directly own or influence the lignite coal mines. They can supply enough fuel even for newly constructed supercritical power stations and retrofitted power stations. The territorial exploitation limits will mainly influence the heat production sector, which currently makes strong benefit of the CR due to large share on heat production, with PES savings.

Supposed replacement of the lignite coal by natural gas or biomass (the most promising Renewable Energy Source) can not be economically effective. It is economically unbeneficial to provide enough biomass even in small share in lignite coal substitution. By the same energy content, biomass has 7 to 12 time higher volume than coal. In brings great problem into transportation, where would be required enormous growth of road cargo transport, because it would be not possible to use railway transport in the same extent. Current energy consumption of the heat production sector is about 11 times higher than total estimated biomass potential, average heat production plant would not be able to cover more than 3 – 15% of its fuel needs in biomass from 70-80 km surroundings.

When converting to natural gas the problem with insufficient capacity of main gas pipelines as well as local gas connections appears. In the time of the gas network construction there was no expectation of connecting so large consumers. Furthermore, the CR is fully dependent on natural gas import (domestic consumption approx. 9 269 mil. m^3/year). The growing rate in 5 years is expected up to 1 mld.m^3 (Nehoda, 2008).

Main advantage of the district heating is operating energy sources large enough to be able to use low quality fuels in economically, ecologically and energetically effective way. The high degree of fuel utilization is reached by extensive use of CHP.

If the use of natural gas and biomass would be increased, despite technological difficulties, the final products (heat, electricity) would be charged by increased fuel costs. The price of heat could be doubled and electricity production would become non-profitable. Limitation of CHP operation and following ecological impacts would be a result of household's conversion from district to individual heating supply.

All these facts confirm that the lignite coal plays non-replaceable role in conditions of the CR.

5. NUCLEAR ENERGY, A TABOO?

The second conference of European Nuclear Forum took place in Prague between 22-23 May 2008, with participation of European Commissions leaders and prime ministers of CR, Slovakia etc. The aim of this meeting was estimation of nuclear energy role, opportunities of its growth, safety. Another discussed concern was information of community about nuclear energy considerations and that in many countries still exist a gap on that issue. Europe today faces lack of energy sources and lack of skilled experts for nuclear energy as well. Who could be interested in a field without future prospect? "Supporting nuclear experts' education and training, as well as research of new generation reactors is our task" (Topolanek, 2008), insisted the Czech Premier. Nuclear energy is not included in the EU plans for providing energy safety by the year 2020. In despite of that, nuclear energy is a low-emission source. Furthermore, nuclear energy represents a hundred year guaranteed source. Though the situation in the EU is changing, still the share of nuclear energy decreases. Every year three reactors are closed, and less are constructed. One of the main tasks of European forum was to change this situation. This process has started with the meeting in Bratislava. Some aspects of nuclear power were taken into consideration as economic advantages, the assumed risk and methods of convincing people of nuclear necessity. Harmonization of regulations for nuclear energy, and disposal of nuclear waste was another important issue among the forum discussions. According to some surveys approximately 70% of Czech population agrees with construction of new nuclear power station. New energy sources exploitation is required. Now is time to act considering that construction of new power plants needs 7-8 years and perhaps longer time of 13-15 years. Actually, there is not much time left for decision makers. Only two real possibilities exist how to ensure the amount of energy required in the future: either coal or nuclear energy. The coal can not cover the whole energy consumption, otherwise coal resources would deplete in a very short time. A huge impact on environment is expected and reduction of emissions would remain an unfulfilled pledge. The second possibility is construction of new nuclear power plants. Nuclear energy presents today an efficient and flexible source, which could effectively solve the growing demand of energy and its variations. Fissionable fuel might be ensured from politically stable countries. Cost of electricity from nuclear sources in CR nowadays stands as the lowest compared to other countries, respectively 2.10EUR cents/kWh. Compared to coal and gas, electricity cost generated from nuclear is 22 % and >50 % lower respectively (according to World Nuclear Association, 2008). Nuclear power is advantageous regarding to COx, NOx emissions. It was estimated that CR possesses to some extent significant reserves of uranium. The main problem of nuclear power plants is the nuclear waste. However, this problem from technologic point of view seems to be solved. Nowadays new types of safe reactors are developed.

Thus, at the end of the European Nuclear Forum, some proposals have been pointed out (Energetika 7):

1. To set out that nuclear power is a low-emission energy source with positive impact on environment and on sustainable development;

2. Support of nuclear energy with respect to reduction of greenhouse effect gases by 20 % by the year 2020;

3. Developing cooperation among EU members and other countries with the aim to find common solutions in the field of disposal of high activity wastes;
4. Supporting development of nuclear power in member states, with programs for R&D of reactors of forth generation, and utilization of atom as potential energy source;
5. Support for training and education of qualified professionals in nuclear energy;
6. Support of educational programs and international exchange of experts;
7. Familiarization of communities with electricity production from nuclear energy and safety aspects.

6. RENEWABLE ENERGY SOURCES

Utilization of renewable energies is a high priority. According to EU objectives, optimal utilization of renewable sources is an important task. Reduction of dependency on external sources is aimed, increasing reliability of energy system, reduction negative impact of the energy on the environment. Promoting renewable sources will help in creating new job opportunities. The rate of renewables utilization is considerable and a growing trend of electricity and heat production from these sources is expected. Approach of CR takes into account the potential of each renewable energy kind. It is necessary to create a strategy based on economic evaluation and to propose actions and instruments for the enforcement of proposed trends. This strategy has to involve agricultural activity, forestry, and other branches that set up circumstances for biomass cultivation, biogas production, and biofuels. In reality the use of renewables as energy source grows slightly.

Table 1-Probable electricity production share embodied in Czech approach

TWh	2000	2005	2010	2015	2020	2025	2030
Total electricity	73,73	78,2	82,37	80,85	84,95	87,49	89,17
							15,06
Renewables	1,71	4,16	8,17	9,84	11,58	14,2	
Biomass	0,01	1,60	4,86	6,32	7,81	10,25	10,96
Small Hydropower	0,52	0,80	1,05	1,05	1,05	1,05	1,05
Wind	0,01	0,57	0,93	1,01	1,25	1,44	1,44
Photovoltaics	0,00	0,00	0,00	0,00	0,00	0,01	0,01
Biogas	0,01	0,01	0,01	0,01	0,01	0,01	0,16

6.1. Small hydropower plants

Predominant part of hydro potential is concentrated in small streams, where are not favorable conditions for building up large hydro plants (>10 MW). The potential of hydropower is estimated approximately to 1500GWh. However, other possibilities for utilization of hydro energy are offered:

- Utilization of flood basins and lakes eventually other accumulation basins, where is possible proper difference of water level;
- Use of water objects, constructed for drinking water or industrial water supply, where is possible to gain high constant drops without essential changes;
- Modernization of existed hydro power plants, which have outdated technology.
- Optimization may provide a new potential via low investment cost.

6.2. Wind energy

Since 1989 development of wind energy in CR has been variable. From 1990-1995 installations of wind turbines had the same trend as in other countries of EU. After this year this tendency declined. Until 1995, 24 wind turbines were built, with a total power capacity of 8220kW. In recent years 6 wind turbines were demounted with a capacity 1075kW and 11 of them have been stopped (2220 kW). The growing interest for wind energy recovered after 2002, and of course as a result of electricity price policy, where price of electricity from wind sources were 0.111 EUR/kWh. This trend has followed further decreasing and in 2006 electricity redemption value was established at 91 EUR/MWh. In 2006 the total capacity of wind power installations estimated at 55 680 kW. However, wind energy is not expected to have dominant role in Czech energy system, due to its geographic position, climate and other factors.

6.3. Biomass energy

Biomass is the most important source among RES behind hydropower in the CR. Biomass is classified as solid biomass utilized directly to electricity or heat production and to co-combustion with fossil fuels. Its products might be considered as stable source, though it is connected to weather conditions and location. Based on surveys, it is estimated that biomass will have a considerable role in energy supply. In 2007 total net electricity production from biomass is calculated at 403.706GWh. Heat production from biomass and its variations was 45.52 PJ.

6.4. Solar energy

For solar energy utilization CR is not favorable country, because of low number of sunny days and geographical position. As for current photovoltaic systems the repayment time of investments is very high. State support in order to minimize the repayment time is required. In 2007 gross energy produced by solar systems was calculated at 2127MWh. However the contribution of solar energy in RES remains unpretentious 0.02 %. The future for solar energy and especially of photovoltaics is strongly related to the political and economic priorities of government, individuals and the whole society as well as the technology development, science achievements etc.

7. THE PACES'S COMMISSION

The government of the CR in 2007 established an independent energy commission (IEC). The commissions' tasks were to estimate the long-term strategy in development of the energy sector, give recommendations to the government and find out paths of its realization.

The current situation of the Czech economy is stable. Energy consumption is currently higher than European average. On the other hand, emissions of gaseous pollutants have decreased by 25 % during 1990-2006. The Kyoto Protocol ratification obligates reduction of CO2 by 8 % until 2012, with reference to 1990.

Stability of energy and electro-energetic system will become critical if real and fundamental decisions are not to be made. A depletion of home energy sources is predicted, especially lignite coal and hard coal and there is not enough high potential of other sources for substitution. It is assumed that in forthcoming years 2015-2020 Czech Republic will face an electricity and heat insufficiency. It is not easy task today to make serious decision in the energy sector for the future. On one hand, energy policy of government follows the European trend with regard to liberalization and opening markets of primary energy sources and energy products. On the other hand, energy sources exports will lead to scarcity for home power plants. The exploration of new energy sources, especially RES. The government should create a commission advice is liberalization of decision-making of energy companies, towards legislative framework for all actors including the state.

7.1. European context

The decisions on energy issues have nowadays involved a global concern. European Union forecasts show that dependency on imports of primary energy sources will increase from 50 % to 70 % in the next 20 years and is predicted to reach 80 % in 2050 (Vupek, 2005). This is caused of course by the growing demand for energy and consequently by an increase of energy prices. European energy policy consists of four main directions: First, developing an inner effective market for stimulation of competitive advantages of European economy.

The open market could ensure the security and credibility of primary energy sources, support for utilization of renewable energies and emission reduction as well. Effective grid interconnection and construction of new grids is the second direction. Thirdly, support of research and utilization of clean technologies related to CO_2 emissions, new generation nuclear sources, hydropower, and renewable sources as well. The last field is energy savings and increase of energy efficiency in air heating and cooling in buildings.

7.2. Framework of energy strategy

The Paces' commission work concluded with some proposals for the government. The government should be aware of environmental conditions on long-term economic development that are in public interest. The commission proposed that the government should promote utilization of any energy source or technology which respect to following obligations. New economic and legislation parameters should be established. Development and breeding of energy market should be in the long-term governmental policy. Domestic and foreign capital should be given a significant promotion. The government should not intervene in energy sector except in case of public interest. The gov-

ernment should not support electricity import in the long-term outlook, meaning to consider domestic energy sources. Regarding to oil and gas imports should act in cooperation with partners. These tasks derive from:

- the economy possess advantages for production of heat and electricity in its territory;
- present positive impact of social and economic field (economic growth, exchange rate, employment rate);
- the need to minimize security risk.

The following assumptions are taken into consideration:

- economic and demographic growth. During 2010-2030 GDP growth is assumed to 3-4 % and later this figure will decrease by 1 %. A stagnation of population growth and migration to urban areas is taken into account.
- world energy prices. It is not easy to predict oil and gas prices in next 20 years. Forecast of hard coal imported to CR is also an uneasy task. However, according to general opinion a slow increase is predicted. Uranium ore prices are assumed to sustain constant growth.
- availability of conventional PES. Lignite coal production is estimated to stay in current limits. Energy demand is expected to be satisfied in case of oil and gas import prices.
- potential of RES. This is a very sensitive issue. Forecasts show an increase in energy production from RES, from 92.2 PJ in 2007 to 346.9 PJ in 2030. It is important to mention that biomass is the biggest contributor by 246 PJ, or 71 % of RES.
- energy saving. Reclamation of effective energy market is fundamental to achieve this goal. The commission proposed to consider savings per new energy sources equivalent. An energy efficiency plan, support of R&D, economic instruments from government and European funds, and education are considered of direct impact on energy savings.
- environmental aspects. Regarding to European directives has to be respected the emission releases in atmosphere. An increase is predicted in licensed prices as well.
- other parameters. Until 2015 maximal electricity export is estimated to be 20 TWh/year, and import up to 10 TWh/year. Then a balance between these two parameters is expected. Electricity consumption is expected to grow by 15 % within 2030. Consumption of oil products is assumed to decrease by 40 % until 2050.

7.3. Basic observations of performed analysis

- PES demand in long-term point of view is expected to stay in the same current level, because by 2030 a slight increase (+ 5 %) is estimated, and then decreases. How-

ever, total final energy consumption will rapidly increase by approximately 13 % by 2030;

- Domestic fossil fuels, nuclear energy and renewable energies (including biomass, solar and geothermal energy, hydro, as well as wind and waste in less percentage) are assumed to be fully utilized. Imports of oil product is expected to remain constant; meanwhile an increase in gas and dark coal imports is expected, in order to compensate domestic sources depletion;
- CR probably will remain independent of foreign electricity sources, though its consumption will further increase by 1.3 to 1.5 % yearly;
- The energy intensity of the Czech economy is estimated to achieve the European average within 15 or 20 years;
- A significant trend of emission reductions will meet the international requirements;
- Dependency on imports of PES will further grow by 70 % by 2030, which is considered the average of EU.

8. CONCLUSION

The Czech energy sector is being discussed in this paper. First, a brief introduction on primary energy sources consumption was presented. It is stated that CR is energetically stable country so far. However, a depletion of energy sources is predicted in next 10-20 years. Europe and CR will face a growing demand of energy. CR risks set an electricity dependent country, if proper decisions are not made. We have described the lignite coal situation and discussed future problems especially connected to the district heating systems. The government energy policy is also included, considering Paces' Commission proposals. The Czech energy sector trend is determined with respect to energy policy of the EU members. Lignite coal and hard coal will continue to play the major role in PES. A turning point regarding nuclear energy evaluation is required.

Nuclear energy is expected to increase its contribution mainly due to its potential. Renewable energies will remain an option, with continuous growing capacities. The Czech case estimates a higher potential of biomass in future. However, renewable energy contribution in total energy consumption is modest.

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RISKS AND CHALLENGES IN THE PROCESS OF IMPLEMENTATION OF THE EU CLIMATE PACKAGE

Ljubica Dzabirova

1. INTRODUCTION

The European Commission's 60 billion Euros climate action and renewable energy package has received a mixed reaction from the Member States, environmental organisations, industry and experts. More precisely, the Commission proposed a 20 % cut in carbon dioxide emissions so that by 2020 they are 20 % lower than in 1990. In the case of an international agreement, the target could be increased to 30 % by 2020.

The restructuring of Europe's energy markets has attracted the attention of more than just traditional players in the energy sector. In the light of increasing concerns about climate change, environmental sustainability, economic growth and security of energy supply, a growing chorus of voices has chimed in for the shape of the EU's future energy policy. Reaching the targets set in the new package will be quite challenging. Some of the EU countries have very low level of renewable energy use and they are already scoping a vast expansion of wind energy offshore.

Energy-intensive industries which are included in emissions trading continue to receive the necessary CO_2 allowances free of charge. Thus, the package should apply to steel, aluminum and cement production.

While most parties agree that Europe's energy policy should simultaneously guarantee security of supply, competitiveness and environmental sustainability, stakeholders differ widely on how these objectives should be achieved.

The success of the internal energy market will also be heavily dependent on a predictable and stable carbon price, without which electricity producers across Europe will be unable to make correct investment and business strategy decisions.

The paper will discuss the reactions towards the new package of measures, the new challenges and the possible scenarios in the process of its implementation.

2. THE NEW PACKAGE

The new EU package[1] include an improved emissions trading system (ETS) covering more emissions and allowing firms in one EU country to buy allowances in any other and an emission reduc-

[1]Climate and energy measures approved in December 2008, http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=20081217&secondRef=TOC&language=EN (accessed 24/03/2009)

tion target for industries not covered by the ETS (e.g. buildings, transport, waste) so that everyone is contributing.

3. WHAT EXACTLY WILL CHANGE?

These are the targets according the package:[2] for the power plants and energy-intensive industries, emissions to be cut to 21% below 2005 levels by 2020. This will be achieved by granting fewer emission allowances under the EU Emissions Trading System (ETS), covering some 40% of total EU emissions. For sectors not covered by the ETS, e.g. transport, except aviation, which will join ETS in 2012; farming; waste; and households, emissions to be cut to 10% below 2005 levels by 2020.[3]

More precisely, these targets are planned to be achieved through binding national targets, with higher reductions for richer countries and limited increases for the poorest ones. Renewables will produce 20% of all the EU's energy by 2020, through binding national targets which vary from 10% for Malta to 49% for Sweden (climate and energy measures approved in December 2008). At least 10% of transport fuel in each country must be renewable: biofuels, hydrogen, green electricity, etc. It also includes promotion of safe use of carbon capture and geological storage (CCS) technologies, which could eventually remove most carbon emissions from fossil fuels used in power generation and industry.

The package[4] thus focuses on three important areas: emissions cuts, renewables and energy efficiency. Changes have been made to the original package unveiled by the European Commission to address European industrialists' concerns about green measures potentially making them uncompetitive at a time of weak global demand.[5]

However, the overall 20-20-20 targets have been kept:[6] a 20% cut in emissions of greenhouse gases by 2020, compared with 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% cut in energy consumption.

The EU package builds on the international commitments.[7] These commitments only run until 2012. A UN conference will take place in Copenhagen in December 2009 (Countdown to Copenhagen, 2009) for the new targets for the post-Kyoto world.

Also, there is an expectation that US President Barack Obama will embrace green targets (Going "Green" to Enhance Brand Appeal, 2008). But China, India and other significant industrial powers will also have to come on board if global warming is to be tackled effectively.

Scientists say global warming is already happening and predict that if the planet's temperature rises more than 2C above the pre-industrial level there will be more extreme weather phenomena and rising sea levels, threatening coastal areas. Northern Europe is getting wetter and the south drier, Arc-

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[2] See Ibid
[3] See Ibid
[4] See Ibid
[5] BBC news/EU climate package explained, January 2009
[6] See ibid, Climate and energy measures approved in December 2008
[7] Kyoto Protocol, 1997

tic summer sea ice is melting faster than expected, many plant and animal species are moving further north and uphill.

Deforestation and the burning of fossil fuels are blamed for the warming effect, because they increase the main greenhouse gas, the carbon dioxide (CO_2), in the atmosphere. The target of cutting greenhouse gases by at least 20% by 2020, compared with 1990 levels will rise to 30% if an international agreement is reached committing other developed countries and the more advanced developing nations to comparable emission reductions.

Under the ETS, permits for emitting CO_2 are distributed under a system of national allocations. The permits are traded, so big polluters can buy extra ones from greener enterprises. The ETS covers about 10,000 heavy industrial plants across the EU - notably power plants, oil refineries and steel mills. All major industrial emitters of CO_2 are to be brought under the ETS eventually and the scheme will also include greenhouse gases other than CO_2 - nitrous oxide and perfluorocarbons. According to the package[8] in the first and second ETS trading periods (2005-2012) the EU decided to give most of the CO_2 permits to power plants and energy-intensive industries for free. The original plan was that from 2013 such enterprises would have to buy all their permits at auction. But industrial lobbies, particularly in Germany and Italy, complained that the cost would be too great, at a time of economic hardship. Poland, whose power plants are 95% reliant on coal, argued that the extra cost of buying permits would mean an unacceptable rise in electricity prices - a fear echoed by its former communist neighbours. Therefore, EU leaders made some concessions[9] denounced by green campaigners. Full auctioning will be delayed for industrial sectors where there is a proven risk of "carbon leakage" - that is, a risk that jobs or plant could be relocated to non-EU countries where the rules on emissions are more lax.

Poland and other former communist countries will get about 12% of the revenues from the ETS, as help to clean up their heavy industry. Plants in the poorer EU states still heavily reliant on fossil fuel, including ones which were not integrated into the main EU power network in 2007, will only have to buy 30% of their CO_2 permits in 2013. Full auctioning will not apply to them until 2020. A substantial amount of the emissions cuts will be achieved through carbon "offsets" - the practice whereby enterprises in the EU get carbon credits by sponsoring green projects in developing countries. The projects have to comply with the mechanisms set up by the Kyoto Protocol.[10] Credits not already used up in the 2008-2012 ETS period can be banked and carried over into the 2013-2020 period.

Some environmentalists say the use of carbon offsets will seriously weaken the impact of the EU's climate package in Europe. Green MEP Claude Turmes, one of the European Parliament's top negotiators on the package,[11] said at the EU Summit that revisions meant only one-fifth of the world's emission cuts would be made in Europe. He said EU leaders had given away "too much to the big polluters".[12] An Oxfam spokeswoman, Elise Ford, said the EU package "looks too much like busi-

[8] See Ibid, Climate and energy measures approved in December 2008
[9] See Ibid
[10] Kyoto Protocol, 1997
[11] See Ibid, Climate and energy measures approved in December 2008
[12] EU summit: 19.03.2009

ness-as-usual tied up in a green ribbon".[13] Sectors not covered by the ETS account for about 60% of all EU greenhouse gas emissions. Chief among these are road and sea transport, buildings, services, agriculture and smaller industrial installations.[14]

The whole car industry has been set an average emission target of 120g of CO_2 per kilometre by 2012 for new cars, compared with current levels of 160g/km. The target for 2020 is 95g/km.[15] But CO_2 emissions vary from car to car, and manufacturers have been given a deadline until 2015 to meet their specific targets for each model. A key area of green innovation is carbon capture and storage (CCS) - new technologies that allow industrial CO_2 emissions to be captured and stored underground, where they cannot harm the climate. There are plans to build 10 to 12 big pilot plants in the EU by 2015, with a view to making CCS commercially viable by about 2020. The plants would be funded by revenue from the ETS. The EU package sets the goal of increasing renewable energy's share of the market to 20% by 2020, from around 8.5% today [16]

Within that goal 10% of transport fuels will have to come from renewables, including biofuels. The Commission wants a strict certification system to ensure that only biofuels achieving a real cut of at least 35% in CO_2 emissions will be allowed.[17]

The renewables targets for Member States differ because they are at different stages in their use of wind energy, solar power, hydroelectric power and other green sources. The EU must embrace renewables not only to slow climate change but also because the EU's reliance on imported gas is set to increase. The creation of new jobs in renewable energy technologies is another benefit. Energy consumption is to be cut by 20% by 2020 through improved energy efficiency (climate and energy measures approved in December 2008). State aid can legitimately be used to promote emissions cuts and increase take-up of renewables, so long as it does not breach EU competition rules.

In December 2008 the Commission came up with new proposals for the EU to co-finance national and local schemes to promote energy-efficient housing.[18] If the plan is adopted, the EU can help Member States install double glazing, wall insulation and solar panels in housing, especially targeting low-income households.

Apart from all the benefits expected to occur with the implementation of the package[19] the scepticism towards it arises because some countries fear that they will face the biggest crisis within 6 or 7 years, by losing their generating capacity. Some countries are heavily reliant on imported Coal, Oil and Gas. Their Nuclear Power Stations will shut down in the next 7 years, before the final deadline. EU environmental directives also impose closure of Coal Fired Power stations and new emissions targets.

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[13] Oxam, 2009
[14] **Cronin, 2008**
[15] Climate and energy measures approved in December 2008
[16] See Ibid
[17] See Ibid
[18] BBC: EU climate package explained, 2008
[19] Climate and energy measures approved in December 2008

4. POSSIBLE RISKS AND CHALLENGES

Analysing the content of the measures, there are several possible risks in the process of their implementation: One is the fact that many countries had a lot of oil and gas which meant for many years they didn't have to think about where they are going to get their energy from in the future. The second is the environmental wave which led to lose touch with the value of nuclear power stations, which became dirty words and nobody wanted anything to do with them. Also, some countries are completely hamstrung by what Brussels is deciding about renewables, about biofuels and about lots of other things to do with their energy, the closing down of coal-fired power stations, so they are no longer masters in their own house,

With the adoption of the Environmental Directives, EU is imposing onerous targets for reduction of carbon emissions. It demands that by 2020, 20% of energy needs come from "renewable" sources, but this precludes using the proven alternative to fossil fuels - such as nuclear power. These may be considered as more costly solutions such as biofuels and wind turbines. The question thus is how to secure energy supplies in the best possible way, which means the most secure and cost-effective ways. The new package of measures implies to cut down in CO_2 emissions. That signifies a lot of renewable energy - but of course by far the most efficient way to get the maximum amount of energy is by building nuclear power stations. However, building nuclear power stations is not included in the renewables targets, although for some countries the cost of building 10 Nuclear Power Stations, which would provide a high percentage of energy requirements, would be less than 2 years contributions to the EU, such as the "green" taxes: Climate Change Levy, Emissions Trading Scheme, Vehicle Excise Duty, Congestion Charging, Landfill Tax, Fuel Duty, Renewables Obligation Certificates, Air Passenger Duty, etc.

There are many countries, such as the UK for example, with a low base of renewable energy. This leads to additional costs for each household, unproportional among the countries within the EU. Some countries with a high base of renewable energy will face much less costs than the others.

The EU directives are encouraging to build wind turbines across the countries. However, there are many people in village halls who are trying desperately to protect their villages from these developments. It is a fact that the countries need thousands and thousands of wind turbines to meet even the minimum targets and half the time of course the wind doesn't blow so they don't turn. For example, in Germany they have found that their 19,000 wind turbines have not resulted in the closure of any of their conventional power stations - as they have been retained as back-up for when there is insufficient wind to turn the turbines, around 70% of the time. Power Stations on immediate standby are also a very expensive way to generate electricity, the equivalent of cycling to work whilst a car journeys behind, carrying your bags.

Building windmills may cost, per kilowatt of capacity installed, somewhere between 2 and 3 times the costs of building nuclear station. For some countries to commit to so many wind turbines in such a short time will require widespread extensions to the national grid, and whereas in a normal world the expense and inefficiency of these wind farms would price them out of the market lavish subsidies make wind farms very lucrative. It is known as the Renewables Obligation - and a single turbine can potentially earn the operators half a million pounds a year - of which 60% is subsidy.

Another risk is the perception of the new package is that the way it works with wind turbines or indeed any renewable source of electricity is that the people who sell electricity have to buy a percentage of their power from renewable sources and they pay twice the normal price for it. So there is a massive hidden subsidy, which people are all paying when they get their electricity bill.

All around the world there are many farmers who are turning over their fields to growing crops to produce biofuels, i.e., crops grown specifically to be processed as fuel for motor vehicles or burnt in power stations. It's supposed to be the green solution to energy problems. To meet that target, agriculture is turning arable land over to growing biofuels - harvested to be burnt in coal fired power stations - not for efficiency, but to meet quotas. Corn fields are now turning over thousands and thousands of acres to this stuff in a world that is desperately short of food. Crops have become twice as expensive compared to a year ago - and people in the world are starving while some countries are growing this stuff to burn instead of growing food. It isn't particularly CO_2 emission saving and it costs a great deal of money by comparison with even the inflated costs of oil today, and it abstracts from the world food production. Over half of the farmland in Europe may be needed to grow fuel for cars. The land needed to produce enough grain to fill the tank of a 4x4 car engine with biofuel, just once, would feed one person for a year.

The targets may be unachievable, and when the twenty seven EU states would turn to imported biofuels to meet targets, it may have disastrous consequences for global agriculture: millions of acres of land converted from food production to growing Biofuels. The USA and the EU have considerable influence - so much so that according to a leaked World Bank report, their demand for biofuels has pushed world food prices up an incredible 75%.[20]

Another highly debated issue is the Landfill Directive.[21] In many arable fields mounds have started to appear in the corners of crop fields. Closer inspection reveals they are heaps of industrial waste, sewage waste, human waste, waiting to be ploughed into the fields. The 1999 Landfill Directive, which means instead of putting filth and muck into a big hole in the ground and covering up and landscaping it, people now spread it across the land and call it compost. However, it may cause a stink. This is where the waste originates, local farmers are paid by the tonne to take it away, and stockpile it in their fields until they can spread it on the land. So this classifies as recycled - and if the local councils don't meet the tonnage of recycling they get fined directly by the EU. So whatever filth is in this, it isn't in the interests of the local council or environment agency to find anything wrong with it or prosecute seriously any illegal spreading of it for the simple reason that if they can't get rid of the waste they get fined.

5. CONCLUSION

Some of the above mentioned objectives: reaching the biofuels targets; implementation of the Landfill Directives; wind power strategies and building wind farms; using biofuels and the influence it brings to world food prices; are often creating scepticism among the countries in the process of implementing the EU environmental policy measures. However, the negative effects that can be

[20] World Bank Report, 2008
[21] 1999/31/EC

caused from the climate changes in the world, the energy crisis and the whole process of global warming are red signals that the world must respect and find the best way to overcome those problems.

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xii. Position of the European Parliament adopted at first reading on 17 December 2008 with a view to the adoption of Regulation (EC) No ../2009 of the European Parliament and of the Council setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles

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THE DEVELOPMENT OF THE ENERGY MARKET IN THE WESTERN BALKANS

(the case of Macedonia and Croatia)

Sonja Risteska

World fuel crisis, rising prices, global warming and climate changes are influencing all of the world economies. Small countries like in the Western Balkans that have open economies are also feeling the impacts of these events. "…Increase of energy consumption at the world level is even accelerated in comparison with the previous period…and a real increase of RES participation is minimal..."[1] Bigger energy consumption leads to bigger prices, bigger prices lead to bigger costs for the producers, the industry and the whole economy, which at the end of the day negatively influences the economic development of the countries. Having in mind that the WB countries' economic progress is quite fragile just adds up to the pressure: how to sustain market growth when all of the economies especially the biggest American economy are going into a crisis?

In the first part of the chapter the current position of the WB and the regional cooperation in this field will be discussed. In the second part of the chapter, the recommendations for the development of this sector will be elaborated with a special notion to the renewable energy sources and their better usage in the region.

1. REGIONAL COOPERATION AND UP TO DATE PROGRESS

In the past most of WB countries were relying on their high reserves of coal and in some part to the water and nuclear energy for their energy production. However with the global environmental issues and the high dependence of these countries from oil and gas can cause a major restriction of the development of their private sector. Each country cannot exclusively rely just on its own energy production. First, they do not have the capacity to achieve that, second only with enhanced regional cooperation will the energy supply be constant and according to the standards and third, with increasing the competition in this sector and investing in renewable energy sources they will not only improve the service but also the prices will go down. All of this will of course have an impact to the development of the entire economy and in the attracting of new investments.

The countries in the region however, have a good cooperation in this field with a highly good perspective of it being further developed. The most important step was the creation i.e. signing of the Energy Community Treaty in 2005 between the SEE countries with a purpose of integrating the whole region into the European Union's Internal Energy Market by 2015 through implementing completely the acquis on this subject and through regional cooperation. This Treaty is based on the Thessaloniki Agreement and the Athens Memorandum of Understanding. This memorandum was signed in 2002 and was based on "the principles, which are set out in the Stabilisation and Associa-

[1] MANAGE, Energy Efficient Economy and Improved Environment Quality, Collection of Conference papers, Cosmo Energy Efficiency Conference 2008, Skopje, May 2008, page 5.

tion process, of cooperation between the European Union and the countries of the region, and of the necessity for co-operation between countries of the region"[2]. With it was set the creation of the national energy authority body, national independent regulatory body, transmission system operators and distribution system operators in each country signatory of the Memorandum. All with one purpose, creating an integrated regional energy market in which there will be fair competition and fair prices for the customers. The countries that signed this Memorandum also signed the ECSEE:

- EU Member States: Austria, Greece, Hungary, Italy, Slovenia;
- Regional members: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Montenegro, Turkey, Kosovo;
- Observers: Moldova.[3] (before the creating of ECSEE, observers were also Austria, Hungary, Slovenia and Italy which later, when the Energy Community was created, joined the other regional members. Now only Moldova left as an observer country-author's remark)

As it was mentioned, the purpose is creating a regional integrated market for electricity and gas, which will gradually integrate with the EU Single Market for Electricity. For that reason all the countries signatories have "…to unbundle generation, transmission, and distribution, while establishing independent sector regulators and transmission system operators (TSO's)"[4] which was supposed to be finished by 2005. How this process will be developing, will be supervised by the organs created and those are:

1. Ministerial Council (all the Energy Ministers of the above mentioned countries). The Council meets "…once a year to decide the next stages of the process, in each case so far consisting of a political agreement amongst the members (the two MoUs)."[5]

2. Permanent High Level Group (which consists of senior ministry officials). These officials meet 3-4 a year to "…prepare the Ministerial Council and to ensure the follow – up of its decisions. The meeting will be co-chaired by the Commission and the Presidency in Office."[6]

3. "A regulatory forum of PHLG members, Regulators and TSOs meets twice a year to develop the practical implementation of the MoUs."[7]

There are lot of benefits that can come out of this project, such as: "…increased reliability in electricity supply; lower operating costs; reduced needs for additional capacity investments, especially in generation; improved opportunities for intra- and interregional trade, including peak load by hy-

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[2] **Memorandum of Understanding on the Regional Electricity Market in South East Europe and its Integration into the European Union Internal Electricity Market** ("The Athens Memorandum - 2002"), page 2.

[3] BRIEFING NOTES, Energy Community of South Eastern Europe, page 1.

[4] Kathuria Sanjay, Western Balkan Integration and the EU, an Agenda for Trade and Growth, The World Bank, page 101.

[5] BRIEFING NOTES, Energy Community of South Eastern Europe, page 1.

[6] The Athens Memorandum - 2002, page 10.

[7] BRIEFING NOTES, page 1.

dro producers in the region; and lower prices for the end-customers."[8] However still a lot of work needs to be done; firstly in adjusting the laws in this sector between all the involved countries, secondly in strengthening the independent regulatory bodies, thirdly in enchaining the competition by introducing new types of business concepts and practices, etc.

2. STRATEGIES FOR DEVELOPMENT OF THE ENERGY MARKET AND STRATEGIES FOR BETTERUSAGE OF RES IN CROATIA AND MACEDONIA

The reason why all the Balkan countries should engage and deepen the cooperation into the energy sector is simple. For small countries "…the benefits of regional integration stem from cross-border competition, the ability to reduce expensive reserve capacity, and the ability to trade electricity with neighbours that have different energy endowments."[9] The progress up until now has been good. The market is slowly opening with the support of the EU, the governments are realizing the need for investing into RES, the big energy companies are privatized, slowly competition is creating in this market, etc. However, a lot remains to be done in order the regional energy market to be completely functional and fully integrated into the EU Single Market.

2.1. Strategies for development of the energy market

Very important notion is that this entire sector used to be held by the public monopolies. The prices were made be state regulators and the companies were not usually managed according to the markets demands, the capacities were not fully used, the revenues not fully collected. As this situation demanded a change, the WB countries started to privatize these companies. "Some of the arguments for private ownership of utility services—for example, the need to access capital to meet growing demand and improve quality of service—are even stronger for South Eastern Europe (SEE) than for other regions. And the discipline provided by private ownership is even more needed. The scale of losses and non-collection in some of the utility sectors…is very high. Moreover, losses and non-collection are simply inconsistent with good management and protection of customers and would not be tolerated under private ownership."[10] Private firms care about the profit and will not tolerate losses, since unlike the state firms they have no one to cover their expenses. Because of that they will not leave poor management in the companies. Furthermore foreign owners will bring know-how, new technologies and invest further in the country's infrastructure and network. Especially with the ECSEE, were the countries' markets are united, companies for more profit will compete among each other for the non-domestic consumers. They will invest more, the supply will improve and the prices will be affordable. And this of course means increased GDP for the country were the

[8] Harry G. Broadman, James Anderson, Constantijn A. Claessens, Randi Ryterman, Stefka Slavova,Maria Vagliasindi, and Gallina A Vincelette, Building Market Institutions in South Eastern Europe, Comparative Prospects for Investment and and Private Sector Development, The International Bank for Reconstruction and Development/the World Bank, page 210.
[9] Kathuria Sanjay, 2008, pages 101 and 102.
[10] *Building Market Institutions in South Eastern Europe*, 2004, page 182 and 183.

company is located. By now in almost all of the region the energy companies have been privatized (mostly sold to foreign investors) but for more investments to come still a lot needs to be done.

For instance, a highly independent regulation is needed. This is especially important in the service sector (telecommunications, energy, aviation, etc.), where in order the markets to run as they should, regulatory bodies are needed to look over the competition, to control the prices, which in case of one supplier who exercises market domination can be distorted, and to basically deal with all the market distortions. In the past these bodies were naturally part of the government i.e. national, since all of these services were provided by the government. However times and things have changed. The WB countries in their path to the EU have vowed to open their economies especially this market sector to the free market forces and competition. Its opening comprehends that someone independent from the state's influences will look after the competition and with a good solid governing, new investments will be attracted. "Independent and strong regulators are the key to successful and sustained private interest in the power sector, as well as to protect consumers from the possibility of misuse of market power. To the extent that SEE regional cooperation allows form multiple sources of supply of power, the consumer as well as the business sector would benefit. Apart from capacity building, regulators would also benefit from regional cooperation in regulation."[11]

In table 4.1 the time when independent regulators have been established is presented. As it can be seen Macedonia, if we exclude Bosnia, was the last to introduce independent regulatory body.

Table 4.1 Independent Regulators in the SEE8[12]

Country	Electricity	Telecommuniction
Albania	1996	1998
Bosnia and Herzegovina	Planned	Planned
Bulgaria	1999	2002
Croatia	1997	2000
Macedonia	2003	2000
Moldova	1997	2000
Romania	1998	2002

Source: EBRD (2003).

[11] Kathuria Sanjay, 2008, page 104.
[12] *Building Market Institutions in South Eastern Europe*, 2004, page 189.

The point is not only to establish these institutions but also to equip them with qualified personnel and to provide the necessary working environment away form the state's influences. Without proper functioning of the regulating bodies, investors will deter from this market. "Network industries are typically capital intensive, and the needed investment is sector specific; that is, it cannot be easily reallocated and can be viewed as "sunk." Consequently, a fair return on capital is guaranteed only if the private investment plan for the utility is successfully carried out over a sufficiently long time horizon that permits the private owner to recoup the sunk investment."[13] Weak regulatory bodies show that the investment made maybe will not be returned as planned, since they may not be able to correct the market distortions.

Not only that but also in a situation were the regulatory body is influenced by the state or were corruption is present, the companies which hold big market share of the energy sector will most likely behave in the same way. "…the entrepreneur...is acting rationally by definition, which means less as possible costs and the strain for realizing the set goals, above all the profit. In that case, if the macroeconomic model and politics of the state create the ruling economic model and policies with certain parameters and frames….most of the entrepreneurs will act rationally and search for the best solution in those frames. If the sate…is corrupted, it is hard to believe that each entrepreneur will resist the urge to corrupt that bureaucracy for the realization of his goals."[14] Good, independent regulation means trust in the system. In case of uncertainty, those present on the market will behave as the situation imposes, those which want to invest will avoid that market, knowing that some of the money will have to go into bribing the administration, in order for them to function on that market.

Nevertheless, the countries can learn a lot from the EU in this field. What has been proven as exceptionally successful are the regional regulatory bodies. Since all of these countries are small, and they need regulatory bodies as a substantial part of the functioning market institutions, but because the corruption and inefficient administration are still a problem, with the creation of independent body on a regional level these problems could be solved. They already are in a process of creating integrated energy market and with the establishment and strengthening of the regulation, the integration will not only be deeper but also investments will be attracted. Important regulations are needed to ensure the emergence of effective competition because even if the cross-border trade is open and customers can by services from other suppliers, if the tariffs are not levelled or the interconnection is not made possible, the competition will not advance.

This leads us to the creation of a competitive environment. The current condition on these markets is: even though most of the service providers have been privatized, those are still big companies with almost no competition that can oppose them. Which means that small enterprises can face difficulties in establishing their business on the market since these companies can cause them difficulties. That is the reason why strong regulation is needed, to "…ensure the emergence of effective competition by providing access to the incumbent's network. Those operators with the ability to abuse their market power should be subject to special rules (ex ante regulation) to ensure that they do not abuse their dominance. These rules should include a requirement for the operator to meet all

[13] Ibid. page 188.
[14] The European Perspective of Democratic Croatia, gathering of publications from a conference, Zagreb, 6th of June 2001, page 64.

reasonable demands for interconnection services from other network operators (for example, transparent and cost-based interconnection, unbundling of interconnection charges, non-discrimination, and publication of interconnection offers, including terms and conditions of contracts and prices).”[15]

Also, a possible solution can be the creation of private-public partnerships between the state and the private sector. Since this is a high risk capital intensive market, reallocation of the investment is had to achieve and profit comes in the long run. One of the possible solutions for each government is to offer some risk-sharing in the investment process, so especially smaller companies to be able to enter the market. “…international practice and experience demonstrate that the combined capital and intellectual resources of the public and private sector can result in better, more efficient services…”[16] Since foreign investors do not know much about this particular market and the possibilities it offers, it is up to the governments in the region to promote it. Also, having in mind that the corruption and the weak administrative and judicial systems are still a huge obstacle for attracting FDIs in this region, by offering to share the risk with their own investments in “…local capabilities…upgrading local skills, technological capabilities and infrastructure,”[17] they will appear as serious business partners. Governments in today’s imperfect markets are the leading players with a possibility and means to create an environment for investments and incentives to thrive.

2.2. Strategies for better usage of renewable energy sources in Macedonia and Croatia

Although the WB countries have huge reserves of hydro, geothermal and coal capacities, they still remain net importers. What they need to do is to develop further the usage of these capacities, throughout exchanging experiences and enhanced regional cooperation, throughout joint projects and deeper cooperation with the countries of the EU.

2.2.1. Macedonia and Croatia

In Macedonia there has been some progress lately with the instalment of the new government which “in its programme introduced concrete projects for overcoming the energy crisis, throughout gasification of the biggest part of the country, new mining capacities, building of new combined electricity and heating plant, building of big and small hydro plants through concessions…modernization of the thermo-electrical plant Negotino’”.[18] Also in the National Development Strategy for 2007-2009 the same measurements have been purposed, which gathered together will amount up to staggering 424 millions of Euros for that period. Most of the money, 361 millions Euros is meant for electricity generation and the rest is for the improvement of the energy distribution network. The main idea in the National strategy is the same as in the Croatian strategy: effective energy market, fair prices, save supply, environmental protection. However, what this strategy and every other

[15] *Building Market Institutions in South Eastern Europe*, 2004, pages 192 and 193.
[16] Efthymiadis Nikos, 2004, page 31.
[17] Ibid., page 36.
[18] Utrinski Vesnik. http://www.utrinski.com.mk/?ItemID=BD1A39969440CB4683D84759E0BDD50E

strategy in Macedonia lacks is how to efficiently use the RES, apart of the upgrading of the hydro sector. Nowhere in these strategies, is the developing of the RES (like geothermal, solar or biomass) mentioned, even though the potentials are great. Strategic partnerships throughout the ECSEE with the Croatian government and companies operating there, as well as with the neighbouring EU countries can help in changing that situation. What the government needs to do is to build a new energy strategy, apart from this quite extensive national strategy, where all the problems in the energy sector will be emphasized, were sustainable solutions and programmes will be suggested and constructed, that at the end of the day will serve as guidelines for the future projects in this area.

However, there are some important projects on the way, concerning the development of generating power from hydro sources. "In the period of 2007-2009, the building of the following hydro power plants is expected to start: Matka 2 (Sv Petka) Cebren, Galishte, Boshkov Most. Apart form these separate HPP, the building of a 19 smaller HPP is also suggested, which should be build in the scope of the concessions model with a high 'investment need' from 120 million Euros. The same model is expected to attract private investors for building of 6 other HPP in the Vardar alley." [19] The important thing is that a strategy for building small hydro power plants needs to be developed. They are becoming very attractive lately but somehow their development has not been noticed in Macedonia. It is proved (as the case of Croatia) that HPPs will make the country less dependant on electricity imports, the production of clean energy will increase, which is a trend in the EU, etc. Having all the water capacities, it is a total waste to be left unused, especially when the country is a net importer of electricity. Some of the proposals for attracting FDI in building these SHPP are: creating "…one-shop-stop for SHPP, improvement of the cadastre services, continually regeneration of hydrological data for all locations, bigger promotion of SHPP like ecological energy resources, strengthening institutional capacity, etc."[20]

How and with what incentives does the government plan to find i.e. attract foreign investments with to build these plants is not clear yet.

One type of energy is especially interesting but not much discussed or developed. It is the geothermal energy. The whole Balkan Peninsula lies on a huge amount of geothermal resources. The geothermal energy can be defined as: "Natural heat contained in the rocks, hot water and steam of Earth's subsurface; can be used to generate electricity and heat homes and businesses."[21]

The amount of geothermal energy, in particular for Macedonia is: the total discharge of wells from the exploited fields…constitutes 1000 1/s, the existing thermal capacity is 74.5 MWt. The proven thermal potential constitutes 220 MWt."[22] The geothermal energy source potential for Croatia "…is estimated at 839 MWt. The potential of binary GeoPP constitutes about 48 MWe."[23]

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[19] National Development Plan of the Republics of Macedonia 2007, 2009, page 118.
[20] MANAGE, Energy Efficient Economy and Improved Environment Quality, 2008, page 116.
[21] Energy Terms, Geothermal Energy, http://www.wisconsinpublicservice.com/farm/terms.aspx

[22] Renewable Energy, Geothermal Energy, http://www.eva.ac.at/enercee/mk/supplybycarrier.htm

[23] Renewable Energy, Geothermal Energy, http://www.eva.ac.at/enercee/hr/supplybycarrier.htm

Although the used amount is well below the potential there has not been much of an investment in this field after the break-up of Yugoslavia. The transition that these countries had to go through, the conflicts that happened left them with crippled infrastructure that was high-priority for restructuring and investing in. Therefore these alternative sources of energy remained quite neglected. However, with the global environmental problems, that these countries also feel, some changes have begun to emerge. Since their aspiration is to join the EU, which is momentarily leading in application and development of renewable energy sources and is imposing high environmental standards, the WB countries have to get rid of their dirty industries and high dependence in their production from oil and coal. Apart form that, the world energy crisis and the high prices of oil and gas increases the production costs which influence their fragile economies. Also, without enlarged competition in the electricity market and heating supply, the households and companies are forced to pay high prices, which influences their purchasing power and growth potential, which at the end will have negative impact of the overall country's GDP. So lately, many initiatives about using the potentials for clean energy are emerging. One of them is the renewed interest in using the geothermal sources in the agriculture and for heating.

In the case of Macedonia, the interest in geothermal energy and its potentials was high before the 1990's and the beak-up of the old system. "Rather intensive development…during the 80-es of the last century has been replaced with a complete stagnation during the 90-es and recent years…Unfortunately gained rich experience was not used for further development of use if this renewable energy source."[24] None of the governments had a strategy for developing this sector and making projects for better usage of the geothermal energy. However, as it was mentioned, with the higher and higher energy prices, the situation has to change and there has been some development. What is needed is a sound strategy for all geothermal potentials of the country, what has been done by now, how can current facilities be improved, how can new capacities be build, which new technologies can be used and how can FDI be attracted in this field.

The resources in this field are great. At present they are used for heating green houses in the agriculture sector, for heating households, swimming pools, some industrial objects and for balneology. The places i.e. the fields where geothermal springs can be mostly found are in the eastern part of the country and in Croatia the reservoirs are in the northern part of the country and are characterized by high value of geothermal gradients. This type of energy appliance was developed mostly during the energy crisis in the 70es where most of the projects and research was done. However the potentials are still great, especially in its application in the agriculture sector and the heating of the greenhouses as well as for the development of balneology and this type of alternative tourism.

Even though the agriculture and fisheries sector is decreasing its participation in the total GDP in all of the countries of the region, still there is a huge potential of developing it, with the usage of this type of energy. The reasons, why heating the greenhouses with geothermal energy is so important, are:

1. Good correlation between the sites of greenhouse production areas and low enthalpy geothermal sources.

[24] Geothermal Energy in Macedonia, Macedonian Geothermal Association MAGA, Skopje 2005.

2. The fact that greenhouses are one of the largest energy consumers in agriculture.
3. Geothermal energy requires relatively simple heating systems, but advanced computerized installations can later be added for total conditioning of the inside climate in the greenhouses.
4. Economic competitiveness of geothermal energy for greenhouse heating in many situations.
5. Strategic importance of energy sources that are locally available for food production.[25]

Also growing of different spices of fish in out-of season conditions made artificially has been proven successful. This could be the right solution where there is a need for some type of fish and also for the export. Furthermore this is especially useful for the development of the local fisheries and the SME's where lot of investment is not required but were there is a possibility for further growth with a small budget and efficient use of the energy sources. This also counts for the development of the greenhouses. All of this should be consider with an overall goal of making these countries' economies and agriculture sector more competitive once they enter the European Union Single Market. This also counts for the development of the spa tourism (balneology) in these countries as an alternative type of tourism and the development of the usage of this type of heating for more households and industrial objects.

3. CONCLUSION

With the energy prices growing up and with the possibility of increasing the competition in the energy market, the increased usage of these alternative types of energy sources can help these countries find solutions for the common issues. Enhanced cooperation in this area, working together on projects, especially with the neighbouring EU countries, would help them in the developing of the regional energy market. However the "main problem for further development…is the absence of economic interest for concentration of efforts and investment funds for this 'neglecting' energy source, when the 'real energetics' needs urgent solutions. Plus, there is no local industry, interested for supply of materials and completion of geothermal projects, to 'push' the national and local governments to support the development.[26] The resources are there but more effort from the governments is needed as well as more funds for the projects and incentives for the foreign investors to invest in this renewable and clean energy sources. How much will this sector develop in the future, it remains to be seen.

[25] MANAGE, Energy Efficient Economy and Improved Environment Quality, page 85.
[26] Ibid., page 90.

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