

# Croatia and the Region in the WEC's Scenario Concept (WEC – World Energy Council)

G. Granić, B. Jelavić, D. Pešut, G. Majstrovic, H. Božić, M. Tot, N. Dizdarević, R. Bošnjak, R. Fabek and Ž. Jurić

REVIEW

The most significant project of the World Energy Council (WEC), in the period from 2004 to 2007, is the *Energy Policy Scenarios to 2050* study, in which the members of the WEC and independent experts have been working on for the last three years. The results of this were presented in the congress in Rome from November 9-16, 2007. The energy future of the world is viewed by continents, and because of this the energy future of Europe is one of the pre-projects. By following the concept of analyzing the energy future of Europe in the *Energy Policy Scenarios to 2050*<sup>3</sup>, the region of southeastern Europe within Europe was processed. This region was not previously monitored in particular in this mentioned work. A concept was drawn up of possible region scenarios and a connection with events in EU and the rest of Europe. Since the region significantly differs by its economic strength as well as by its developmental potential, it would be useful for the region to have an energy analysis done according to the elaborated concept of the scenario. To make the problems and possibilities of the region more understandable, the main energy indicators were analyzed especially in the part which refers to electric energy and gas. Recommendations were given concerning further activities which partly also refer to the broader area of Europe.

*Key words:* development scenarios, energy policy, SEE region

## 1. INTRODUCTION

Energy policy comes back in the center of political interest and attracts growing attention of the public. In addition to rising energy demand in transportation, higher dependence on appliances powered by electric energy in all spheres of global society, we are facing the challenge of security of energy supply. Awareness that we depend on fossil fuels and on a small group of oil exporting countries, frequently marked with political instability, mobilizes all in the search for long-term solutions. Enhanced energy efficiency, promotion of renewable energy sources, lower energy dependence and decrease of harmful emissions that cause greenhouse effects, including right of consumers in power and natural gas market to choose their supplier, become priority topics on the agenda of all factors. These issues cannot be resolved separately because they are all interconnected and have strong influence on energy sustain ability.<sup>1,3</sup>

On top of the above issues, there are geopolitical tensions, questioning of legitimacy of the existing hegemonic powers, re-emergence of nationalist and protectionist approaches in developed countries, re-nationalization of energy companies in South America and Russia, and distorted equilibrium between energy producing and consuming countries. When it comes to energy, various strategic interests are at play on national and regional levels. Progress in forging international agreements and negotiations on sustainable development, climate change or investments in energy producing countries, can be achieved only when all these interests are identified. No doubt, these issues represent a big challenge for deci-

sion-makers in corporations, governments, but also for various international organizations and institutions.

Formally, the Region includes contract parties in the Energy Community Treaty signed in 2005 (Croatia, Bosnia and Herzegovina, Serbia, Montenegro, Kosovo, Albania and FYR Macedonia) which have not achieved yet the level of administrative and economic development required by the EU due to objective or subjective reasons, and which currently have different status as candidates for EU accession. From the energy perspective, considering consumption levels and flows of energy, this region should be observed in a wider context of surrounding EU member countries, which are also parties to the Energy Treaty.

In addition to all global problems which are common to different countries, the Region is burdened with the consequences of 50-year long communist rule, the 1990s wars and all other problems brought about by the post-war and transition era.

## 2. SCOPE OF SCENARIOS

Energy policy is perceived from different perspectives by the energy consuming countries, whose main concerns are security of supply, market and pricing balance, contrary to producing countries whose main concerns are security of demand and management of natural resources. However, four key issues of global energy policy that determine our energy future can be identified: market efficiency, climate change, fight against poverty and, growingly important, geopolitics.

### Market and energy efficiency

Since the early 1990s, in many political arenas, market mechanisms were the main ideology in energy policy and development of energy sector. This promoter of change, together with respective roles of both public and private sectors within legal frameworks of individual countries, led to a global trend of market opening and free trade of energy and energy services. Energy deregulation in the USA, liberalization in the European Union, market forces and private sector in the countries in transition, market conditions for investments in energy sector in emerging economies set by international finance institutions, are just different tunes in one and the same composition: market mechanisms must be applied wherever possible for the purpose of achieving goals of energy policy and as counter-balance to government interventions. Market instruments are also used for fulfilling other policy goals, as for example emissions trading schemes (ETS) in the EU, clean development mechanism (CDM) and joint implementation (JI) foreseen by the Kyoto Protocol, trading with certificates for the promotion of renewable energy sources and energy saving, incentives for investments in energy generation, distribution and consumption.

However, an important condition for proper functioning of the market, that can ensure benefits for consumers, is economic rationale, reasonable prices and stable regulatory regimes with transparent, reliable and credible decision-making process. In many developed and developing countries this process is still developing, although there are signs that participants are skeptical to market paradigm.

Market mechanisms are not a universal solution to all energy problems. Overall civilizational values could also contribute to behavior of consumers and lead to global ethics of energy saving. Already now it is widely perceived that, historically, energy consumption in the developed countries has been huge and that these countries have done little to curb such consumption. On the other hand, it is civilizational necessity that poor countries accelerate their economic growth and improve the standard of living of their citizens, which involves increase in energy consumption. Therefore it is imperative for all of us to achieve higher level of energy efficiency and saving through development and deployment of existing technologies and the new ones to be developed.

### 2.1. Climate change and energy

Energy, food, water, biodiversity, health, human rights, tolerance and dialogue, are essential for sustainable development and survival of human race in this world. There are numerous local, regional and global (global warming) problems connected with energy generation and consumption. Therefore it is a real challenge how to find proper solution for reduction of anthropogenous greenhouse gas emissions and to avoid or minimize exhaust of such gases in the atmosphere and consequences that arise thereafter.

Although there are no major disagreements concerning the need of decreasing greenhouse gases, the question of distribution of responsibilities among the states, as well as the selection of mechanisms for achieving this goal, re-

main unresolved. The Kyoto Protocol is the first such attempt in imposing global responsibility and its real value is the effort to do something, albeit achieved results are below expectations. There are three crucial problems:

- Not all countries are included;
- The principle that historical levels of emissions are taken as a base and the principle of solidarity in decreasing emissions represent an advantage for developed countries and disadvantage for developing countries whose economies are growing;
- The problem related to reduction of emissions is underestimated, which is confirmed by modest results.

Participation of all countries and fair distribution of commitments, particularly in relation to developing countries, are conditions precedent for a new global agreement to succeed.

### 2.2. Energy and poverty

One of the goals within the United Nations' program Millennium Development Goals is eradication of extreme poverty. In order to meet this goal, the number of people with income of one dollar a day should be halved by 2015. It will be difficult to achieve this target, if minimum consumption of electricity is not made available to the poor, because there is a strong correlation between the level of income and access to electric power. This fact points to conclusion that very poor countries should have steep increase of electrification.

Growing imbalances on global level pose moral dilemmas and require continuous coordination and support in order to make progress in achieving global energy sustainability. Higher level of cooperation between developed economies and developing countries is particularly important. It is also essential that the support is not provided only in financing. It is well known that in some cases developed countries apply restrictive measures in trading with developing countries, and thus limit further their participation in global trade and diminish their potentials for economic growth and development.

The countries in the Region are developing countries with inadequate energy infrastructure, partly due to historic heritage of communist system which neglected appropriate development of energy infrastructure. The other problem is poverty and inability of poor citizens to pay their bills (most frequently for electricity and gas) despite the fact that generally, such prices are below economic levels. In absence of active social policy, governments tend to control energy prices, with adverse consequences for energy companies which face pauperization and cannot achieve their development targets or at least proper maintenance of existing plants, while, on the other hand, such policy fails to resolve social problems of poor citizens unable to pay economic price of energy. Reasonable economic prices and active social policy that would help citizens to pay energy bills, at least for what is considered a civilization minimum, should enable conducting of needed development policy.

### 2.3. Geopolitics and energy

After the fall of the Berlin Wall, there was a general belief among developed countries, that the global economy

would be integrated on market principles. However, expected *strong* globalization, in a relatively short time, turned into *weak* globalization. This general trend was particularly conspicuous in energy markets. The reason lies in rising nationalism rooted in *weak* globalization due to lack of trust in superpowers with hegemonic pretensions by the countries supporting this type of globalization. The events after the "11th September" changed the direction of designed and implemented policies and put forward national interests as priority and the main purpose of some countries' international activity. Such developments put in question legitimacy of dominant messages of the western world regarding free market, democracy and freedom.

Awareness that traditional of free market do not apply the market principles they preach, raises doubts about credibility of such systems. Difficult negotiations within the World Trade Organization are good example of such lack of trust. On the other hand, the countries that used to have planned economy adopt new economic standards and integrate part of their markets in international trade when they find it feasible. Tensions among large players lead to misunderstanding and false interpretations of different moves, making the situation more difficult and posing security problems.

Currently, there are two approaches toward international economic system. One is more focused on economic efficiency as a dominant managing principle. The other is more focused on efficiency in promoting national interests. The existing dynamics of international relations lead to unpredictable and dim geopolitical picture. Since energy is the object of geopolitical manoeuvres, it is clear that such unstable situation has significant impact on international energy markets and international relations.

The SEE region, with Croatia included, depends on energy imports, particularly imports of oil and gas. Due to its size and economic development level, the SEE region is unable to resolve its problems independently, but has to rely on the European Union and its relation to the region, and on Russia as the main exporter.

### 3. SCENARIO OBJECTIVES

The objectives of the global energy policy are marked by 3A – *Accessibility* – to modern, affordable energy for all; - *Availability* – in terms of continuity of supply and quality and reliability of service; and - *Acceptability* – in terms of continuity of supply and environmental goals. Achieving of 3A goals is largely determined by social, political and economic context. In addition, the governments in countries and regions all over the world must make relevant decisions. On the basis of the above objectives, four overlapping scenarios were designed for the region:

**Government engagement.** Policy environment may support competition in the private sector, unleashing the power of the markets, or, governments can compensate for a lack of private enterprise capacity. Between these two extremes, there is a vast spectrum of „government actions“ in the form of engagement, involvement and interference:

- *Engagement* – occurs when government is fully aware of what is going on, what the issues are, and what is required of it in order to ensure optimum functioning of energy systems. Engagements focused on improvement of energy efficiency and advances in use of renewable energy sources are particularly important.
- *Involvement* – occurs when the government is carrying out a number of functions, possibly in competition with other providers. This may distort the market due to inequity of power.
- *Interference* – occurs when the government's actions or regulations are so obtrusive as to affect the market negatively; energy systems are not developed as effectively and efficiently as they could otherwise be.

**Cooperation and integration.** There are three main forms of cooperation and integration: there is government to government collaboration in the form of treaties or international agreements; private-public partnerships to design specific programs or regulations to achieve specific policy goals; and company to company agreements. In case of Europe, it is essential how member states cooperate within the EU (accession policy and fast expansion), including quality of regulatory and other systems within the EU. According to some forecasts, by 2050 EU may expand to Russia's borders. Of course, the expansion process could be slower and less extensive.

Europe has achieved considerable progress in meeting the 3A goals in power sector, while achievements in natural gas sector are lagging behind. However, European energy market is also characterized by misbalance in energy production and consumption. Energy production is higher in Eastern Europe (Russia) and consumption is higher in the West. Consequently, energy security goals vary within Europe. The priority goal of Western Europe is to ensure security of supply and Russia's priority is to ensure security of demand. The ultimate range of possible cooperation would be to put into balance interests, risks and responsibilities of both, the EU and Russia.

For the SEE countries, whose long-term goal is to join EU, the relations between EU and Russia are of utmost importance. Although the arrangements forged between individual SEE countries and Russia might render short-term results, in the long run such arrangements cannot replace finding of quality solutions for cooperation between the EU and Russia.

#### **Accessibility**

Almost entire Western Europe has a 100-percent access to electricity supply. The development of gas grid and gas market did not follow the developments of electricity market, so there is considerable room for progress in natural gas accessibility.

#### **Availability**

There is an important interdependency between Russia and the rest of Europe. Russia, having enormous reserves of crude oil, natural gas and coal, is in a unique position to maintain the supply of Europe. Availability of energy for Europe is largely determined by imports from Russia. Recent interruptions in natural gas and oil supply have demonstrated that such dependence poses a risk to wider European Availability, including the SEE region.

### Acceptability

The combination of market-based instruments with strong regulation and public service obligation, increase the level of acceptability of energy development plans. Evolution and strengthening of energy market on one hand and stronger regulation on the other hand, should ensure protection of social rights and the environment. New measures are being introduced with considerable impact on acceptability: EU emissions trading system or the revised emissions limits (for SO<sub>2</sub>, NO<sub>x</sub> and particles) and the Large Combustion Plant Directive. Public concerns and opposition to construction of all types of energy plants, specifically nuclear and coal power plants, pose serious problems for new builds.

## 4. ENERGY POLICY SCENARIO DESCRIPTION

### 4.1. Relation between governments' engagement and globalism /nationalism

Governments' role, degree of their engagement and involvement, and events taking place in energy market, are not in correlation with the concept of "heavy government" or "strong political leadership". It is possible that heavy government will have low level of engagement or will not interfere in energy sector at all, while a light government may be forced to make considerable interventions. The government will always conduct an active policy in energy market because it makes part of its constitutional responsibility. Since energy policy does not include only energy market, but also various measures and activities aimed at improvement of energy efficiency and environmental protection, a qualification of government's role differs in the matters relating to energy market and relation to environmental protection issues or energy efficiency issues<sup>3</sup>:

- In the area of legislation, governments with low level of engagement generally fail to introduce regulatory framework and its harmonization with EU Directives with necessary speed;
- In the area of market mechanisms development in energy market, lower level of engagement by governments means less interference in regulator's activities;
- In the area of environmental protection and improvement of energy efficiency, lower level of engagement by governments means weak performance in this field and slower implementation of changes.

### 4.2. Relation between globalism vs. nationalism

A strongly globalized world has a multilateral framework and tends to rely predominantly on market forces and market prices. In such framework, energy consumption, trade and supply are determined by various contracts and their due execution as the main rule of the game. The rules established by the WTO, global energy market and other multilateral mechanisms and agreements, will determine the behavior of various participants. On the other side of the spectrum is the world in which national, bilateral and regional factors play dominant role. Politics, geopolitics and foreign policy will determine which

strategy will prevail. In such a world we can expect politics based on „divide and rule“ principle, in which energy supply and trade could growingly become an instrument of governments with political power and readiness to use it.

Europe is not a homogeneous area, but it is marked by political, economical, cultural and historical differences. From the energy perspective, it can be divided into Russia as the largest supplier and exporter of energy, and other part of Europe which is a large consumer and importer. The other dividing criterion is institutional: EU member countries, candidate countries and those who intend to become EU members, and those with no ambition to join EU on one side, and Russia on the other side. Also, there are considerable differences among the countries regarding the level of economic development, functioning of rule of law, development of energy sector, energy policy and capacity of energy system.

Since energy development scenarios are designed for a long-term period up to 2050, the future of the European Union is an important component for viewing all elements, at least in two dimensions:

- EU enlargement from the current 27 member states, and dynamics of enlargement process;
- Relations among EU members and quality (and strength) of their institutional systems: the relations between EU institutions and national institutions of individual countries, which are very important, but frequently under various interest pressures, achieved certain improvements, however, this progress is relatively slow. We can say that European Union still lacks a general energy policy, but it passes decisions on key elements of energy policy of national governments, particularly directives that have to be incorporated in national legislation.

One of possible scenarios is expansion of the EU to the Russian borders and creation of partnership relations between the EU and Russia based on equitable market rules. Any other solution would be of lower quality in scope and level of cooperation, which would also mean higher risks and challenges. For Croatia and the entire region, different scenarios of EU development and relations to be established within the EU, as well as between EU and Russia, will result in slower or faster economic growth, lower or higher level of security of energy supply.

Security of energy supply in Europe will be also influenced by the countries in Central Asia, i.e. former Soviet Republics. They could have important role in diversification of sources of supply and thus their resources could become a part of European rather than Asian energy scenario. These Central Asian countries have attractive resources of oil and gas and Europe could benefit from this diversification of supply. However, it is uncertain whether they will lead their export policies independently or in coordination with Russia.

The experience has shown that European Union is not a «single entity» when energy is concerned. The different storylines of the scenarios follow the line which divides more or less conspicuous national approaches of the EU countries, versus globalism, hence the question is whether EU should be considered as a community acting

as one, or a series of nationalisms of its members? In other words, it is possible that a strong component of external energy policy could act as an integrating element, making a community in which member countries coordinate their national policies by deployment of EU measures or agreements, as the case may be.

Politically feasible models could include energy policy as a common responsibility of member countries and the EU (EU Convention draft model), or a model in which approach to energy policy would be based on intra governmental cooperation with certain common standpoints on resolving common external interests. More regionally oriented approaches could also be designed by a «coali-

tion of the willing», as well as models with highly integrated markets but limited interventions by the EU institutions and national governments. Institutional relations between EU member states are very important for the establishment of common energy market and actual achievements of the common market will depend on how successful these relations are.

### 4.3. Key indicators

The scenarios are described by seven indicators:

- *Political context* – relations between the EU and Russia, as well as relations between the EU and other international energy suppliers.

Table 1. Projection of primary energy prices <sup>1</sup>				
L'Europe des patries – national approach and light government				
	2005	2020	2035	2050
Crude oil (USD/bbl)	54	59	90	118
Natural gas (USD/Mbtu)	5.4	7.3	10.6	15.3
Coal (USD/t)	72	89	104	117
Fortress Europe – national approach and heavy government				
	2005	2020	2035	2050
Crude oil (USD/bbl)	54	66	87	107
Natural gas (USD/Mbtu)	5.4	7.1	9.7	12.3
Coal (USD/t)	72	88	101	112
Confident Europe – globalism and heavy government				
	2005	2020	2035	2050
Crude oil (USD/bbl)	54	54	70	92
Natural gas (USD/Mbtu)	5.4	6.8	8.9	12.4
Coal (USD/t)	72	91	112	138
Competitive Europe - globalism and light government				
	2005	2020	2035	2050
Crude oil (USD/bbl)	54	57	82	117
Natural gas (USD/Mbtu)	5.4	7.4	10.4	15.7
Coal (USD/t)	72	93	115	143

Table 2. Scenario – Nationalism and light government engagement – L'Europe des Patries				
1.	Nationalism and light government engagement - L'Europe des Patries	Political context	Europe	Slowdown in EU expansion. Slow achievement of consensus on strengthening of EU institutions and overtaking part of members' sovereignty. Tensions among EU institutions and member states governments. Inefficient EU lags behind USA, Japan and new economic powers - China and India.
			Region	Delays in resolving crises issues as a result of insufficient engagement of governments of Serbia, Kosovo and B&H. EU accession of countries in the region delayed to 2030, due to their weaknesses and EU weakness.
			Croatia	Delays in joining EU and slow resolving of problems in relations among countries in the region due to problems within EU and the region, or due to own weaknesses. Full EU membership in 2016.
		Security of supply	Slow implementation of projects for connecting energy transmission systems due to lack of interest and lack of engagement by neighboring countries.	
		Development of energy market	Administrative and other barriers hinder development of energy market and competition within national states.	
		Energy efficiency	Light government activities in stimulating energy efficiency, weak international cooperation.	
		Environmental & climate change	Light engagement of government in environment protection and curbing emissions.	
		Environmental of energy production - energy mix	Lack of activities aimed at establishment of optimal energy production structure -low implementation of alternative energy projects.	
R & D	Weak support to R&D, weak international cooperation in innovations.			

**Table 3. Scenario - Nationalism and heavy government engagement - Fortress Europe**

				Europe	Slowdown in EU expansion. Prevailing attitude on closing EU borders and more tensions in EU/Russia relations as a result of rocket launching base in Poland and CZ, and Kosovo. Slow achievement of agreements regulating EU - Russia relations.
2.	Nationalism and heavy government engagement - Fortress Europe	Political context	Region	Slow resolution of crises issues as a result of inflexible attitudes by governments. EU accession by 2025. Revision of Dayton agreement and possible political crises in Serbia because of Kosovo	
			Croatia	EU accession by 2014. Slow resolution of outstanding issues with Slovenia	
			Security of supply	Slow implementation of projects for connecting energy transmission systems due to lack of interest by neighboring countries. Higher government engagement in renewable projects	
		Development of energy market	Containment of energy markets within national borders, dominant role of government in setting energy prices		
		Energy efficiency	More intensive government engagement in stimulating energy efficiency, weak international cooperation		
		Environmental & climate change	More intensive government engagement in environment protection and curbing emissions		
		Environmental of energy production - energy mix	Active establishment of optimal energy production structure within possible national solutions - stronger implementation of alternative energy projects		
		R & D	Stronger government support to R&D, weak international cooperation		

- *Security of supply* – the scenarios describe different levels of security of supply or possible risks in supply or reliability of supply, but emphasize the difference between security of imports versus adequacy of energy system by itself.
- *Development of energy market* – creating conditions for efficient and effective energy market and its promotion.
- *Energy efficiency* – active policy and measures aimed at increasing efficiency in energy generation, transport/transmission, distribution and consumption.
- *Environment and climate change* – this issue comes on top of the agenda, with focus on local and regional problems and various forms of government's engagement. However, more attention should be paid to global issues of climate change and CO<sub>2</sub> emissions because these issues have impact on energy supply structure.
- *Structure of energy production* - capacity of governments and/or their engagement in promotion or defining of desirable structure of energy mix, will determine concrete roles of different energy sources.
- *Research and development* - investments in development and international cooperation in achieving technology improvements across entire chain from production, transmission, distribution and consumption (appliances) of energy.
- In many aspects Europe is based on «Community Law». This is important fact because the Community Law sets rules for functioning of economic community, not only from legal aspect, but also from the aspect of industry and trade.
- The fall of the Berlin Wall, which took place in the 1990s, was a manifestation of fundamental changes in key European parameters. Events that followed after that demonstrate that Europe is still searching for new forms of cohesion in new circumstances. This transition process affects energy, too, particularly in relations between the East and the West, and therefore it calls for creation of a vision on possible futures of Europe and the world.
- Observed in a global context, energy consumption per capita in Europe is on medium high level, however it varies in individual countries, particularly when different levels of energy efficiency are taken into account. There is still room for considerable improvements in this area.
- Creativity has always been strong in Europe, particularly in case of improvisations. Solutions to the problems brought about by changes are usually found through trial and error method.
- As for CO<sub>2</sub> emissions, it is most important to solve the problems on global level, including China and India. Europe and North America must achieve considerable decrease of greenhouse gas emissions.

#### 4.4. Other important features of the scenarios

Other issues that are not considered in this paper and do not impact scenarios, include demographics and energy resources, because no changes are expected within the scenarios that could impact the results. It is important to take into account some other features of Europe, those related to political, economic, cultural, educational and historical experience of individual countries, which determine the dynamics of change process, as for example:

- Culture and politics of Europe have been dominantly inclined toward international orientation and cooperation.

#### 4.5. Observed scenarios in the WEC's study for Europe

The four storyline themes have been designed for the four scenarios for Europe:

- «L'Europe des patries» - national approach and light government – low engagement,
- «Fortress Europe» - national approach and heavy government – high engagement,
- «Confident Europe» - globalism and heavy government – high engagement,

**Table 4. Scenario - Globalism and heavy government engagement - Confident Europe**

3.	Globalism and heavy government engagement - Confident Europe	Political context	Europe	Accelerated EU expansion to Russian borders (by 2050). Balance in management between EU and its institutions and member states. Cooperation agreement between EU and Russia
			Region	EU accession by 2020. Satisfactory resolving of political problems in the region, faster preparations for joining EU and economic growth
			Croatia	Joining EU by 2012. Good results in curbing corruption and in judiciary system reforms
		Security of supply		Good realization of projects for connecting energy transmission systems, stronger governments' support in resolving implementation problems
		Development of energy market		Opening of energy market, maintenance of certain government's role in setting energy prices
		Energy efficiency		Stronger government's activities in providing incentives for energy efficiency, strong international cooperation
		Environmental & climate change		Stronger government's engagement in environment protection and decrease of emissions, strong international cooperation
		Environmental of energy production - energy mix		Active establishment of optimal energy production structure supported by good international cooperation - stronger implementation of alternative energy projects
R & D		Stronger government support to R&D, stronger international cooperation		

**Table 5. Scenario – Globalism and light government engagement – Competitive Europe**

4.	Globalism and light government engagement – Competitive Europe	Political context	Europe	Accelerated EU expansion to Russian borders (by end of 2050). Strengthening of EU institutions. Russia harmonized its legislation with EU, it is non-EU but its relations with EU are regulated by specific partnership agreement
			Region	Joining EU by 2015
			Croatia	Joining EU in shortest time - by 2010
		Security of supply		Good international conditions for realization of projects for connecting energy transmission systems, weak engagement of governments
		Development of energy market		Opening of energy markets, minimum government's interference in functioning of markets, dominant role of regulators
		Energy efficiency		Light government's engagement in stimulating energy efficiency, good international cooperation
		Environmental & climate change		Light government's engagement in environment protection and decrease of emissions, strong international cooperation
		Environmental of energy production - energy mix		Active establishment of optimal energy mix supported by good international cooperation - weak implementation of alternative energy projects
R & D		Weak support to R/D, good international cooperation		

- «Competitive Europe» - globalism and light government – low engagement.

According to set assumptions for the above scenarios, ENERDATA devised a possible scenario of primary energy prices (Table 1.). All values are expressed in USD prices in 2005. Prices of natural gas and coal are those prevailing on the European market.

#### 4.6. Theses for scenarios in the region

Based on the above energy policy scenarios to 2050 for Europe, possible scenarios of the SEE region have been designed by linking basic features with the EU energy future.

The political context refers to Europe, but also the region and Croatia. Development of political and economic relations in each country of the region, cooperation and strengthening of economic cooperation, as well as EU's relations toward the region, will determine the dynamics of economic development and energy consumption, including energy efficiency and use of renewable energy sources.

It is in the best interest of the SEE region as a whole, each individual country and all countries together, to an-

alyze energy future by applying one and the same methodology. It can be concluded in advance that such analysis would give sufficient reasons and incentives for structural changes, qualitative integration and harmonization with *acquis communautaire*.

The concept of scenario storylines adopted in the study<sup>3</sup>, and redesigned to meet the requirements of the regional scenarios, enables forecasting of consequences of good or bad policy, good or bad cooperation, active policy or lack of adequate active policy. Therefore such scenario exercise is very useful for all decision makers from government, energy companies to all those who participate in decision making process. The scenario features are presented in the Tables from 2 through 5.

## 5. THE REGION AND CROATIA IN ENERGY SCENARIOS

Formally, the Region includes contract parties in the Energy Community Treaty signed in 2005 which have not yet achieved the level of administrative and economic development required by the EU due to objective or subjective reasons, and which currently have different status as candidates for EU accession.

However, it should be noted that the Energy Treaty, as the base document for establishment of the Energy Community, neither determines the scope of the Region, nor its borders. The parties to the Energy Treaty are the European Union on one side, and 9 countries as contract parties on the other side (after joining the EU, Bulgaria and Romania ceased to be contract parties but are included in the EU as the contract party). The Energy Treaty sets the Energy Community for the purpose of implementation of harmonized legislative and regulatory frameworks based on the *acquis communautaire*, in the area of electric energy and natural gas, extending in the territories between the Atlantic and the Black Sea, Scandinavia and the Mediterranean. In other words, the Energy Community has been formed, and the SEE region tends to find its place within this Community.

Within the EU there are 7 regional electricity markets and 3 regional natural gas markets in the process of formation/development. It is assumed that the SEE region will become the 8th electricity market and that it will be joined to the 3rd regional natural gas market. The Energy Treaty actually enables the EU countries to co-exist in the same regional market with the non-EU countries and operate in accordance with the rules set by *acquis communautaire*. Consequently, the Energy Treaty as the document regulating establishment of the Energy Community should be observed as an instrument for regulation of an additional regional market, and not energy community. Moreover, the Energy Treaty can be further expanded to include legislative and regulatory frameworks for other energy sources.

The above tables present the most influential factors: political, economic and energy related, that will have significant impact on the region's future. The next task would be to analyze the region in accordance with the described scenario storylines. In this paper we present the energy profile of the Region, based on the surveys carried out by the Energy Institute Hrvoje Požar, which provides an insight into the key challenges the Region will face in the future.

Energy Community as a political project for legislative harmonization with the *acquis communautaire*, from the energy perspective, differentiates itself from Region. The Region should include all SEE countries (including Greece) as well as other surrounding countries in the west (Italy, Slovenia, Austria and Hungary) because these countries with their needs, will have significant impact on the development of infrastructure in the entire region. The Region is characterized by the following features:

- Steady growth of energy demand in the future;
- The region is importer of oil and gas, in some cases even power importer;
- In individual cases potentials for power generation exceed own demand;
- EU is net importer of all energy sources and is interested for import of electricity from the region, i.e. from individual parties in the Energy Community.
- Larger sources of oil and gas are located outside the EU and the Region.

## 5.1. Electric energy

Demand for electricity will steadily grow, higher growth is expected in Energy Community member states. The size of demand and consumption growth rates will depend on the factors described in the scenarios.<sup>4</sup>

Development of integrated electricity market in the region will greatly depend on transmission capabilities. In entire Europe transmission grids have developed as national grids earmarked for the supply of customers in the territories of national states and not for large scale cross-border power exchange. With market opening, apart from the task of national supply, the grid gets strong trans-national dimension. South East Europe is in a slightly more favorable position because former internal transmission lines, with former republics becoming sovereign states, became cross-border interconnectors (Figure 2). However, total nominal cross-border capacity is significantly lower than associated (relatively high) installed cross-border transmission capacity, partly as a result of system security margins imposed by system operators, and partly as a result of protectionist measures toward indigenous power generation.

There is a considerable gap between the needs and current availability, calling for new investments, but also different financial and institutional-organizational treatment which would enable higher level of energy services as required by future needs and future market relations.

## 5.2. Natural gas

According to forecasts, the demand for natural gas in the wider area (without Turkey) will grow intensively till 2030, after which period the growth would be slower. By 2030 the missing volumes to meet the demand in the region are at the level of 85 bcm, which points to the fact that new supply routes should be developed and that governments have responsibility for realization of these projects.<sup>8</sup> It is clear that some supply routes overlap with each other, both in regard to source of supply and target end market. It will not be possible to implement all the supply route projects in the short-term – development of one supply route excludes development of the other.

There are new projects in preparation for the supply of 100 bcm of natural gas to the Region. The other important element is future supply from LNG terminals without which it would be difficult to ensure sufficient level of security of supply (planned LNG projects should provide about 80 bcm of natural gas. In addition, for the case of increased consumption it will be necessary to double the capacity of underground gas storage to the level of 50 bcm.

Contrary to electricity grid, natural gas grid is significantly less developed with lower number of consumers connected to the grid, and with lower number of interconnectors linking national grids. Natural gas market has only theoretical potential for growth unless investments in interconnectors are made in order to connect different countries' gas grids in the Region.

The study<sup>2</sup> analyzes possible gas supply through the aforementioned transport routes to larger cities in the Region with no distribution system. In addition to devel-

opment of branch gas lines in order to bring natural gas to non-served parts of the Region as proposed by the mentioned study, a construction of the South European Gas Ring is proposed as a long-term project.

The development of the Gas Ring project would bring numerous benefits: the most important is a possibility for strong regional co-operation based on the documents such as Stabilization Pact (the main role in implementation of this document is taken by SEECP – South-East European Cooperation Process), Energy Community Treaty and Energy Charter; potential for optimizing gas pipelines capacity and thus decreasing investment costs; flexibility of supply from the main transportation routes and sources; improved diversification and security of supply; and in the end, SEE Gas Ring would enable construction of additional transport capacity when and if new transportation routes are constructed.

**5.3. Motor fuels**

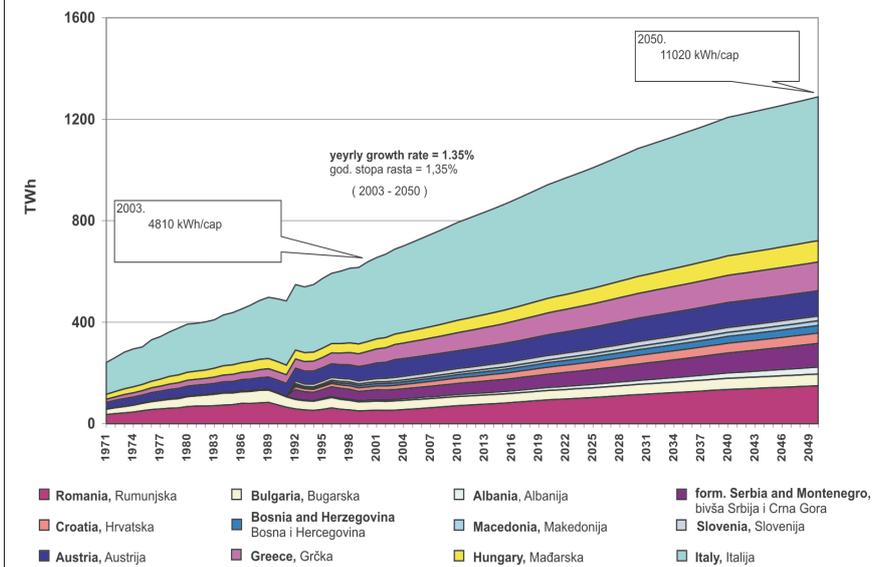
Consumption of motor fuels in the wider region is in steep rise. According to forecasts, the fastest growth will be recorded in the developing countries with strong increase of transportation vehicles. Opposite effect will be caused by improved efficiency of motor vehicles. Consequently, overall result would be decline in consumption of motor fuels in the wider region after 2025.

**5.4. Crude oil**

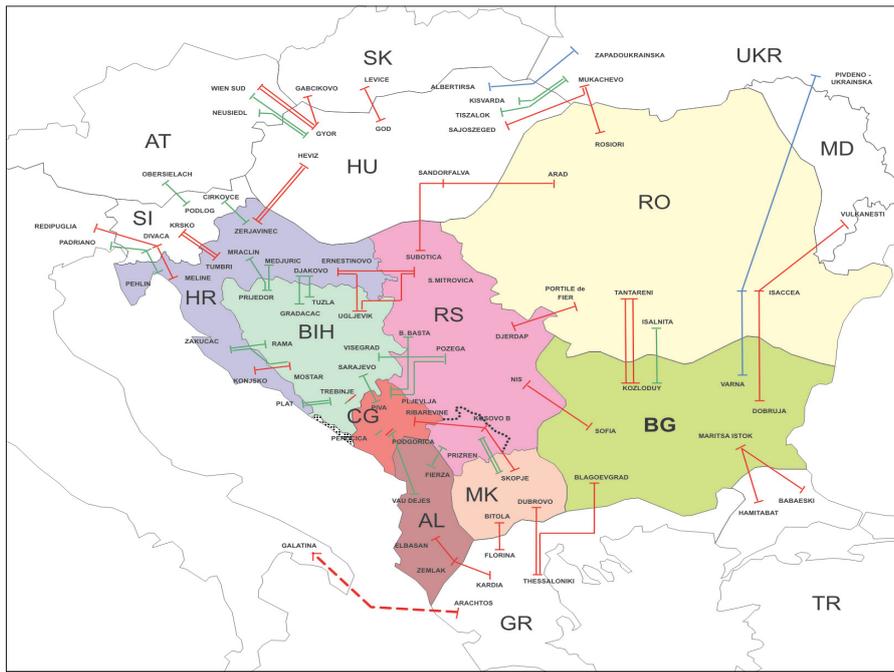
Proved oil reserves in the countries of the region were estimated at about 345 million barrels (about 55 million tonnes) in 2006, while production was only about 40 000 bbl/day (6 350 tonnes/day). Due to low indigenous production, countries in the region meet about 80% of their needs from imports. The supply of the region, but also Europe, is carried out through oil pipelines from Russia and Greece, and by tankers through the ports in the Adriatic and Black Sea.<sup>9</sup>

Increased demand for oil, which entailed high increase of oil prices, as well as global changes in the environment, put oil on the top of political agenda. Due to high dependence of European countries on oil imports, new

**Total electricity consumption**  
Ukupna potrošnja električne energije



**Fig. 1. Electricity consumption in the region (without Turkey)<sup>4</sup>**  
Sl. 1. Potrošnja električne energije u regiji (bez Turske)<sup>4</sup>



**Fig. 2. Existing interconnectors in the region in 2007<sup>4</sup>**  
Sl. 2. Postojeći interkonektivni vodovi u regiji 2007. godine<sup>4</sup>

supply routes are planned in order to ensure stability of oil supply and, consequently, economic stability of each country (Figure 8).

In addition to new supply routes, in order to ensure security of supply, European Commission enforced the system of compulsory stock holding of oil and derivatives. The goal of this system is to provide stable supply in case

of major disruptions in the market. The goal of the compulsory stock-holding is defined in the EU legislation and it is based on the member states' obligation to hold stocks of oil and oil products equivalent to 90 days' national consumption. In order to ensure reliable and transparent data about energy market and enable timely corrective actions in case of disruptions, at the beginning of this year a new Energy Market Observatory System – EMOS was put in place for monitoring of energy market. The goal of this system is to identify possible threats to security of supply in Europe and implementation of appropriate activities. In compliance with the EU regulations on compulsory stock-holding, Croatia introduced similar provisions in its Oil and Oil Derivatives Market Law (Official Gazette 57/06) for compulsory stockholding equivalent to 90 days average consumption of oil and derivatives in previous year. Compulsory stocks include three groups of oil derivatives: (1) motor gasoline and jet fuel (2) diesel fuel, gas oil and kerosene and (3) heating oil (light, medium and heavy).

### 5.5. Coal

Significant coal reserves in the region exist in Kosovo (the second largest lignite reserves in Europe) then in Bosnia and Herzegovina (lignite and brown coal), Serbia (lignite), Bulgaria (lignite, hard coal), Romania, FYR Macedonia and Greece. Apart from indigenous reserves, there is always possibility of hard coal imports. Coal, indigenously produced or imported, is mainly used for power generation and in industry. Despite high CO<sub>2</sub> emissions appearing during coal burning process, the advantages of coal are price (lower and stable price compared to volatile oil and natural gas prices), availability and security of supply (locally and on international market).<sup>4,10</sup>

Production of lignite in Kosovo represents a competitive option for power generation when compared with international electricity prices and alternative fuels. Coal mined in Kosovo is the cheapest coal in Europe and one of the cheapest in the world. The coal reserves in Kosovo are estimated around 14.3 billion tonnes.

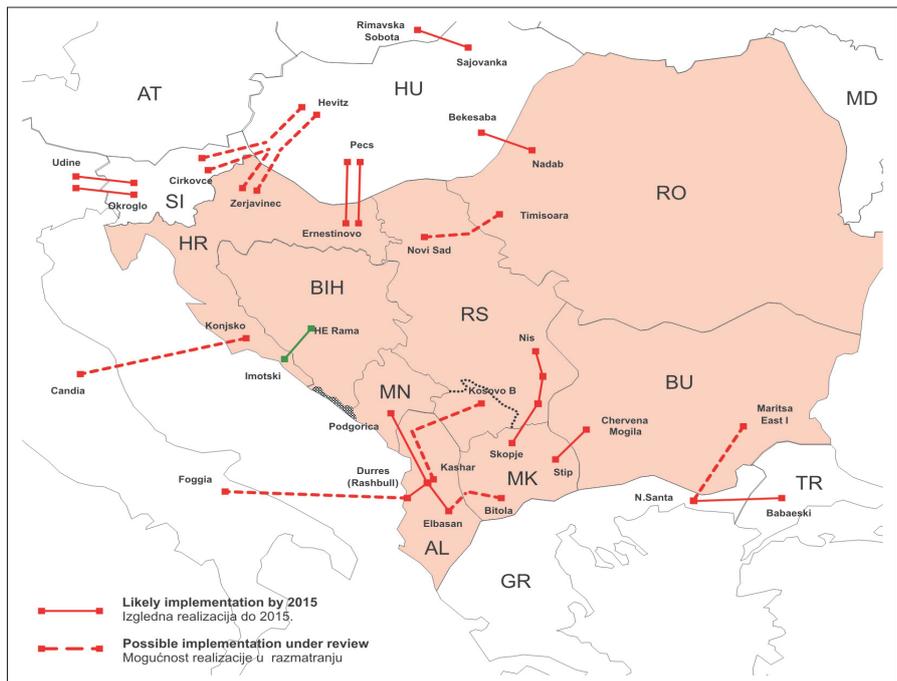


Fig. 3. Planned interconnection lines in the region by 2015<sup>4</sup>  
Sl. 3. Planirani interkonektivni vodovi u regiji do 2015. godine<sup>4</sup>

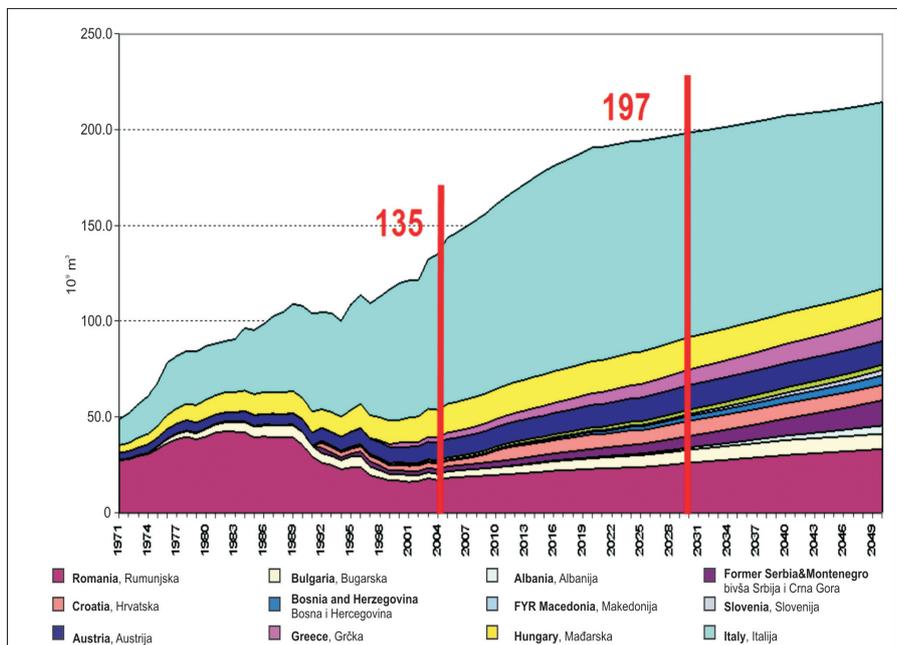


Fig. 4. Total consumption of natural gas (wider region excluding Turkey)<sup>8</sup>  
Sl. 4. Ukupna potrošnja prirodnog plina (šira regija bez Turske)<sup>8</sup>

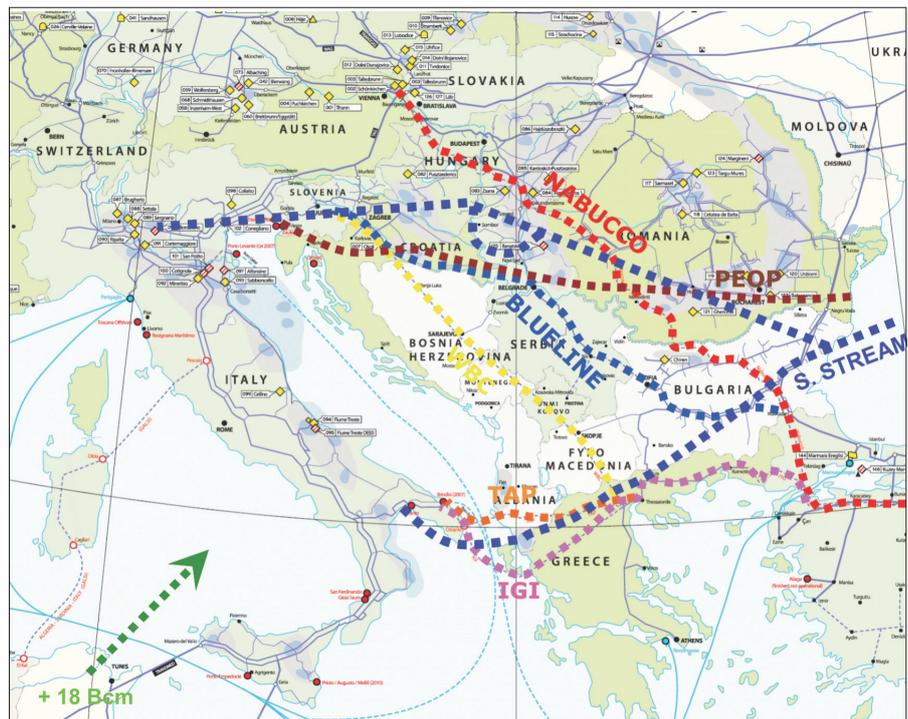
Future use of coal will mostly depend on environmental legislation and obligatory emission reductions, as well as on political stability of the region and security of investments (ex. Kosovo under UNMIK governance). The states with the highest coal reserves still do not have obligation of CO<sub>2</sub> emission reduction. Depending on emission re-

duction scenarios, carbon capture and storage technologies will have strong impact on the use of coal for power generation and in industry. Development of the so called «clean coal technologies» and creation of legislative framework for use of these technologies (ex. passing of directive on obligatory carbon capture and storage from power plants on fossil fuels) represent the objectives set by the EU by the year 2020.

### 5.6. Renewable energy resources

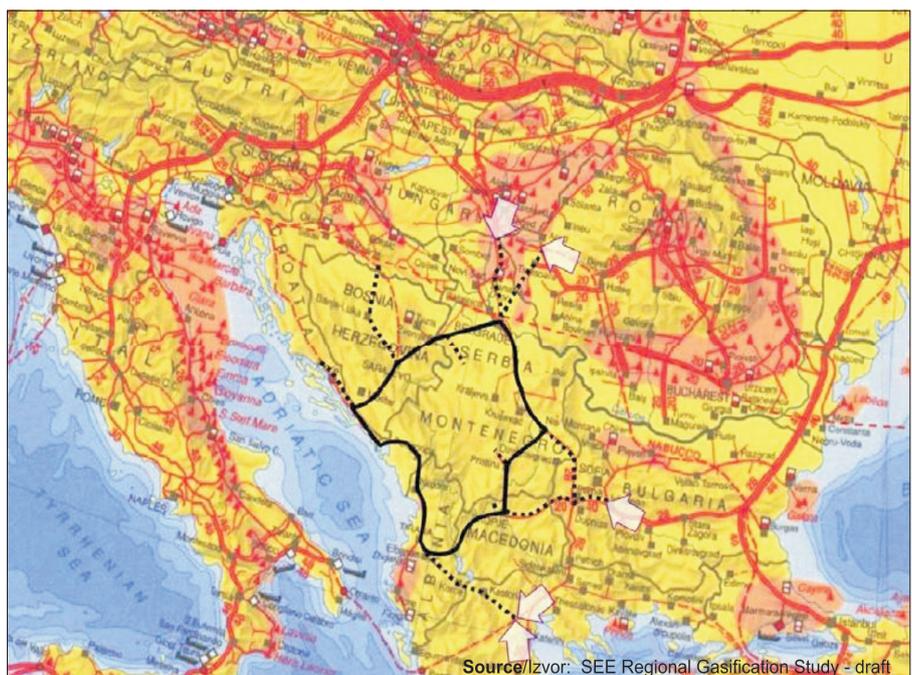
Establishment of a system for the use of renewable energy sources in the Region is still in initial stage. The main obstacle for wider use of renewable resources is the lack of a stable legislative framework. When we look at the current contract parties to the Energy Community Treaty, only Croatia has in place laws that regulate power generation from renewable resources, while no party has biomass regulations. The only feasible way for correction of this deficiency is introduction of targeted approach which proved quite efficient in case of the EU countries. This approach assumes setting of regulation targets for the use of renewable resources in power and heat generation and in transport, as well as introduction of additional measures necessary for meeting these targets. Before setting the targets, it is necessary to analyze potentials, costs and benefits, as well as possible impacts of a renewable energy project on the environment. Set targets must be based on realistic assessment of technical and economic potentials of renewable energy resources in each country. Most of the countries in the region have not yet done such assessment. All current parties to Energy Community Treaty, except Croatia, are faced with additional problem and this is lack of regulatory system for other energy markets, particularly electricity market, and proper regulation of these markets must precede establishment of a system for renewable energy resources.<sup>6</sup>

It should be noted that increased use of renewable resources means



Note: proposed new route along the PEOP oil pipeline; Blue Line is gas pipeline supported by SRBIJA GAS and Russia as one option for WBC corridor. With the South Stream project defined, nobody supports neither Blue Line nor WBC.  
Napomena: predstavljena mogućnosti izgradnje paralelnog plinovoda uz PEOP naftovod; Blue Line je plinovod kojeg je zagovarao SRBIJA GAS i Rusija kao jedna od opcije WBC koridora. Uz South Stream više nitko ne zagovara Blue Line niti WBC.

**Fig. 5. New natural gas supply routes to the region<sup>6</sup>**  
Sl. 5. Novi dobavni pravci prirodnog plina u regiju<sup>6</sup>



**Fig. 6. SEE Gas Ring<sup>2</sup>**  
Sl. 6. Plinski transportni prsten<sup>2</sup>

Source/Izvor: SEE Regional Gasification Study - draft

also higher energy costs. As this is an area where realistic price levels have not been achieved, higher costs of renewable energy involve also social dimension that must be taken into account.

The governments should establish stable system of subsidies in order to enhance increased use of renewable resources, therefore it is important that member states in the region have stable political situation. Due to specific problems, for the time being it is impossible to propose a single solution, but each country has to design its own model.

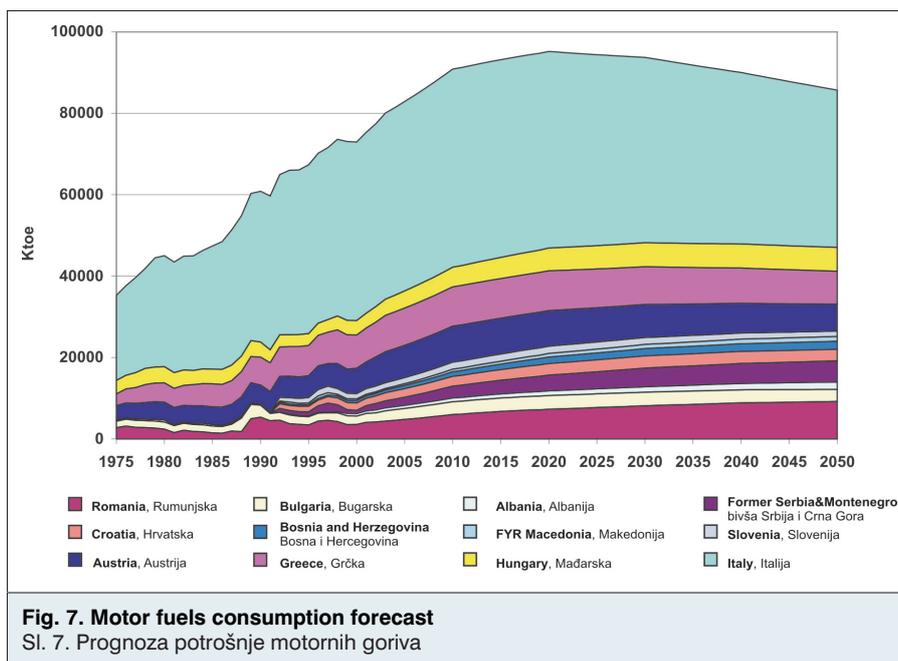
### 5.7. Climate change

Climate change, or global warming caused by increase of GHG emissions poses a very serious global problem. For the purpose of efficient implementation of measures aimed at decreasing GHG emissions, two important documents were adopted: United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol<sup>7</sup>.

The Kyoto Protocol offers a possibility for implementation of the so called flexible mechanisms: joint implementation, clean development mechanism (CDM) and emissions trading in international market. The implementation of the flexible mechanisms enables the Protocol member countries to meet part of their obligations for decrease of emissions by way of investment in projects that contribute to reduction of GHG emissions in other countries, generally at lower costs than their «domestic» measures for emission reduction.

The main deficiency of the Kyoto Protocol is that it does not include all the countries in fighting excessive emissions, but only those included in Attachment 1 of the Convention on Climate Change (developed and transition countries), and Attachment B of the Kyoto Protocol. The selected model of target percentage decrease of emissions relative to the base year puts in better position the countries that had higher emissions in the base year, and these are developed, industry intensive countries or the countries with inefficient energy use. In order to correct this deficiency of the Kyoto Protocol, a new, more equitable agreement is in preparation for the period after 2012, which would also include large developing countries - China and India.

EU established the emissions trading market even before the Protocol's first binding period (2008-2012) trading with emissions credits (launched on 1 January 2005) according to the rules set in Directive 2003/87/EC (the so called *ETS directive*). For the time being the EU emissions trading system (EU ETS) includes only carbon dioxide as the main greenhouse gas, from the four energy activities: power generation, heat generation, direct emissions from oil refineries), iron and steel mills, man-



ufacturing and treatment of minerals (cement, glass, ceramics) and paper industry.

One of the consequences of the Kyoto Protocol and emissions trading system is higher price of energy obtained from fossil fuels, which certainly affects selection of primary energy source and its cost, selection and development of technology for new processing plants, cost of final energy, security of supply and overall economic movements. On the other hand, the Protocol speeded up development and wider use of energy efficient technologies and renewable resources, but also technologies that enable use of fossil fuels without carbon dioxide emissions through application of carbon capture and storage.

## 6. PRINCIPAL OBSERVATIONS

The Region is energy deficit and depends on imports, while energy systems of the countries in the Region are insufficiently interconnected, particularly in case of natural gas grids. Security of supply depends on construction of new power generation capacity, connection of transmission systems and implementation of large infrastructural projects for the supply of oil and gas to countries of the Region.

In general, energy infrastructure in the Region is in rather poor shape as a result of lower energy prices passed on end consumers and ineffective management of the energy sector. During the socialist rule, but even later, energy pricing policy had strong social component, neglecting economic and market rationales. Despite that, there is rather high percentage of unpaid energy bills, partly due to overall economic situation and absence of rule of law.

Political problems in individual countries slowdown necessary reforms and harmonization of national energy legislation with *acquis communautaire*.



**Fig. 8. Existing and planned oil supply routes to Europe<sup>9</sup>**  
 Sl. 8. Postojeći i planirani pravci dobave sirove nafte u zemlje Europe<sup>9</sup>

Cooperation among the countries in the region is important for each of them individually but also for the entire region because no single country can resolve the problems alone. If EU members are excluded from the Region, then, it is rather small market and security of supply is joint problem of all the countries. Finding proper solutions could be facilitated through stronger cooperation of expert and scientific institutions, as well as providing incentives for investments in energy sector of the Region. Desirable areas for cooperation are:

- Interconnection of transport grids (transmission power grids, oil and gas pipelines) between the countries in the Region,
- Harmonization of legislation and building of institutions necessary for the development of energy market (one of the goals of the Energy Community),
- Development of regional energy hub.

It's a big question whether construction of transportation systems can be realized, in scope and expected time frame, as entrepreneurship projects, or the governments should take responsibility for interconnection of transmission and transport systems. In a 5-year program all countries in the region could be interconnected with at least one interconnector (electricity transmission network, natural gas grid and oil pipelines).

In addition to the concept issue, there is a question how the investments in transport grids can be realized considering the existing needs and speed of market development. Realization of projects for known buyer slows down market development and project implementation.

On the other side, cooperation on infra structural projects for unknown buyers contributes to market opening, and price of cooperation is factored in the cost of energy transport in each country on solidarity basis for all buyers. It is important to set prices of transit and transport on real economic basis.

## 7. RECOMMENDATIONS

- Political agreement between Russia and the EU is a key precondition for further development of the European energy market. EU must open its markets to companies from Russia, and Russia must allow exploration and production activities in Russia by EU companies. It is necessary to achieve reciprocity in responsibilities and opportunities for both partners.<sup>5</sup>
- Construction of transmission power lines and gas pipelines is a precondition for the development of energy market. Currently, the decisions on construction of such infra structural projects have been left to interested countries or individual investors. Each country should oblige itself for ensuring transit capacity for energy. Also, EU should provide institutional, organizational, financial and political support for priority projects facing problems in their implementation.
- Realistic assessment of security constraints is very important for planning production facilities outside national borders. It is desirable to contribute to market opening in power generation and to construct generation plants outside state borders, but, on the other hand it jeopardize security of supply as electricity im-

ports grow relative to indigenous generation. A possible solution is that each state builds its minimal and prescribed share of power generation plants, or that each country ensures 100 percent stocks in its own territory or in other countries by way of long-term contracts. Final solutions should be found based on thorough analyses and proper timing. National governments should have a possibility for intervention in case construction projects lag behind. Cost of security of supply in the form of stocks held in the territory of each country, should make an integral component of electricity price.

- Development of gas market and security in gas supply should be regulated by setting standards for security and quality of supply, which assumes liabilities for ensuring partly transit for unknown users, interconnection with neighbors, construction of new supply pipeline routes and sufficient storage capacity. Risk assessment studies should be obligatory, and based on these studies, individual states and the EU should design respective measures.
- Monopolies should be prevented, as well as concentrations that could lead to territorial monopoly. In order to prevent monopolistic behavior it is necessary to set criteria by analyzing specific situation in each member country, and then in the EU as a single market and administrative area.
- One of the priorities is achieving higher level of energy efficiency by implementation of comprehensive measures based on price incentives and regulation. There is a wide range of technical and other options for achieving this target.
- Specific legal and financial frameworks should be devised to facilitate implementation of the Kyoto Protocol and higher use of renewable energy resources, as well as development of energy market. The solution to this problem should be based on the value of energy and cost of environmental protection, regardless what technology is used, however, by taking into account consequences of specific technology.
- No energy supply option should be discarded, however, each option should be also reviewed in the light of long-term guarantees for setting of fossil fuel prices. Market oriented pricing mechanisms complemented with the elements of EU emission trading system could be a good starting point, among other, for air transport. Particular attention should be paid to further development of nuclear option and global conditions for this development.

In view of the future challenges, unprecedented until today, and at the same time being aware of the opportunities in the area of research and development, governments on national level and EU level, including the private sector, should increase their efforts in financing R&D in energy sector and sustainable energy technologies and achieving their commercial application.

- Cooperation between governments and industry on R&D projects in energy and green technologies should be intensified and improved in national and international context through distribution of costs and by enhancing their efficiency, by avoiding duplication of

research efforts on national and international level. Research and development of new technologies should be integrated European project with synergy effects for all countries in scientific and financial aspect.

## 8. REFERENCES

1. Deciding the Future: Energy Policy Scenarios to 2050, WEC Studies Committee, Sep 2007
2. Economic Consulting Associates, Penspeni, Energy Institute Hrvoje Požar: South East Europe: Regional Gasification Study – Draft Final Report, Oct 2007, Vienna, Austria
3. Energy Policy Scenarios to 2050 Study: Overview of the Report for the Europe Region, WEC, March 2007
4. Generation Investment Study Update 2007, Energy Institute Hrvoje Požar/EKC, Zagreb, 2007
5. Granić, G., Pešut, D. and coauthors: Does the Energy Sector Reform Call for Reform?, World Energy Congress, Nov 2007, Rome, Italy
6. Jelavić, B., Šegon, V.: Report on the Implementation of the Acquis on Renewables in the Energy Community Contracting Parties – Draft Final Report Presentation, Energy Community, Oct 2007, Vienna, Austria
7. Jurić, Ž., Tot, M.: Influence of the Kyoto Protocol on the development of the Croatian Electricity System, 8<sup>th</sup> Conference HRO CIGRE, November 2007, Cavtat, Croatia
8. Pešut, D., Zeljko, M. and coauthors: Development of gas sector by 2030, Energy Institute Hrvoje Požar; Zagreb, 2007.
9. Taiss, M.: Oil Terminal Constanta: Storage Expansion – Criteria, Methodology and Investment Trends, StocExpo Europe 2007 Conference, Antwerpen, Belgium, 2007
10. Tot, M.: HEP Group in Energy Community of SEE, Energy Institute Hrvoje Požar, Zagreb, 2006



Authors:

- Goran Granić**, DSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Branka Jelavić**, DSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Damir Pešut**, MSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Goran Majstrovic**, MSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Helena Božić**, DSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Mario Tot**, MSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Nijaz Dizdarević**, DSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Robert Bošnjak**, B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Robert Fabek**, MSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia  
**Željko Jurić**, MSc., B. E., Energy Institute Hrvoje Požar, Zagreb, Croatia