

Developing Energy Networks in Southeastern Europe

By Agis M. Papadopoulos*

The social and economic developments that have taken place, since the political changes of 1989/90, had their inevitable consequences for the world energy market. This applies particularly in eastern and southeastern Europe.

These changes were manifold, affecting the national energy markets as well as bilateral and international energy relations. After decades of subsidised, wasteful energy production and provision schemes, drastic reforms now occur: energy production is liberalised, energy pricing is more reasonable, the use of environmental burdening primary sources is put under question, energy consumption increases and rational use of energy becomes important.

Although the transition to the liberal energy economies had similar effects in most eastern European countries, the situation in southeastern Europe is slightly different. Political and socio-economic conditions have by far been less stable: The wars in former Yugoslavia (FYROM), the long-lasting economic crises in Bulgaria and Romania, the Greek-Turkish tensions and the conflicts of interests in the Black Sea and the Caspian region create an unfavourable background for energy networks and policies.

However, considering the geopolitical and social conditions, such networks and policies are necessary in order to establish sound energy provision schemes, and, therefore, the base for sustainable economic growth, expanding beyond the specific region. As far as transboundary energy flow is concerned one has to keep three points in mind:

- The flux of primary energy sources, like gas and oil, along the east-west axis from the Caspian region to Western Europe, presupposes political stability and a vast and costly infrastructure.
- The same applies to the flux of electricity along the west-east axis, in order to utilise capacities like the French nuclear ones.
- Finally, the perspective of 'closing the circuit' between southern Europe and the Northern African countries of the MAGREB, is not so remote as it seemed five years ago.

Energy networks and policies are also vital if one considers the national energy markets in the area. On the basis of data provided in the following paragraphs and after the examination of the energy features of these countries, one can easily deduce two conclusions:

- The installed capacities are about enough to cope with a 'reasonable' demand increase, but nothing more than this.
- With the exception of Greece and Turkey, the national markets are not big enough to justify major cost-intensive investments aiming at these markets only.

These observations were made in the early nineties by the European Commission and some major international projects, financed by the PHARE and SYNERGY programmes, were

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carried out which resulted in determining the key factors for a reasonable energy policy in south-eastern Europe. As such arose the necessity of:

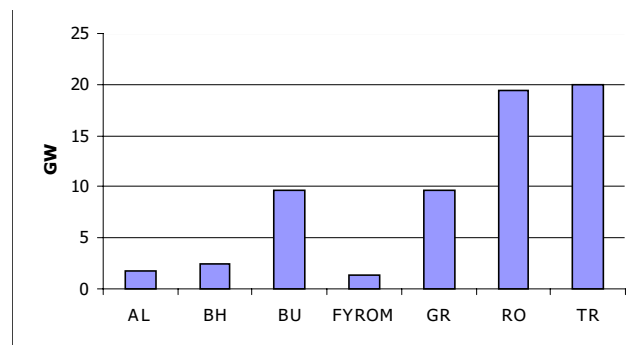
- An inventory of plans and proposals for the interconnection projects in the electricity, gas and oil sectors, and
- The evaluation and prioritisation of projects of common interest.

The most important points of these factors will be presented briefly in the following paragraphs.

The Electrical Sector

The electrical systems in the countries of southeastern Europe reflect, to a great extent, decades of political division, the troublesome political situation and the differences in technological development. Some of the problems to be overcome are the different operational standards and transmission modes, the state owned utility companies with important debts, the out-dated nuclear or coal-fired power plants and the networks destroyed by the wars in Bosnia-Herzegovina and Kosovo.

Figure 1
Installed Power Production Capacities

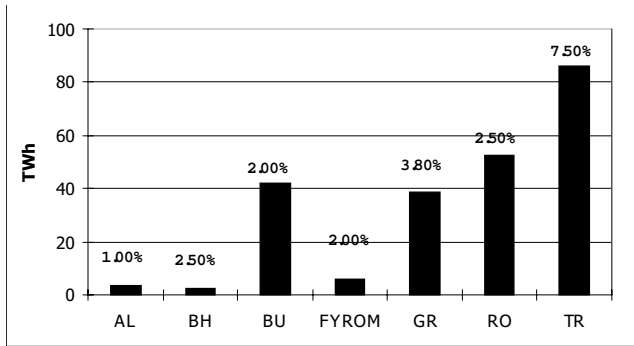


The current installed production capacities and the annual consumption per country, together with the predicted demand growth rates, are presented in Figures 1 and 2.

Comparing the data presented in these figures, one cannot fail to notice that the capacities of each country are by and large enough to cover the national demand. Seasonal and occasional surpluses or shortages are dealt with means of respective exports or imports to and from their neighbours. This situation is a clear result of the self-sufficiency attitude prevailing in the previous decades, which lead to a vertical structure of each country's electricity energy sector.

It has to be noted that the data presented go back to the year of 1996, as this is the most recent set of data available for all these countries. No reliable data on exports and imports were available for Bosnia - Herzegovina; Yugoslavia is not included due to the political situation. Bulgaria is shown as a net exporter, with its production depending on the Kozloduy nuclear plant, whilst Rumania is expected to become more self sufficient with the commissioning of the new Cernovoda nuclear plant. However, and in order to cope with future demand growth, the interconnection of these countries is crucial. In that sense and though considerable progress has been made since the mid-eighties, there is a significant potential for improvements. Romania, Bulgaria, FYROM and Greece are operating synchronised and according to the UCPT (Union for Coordination of the Production and Transport of Energy) standards.

Figure 2
Annual Power Production and Demand Growth Rates



The 400 kV connection via Hungary and Yugoslavia is not operational, as a result of the Kosovo war, but the connection over Romania should soon provide a solution for this problem. An alternative route will be provided by the underwater 400 kV connection between Italy and Greece, which is to be completed by 2001. It is needless to say that the interconnection of Yugoslavia will provide significant margins of stability and capacity to the system.

On the eastern side of the area, Turkey is only connected with a single 400 kV line to Bulgaria, with very limited capacities. The planned 400 kV 2B'B' connection between Greece and Turkey would provide an important boost to the grid of the area. This project, which is technically and financially very sound, is subject to the difficult relations of the two countries.

The SYNERGY task force concluded in the following high priority joint projects, which were approved last October by the energy ministers of all the involved countries:

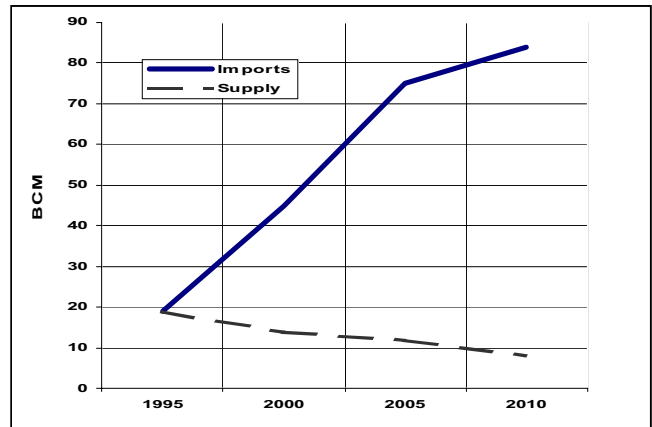
Code	Action
E 16	400 kV line Arad (RO) – Sandorfalva (HU)
E 7	Development of the control system of the trans-boundary network
E 6	Improvements on the following 400 kV lines of the networks: <ul style="list-style-type: none"> • Blagoevgrad (BU) – Thessaloniki (GR) • Sofia (BU) – Nis (YU) • Kozloduy (BU) – Tintareni (RO) • Maritsa (BU) – Babaeski (TR) • Dobrudja (BU) – Vulkanesti (MLD)
E 14	Rebuilt of the 400 kV system in B-H
E 13	Upgrading to 400 kV of the line Bitola (FYROM) – Amyndeon (GR)
E 9	400 kV line Philippoi (GR) – Plovdiv or Maritsa (BU)
E 9	400 kV line Thessaloniki (GR) – Hamidabat (TR)

The prospects for most of these projects are positive and the good possibility of some of them being completed by the year 2001 will enable an increase in electricity consumption respective to the expected economic growth in most of these countries. Most of these projects will be supported, directly or indirectly, by European funding sources. Besides the obvious geographic conditions, Greek constructors and banks are participating in the bidding, or already established, project consortia.

The Natural Gas Sector

The propagation of natural gas in the region has been rather modest. Romania is the only gas producer, and, therefore, the only country that features an infrastructure; however, this is ailing and production is diminishing. Bulgaria has a certain infrastructure, importing gas mainly from Romania, but recently also from Russia. FYROM is connected to Bulgaria, over an obsolete pipeline and Albania is currently not connected at all. Romania, Greece and Turkey are expected to become the major gas consumers of the region over the next years.

Figure 3
Predicted Gas Consumption and Production Values of the Region



The consumption of every single country is not considered to be significant, by international standards. Still, the total energy consumption of the region, plotted in Figure 3 vs. the regional production (i.e., that of Romania), makes it still worth examining the options of establishing and upgrading regional networks to provide for the smaller countries.

The Oil Sector

The analysis of the prospects for oil transport networks in the area has to be carried out under two criteria; namely that of the regional market and that of the region as a corridor for oil transports.

Oil has become a significant factor, in terms of political decisions, for the southeastern European region. The prospects of exploiting the Caspian oil fields, leads to some debates on the issue of the transport. The alternative routes examined can be synthesised as follows:

- Over Azerbaijan to Turkey (Ceyhan) in the Mediterranean.
- Over Azerbaijan and Georgia to Turkey in the Mediterranean.
- Over Azerbaijan and Georgia by ship on the Black Sea through the Bosphorus and the Aegean.
- Over Azerbaijan and Georgia by ship on the Black Sea to Bulgaria (Burgas) by pipeline to Greece (Alexandroupolis) and the Aegean.

The evaluation of these alternative, but not mutually exclusive, scenarios is a complex issue, taking into consideration technical, financial, environmental and political factors, the presentation of which exceeds the scope of this presentation. Still, it is beyond any doubt that any single

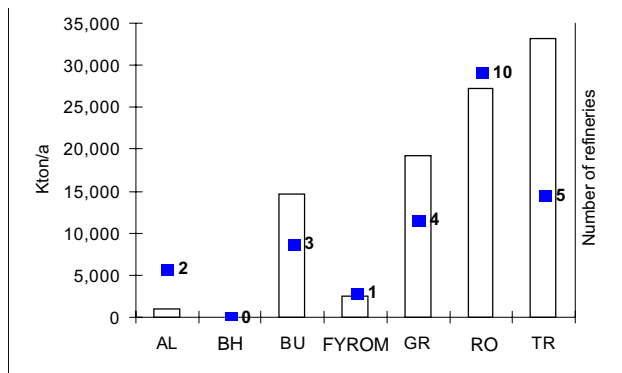
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Southeastern Europe (continued from page 19)

choice will also have side effects on the energy economics of electricity and gas.

As far as oil consumption in the region is concerned, it is expected to increase by an average of 2.4% p.a., with energy efficiency measures maintaining consumption at a pace with economic growth. As the countries of the region are heavily dependent on oil imports, the main problem to be tackled is the one of refining capacities. As it can be seen from the data presented in Figure 4, there are 25 refineries in the region, with an annual refining capacity of 98,000 ktons, or 1.7% of the world's total value.

Figure 4
Refining Capacities in the Balkan Area



These capacities are not capable of coping with increasing demand and in principle there are two options available:

- The existing refineries can be upgraded, in order to refine bigger quantities of crude oil from the CIS area.
- Refined products from Western Europe should be imported.

Both options are costly, the former coming in question only for Greece and Turkey, the latter being a short-term solution for Albania and Bosnia-Herzegovina.

In that sense, the agreement of Greece and FYROM to build the oil pipeline between Thessaloniki and Skopje and the decision of Hellenic Petroleum S.A. to modernise and expand the refinery in Thessaloniki, seem to be reasonable steps for the coming decade. Provided the political situation in Kosovo becomes stable, the extension of the pipeline to Albania would be a step further in that direction.

Conclusions

Despite the complex political situation and the economic restrictions in southeastern Europe, the necessity for an effective co-operation in the energy field has been recognised by the authorities of most countries. An international task force, financed by the European Commission and co-ordinated by Professor D.Mavrakis (University of Athens) has determined the priorities, as they were briefly described in the previous paragraphs.

The same task force is currently examining the options for funding the implementation of the much needed, but also cost-intensive, projects. The European Investments Bank, the European Bank for Restructuring and Development and the major European players in the energy production sector are possible options.

These results have been acknowledged in a formal way

as part of the BSREC (Organisation of the Black Sea Region for Economic Co-operation) memorandum, signed by the energy ministers of Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Bulgaria, FYROM, Georgia, Greece, Moldavia, Romania, Russia, Turkey and Ukraine.

Furthermore, the results concerning the electrical networks and trade have taken the official form of a memorandum for the establishment of a regional electricity market, signed by the energy ministers of the BRESC in Thessaloniki, in September 1999.

These developments can allow a certain degree of optimism for the future of southeastern Europe, which has been clouded by some problems during recent years.

Transformations in the German Electricity Sector

*By Georg Erdmann**

It seems that the long period of ideological debate on electricity supply issues in Germany is over. Today is the moment of action. Never before has the industry seen so many important interventions in such a short time, and never before has the industry seen more restructuring, business initiatives, and price dynamics than during the past year. Usually, any business change creates winners and losers, chances and risks, but today there is an unusual amount of uncertainty and confusion about the future of the industry. This article aims to give an interpretation of the recent evolutions and some estimates of future developments.

All began with the European Directive of 19 December 1996 on the European internal electricity market that determined minimum competition standards for electricity trade. In complying with this directive, the German Parliament adopted an Energy Law in April 1998 that opened 100 percent of the electricity market from one day to the other, at least formally, by choosing negotiated third party access as the grid access scheme. But the associated negotiations are complicated and take a lot of time during which the electricity market, in practice, is still not 100 percent open.

No particular electricity market authority has been established so far in Germany. The competition is assured by the federal antitrust authority (*Bundeskartellamt*), while the appropriate grid access framework is left to market forces (*Verbändevereinbarung*). According to some experts a particular electricity market authority might have achieved faster results than negotiations among business associations and between individual companies, but the establishment of such an authority would have required time as well. More important, such an authority would have started without sound knowledge about what might be the optimal grid access scheme. According to the experience in other countries, several modifications of such a scheme should be expected before a workable competition is established. Thus, a national grid authority cannot offer more stable market rules than agreements between private business associations.

An obvious advantage of the German approach is that a national grid authority can still be established if necessary, while the abolishment or a major modification of such an

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institution would probably be impossible. Because the market players want to avoid the national electricity authority, the German federal government has some indirect influence on the outcome of private sector negotiations. In total, the German strategy of electricity market self-organization is quite successful so it will probably not be replaced in the near future.

The successful introduction of electricity market competition is reflected in electricity prices that recently went down on a broad scale. The Association of German Power Companies (VDEW) estimates that the overall electricity bill was • 7.5 bn or about 20 percent lower in 1999 than in 1998. Few experts expected such a degree of price collapse and many companies in the electricity sector suffer from enormous stranded costs, in spite of significant cost cutting programs. Until recently German law strictly refused to offer any fiscal compensation for stranded costs and thus increased the pressure on the exposed market players. The reaction was the closure of generation capacities, particularly small and medium sized coal and gas fired cogeneration plants.

But as cogeneration is regarded to be an important greenhouse gas option for Germany, new political initiatives try to correct for this unintended result of electricity market deregulation. The discussion is still going on, but a combination of subsidies (in the form of fixed feed-in tariffs) and a mandatory cogeneration quota will soon be introduced. Both measures will be financed through higher electricity transmission and/or distribution prices.

There are more reasons why electricity customers will probably not see lower prices in the future. First, many companies sell parts of their electricity below their short term marginal costs which cannot be a sustainable market situation. The power generation over-capacities should still execute a strong pressure on electricity prices, but the generation companies have begun to learn how to stabilize (spot) market prices. Second, the federal electricity tax rates introduced in April 1999 will increase in coming years; in 2003 they will be 0.004 • /kWh for industrial customers and 0.02 • /kWh for all others. Third, the recently modified Law on Renewable Energies (*Erneuerbare Energien Gesetz*) increases the fixed feed-in tariffs for electricity produced from renewable energy sources and generates indirect subsidies of up to 2 bn • per year. Again the transmission and/or distribution of electricity will be charged.

In such a market environment any aggressive electricity price policy is a costly venture for the majority of power companies. The generation of shareholder value through discount prices requires the establishment of stable customer relations and the supply of additional services being sold for good money. Apart from market niches the success of appropriate efforts is still not convincing. It may be that information technologies will be available that open the electricity grid for telecommunications. In this case the shareholder value potential for power companies will improve. But the necessary investments into the new technologies and shortages in human capital will give majors an advantage over small and medium sized (municipal) electricity suppliers.

Many of today's over 700 electricity suppliers in Germany – mostly local and regional distribution companies with some smaller generation capacities – will probably not survive as independent market players. Mergers and acqui-

sitions are on top of the agenda today. The announced merger of *PreussenElectra* with *Bayernwerke* and *RWE* with *VEW* is only the first step in this transformation of the market. The next step could be the expansion of these in generation and transmission specialized companies into the distribution business.

Much depends on the national and European anticartel authorities and their interpretation of the relevant market. According to recent announcements by these bodies a German duopol will not be accepted. Accordingly, the east German VEAG should survive as another independent electricity company, in spite of its particular stranded cost problem due to extensive post unification investments.

The recent electricity market restructuring occupies virtually all the existing management capacities of the electricity sector – and even more. After a period of relatively conservative career opportunities the industry offers challenging perspectives and is able to attract many skilled and creative people. The role of engineers is diminishing in favor of business administrators, marketing experts, traders and lawyers. These people regard the company's image as a more important success factor than a particular portfolio of power plants. Many of them also have an advanced view about protecting the environment.

All this should affect the medium to long-term behavior of the industry. Present political issues such as the role of nuclear power, the extension of renewable electricity generation or the approach to least cost planning will nearly automatically lose their social conflict potential. If the government applies an appropriate approach, the still unresolved environmental issue of reducing greenhouse gas emissions may be addressed in firm cooperation with the modernized management. This approach should take into consideration that the existing over-capacities in the electricity sector (at least 10.000 MW in Germany) leave no space for major emission improvements during the next ten years or so. But the expected capacity investments from the year 2010 onwards will change this; they offer strong long-term opportunities for a successful greenhouse gas policy in cooperation with the electricity sector. After having solved the most urgent questions posed by the electricity market liberalization it is time to start thinking about these long-term opportunities and to develop strategies for using them.

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