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The Black Hole of Bulgarian Power Industry
(Transformation of Electric Power Sector in Bulgaria after 1989)
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English Summary

Introduction

The book presents the results of a study of the development of Bulgarian electric power industry during the last two decades, applying the actor-network theory and path-dependency approach. The methodology included in depth interviews with experts - among them were managers of National Electricity Company, directors and engineers at nuclear, thermal and hydro electric power plants, journalists monitoring energy sector, and Government officials from Ministry of Economy and Power. We also studied some published memories of electric power engineers and historiographies of the sector. The data from the interviews and publications have been mirrored to the secondary analysis of statistical data about electric power sector, analysis of legal documents and analysis of media coverage of the topic – we analyzed the publications on electric power between 1980 to 2007 in two daily newspapers (the officials of the former Communist, now Bulgarian Socialist Party and its political counterpart Union of Democratic Forces) and two weekly newspapers – one with economic orientation and one with nationalist orientation. This helped us to outline the initial situation in the electric power sector in the eve of 1989 and to identify the key actors in the process of its transformation during the last twenty years, tracing simultaneously technological, legal, economic, political and media aspects of this transformation.

The analysis revealed the immediate effects the dismantling of previous system of communist governance of the economy and lifting the trade barriers with the West had on the sector after 1989 and the establishment of some specific patterns of production and management. They lasted for almost two decades and up until recently made Bulgaria a power hub at the Balkans. Among these (antinomic) patterns are:

– The consequence of the blackout in the winter of 1985 and the strange equilibrium between technocratic and financial-political wings in Bulgarian Electricity Company management around and after 1989, including the stabilization of the work force, and middle and low lever technical staff coupled with eroding influences of the political interventions in power sector;

- Good overall design and basic parameters of power system - shares of hydro, thermal and nuclear power; spatial distribution of powers sources; balance between locally produced and imported fuel, etc., together with preservation of lasting discrepancies in the very core of the power system (such as high share of conversion of primary sources of energy; limited use of natural gas and high share of electricity for heating in households, resistance to renewable - wind and solar - energy, persisting low level of electricity prices, etc.).

The book explores how seeming technical differences in the sources of power (hydro, nuclear and thermal) bear on the patterns of privatization in the sector, as well as on the corruption and other shadow practices in employing and maintaining the electric power system.

1. The Bulgarian electric power system in the period of post-socialist transition.

Analysing the economic and technical parameters of Bulgarian electric power system by 1989 in comparative perspective, one could easily come to conclusion that in number of these parameters – total electricity output, installed power, electricity consumption per capita – it is close to the average EC level and is compatible with some small developed European countries. (See Table 1)

Table 1 - *Installed electric power & consumption in 1989: Bulgaria and some other EC countries*

Country	Population Mln.	Installed power				consumption TWh	Specific indicators	
		Total	TPP	HPP	NPP		Kw/pers on	Kwh/pers on
Belgium	9.9	14,1	7,2	0,1	5,5	66,5	1,42	6680
Greece	10	9,0	6,7	2,3	0	35,5	0,9	3550
Denmark	5,2	9,1	6,7	2,3	0	32,8	1,9	6370
The Netherlands	15	17,6	16,9	0,25	0,5	81,1	1,17	5410
<i>Bulgaria</i>	8,6	11,7	6,9	2,0	2,8	45,9	1,36	5340
<i>EC</i>	327	435	252	81	102	1806	1,33	5521

Source: Spirof, Georgiev, Tzonev 1998: 344 (in Bulgarian)

The power system was well positioned from the point of view of spatial distribution of the its key power plants, the ratio between main types of power production (nuclear, thermal and hydro power) and even according to the ratio between local and imported sources of energy.

During the communist regime, Bulgaria gradually became the country with highest per person capacity of the installed electric power in the Balkans and in 1989 it was 11 700 MW. On the eve of political and economic changes in 1989, Bulgarian power system was based on four pillars, which remained almost unchanged during the last two decades:

1) The thermal power complex Maritza-East in central south region, consisting of three big thermal power plants (TPP) between 800 and 1200 MW each and utilising local lignite. TPP are using highly efficient fun-mill technology for direct burning of the lignite and developed by Bulgarian engineers in 1970s, redesigning a German RWE technology used in Greek lignite power plants in Kozani. There are another three large TPP based on imported coal (with its 1400 MW installed power the plant in Varna is the biggest in the country), plus several smaller plants based on local or imported coal. Initially they were designed to use Donbas anthracite coals, imported from Ukraine via the Black Sea and Danube River, but after 1990 there was import also from other countries. The TPPs provided more than half of electricity output.

2) Kozloduy Nuclear Power Plant (NPP) possessing four 440 MW and two 1000 MW Soviet designed “water-water” reactors. The four smaller units have been shut down in January 2007 according to the agreement between Bulgarian and EC. Between 1990 and 2006 the plant provided more than 40% of electricity output. A construction of new Belene NPP with two 1000 MW blocs begun in late 1980s, then in 1991 the construction work was frozen to be resumed in 2004 with the government decision.

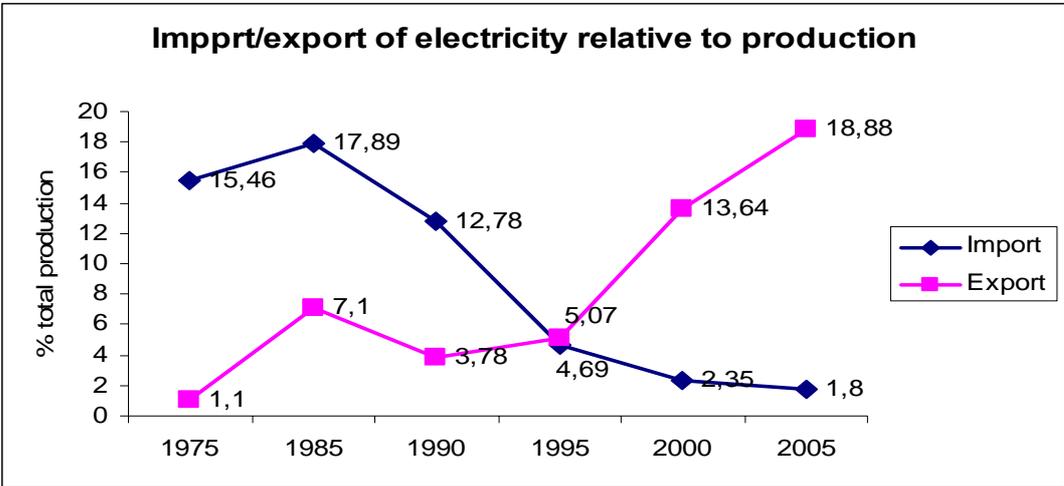
3) Hydropower plants (HPP) providing about 10% of the electricity output. HPP are used mostly as high-load power during the peaks of electricity consumption. Among them there are several pumped storage hydro power plants that optimize the more rigid NPP and lignite TPP. The powerful 840 MW Chaira pumped-storage HPP equipped with Japanese *Toshiba* turbines was designed to work in pair with Kozlodui NPP storing its night energy.

4) To this we should add the substantial international connectivity of the country, which grew to set of 110, 220 and 440 kV lines to all its neighbours, together with a powerful 750 kV direct line to former USSR built in in late 1980s. Together with three internal rings with same parameters these lines have been used both for import and export of electricity, as well

as to transfer loads through the country’s territory. from COMECON countries to non-COMECON countries such as Greece, Turkey and partly Yugoslavia.

The economic crisis that followed the transition from administrative to market economy significantly reduced the industrial output and correspondingly the internal consumption of electricity, so that the peak load felt from above 7000 MW in 1989 to less than 4000 MW in mid and late 1990s. As a resulting of this in 1994 the import/export ratio of electricity decidedly changed in favour of export, so that after year 2000 according to EUROSTAT data Bulgaria exported nine times more electricity than its import – about 18% of totally produced electric power. (See Graph 1)

Graph 1 - Bulgaria’s import/export balance.



Source: UNIPEDE and EUROSTAT

With the exception of a period of about 18 months between late 1991 and early 1993 when the transition from subsidized production of electricity to market principles of production took place, the power system was stable and efficient, due to the good ratio between different types of power production, normal and pumped-storage HPPs (there was more than 1000 MW pumping power installed) and good international connectivity.

Meanwhile, the power system disposed with well developed set of repairing plants, inherited from socialist period, which was at better lever than the rest of the industry – some of the expert called it ‘a second machine building industry’ of the country. The power system possessed also a strong science and applied research base, the biggest research institute *Energoproject* having more than 2000 researchers and engineers. There existed experimental

applied research and production combine *Techenergo*, laboratories and chairs at Bulgarian Academy of Sciences, Sofia Polytechnics and some others.

It is important to mention also *the managing and technical cadres*, working in power plants, transmission systems and research units – they were competent and disciplined, with strong professional ethos and sense of tradition since the power system was one of the few industrial sectors that have preserved its traditions from pre-socialist period (especially in hydro power) and new national schools in thermal and nuclear power have been build – with the exception of first generation nuclear power engineers, the technical staff was educated in local technical universities and colleges. Their high self-esteem was supported by the higher salaries they received already during the socialist period, when they had also some other privileges such as priority provision with lodging, additional holidays, etc. This professional ethos was preserved during the decades after 1989, which guaranteed the good technological discipline and reliable functioning of the power system units.

The break down of communism removed previous restriction to the import of Western technology and power plants introduced some more efficient and reliable spare parts, produced by ABB, Siemens and other companies. The newly emerged unemployment made blue collars in energy sector to compete for their job and put an end of the previous persisting problems in finding qualified staff. Some of the managers of the power industry called the period between 1993 and 2001 the ‘golden age’ of power industry.

All these characteristics of the power system, together with its preservation as unified corporate structure in the framework of *National Electric Company* (NEC), the new access to efficient Western technologies and better opportunities to selection and development of its cadres transformed it as one of the best functioning sectors of Bulgarian economy. Since 1993 it was able to provide reliable supply of electric power to the industry and households. It also exported significant amount of electricity in the region, especially before the closure of the four 440 MW nuclear reactors at Kozlodui NPP in January 2007. Hence the power industry was spared of the process of destruction and de-industrialisation that after 1989 took place in most of the other sectors of the economy. Especially in arm production, electronics and some other sectors, the lost of the former customers abroad together with assets-stripping practices of the heirs of the communist political nomenclatura resulted to their collapse and non-existence.

One could state that Bulgarian power system survived the transition period in good shape and early this century it entered a period of gradual transformation, marked by

privatisation of the repairing and maintenance units, most of the biggest TPP, and the electro-distribution enterprises. Some large foreign corporations such as American 3S company, Italian Enel, Austrian EVN, Czech CzES, and some others entered the electric power sector. After the country's membership in EU in 2007 and adoption of its regulations in the field of electric power, there is a boom in wind power and the installed facilities are approaching 500 MW. The first solar power plants were built and others are under construction.

Important changes took place in the 'brain' of the power system – its research units. The large applied research institutes inherited from socialist period have been dismantled in early 1990s and the most talented researchers and engineers established their own consultancy and engineering companies. They changed the old principles of socialist division of labour, according to which one was researching, other was designing, third was constructing the power units, fourth was controlling, etc. The new private engineering companies carried out a successful organisational innovation and from research and design moved to offering complete industrial solutions 'to the final key'. Hence they introduced new processes of horizontal integration in power industry, where the engineering and consulting companies took over the control of entire process of modernisation of existing equipment and construction of new power units, transforming the former specialized construction and repairing companies into subcontractors.

The new private engineering companies became the new 'big boys' in Bulgarian power sector. Preserving their most valuable assets – their knowledge and know-how inherited from socialist period, they not only took upper hand to Bulgarian power sector, but entering and the international arena. The Bulgarian engineering company *Totema* has signed contracts for providing consultancy services for the construction of highly efficient lignite burning chambers at some TPPs in Spain and Australia. The two biggest companies *Risk engineering* and *Frontier* established joint-venture companies with *Worley Parsons* and *Westinghouse* correspondingly. *Risk engineering* and *Worley Parsons* had partnerships in modernizing the two 1000 MW reactors at Kozlodui NPP, power units at Maritza-East TPPs, NPP in Republic of Slovakia, etc. Recently *Worley Parsons* announced that it has signed a contract with the Egyptian Nuclear Power Plant Authority (NPPA) for a consultancy services in building the first Egyptian Nuclear Power Plant. The project will be led "from *WorleyParsons' office in Sofia, Bulgaria...Sofia serves as one of WorleyParsons' nuclear power centres of excellence with nuclear consultancy and engineering services currently being provided to projects across a number of countries in Europe, the Former Soviet Union and Africa.*" (<http://www.worleyparsons.com/InvestorRelations/ASX/Pages/1,200megawattnuclearpowerplantinEgypt.aspx>).

These are in brief some of the most important positive processes that took place in Bulgarian power industry during the last two decades that changed most of patterns of work and relationships, inherited from socialist period. Because of that the country did not experienced any significant blackout during the last two decades, and between 1997 and 2007 it became a power hub and key exporter of electricity in the Balkans.

2. The shadow side of Bulgarian power system.

Our study has revealed, however, some other characteristics of Bulgarian electric power system, which are in sharp contrast with the above positive outline of its development.

First, it differs from the power systems of the Belgium, Netherlands, and Denmark mentioned above, by some other parameters such as *own energy consumption of the power system* (by power plants, dams, etc.), *transmission losses* and most of all *the share of transformed primary energy* (i.e. the share of primary energy sources used such as coal, natural gas, etc. transformed into electricity). These characteristics of Bulgarian power system are *several times higher* compared with the above countries! Strangely enough, these differences have been preserved during the entire period from 1989 till now, some of them even getting worst:

In 2005 for 1000 euro GDP Bulgaria consumes 927 grams petrol equivalent (gpe), while the average for EU is 165 gpe. *This means that Bulgarian industry is consuming five times more energy for unit of production than the average EU level. In energy efficiency the difference is 6,9 times!* ... The losses in production and transmission of electricity in Bulgaria are 50% higher than average for EU. This means that 100% electricity produced in EU is consumed with 68% of efficiency, while the same parameter for Bulgaria is 52%” (Source: commented data from the internet site of Bulgarian Ministry of Economics and Power Industry www.petardikov.bg/index.php?page=napisano_energetics)

Viewed from this perspective, the outline in the first part reveals *a significant for the scale of the country power sector, which, however, is of classical modern type, typical for the middle of the 20th century and NOT for the beginning of this century.* Bulgarian power system seems ‘frozen’ at the stage, the developed Western countries departed in mid 1970s, when they begun to increase the energy efficiency together with the introduction of renewable sources of energy. Unlike these countries, till 2005 the measures for improving energy efficiencies of Bulgarian economy were practically nonexistent, there was almost no investment in renewable energy other than water, so that wind and solar power have been developing only after 2007. For more than 15 years those managing power system preferred to maintain the existing technologies, completing at best some of the big construction works from the socialist period (such as Chaira pumping power HPP, 6th reactor of Kozlodui NPP,

8th unit of Maritza East 2 TPP, etc.). National Electricity Company (NEC) did not invest in new and more efficient power units or in reducing the transmission losses even during the period of higher revenues from electricity export:

„NEC is not prepared technologically for large scale introduction of renewable energy from wind or solar plants – it is technologically backward and does not dispose with necessary automatic systems, it lacks modern systems of technical management... When Europe pushes the introduction of wind and solar power, which are with different, irregular parameters, these *sources require new system of power management, new connection technologies, etc.*, which our system is lacking. That is why NEC resists to renewable energy and imposes various restrictions to it.” (interview with former manager of thermal plant at Maritza East and NEC)

Tracing the actors-networks, we arrived at what we called „*the obvious, but well hidden paradoxes of Bulgarian power sector*”. We mean that these problems are well known by the experts, but are carefully kept hidden from the public! The strange combination between significant technological achievements and chronic problems in the overall efficiency has striking persistency – it is a *lasting phenomenon, characterizing power sector since the socialist time to the present days*.

1) We arrived at the *first paradox* during the analysis of the statistical data about electric power sector after 1989. It appeared that in spite of the relative inefficiency of the electricity production in Bulgaria, the country has the lowest electricity prices in EC both for industrial consumers and for the households! The prices have been especially lower during the 1990s, when the governments kept them low because of social and political reasons. It was only the pressure of World Bank after NEC took loans for the completion of the big power projects initiated in late socialist period, which released the process of making electricity prices compatible with the costs of its production. Yet the prices remained far below the average EU level even till the present days.

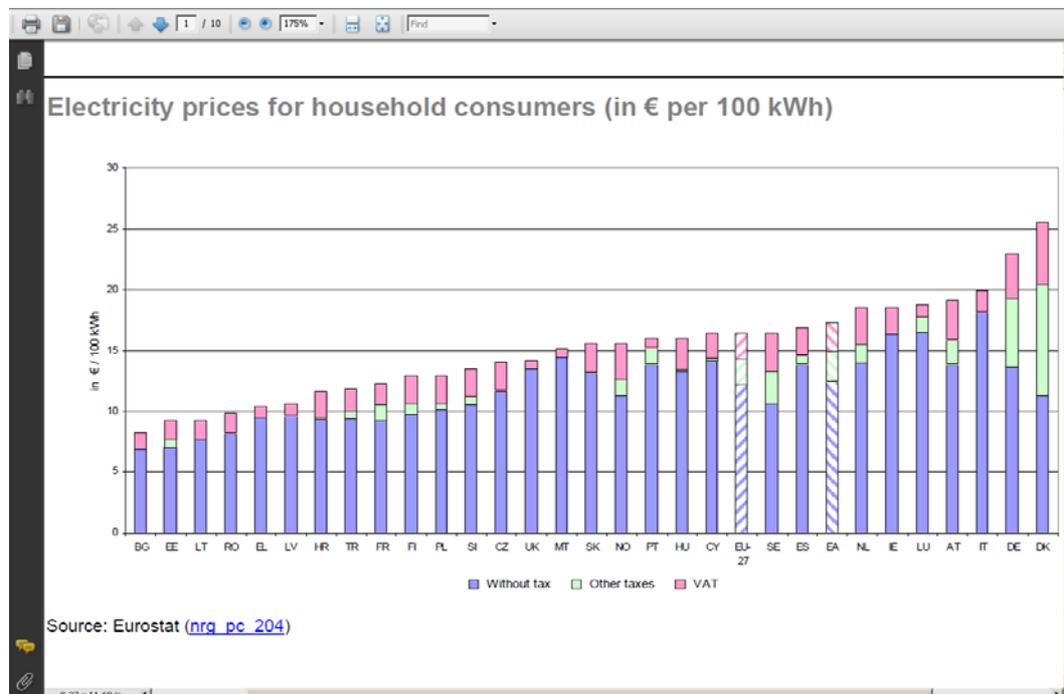
The analysis of legal documents in the field of electric power revealed that for the most of the last 20 years there was not a real electricity market in the country, the prices remained monopolistic and ‘regulated’, subject of constant political interventions. These lasting deformations remained hidden from the public and are subject of media distortions, so that today even for the specialists it is difficult to clarify the problem. According to the former Vice Minister of Power industry Ivanka Dilovska till 1993 it was not possible at all to know the real costs of electricity production in the country:

„The former Ministry (State Committee) of Power Industry possessed all power plants. It decided how much money to which plant to give for investments... Earlier the investment money came from State Planning Committee and none was calculating these money into the price of electricity produced – we believed it is very cheap, for many years the price was 1 cent per KW/hour night energy and 2 cents for daily energy... When in 1983 I was in *Energoprojekt* institute, together with my colleagues we calculated the real price of electricity

and our team announced cost of about 35 cents per KW/hour! We proved that if such excessive use of electricity continues, the country will arrive in situation where the entire GDP have to be spent for fuel... But we were declared almost 'enemy of the people' and were even punished financially - they took part of our salaries as a penalty. But the true was that the electricity was sold much below the costs of its production! (interview September 2009)

It was only in the mid 1990s when the electricity prices approached the costs of its production, but never departed significantly from it. According to the *Eurostat* data since mid 1990s Bulgaria had one of the lowest prices for electricity in Europe. In 2009 the electricity prices were the lowest among the 27 EU members - both for industrial users and households (http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-QA-10-022)

Table 2 – Electricity prices for households in EU countries for the second half of 2009



However, this fact was never made public – *Eurostat* data have never been published in the printed media. It was never discussed in electronic media too. Just the opposite – the media coverage of electricity sector was dominated by the never ending stories about the high electricity prices, how harmful they are for the households and enterprises. We found a comment of the data in the above table in the specialized economic website *Investor.bg* (May 18, 2010), under the title “Bulgarian has one of the highest price for electricity in Europe compared to the average income” (!)... The papers stressed *the high price of the electricity* and not the fact that being the lowest in EU, these prices – coupled with the import of large part of energy sources and different illegal and shadow practices diverting part of the income – make impossible for the *National Electricity Company* to invest in modernization of the existing power facilities and to improve efficiency of the system, which leads again to hidden

or apparent transfer of public funds (including EU finds) to cover the urgent needs for improving safety (in nuclear power for example) or reliability of the system:

„...We cannot expect a reliable and good quality of electricity supply if the prices do not cover the standard costs needed to bring the power to the consumers. Now natural gas seems too expensive for the consumers, but this is an effect of the artificially low price of electricity – we made calculations that if this price reflect all cost for its production (including environmental costs), the people should pay for natural gas *three times less they are paying for electricity*. And this leads to lasting deviations in consumer behaviour from the macroeconomic point of view.” (From an interview with engineer I. Dilovska, former vice minister of economy and power in 2001-2005 government)

The imposed (and accepted) ban on public debate about this topic leads also to the fact that for public opinion *there is not difference between price of electricity and electricity bill the customers receive*. As Ms Dilovska put it, one could have a higher price of electricity and lower bills provided the electric power system is efficient enough – having no investments in reducing transmission and other losses in the system, now Bulgarian customer pays 100% of electricity while in fact it receive only 75% of the produced electric energy. In more efficient systems such as Danish or Dutch ones, when the customer is paying its electricity bills he gets 90 or even 95% of the produced energy.

2) Hence *the second paradox* of Bulgarian power system: during the last two decades the natural gas has been sold to the customers at prices higher than electricity, so that it was cheaper to use it for heating than to use natural gas. Not surprisingly, Bulgaria is the European country with highest share of electricity used for heating. This paradox stems from the fact that only a third of primary energy is utilized when used for electricity production.

The systems for transmission of natural gas help preserving natural resources via efficient supply of energy to the end users. *The losses during the production and transmission of electricity are 73%, so that only 27% of the primary energy used arrive at the end user*. In transmission of natural gas we have only 9% losses and 91% of the course is supplied to the user. (*Overgas* company web site, <http://www.Overgas-zapad.com/index.php?mPath=72>)

3) This is related to the *third paradox* of Bulgarian power system – the remarkable efficiency of the system of central heating, established during the decades of socialism in most of the big Bulgarian cities and the wide-spread public conviction in the opposite! Working in natural gas, these systems supply the households and public offices with heat and hot water. Only Sofia central heating system produces 1700 MW heating power during the winter season, which is almost equivalent of the 2000 MW electric power produced by Kozlodui NPP. Their efficiency stems from the above fact that in central heating almost 100% of the energy of the gas is transformed into heat, while electric systems utilize less than 30% of the primary energy. Central heading appears to be very efficient in urban agglomerations

with large share of high, multi-floor buildings that were widely built during the socialist period. Instead these systems to be further improved and developed, however, we found in media persistent attack against central heating, carried out both by political establishment and various experts from the electric power sector.

Some of the interviewed experts called these paradoxes, maintained in the country during the last two decades, “the biggest deviation from economic rationality”. Added to the higher loses proper to the power sector (for own consumption and during the transmission), we arrive at *strange situation of low electricity prices coupled with higher loses in production and low efficiency in its utilisation*. This seemed to be the short way to bankruptcy. Indeed, NEC worked with extremely low margins of profitability - during the entire period between 1993 and 2008 the profit was between 4 and 6% annually. Having annual sells of electricity for above 2,2 billion euro, profit of power industry enterprises stayed below 100 million euro, and in some years it was below 30 millions. The revenues have been spent for fuel, maintenance of the equipment, and measures to increase the safety. During the last twenty years there were practically no investment in new facilities, in improving the efficiency and in introduction of new forms of renewable energy such as wind and solar power.

3. The media coverage of power sector – both mediator and actor of its own

Next discovery of our study – a *fourth paradox* by itself – was the media presentation of the electric power sector technical parameters, described in the previous two sections. They appeared in kind of ‘distorted mirror’ when we studied the two daily newspapers (*Parole* and *Democracy*) and two weekly journals (*Capital* и *168 hours*). Some of these parameters have never been mentioned or presented in opposite – to the existing state of art – manner. In fact the media were a key instrument in the process of manipulation of public opinion and hiding the truth. The studied media have never published information about Bulgaria’s lowest electricity price in Europe, although they have discussed the electricity prices and its dynamics abundantly, namely its ‘constant growth’ and ‘how unbearable it is for the population’. The studied media have often published papers about the corruption in power industry, but the money they have been talking about were thousands, ten of thousands and very rarely about millions of Bulgarian leva, *while as we will see below, our study identified corrupt practices for hundreds millions and even billions of leva annually*.

In practice, up until 2005 the studied media never discussed the lack of investments in renewable energy, the surprisingly low profit of National Electricity Company and enormous expenses for maintenance and repairing activities. The media have actively participated in the

lasting campaign of blackmailing big cities central heating utilities, working on natural gas. That campaign pushed thousands of families to leave central heating and switch to heating with electricity... Put in other words, the study has revealed that public perception of electric power sector has systematically been fed with distorted and even wide of the truth information, and public attention have been diverted to insignificant, but made important for the mass reader issues. Some actors in the sector have been given media platform incommensurable to their actual role, while other key actors have been ignored or scantily represented. There were fewer serious analytical publication (with some exception of *Capital* weekly, which is not really a 'mass' media), which were difficult to find in the stream of one-sided and even false information. Together with the lack of special media investigations on specific issues of power industry, all this became part of mechanisms of conscious or unintentional distortion of the media coverage of this industry. Rather, this coverage was a kind of 'propaganda campaign' serving the political and economic interests of some oligarchic groups closely related to the power sector.

The paradoxes outlined above, including media coverage, became an entry point in our effort to understand the evolution of electric power sector beyond the typical figures the public discourse have used to during the last two decades. Tracing the actor-networks of sector we arrive in a strange world, known in its entirety only by limited circle of players in it. Interesting enough, one could hardly speak about conscious conspiracy – rather, we mean a complex intertwining between specialized technical information and economic and financial data, which together of the scale of the business and the obscurity of process of decision making in it makes extremely difficult for an 'external' observer to fully understand what in fact is going on there. And to this complexity adds the one-sidedness, biases and specific 'perceptiveness' of the public media and their bosses.

4. The political and economic processes 'behind' the evolution of power sector

Our study of the evolution of electric power sector after 1989 has identified the same complex intertwining between economic, political and legal 'fields, we described in the book *'Networks of transition. What Happened Indeed in Bulgarian after 1989'*, East-West Publishers, 2008 (in Bulgarian – selected chapters in English could be found at <http://www.policy.hu/tchakov/Tchakov%20Networks%20of%20Transition%20selected%20chapters.pdf>).

The strong tradition of political domination on the sector, inherited from the socialist period,

was the key issues.¹ Although at first glance the power industry was managed by technocrats, the political control on it remained tough and uninterrupted up until recently – not only by the heirs of former Communist Party, but practically by all governments that came to power after 1989, including the those of liberal and democratic parties.

Before going into details, the key positive process our study has identified was the *privatization in the power sector*:

„Talking with the people from the regional units of *National Electricity Company*, they unanimously complains: *Please privatize us as soon as possible, we cannot withstand anymore. There is pressure coming from everywhere of political circles – MPs, regional governors, majors, and so on – they are pushing us in favour of certain companies, to manipulate the tenders, etc.* The situation is hard to describe. That is the (source of) hatred of privatization in political circles – they want to arrange ‘their people’, just by a phone call...” (I. Dilovska, former Vice Minister of Economy and Power Industry)

“I have always been in favour of foreign investment entering power sector, because it is difficult to steal from the foreigners... *Behind the frequent slogans of ‘national independence of electric power’ stays in fact a systematic draining out of the resources, an enormous anguish that privatization closes many of ‘taps’ to steal.*” (CEO of a privat engineering company)

It is not at random that while the share of private property in Bulgarian economy today is approaching 80%, in power industry it is barely 30% that is privatized. The public companies like *National Electricity Company* have never been autonomous enough as it happened with some of its fellow companies in Czech Republic and Poland, not to mention French EDF, or Italian ENEL. *NEC* has been always under control of governing political elites and economic circles related to it.

The destiny of the power sector after 1989 was not different from the destiny of other economic sectors we described in “*Networks of Power*”. However, there was an important difference – unlike Bulgarian electronic or armament industry, *here the political control was strangely combined with non-intervention into technological management.* We found a specific *internal division* between technological management of power industry on the one hand, and its economic and financial management – on the other. The peculiar role of electric power in society and economy, together with bitter socialist experience of direct political intervention in it resulted in the existence of two separate ‘wings’ in its management – the ‘technocrats’ and ‘politically appointed guys’, dealing with financial and economic issues. Since the technological discipline, regular maintenance and repairing of the equipment is key condition of its reliable functioning, the ‘political wing’ was compelled to respond the needs

¹ The introductory event we put in the beginning of this paper was not exception – during the early years of socialism several consecutive Ministers of Electric Power have been prosecuted, one of them was executed, the other spend many years in prison.

of ‘technocrats’ providing satisfactory salaries, investing in maintenance, repairing, and sometime even in new facilities. And it never intervened into daily management of the system, keeping the control over the ‘strategic issues’.

Where are located then the corrupt practices in Bulgarian electric power sector?

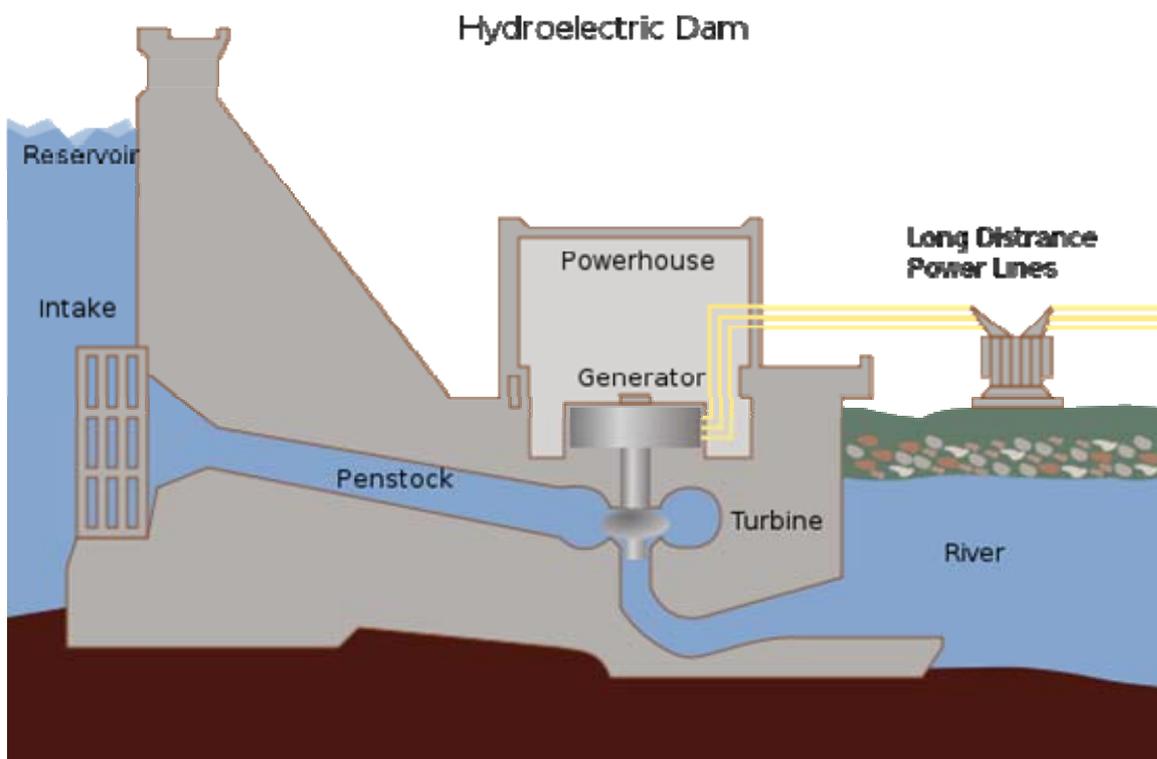
Similarly to the other economic sectors, during the first years after 1989 the main form have been *at the ‘entrance’ and at the ‘exit’ of the sector – supply of coal and other fuel, export and transit of electricity, supply of spare parts, etc.* Starting with the emergency supply of Ukrainian coal during the difficult winter of 1992, some economic groups related with the former Communist Party developed at first glance ‘normal’ commercial operations that, however, diverted illegally significant public recourses into private hands, including to the related political circles. These operations evolved into complex ‘shadow’ activities, which for long time remained hidden both by the public and specialized institutions for law enforcement.

The second group of corrupt practices was getting control over the industrial enterprises, which are big consumers of electric power – those in metallurgy, chemical industry, etc. Here again at first glance the enterprises carried out normal industrial and commercial practices that have nothing illegal by itself. However, they profited by the deep economic distortions, inherited from socialist period, one of which was the extremely low electricity price we mentioned above. Suppressing competition and putting an iron hand on the export of chemical and metallurgical production abroad, the politically bound economic groups (we called them ‘mediators’ of communist party’s political nomenclatura) were able to offer competitive prices at the international markets. In their products, however, both the low post-socialist salaries of their workers, as well as *the low, still subsidized prices of electricity* have been calculated. Up until mid 1990s the state practically continued to put public money on electric power sectors for the benefit of the newly emerging ‘big capitalists’.

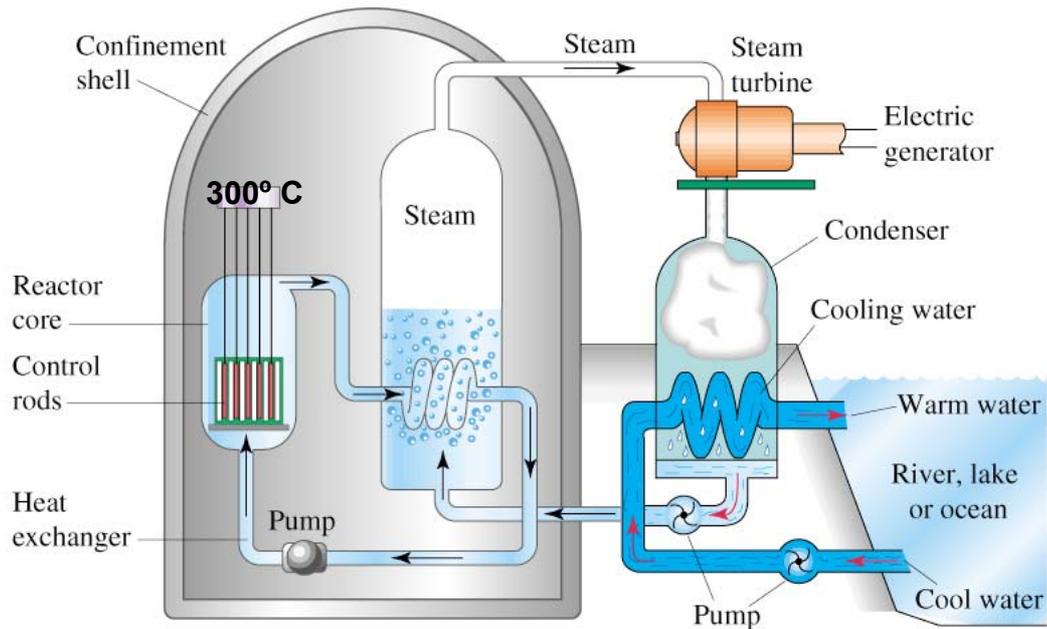
The third form of corrupt practices emerged in the engineering and consultancy services in the field of safety, maintenance and repairing. Together with the political pressure, the complexity of the sector and closeness of the expert communities that are evaluating these services were the main reason. Just recently there appeared publications in Bulgarian media about the enormous sums of money paid for consultancy and engineering services in the fields of nuclear safety, ecological expertises, investment studies, etc., as well as about complex mediations in repairing and other activities. We found that *it were these services where the*

biggest draining out of public resources took place. Interesting enough, these practices continued after the privatization of the thermal power plants, allowing excessive profit of their new owners, part of which probably also goes for ‘administrative payments’.

How could we estimate the value of the corrupt practices in engineering and consultancy services in electric power industry? – We found to main parameters that bear on the value of these services – *frequency* and *volume* of work (together with the value of invested materials and equipment). *The maintenance and repairing works in hydro power stations is lowest as frequency and volume.* Building a HPP requires large initial investments for hydro technical equipment and related machinery, but once completed, they are steadfast and reliable enough, with little annual expenses for maintenance, *which rarely go beyond 1% of the initial investments.*

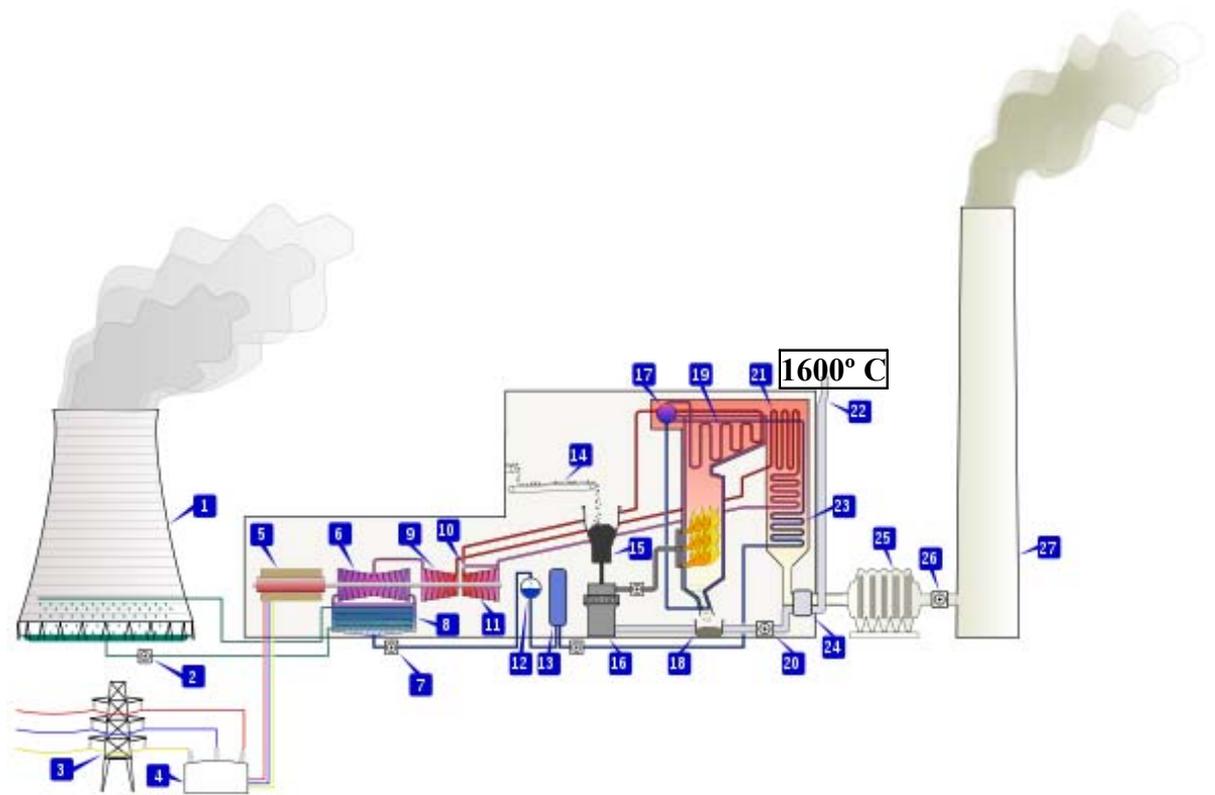


The situation with nuclear power plants is similar – they too require large initial investments, but once completed, they are able to work decades without big investment in repairing and maintenance. The reason is that NPPs *have relatively low working temperature, which in the active zone of the reactor (first contour) is between 300 and 350 degree Celsius, while in the second contour, where the production of electricity takes place, it is even lower.*



Yet unlike HPP, a NPP has the big item of nuclear safety, including training and retraining of personnel. Being accessible to a rather limited circle of experts, the consulting and engineering services in nuclear power are excessively expensive and their annual costs is about 5% the initial investments.

The thermal power plants have the highest annual costs of maintenance and repairing which exceeds 10% of the initial investments. The main reason is the extremely high temperature in the burning chamber – about 1600 degree Celsius, which causes rapid wearing out of the equipment and require every year the so-called ‘operative repair’, every second year ‘intermediary repair’ and once in a four years – ‘capital repair’. Hence the popular proverb among the power engineers: “Give me the annual repairs of TPP and don’t ask about my money!”



- | | | |
|--|---------------------------------|---------------------------------|
| 1._Cooling tower | 10. Steam_Control valve | 19._Superheater |
| 2._Cooling water pump | 11. High pressure_steam turbine | 20. Forced draught (draft)_fan |
| 3._transmission line_(3-phase) | 12._Deaerator | 21. Reheater |
| 4. Step-up_transformer_(3-phase) | 13._Feedwater heater | 22._Combustion_air intake |
| 5._Electrical generator_(3-phase) | 14._Coal conveyor | 23._Economiser |
| 6. Low pressure_steam turbine | 15._Coal hopper | 24._Air preheater |
| 7._Condensate pump | 16._Coal pulverizer | 25._Precipitator |
| 8._Surface condenser | 17._Boiler steam drum | 26. Induced draught (draft)_fan |
| 9. Intermediate pressure_steam turbine | 18._Bottom ash hopper | 27._Flue gas stack |

During the period of socialist administrative economy the repairing of thermal power units was carried out by TPP's own specialized staff, together with state-owned repairing enterprises dealing with more complex activities. However, by mid 1990s these enterprises have been privatized and soon after that the repairing has gradually transferred to the private engineering and consultancy firms.²

According to the interviewed experts a conservative estimate of the annual value of the repairing services in Bulgarian electric power industry is above 2 billion BGN (above 1 billion euro) – mainly for the large thermal plants, nuclear power plant and less for the hydropower. Some experts are talking about bigger value, but we stay with the conservative estimate, since it matches the statistical data on annual expenses of the electric power

² The last and most complex repairing enterprise *Atomenergorepair* was privatized in 2004.

enterprises, compared with their sells and declared profit – for 2007 they spent for external services 2,3 billions BGN (about 1.2 billions euro).

Most of the orders have been received by few engineering firms (*Frontier, Risk Engineering, 7M, and some others*), most of them having political protection in Bulgarian Socialist Party, but not only. Winning almost all ‘tenders’, they usually hire sub-contractors – ‘ordinary’ engineering firms who carry out the repairing works for *about 30% of the value of the order* (in different interview the share varied between 15 and 40% of the contracts)! In their professional slogan, the managers of the ‘ordinary’ engineering firms call the small privileged group ‘our companies’ (which obviously means ‘our’ to the political establishment), while perceiving themselves as ‘the makers’ (or ‘working horses’). If these estimates are true, *this means that about 70% of the money spend for repairing works in electric power industry remain in the hands of the ‘our firms’*. *This is about 1.4 BGN billion or 700 million euro, which is an enormous profit for the scale of the country. Obviously part of it is transferred to the political establishment as ‘administrative’ or overtly corrupt payments. We define this as one of the major channels of political corruption (or illegal transfer of public resources to the oligarchic circle) in Bulgaria.*

To give a small example, in April 2010 the new Bulgarian government revealed the case of the leader of the Union of Rights and Freedom Ahmed Dogan, whose party was member of coalition Government between 2005 - 2009. Being graduated philosophy, he personally received consultancy contract from an engineering company, working at the new hydro-power complex *Tzankov Kamak* at Rhodope Mountain. The contract was 2 million BGN of value, which the philosopher fulfilled by hiring three hydro-engineers from public applied research institute, paying them total of 50 000 BGN, i.e. less than 3% of his contract! This case in a nutshell reveals the essence of the corrupt practices in the power industry.

The registered systematic draining out of enormous for the scale of Bulgarian economy resources is the main reason about the *low rate of technological renewal* of electric power sector we mentioned in the third part of the paper – if the registered political payments and other corrupt practices have been invested into the sector, many of its chronic problems and paradoxes should have been resolved – for example, the power industry could have reduced its own electricity consumption and transmission losses, could have invested in renewable power, introduce flexible technologies in system management and other measures increasing the general efficiency of the system., could have reducing the conversion rate of primary energy expanding the use of natural gas among the households and enterprises, etc.

With 700 million euro diverted annually, National Electrical Company could have build alone the much debated second Bulgarian nuclear power plant and could have entered as investor at regional and East-European energy markets.

Another negative consequence of these corrupt practices was delayed development of the ordinary ‘makers’ companies, representing the authentic entrepreneurship in the sector. For more than a decade they have been forced to work at the margin of their profitability and have enormous difficulties in improving their technology base and competitiveness.

5. Instead of conclusion – about the economic and political conditions mediating the evolution of Bulgarian electric power sector after 1989

The development of Bulgarian electric power sector, described above, is not an isolated phenomenon in Bulgarian economy during last twenty years – “*Networks of Transition*” study we published in 2008 pointed out that the authentic (not politically bound) entrepreneurs and foreign investors in the country have been systematically pushed away from the most profitable sectors of the economy. Without doubt., the electric power industry is one of these politically controlled sectors, and the means this control to be realized are the same – *systematic (des)information of Bulgarian public about the real processes going on in the sector, specific legislation providing exclusive rights for administrative discretion and making possible the political circles to intervene in the strategic management of the sector, controlling financial sector, criminal control over the independent entrepreneurs, rading, etc.* However, unlike chemical, metallurgical, electronic and other industries, which after decade of such control have been drained out and ruined, due to the technological specificity and social significance of the electric power sector the process of draining of resources had continued – if at lower pace, almost two decades.

Yet there is a contradiction in the paper, which a careful reader should have noticed already. If Bulgarian power industry was successfully developing during last two decades – according the old industrial criteria of 20th century, and if the significant for the sale of the country amount of electric energy produced was used inefficiently while at the same time sold at lowest price in Europe, then *how it became possible for the sector to put aside enough resources for maintenance and repairing of the equipment, while at the same time large amount of money to be drained out annually to political payments and other corrupt practices (including via the maintenance and repairing activites)?*

A possible explanation I found in the writings of great American economist Macur Olson, and especially his 1995 article where he deals with peculiarities of the communist economies. As everywhere in Eastern Europe, the main Bulgarian electric power facilities have been build under economic conditions, where the communist rulers after confiscating the private property imposed unthinkable to the Western market economies high level of taxation and savings. Accumulating in their hands almost entire resources of communist society, they allowed themselves extremely high level of investment the other societies could hardly afford.³ This happened, however, because of *the systematic overexploitation of the ordinary citizens* – it made possible the mass production of tanks and other armament, but it also made possible the large investments in power plants, transmission networks etc., while keeping at the same time the electricity price extremely low. As we have seen above in section three, already during the communist years the ‘efficient’ power industry was making loses, but this largely remained hidden both for the communist rulers, and for the ordinary citizens that have been subjected to overexploitation since late 1940s and almost used to it. When in 1983 an attempt was made by some clever technocrats to estimate the real cost of the electricity produced, they were declared ‘enemies of the Bulgarian people’ and punished.

In 1992 the first democratic government decided to end state subsidies to power industry, however, keeping the electricity prices low because of political reasons. Few months later the power system collapsed and government was forced to tacitly restore some of the subsidies. And as we pointed in the second section, it was the pressure from World Bank that eventually released the process of increasing the prices, although they have been kept well below the average EU level.

I think this is the real ground of the never ending public debate in Bulgarian society about the electricity prices – the furious reactions of the public after every rise indicated the ‘animal feeling’ of the people that although lower than the European ones, through the electricity bills the people continue to be subjected to the old communist overexploitation.

³ “Compare also Tsarist Russia in World War I with Stalin's USSR. In World War I the gigantic Empire of the Tsars was defeated essentially only by Germany, even though the German army had its hands full fighting on a second front against the French and British... and most of the time used only a small fraction of its forces against Russia. By contrast, in World War II Stalin's Soviet Union was victorious against Nazi Germany, even though the Germans committed the great bulk of their fighting troops to the Soviet front... Though German ground and air munitions production was 2.6 times as large in World War II as in World War I, *Soviet munitions production was 24.5 times as high in World War II as the Russian Empire's munitions production in World War I*... There can be no doubt that after World War II the Soviet Union was victorious accorded a superpower status hat the Tsarist autocracy never achieved, and that the Tsars never managed a prestige coup comparable to the Soviet initiation of flight in space. When the Stalinist system was applied in China, Vietnam, and North Korea it again made the communist autocracies incomparably more powerful militarily and politically than other Third World regimes (Olson 1995: 450-451).

Keeping the level of electricity consumption high enough, a limited oligarchic circle continues to capitalize the dividends from overexploitation, yet using it not for industrialization and arm production, but for the egoistic purpose of their own self-enrichment.

The practical conclusion is simple enough: main responsibility for the continuation of these predatory economic practices bear the political elites that governed during the period of post-socialist transition. As Olson has put it "...corruption and crime cannot be properly controlled and a country's economic potential realized unless the government effectively performs a role that the private sector cannot... The governments of the societies in transition have to perform the gigantic task of making and enforcing general rules that define property rights, providing for the impartial adjudication of disputes about ownership of property, and cutting back drastically the domain in which the administrative discretion of government officials can affect the value of property and contract rights." (Olson 1995: 458).

It is precisely this task that was not fulfilled during the transition period.

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