ENERGIAKLUB
CLIMATE POLICY INSTITUTE
APPLIED COMMUNICATIONS

October 2014

THE CORRUPTION RISKS OF THE NUCLEAR POWER PLANTS: WHAT CAN WE EXPECT IN CASE OF PAKS II?

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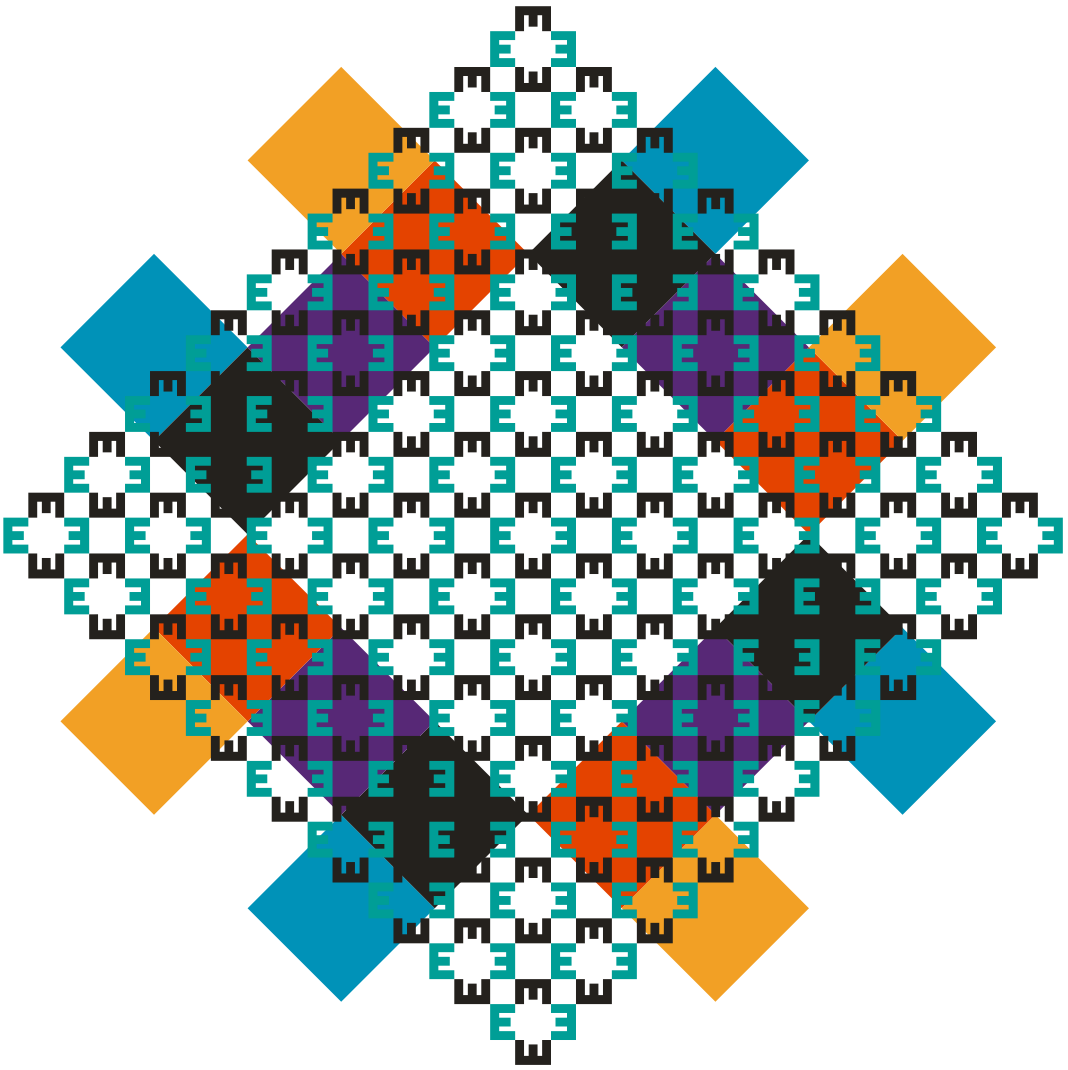

THE CORRUPTION RISKS OF THE NUCLEAR POWER PLANTS: WHAT CAN WE EXPECT IN CASE OF PAKS II?

The study was created by the research group of Corruption Research Center Budapest (CRCB) on behalf of Energiaklub Climate Policy Institute and Applied Communication.

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Typescript closure: 23.10.2014

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The study has been conducted within the framework of Energiaklub's 'Pakskontroll' programme: www.pakskontroll.hu

ENERGIAKLUB, October 2014

"Every organisation managing public funds shall be obliged to publicly account for its management of public funds. Public funds and national assets shall be managed according to the principles of transparency and the purity of public life. Data relating to public funds and national assets shall be data of public interest."

[(2) Article 39, The Fundamental Law of Hungary (25th April 2011.)]

"*The main tool for widening our economic room for manoeuvre is to decrease our foreign and internal debt – including the ratio of our foreign currency debt – as well as the budget deficit, to create the conditions for economic growth, to increase the employment and to effectively combat the black economy and corruption.*"

[Decision of the Hungarian Government, Government Decision 1035/2012. (II. 21.)]

SUMMARY

1. In January 2014 the Hungarian Government announced that it reached an agreement with the government of Russia about the construction of two new units, which are to replace the current capacity at the Paks nuclear power plant. The project with its approximate volume of 3-4 billion HUF will be the biggest investment in Hungary in the next decade. As agreed the investment will be financed from credit provided by the Russian government.

2. The study analyzes the corruption risks of the planned Paks nuclear power plant investment based on relevant economic theory and empirical results, summarizes the lessons learned from similar Hungarian and foreign investments, and gives an estimate of the expected social losses related to the investment, and arising from the corruption.

3. Based on the aspects analyzed in the study, the Paks II investment involves high corruption risks, which risks could and should be reduced. This is the vital interests of the Hungarian nation.

4. Due to the application of the new technology the investment entails such an information asymmetry that could easily be misused by the contractor. Given the nature of the huge investment it will further increase corruption risks: these big, lasting projects create a complex relationship system, for project participants (organization set up by the customer, coordinating project office, contractors, sub-contractors), both for the sellers and the buyers it means higher misuse potentials than would be in case of simpler, smaller-scale projects.

5. On the basis of theoretical economics literature on corruption, and because of project characteristics there are high corruption risks. There are only a few companies able to construct a nuclear power plant, and on the buyer's side governments may be the only customers. Bilateral monopolies based on the participation of two parties generate more opportunities for misuse both for the customer and the contractor than standard market contracts.

6. The literature on the project management of large investments and that of nuclear power plants draws attention to risks related to the implementation of these projects. Primarily not keeping the deadlines and related budget overrun should be counted on. With establishing and maintaining appropriate project management practices these risks can be reduced.

7. In the recommendations and guideline provided by the International Atomic Energy Agency emphasis is put on the importance of using adequate resources to set up and operate organizations that control budget and monitor whether deadlines are kept in case of nuclear power plant investments. Investments implemented with the help of new technologies are increasingly more complex, therefore they involve higher risks concerning contractors and security.

8. Recent European nuclear power plant construction projects underpin/buttress the rationality of these recommendations. Protracted and increasingly costly, controversial investments can be found in Finland, in France, and in Russia.

9. Experience shows, on the basis of similar big Hungarian investments that implementing such a project entails serious risks. Poor project management, legal disputes and licensing scandals, cost overruns and long overdue investment deliveries characterize Hungarian projects. In the Hungarian environment much higher level corruption risks can be calculated than that of Western Europe's.

10. The signed agreement does not include either additional work clauses or the question of penalties. The national experience has shown that most of the time delays and additional work provide opportunities for abuse. The shortcomings of the current agreement therefore provide a great scope for corrupt transactions.

11. International empirical studies on similar projects demonstrate that at least 5% of the value of the investment is exposed to corruption risks. According to Hungarian data the ratio of bribery in case of a project that is implemented with corruption can achieve 13-16% of the value of the investment. Social losses associated with corruption can amount to many times more than that. This means hundreds of billions of forints tax payer loss in case of such an investment.

12. Due to high corruption risks of the investment, Paks II agreement on the implementation of the project needs amendments and modifications. The current structure denotes that the project is to be implemented with significant corruption losses together with a lot of corrupt project procurements.

13. Russian and East Asian experience suggests that the construction and the operation of a nuclear power plant carry high corruption risks.

14. An inverse causal relationship between the corruption risks and the safe operation of the nuclear power plant can be stated: higher levels of corruption will result in a lower level of security.

15. This relationship is exemplified by the recent Fukushima nuclear power plant accident. Corruption and misuse/abuse in the institutional control system can be detected among the causes of the accident.

16. Transparency is one of the best and most profitable means/weapons against corruption. Enforced transparency results in low corruption risks; increased transparency reduces corruption risks. Transparency may discourage potential players from corrupt transactions. Ensuring transparency, however, is not sufficient in itself: it is necessary, but it is not the adequate/sole condition for the reduction of corruption. In addition to it, there is a need for institutions that in case of public funds expenditure effectively monitor corruption risks (i); citizens' participation (ii); and the work and activities of investigative journalism (iii).

17. The issue of corruption should have a high priority in the construction of nuclear power plants. As more positive examples confirm, the solution could be if apart from the investor organization an anti-corruption or compliance office, department is set up, which continuously examines and monitors procurement decisions from this aspect during the whole course of the project.

18. If only the volume, financial, technical parameters of the planned power plant investment are taken into account, as well as how the markets of the investment and how those products and services that are purchased during the investment can be characterized, then preliminary assessment, analysis of risks related to corruption should be conducted, and the results should be considered in the decision making processes of the investment.

19. This is essential, even if a priori good intention, willingness to compromise, fair business practices, a high level of contractual discipline are assumed in connection with each and every participant in the investment project.

20. A significant part of the corruption risks associated with an investment arises from the objective characteristics of the investment. These factors are the following: the extremely

high volume of 7-10% of the Hungarian investment by year (i) information asymmetry resulting from the application of the new nuclear power plant technology (ii); implementation characterized by bilateral monopoly (iii); from the seller's side the contractor's oligopolistic situation (iv); within the investment the substantial amount of products coming from heterogeneous and non-competitive markets, (v); Paks II. is a relation-specific investment, since the implementation of the model is closely linked to its financing model(vi).

21. Only beyond the list of objective factors is it possible and necessary to talk about what institutional solutions, what organizational solutions are set up in the autonomous decision making process during the investment by the investment procurer, the Hungarian government and the Russian partner, and what level corruption risks these institutional and organizational solutions would generate. Regardless of which solutions are chosen, they induce different levels and different intensity presence of corruption risks.

22. Consequently, the Hungarian government, and also the Russian partner could affect the level of corruption at which the investment is to be implemented. Those institutional and organizational solutions, strategic anti-corruption measures, continuous analysis of corruption risks that are based on the international big investment experience can result in low level of corruption risks linked to investment, and in the exclusion of corruption presence in several fields. This all depends on the identification of the objective situation and on the political will to resolve the issue.

CONTENT

INTRODUCTION

The Hungarian government has made a commitment to expand the Paks Nuclear Power Plant; on 17th February 2014 the Hungarian Parliament passed legislation governing the launching and procurement of the investment (Act II of 2014) and in March, legislation governing the financing of the investment (Act XXIV of 2014).

This study does not discuss the question of how the Paks investment will promote the national interests of Hungary, how it will enhance and strengthen the Hungarian economy or how it will improve the competitiveness of the Hungarian economy.[1] Nor does it discuss the questions of how much cheaper, as a result of the investment, Hungarian businesses are expected to buy electricity compared to the current level, [2] or how beneficial the Russian loan construction will be for the Hungarian economy and for the Hungarian tax payers.[3]

What this study focuses on is one single aspect: it aims to discuss the corruption risks of the Paks investment as a nuclear power plant investment.

The authors of this study believe that in the case of projects of such scale, it is natural as well as necessary to analyse the factors and impacts of the investment that trigger undesired and negative economic effects. Among those, the occurrence of corruption in the investment process is of key importance, which, besides undermining the original governmental intentions representing the national interests, will have far-reaching and long-term undesired consequences on income allocation, on the level of corruption in Hungary in general, on the business decisions of Hungarian businesses and ultimately on the competitiveness of the national economy.

The construction of power stations is a special case among energy and construction investments not only due to the unique technological solutions and to the extremely high level of safety requirements; and it is not only these factors that impact a country's economy, potentially on the long run. Other factors that accompany such investments also play an important role in these processes. The process of completing such investments, the choice of technological solutions and the choice of market actors providing those solutions, the coordination and monitoring of the whole investment process, the approval of the works delivered are all decisions that have impacts reaching far beyond the construction of the nuclear power plant. On the seller side, these decisions will have an impact on the income of the energy market and on that of the suppliers of that market, on maintaining the market in the future; while on the purchasing side, they will obviously influence the financial situation of the state, that is, the financial situation and future wealth of the tax payers.

[1] *"When talking about the Paks expansion, Mihály Varga, Minister of National Economy said that cheap energy will not only be beneficial for the public but it is also a prerequisite for competitiveness. It would be desirable if the production sector could buy energy at a lower price." Also: "The Hungarian government's point of view as regards to Paks has remained unchanged. The financial agreements have been approved by both the Russian and the Hungarian party; what still has to be completed is the parliamentary debate. Calculations show that the electricity to be produced in the new blocks will be one of the most reliable and cheapest energy sources in the country in the upcoming years, said the Minister of National Economy at a late night press conference on Paks."* See: pakspress.hu: The Paks expansion is a national economic interest. http://www.pakspress.hu/index.php?ugras=hirolvaso&hirszama=58108

[2] *„János Lázár said that with the expansion, electricity will become cheaper"*. MNO: Paks Expansion Will Lead to Cheaper Electricity http://mno.hu/hirtvarchiv/paks-bovitesevel-olcsobb-lesz-az-aram-1205676

[3] *"The investment will create 10 thousand jobs; the Hungarian businesses will gain contracts worth of at least 3 billion Euros or 900 trillion forints and the Hungarian state will gain 300 trillion forints of tax income, according to the government's estimates. All these, complemented with the cheap loan, guarantee that with this investment, the country is about to secure the best deal of the past 40 years with the Russians. Thanks to the low price of electricity, we will become the most competitive economy of Central Eastern Europe, said Mr. Lázár."* http://www.origo.hu/gazdasag/20140116-ket-heten-belul-biztossa-valhat-a-paksi-bovites.html

Among these factors, those arising from corruption and corrupt transactions related to the power plant investment also need to be considered.

Whether decision makers want it or not, corruption risks are an inevitable part of completing such investments.

Having established all that, only four questions remain to be answered: what are the factors that those corruption risks arise from (i); how do they relate to the decisions made during the investments (ii); to what extent are the parties carrying out the project aware of them (iii); and last, how could they be reduced (iv)?

These are the questions this study aims to address, taking into account the history of the Paks II investment, the plans and designs published until the time of the writing of this paper, the corruption risks of the Hungarian public procurement market and the special role of the Paks II investment in the Hungarian national economy.

The authors of this study believe that what has been stated about investments in general is true to the Paks II investment too, namely that just like any state investment project, this project also carries the potential for corruption. This is inevitable. This needs to be factored in regardless wither political decision makers would like to see it or not.

In the first part of this study, based on the documents available, the history of the Paks II investment is outlined. The second part focuses on the corruption risks of large scale investments from an economic point of view and on the micro economic reasons of those risks. These will be followed by an overview on the Hungarian and international experience related to large-scale investments, while the next chapter will provide a summary on the corruption risks of the Paks II investment and provide a preliminary estimate on the related social and welfare damages. Finally, recommendations are made for institutional solutions that, if the project goes ahead, would reduce the corruption risks related to the investment.

1. FACTS ON THE PAKS II INVESTMENT

The expansion and renewal of Paks was not a sudden decision; the idea of the greatest Hungarian investment of the past few decades has been part of the governmental and public discourse for years. As this study aims to draw a picture of the corruption risks of the Paks II investment, it is necessary to briefly describe the background and the history of the decisions, agreements and contracts shaping the planned investment. Therefore, in the following sections those will be described based on analyses, official documents and news released in the press.

1.1. An exact definition of the investment

The details of the investment are available in a few government documents that have been made public. The main source of information on the investment approved by the government is *the intergovernmental agreement between the Government of Hungary and the Government of the Russian Federation concerning the cooperation in the peaceful use of atomic energy,* to be found in Act II of 2014 adopted by the Parliament. Based on the information available, the conditions of completing the planned investment are summarised in Table 1.

Table 1: Conditions of completing the Paks II investment

Subject of the investment	Operation, modernisation, renovation and decommissioning of the current blocks (1-4)
	Design, construction, commissioning and decommissioning of two new blocks (5-6)
	Fuel supply and treatment of waste fuel for the new blocks
Participants	Ministry of National Development and a state controlled body appointed by the ministry
	'Rosatom' State Atomic Energy Corporation and a state controlled body appointed by Rosatom
Details on the maintenance of the current blocks	
Delivery of new equipment	
Maintenance, repair and modernisation	
Works of extending the operation time of blocks	
Consultancy on technical issues;	
Carrying out works of decommissioning of blocks after the operation time has passed	
Details on the construction of the two new blocks	
Types of reactors in the new blocks	Water cooling, water moderator
Capacity of reactors	At least 1000 MW
Aim of construction	Taking up the capacity of blocks 1-4 that are to be shut down
Details on fuel supply	
Form	Ready-made fuel cartridge and control bar
Period of supply	20 years (minimum) from the commissioning of the new blocks
Waste cartridges	Temporary storage in the territory of the Russian Federation

Source: Act II of 2014

Details on the financing of the investment are laid down in a separate agreement between the two parties: *Agreement between the Government of the Russian Federation and the Government of Hungary on providing a state loan for financing the construction of a nuclear power station in Hungary,* codified by the Parliament in Act II of 2014. The conditions of the financing are summarised in Table 2.

Table 2: Financial conditions of the Paks II investment

Amount of loan	**Maximum €10 billion**
Aim of the loan	Financing the works, services and purchases necessary for the planning, construction and commissioning of blocks 5 and 6 of the plant
Loan provided by	The Government of the Russian Federation, State Corporation Bank for Development and Foreign Economic Affairs (Vnyesekonombank)
Beneficiary of loan	The Government of Hungary, Government Debt Management Agency
Conditions of use	The loan shall be spent on financing 80% of the new nuclear power plant block investment, while the remaining 20% shall be paid by the Hungarian Government from their own resources
	To be used between 2014 and 2025
	The amount of loan to be used during the following year shall be agreed on each year. 0.25% of the annual budget not used shall be paid to the Russian party as a commitment fee.
Conditions of repayment	After commissioning, during the period of 3x7 years In the first 7 years 25% of the amount (4.5% with interests), in the second 7 years 35% of the amount (4.8% with interests), and in the third 7 years 40% of the amount (4.9% with interests). Late payment fee: 150% of the interest rate applied in the given period

Source: Act XXIV of 2014

1.2. History of the Paks investment

The expansion of the Paks Nuclear Power Plant was an issue that was given serious consideration already in the second half of the years of 2000 by the governments at the time. A key event in this process was when on 30th March 2009 the Parliament voted in favour of a proposal for a decision providing theoretical consent to "*starting preparations for installing new blocks on the site of the Paks Nuclear Power Plant*"[4]. The proposal for a decision was passed by the Parliament extremely rapidly and with an unusual consent (in the course of a few minutes without major debate[5]): 330 MPs voted in favour, 6 voted against and 10 abstained. There had been no considerable social dialogue beforehand.[6] And although Ferenc Gyurcsány, Prime Minister at the time accounted for the investment in his

[4]Parliamentary decision 25/2009 (IV. 2.), see http://www.parlament.hu/irom38/09173/09173.pdf The relevant parliamentary minutes are annexed to this study.
[5] The 'debate', following the proposal speech and the speeches of the leaders of the relevant parliamentary committees, merely consisted of a speech by Kálmán Katona independent MP, who listed several counter arguments and did not support the proposal.
[6] Kovács, Áron [2009]

parliamentary speech as an adequate response to the Russian-Ukrainian gas crisis, [7] the government's intention to support the expansion had been born way earlier.

This is proven by the launch of the Teller Project of the Hungarian Electricity Ltd. Group (MVM) in 2007, which involved analysis of the feasibility of expanding the nuclear power plant, a preliminary environmental assessment and an analysis of the options for waste fuel and nuclear waste management. In the end, the three studies that had been requested by the Finance Minister responsible for state assets in 2007 were completed by the working group by the end of 2008.[8] At that time, neither of the reasons quoted in the parliamentary decision approving the investment were relevant[9]: the Ukrainian-Russian crises had not yet broken out and the energy policy between 2008 and 2020 had not yet been passed.[10] The studies prepared during the preparatory phase of the Teller Project were not accessible for citizens for a long time; they were only made public following the lawsuits initiated by Energiaklub. Only after the studies had been made available was it revealed that the company (Esplanade Kft.) contracted for preparing the study delivered one that was copy-pasted from parts of another study, also ordered by MVM, which raised the suspicion of corrupt transactions between the management of MVM and Esplanade Kft.[11]

After the parliamentary decision had been passed in 2009, MVM launched the Lévai Project, incorporating further necessary works for the preparation of the Paks II investment.

In the course of the Lévai Project, 70% of HUF 3.6 billion was spent on the investment tender, on the preparation of the permit process and PR activities, while one fifth of the sum was planned to be spent on economic and technical assessments. Whether the expansion was necessary or not was not examined or assessed at all.[12]

Further details on the Paks expansion only became available in the next governmental term. As a first step, on 3rd October 2011, the Parliament adopted a new National Energy Strategy,[13] which stipulated that the first block of a new nuclear power station would start operations in 2025 the earliest; and if a second block was built, that would start operations by 2030. According to the strategy, one of the aims of the project is to maintain the share of nuclear energy in the electricity production, in other words, to secure a capacity equivalent to the current level. In the decision on the National Energy Strategy, the Parliament, among others, asks the government again to *"carry out works in preparation for the decision regarding creating new nuclear power capacities on the site of the Paks Nuclear Power Plant, and the cost implications of such an investment in particular".*[14]

As a result, in 2012 MVM set up MVM Paks II Nuclear Power Plant Development Zrt. with a starting capital of HUF 9 billion.[15] Preparation works started in the framework of the Lévai Project (e.g. preparation for the tender, carrying out environmental impact assessment, searching for financing opportunities, etc.) and were continued by the project company. At a press conference on 22nd November 2012, Sándor Nagy, CEO of the company, revealed some additional details:

[7] Kovács, Áron [2009]
[8] Kovács, Áron [2009]
[9] Parliamentary decision 40/2008. (IV. 17.)
[10] Parliamentary decision 25/2009. (IV. 2.)
[11] See: http://energiakontrollprogram.hu/hir/50-millio-forint-kopipesztert , http://nol.hu/gazdasag/otvenmillio_allami_forint_egy_masolt_tanulmanyert-1409213 and http://energiaklub.hu/hir/paksi-szerzodesek-kitakarasok-nelkul and http://www.origo.hu/itthon/20130828-az-mvm-50-milliot-fizetett-egy-lemasolt-tanulmanyert.html and http://index.hu/belfold/2011/08/08/tanukent_hallgattak_ki_draskovics_tibort/.

[12] Perger, András [2013]
[13] Seehttp://2010-2014.kormany.hu/download/4/f8/70000/Nemzeti%20Energiastrat%C3%A9gia%202030%20teljes%20v%C3%A1ltozat.pdf
[14] Act II of 2014, http://www.opten.hu/2014-evi-ii-torveny-j247382.html
[15] Sipos, Géza [2012]

For a certain period of time, Paks II would be running parallel to Paks I; the plans include the construction of two blocks on the current site, with a capacity of 1000-1600 MW each. An operational lifetime of 60 years is planned. The CEO of the project company did not say anything on the size of the financial resources necessary for the investment or on the financing of the project in general.[16]

1.3. Agreement on the investment: the Russian-Hungarian cooperation

The history of the investment clearly shows that the government was committed to constructing the new Paks Nuclear Power Plant in spite of the fact that not a single professional study was published that could underpin that necessity of the new plant.[17]Up until the end of the governmental term it was not clear how the preparation of the investment would continue, how it was to be financed and when the tendering process would start.[18]

On 14th 2014, during his visit to Moscow, Prime Minister Viktor Orbán signed a cooperation agreement with Russian President Vladimir Putin.[19] The agreement includes the construction of two new blocks in Paks and names "Rosatom" State Atomic Energy Corporation and the Ministry of National Development as the bodies responsible for the implementation. Article 9 of the agreement stipulates that the Russian government provides a loan to the Hungarian government, the details of which are set in a separate agreement. Article 9 also stipulates that carrying out the investment is subject to this loan agreement: without the loan there is no investment.

During the press conference held after signing the agreement, János Lázár State Secretary of the Prime Minister's Office said that the construction could cost €10-12 billion, 80% of which would be covered by the loan provided by Russia, and 20% would have to be covered from other sources.[20]The State Secretary also said during the press conference that two blocks were going to be built besides the current unit with a capacity of 1200 MW each; they would be built by Rosatom, but, after delivery, would remain in the possession of the Hungarian state. In Lázár's opinion, the European Union also gave its consent to the agreement beforehand, and the investment might bring a 1% increase in GDP and could create 10 000 new jobs.[21]

The Act on the agreement was adopted by the Parliament on 6th February 2014 and signed by President János Áder on 10th February.[22] Previously, the President had been asked by parliamentary parties to examine the possibility of a referendum on the Act, but Áder concluded that the Fundamental Law (constitution) did not provide a legal opportunity for that.[23]

In the meantime, on 5th February 2014 the Russian and Hungarian parties also agreed on the financial agreement that was necessary to validate the initial agreement. It lays down that the Russian state provides the Hungarian state with a loan worth of €10 million, to be repaid between 2025 and 2046. According the agreement, the interest rates of the loan will be banded and will vary between 3.95% and 4.95% throughout the payback period.[24][25] The proposal was accepted by the Russian party at the end of March; it was put forward to the

[16] Sipos, Géza [2012]
[17] Energiakontroll Program [2014a]
[18] Kovács, Áron [2012]
[19] HVG.hu [2014a]

[20] See: http://mno.hu/hirtvarchiv/paks-bovitesevel-olcsobb-lesz-az-aram-1205676
[21] HVG.hu [2014a]
[22] Act II of 2014 http://www.opten.hu/2014-evi-ii-torveny-j247382.html
[23] Világgazdaság Online [2014]
[24] Index.hu [2014]
[25]Act XXIV of 2014 http://net.jogtar.hu/jr/gen/hjegy_doc.cgi?docid=A1400024.TV

Parliament by the government on 1st April and was ratified by the new Parliament on 23rd June.[26]

1.4. Reactions to the agreement in Hungary

The debate on the investment only started *after the agreement* had been signed in January. Taking its volume, the investment could be one of the largest amounts of government spending in Hungary in the following decades.

One of the most fundamental criticism regarding the investment is the lack of impact studies and analyses establishing the necessity of the investment. In spring, Energiaklub and the Hungarian Civil Liberties Union (TASZ) sued the Ministry of National Development as based on the government decisions adopted in 2012, it was the ministry that was responsible for the preparations for the expansion of the nuclear power plant. First, the Ministry of National Development (NFM) refused responsibility for data handling,[27] then, on 23rd June the Budapest Capital Court of Appeal rejected the claim as during the trial it was revealed that the requested information (impact studies establishing the necessity of the investment) did not exist.[28]

Another major line of criticism concerned the form of the agreement, the investor partner and the loan, as the construction of the new nuclear power plant block was not awarded through a tender. After the agreement had been made, parties of the opposition criticised the decision in several rounds. Együtt-PM wanted the President not to sign the Act ratifying the agreement.[29] After that had failed, a constitutional complaint was filed, which the constitutional court rejected on 8th July.[30] In February 2014 the debate between János Lázár (Fidesz) and Benedek Jávor (Együtt-PM) held at the University of Law, mainly concerned the level of social support for the necessity of the expansion.[31]

During the parliamentary debate of the loan agreement, LMP emphasised the fact that the Russian party was unreliable and politically dangerous and, just like the other parties and Energiaklub, criticised the lack of impact studies establishing the need for the investment. The parties MSZP and Együtt-PM criticised the conditions and the size of the loan: together with the interests and the contribution from Hungary, the investment will cost tax payers nearly 7000 billion forints and therefore could violate the regulations on national debt in Hungary's Fundamental Law.[32]

Besides all that, several parties stressed the fact that the investment and the agreement in their current form did not comply with European Union regulations. Energiaklub and Greenpeace added that one of the main concerns was the fact that the financing of the new Paks Nuclear Power Plant could constitute as banned state aid and therefore Energiaklub submitted a petition to the European Commission's Directorate General for Competition requesting an examination of the loan construction.[33]Benedek Jávor (Együtt-PM) also turned to the European Commission with a petition because in his party's opinion, awarding the implementation of the investment without a tender also violates EU laws.[34]

Besides criticising the agreement on legal, formal and political grounds, many professional workshops questioned the need for the investment, expressing doubts about whether a nuclear energy investment would be the most profitable energy investment for

[26] Bita Dániel [2014]
[27] Energiakontroll Program [2014a]
[28] Energiakontroll Program [2014b]
[29] Világgazdaság Online [2014]
[30] Origo.hu [2014a]
[31] Origo.hu [2014b]
[32] Bita, Dániel [2014]
[33] Energiakontroll Program [2014c]
[34] Nol.hu [2014]

Hungary. The Regional Energy Research Centre of Corvinus University assessed in a study the expected profitability of the construction of the nuclear power plant (REKK, 2013) and analysed, with a detailed financial model, what energy prices could be expected if the cost of the nuclear power plant investment is burdened on the consumers (REKK, 2014).[35]According to their analysis, if the Paks investment is completed, the Hungarian state will realise one of the most expensive investments of this kind. Similar calculations were made by Energiaklub as well.[36]In addition to these, an analysis by János Ősz, professor of the Budapest University of Technology and Economics also gained considerable publicity, criticising the planned investment from several aspects.[37]

2. NUCLEAR POWER PLANT INVESTMENTS AND CORRUPTION THEORY CONSIDERATIONS

2.1. Conclusions from literature on the project management of investments

When discussing the potential risks of corruption around the Paks investment, it is logical to start with those risks that could occur at any large industrial or infrastructural investment. There is a wide range of experience in this matter for investors, for the business sector and for governments. Two major areas should be examined: the processes of other investments and the problems arising during the projects on the one hand, and the studies summarising the risks occurring during the implementation of these investments on the other. This is a job the Hungarian government will have to do, along with sharing their findings with the public. Naturally, the purpose of this study cannot be to do this job for the Hungarian government. What this study aims to do is raise this matter, highlight its importance and briefly outline the findings and consequences of the most important relevant works.

2.1.1. Project management of large investments

Although there is extensive literature on the project management of different types of investments, due to the diverse nature of investments (financial investments, in-house IT investments etc.), the focus needs to be on the lessons and good practices of only those ones that are similar to the Paks investment.

Taking its character, the Paks investment could be best categorised as a Large Infrastructure Project (LIP). These Large Infrastructure Projects typically involve a great number of participants, high costs, a long recovery time, a complex and lengthy process and, as a result, a changing legal, political and economic environment as well as the possibility and necessity of using innovative technologies.

The risks of all these should be taken into consideration throughout the whole life cycle of the project: from the selection of the project until the commencement of operations, as risks arising from earlier stages of the life cycle have an impact on the ones occurring at later stages (McKinsey, 2013).

In their paper titled *'Managing Large Infrastructure Projects'*, Marcel Hertogh and his co-authors draw conclusions from similar Large Infrastructure Projects (Hertogh et al. 2008). This comprehensive study was created

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35 See http://www.rekk.eu/images/stories/letoltheto/rekk_atom_megterules.pdf and http://www.rekk.eu/index.php?option=com_content&view=article&id=303%3Aatomermvi-beruhazasok&catid=40%3Aarampiac&Itemid=76&lang=hu

36 Perger, András [2014]

37 See Magyari, Péter [2024], http://444.hu/2014/02/12/osz-tanar-ur-az-energetika-tanszekrol-levezette-hogy-miert-nem-kene-orosz-atomeromuvet-venni/ and Ősz, János [2014], http://www.energia.bme.hu/images/hirek/2014/Paks%20II%20egy%20szakember%20szemevel.pdf

within the framework of the NETLIPSE project, financed by the European Commission, published in 2008. Based on the analysis of 15 recent large infrastructure investments in Europe, the authors draw some common conclusions and, based on them, summarise the good practices that could be applied during the project management process.

One surprising finding of their study is that in spite of the different national environments, in many cases the problems the project owners and contractors had to face during the completion of the investments were similar. One of the typical major problems seemed to be the fact that close to the final stages of the investment, the original budget was almost always exceeded, and very often there were delays in the target dates for delivery and commissioning.

Another general occurrence was budget overruns caused by missed deadlines. When comparing the planned and final costs of large European infrastructure investments, McKinsey describes cost overruns as one of the major and typical risk factors of investments, and argues that they are rooted in the lack of risk management (McKinsey, 2013).[38] The study of the NETLIPSE project comes to the same conclusion (Hertogh, et al. 2008: 41-43 and 52-54).

These are all problems that typically occur during nuclear power plant investments too; therefore, the Hungarian government representing the interests of the nation should consider these international conclusions during the preparations for the Paks II investment and apply those institutional and regulatory solutions that could prevent them. Both studies conclude that the main reasons of delays are inadequate preparation, too early and optimistic estimates for the budget and the use of new technological solutions.[39]

Their main recommendations for similar large investments are the following (Hertogh et al., 2008: 36-46; McKinsey, 2013: 4-12):

- The risks of the project should be considered for the entire life cycle of the project; these should be analysed and monitored throughout the whole project.
- The project needs to be managed as a whole by the project management: starting from the physical project, all the participants, the purpose of the project as well as the interests of the broader society should be taken into consideration and treated at the same level.
- At the early stages of an investment, it is risky to make estimates regarding the timing and the financial aspect of the implementation of the project. While it is important to have those estimates, it is only advisable to make them a decisive factor if the technical, environmental, etc. aspects of the investment have been clearly defined and the risks have been properly assessed. That is what enables the management to keep to the targets that have been set with the contractors. At the initial stage, it is advisable to set intervals for the investment and include them in the communication about the investment to the general public.

[38] *„However, major infrastructure projects have a history of problems. Cost overruns, delays, failed procurement, or unavailability of private financing are common (Exhibit 2). The final cost of the much-anticipated Eurotunnel between the United Kingdom and France, for example, was significantly higher than originally planned, while the Betuwe cargo railway linking the Netherlands and Germany came in at twice the original €2.3 billion budget and more than four times the original estimate. Nor are these problems confined to the past. Today, the construction of Kuala Lumpur's new airport terminal, for example, is facing huge cost overruns and significant delays following frequent design changes. In our view, most overruns are foreseeable and avoidable. Many of the problems we observe are due to a lack of professional, forward-looking risk management. Direct value losses due to undermanagement of risks for today's pipeline of large-scale projects may exceed $1.5 trillion in the next five years, not to mention the loss in GDP growth, as well as reputational and societal effects"* McKinsey, 2013: 1 and Table 1

[39] it needs to be added that corruption, as a possible factor that increases the risks of investments, is not mentioned in either study.

- It is recommended to be realistic and factor in the possible external effects that could impact the process: the possibility of changes should not be underestimated.
- Although public opinion often says that the benefits of such investments are overestimated at an early phase, research shows that in many cases these estimates are too modest.
- The relationship between the management and the investing parties should be characterised by control and constructive cooperation.
- Contractors should maintain good relationships with the external parties, clients and the financing parties.
- This relationship should be present both in the management and among the owners: an approach of a common contract, common projects and common results is needed.
- New solutions and innovations will not cause budget overruns if innovation is managed by a conscious, separate, independent organisation (project or sub-project).
- When there is co-operation between different parties (mainly countries and national bodies), it is important to co-ordinate the sub-projects and work phases together, in a the same pace, instead of only co-operating on the large investment. Differences between the parties may significantly decrease the efficiency of the implementation.

Both studies underline the importance of risk management during the implementation of investments. Assessing and continuously analysing the risks are imperative not only for each investment step, for each measure, for the selection of contractors or for the environmental factors. The benefits and cost savings related to the individual investment decisions also need to be taken into account; and a database containing both sets of factors need to be created and updated regularly (Hertogh et al., 2008: 41-43).

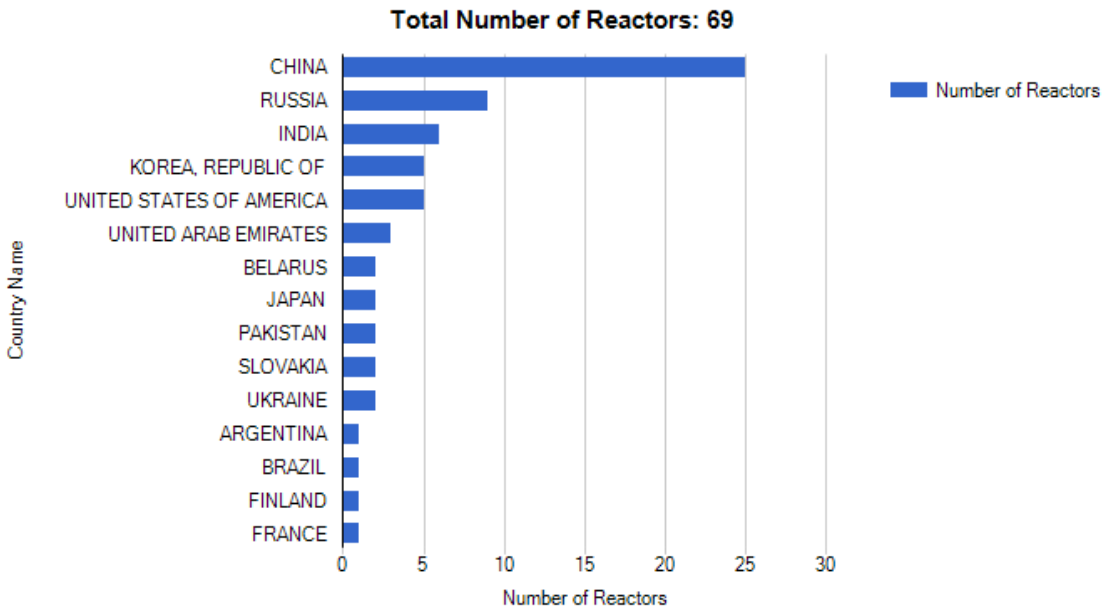
2.1.2. Project management of nuclear power plant investments

What might provide a guideline on the issue even better than literature on project management of large investments is literature focusing on the practice of project management of nuclear power plant investments. This field is studied in detail by the International Atomic Energy Agency (IAEA); their latest policy study summarising guidelines and experience was published in 2012 with the title *Project management in nuclear power plant constructions: Guidelines and experience*.[40]

In their reasoning, IAEA argues that studying the project management of nuclear power plant projects is important because over the past decade several nuclear power plant investments have been launched. In December 2010, there were 65 reactors under construction (and only that year, constructions of 15 reactors started); a similar number was last observed in 1987 (IAEA, 2012:1). As since the last great wave of constructing nuclear power plants in the 1980s and 1990s both the technologies applied and the nature of the investments themselves have changed a lot; the techniques of the project management of such investments have also been refined and adapted to the changing environment.

[40] IAEA [2012], http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1537_web.pdf

Figure 1: Number of reactors under construction world-wide, 2015



Source: IAEA [2015] p. 1.

The IAEA has formulated the following recommendations with regards to project management (IAEA, 2012: 78):

- When preparing the scheduling and the budget estimation, it is advisable to set safety and quality as top priorities.
- Regulatory frameworks and processes need to be taken very seriously and they need to be set prior to starting the physical implementation.
- New-type investments are more costly and complex than the constructions that have already been tested.
- A highly qualified project management team needs to be set up at the very beginning of the investment.
- Planning should be elaborated and tested; project preparation should be effective; steps of obtaining permits should be managed before the implementation starts.
- It should be ensured that suppliers are familiar with the application of nuclear technologies: they possess the necessary special skills and are highly qualified in the areas of quality, documentation and traceability.
- Transparency is an important requirement: the public needs to be informed properly and in detail.
- In the area of nuclear energy, quality assurance is stricter than in any other sector and is directly applicable to the activities of the construction, purchasing, manufacturing, planning and starting of works.
- In the case of such a project, it is inevitable to regularly prepare, maintain, validate and manage the necessary documents, as they will be needed for later modifications for planning and tracing purposes.
- Recovery of the capital needed for the investment can only be interpreted in relation to the operation time. As a result, both from the investors' and the management's point of view, delays in the construction are unacceptable due to increased construction costs and delayed and lost revenues.
- Safety is recommended to be treated as a top priority throughout the whole project.

Besides these general recommendations, the IAEA also provides detailed recommendations.

The following section very briefly outlines the recommendations of those areas that are the most relevant in terms of corruption: content of project management (i), risk management (ii), time and budget overruns (iii) and managing local suppliers (iv).

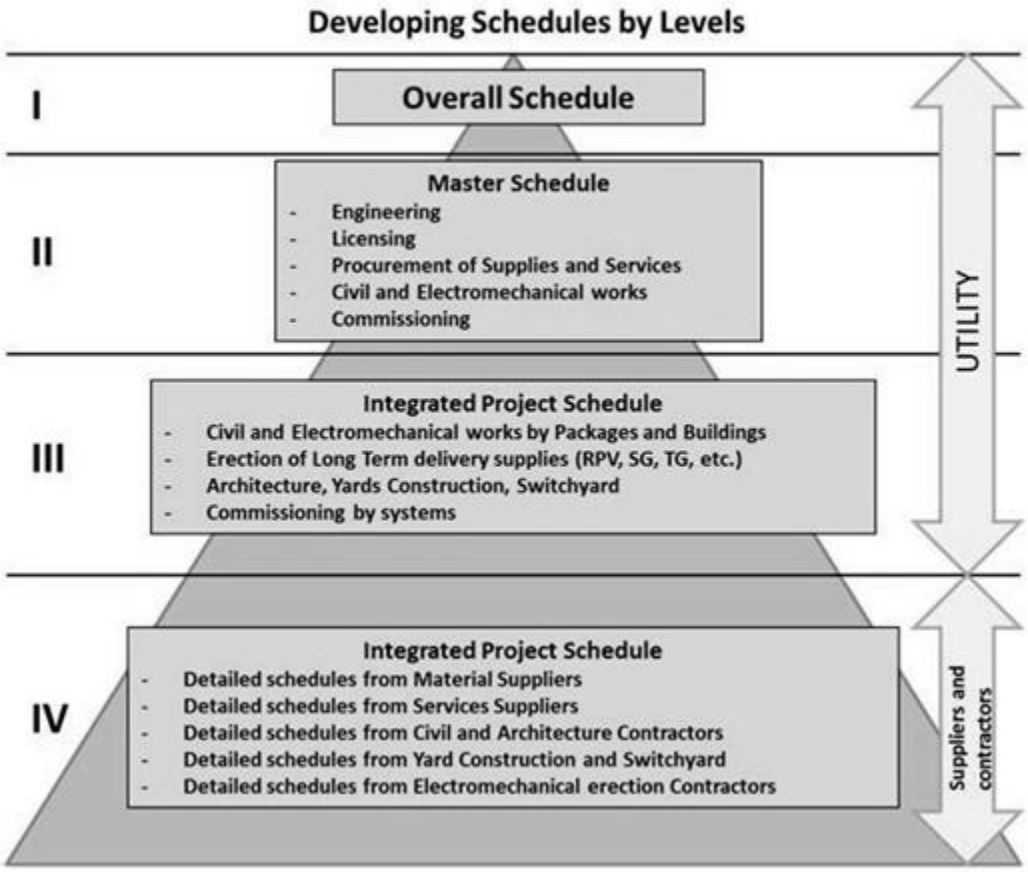
In relation to preparations for the project, drawing up a detailed *project report* is of key importance. A project report contains the type of technology applied, the national experience gained so far, taking into account the reasoning of the selection; it provides details on capacity and supply; it outlines the agenda and the budget of the investment for each year. Besides, the report also defines the type of agreement with the contractor. The most common forms of that are *turnkey*, engineering, procurement and construction (EPC), procurement and construction (PC) and construction (C) contracts. (IAEA, 2012: 6).

IAEA also highlights the importance of risk management. First, it recommends setting up a separate risk management team, and second, it urges to perform risk management throughout the whole life cycle of the project in order to meet financial plans and deadlines. (IAEA, 2012: 26):

„In principle, risk means financial and schedule exposure, in direct costs or through unavailability of the plant. Each project partner has to minimize these risks in his area of responsibility. Project management has the responsibility to manage risk, and coordinate with other project partners. However, since 'risk' is something only perceived or anticipated, it is hard for a risk management item to compete with pressing day to day issues, many of which may in turn be ironically former risk items, which were not dealt with in due time. The effectiveness of risk management is very much a question of timing. Risks should be reduced or eliminated at an early stage, but their management must be performed during the complete life cycle of the project."

Scheduling and timing are factors that should be given special attention as they might affect the costs of the implementation and therefore the profitability of the investment. IAEA recommends a four-tier scheduling: the first step being the general scheduling with defined milestones, the second stage still being general but filled with details, the third (that needs to be started before building the concrete base) and the fourth stage containing the integrated tasks and milestones of the subtasks (IAEA, 2012: 37-39). Scheduling should be overseen by designated project management professionals, continuously collecting and processing information and actively resolving problems. Obtaining permits should be handled separately and as early as possible, since in many cases that is what causes project time overruns. This requires the project management team to do adequate preparation for the processes and facilitate information sharing between the parties.

Figure 2: The 4 tier scheduling of project implementation



Source: IAEA [2012] p. 39.

Besides scheduling, IAEA also makes important recommendations regarding *controlling costs.* Appointing dedicated cost analysers and giving them the necessary authorisation is an important recommendation, as is actively collecting and processing information and active and fast response to problems. In addition, IAEA emphasises the importance of selecting partners and suppliers carefully: only companies with adequate history and quality should be contracted and, in case of problems, they should be encouraged even by suspending works.

Every cost overrun, no matter how insignificant, should be dealt with seriously (IAEA, 2012: 41-43).

Project owners need to make sure that local suppliers are well trained, informed and tested already before signing the contracts. A strict and unbiased treatment of suppliers is indispensable: even at the slightest deviation they need to be contacted, despite the fact that suppliers have in recent years provided increasingly professional and high quality products and services in this field. The IAEA divides the various groups of suppliers into four sectors. The project management should handle those four sectors with different requirements (IAEA, 2012: 63-64).

2.2. Major conclusions drawn by economic literature on corruption

2.2.1. The definition of *grand corruption*

In order to better understand the corruption

risks of the Paks nuclear power plant investment, it needs to be clarified what type of corruption might occur in the case of such an investment. When categorising the possible types of corruption, the most fundamental bases for distinction are the size of corruption and its relation to the state. On that basis, two main categories are distinguished: *grand corruption and petty corruption*. Grand corruption is defined as corruption at the highest level of the state, when corruption becomes one of the factors to characterise the operation of the state (Rose-Ackerman, 1978; della Porta, 1999; Lambsdorff, 2007). It destroys the integrity of state institutions and degrades good governance, the rule of law and confidence in economic stability (Holmberg-Rothstein, 2012, Rose-Ackerman, 2006). Petty corruption on the other hand is a one-off transaction between two parties, typically involving citizens on one part and civil servants on the other (Rose-Ackerman, 2006). It is manifested in small favours and in exchanging small amounts of money through some kind of personal contact. Grand corruption and petty corruption are not independent from each other: grand corruption creates opportunities for employees to engage in petty corruption, in other words, 'legalises' petty corruption. As a matter of fact, empirical studies show that one of the conditions of grand corruption is that managers who apply grand corruption encourage their staff members to engage in petty corruption within the organisation (Jávor-Jancsics, 2013). This is a way of 'paying' or compensating their staff members who are aware of the transactions falling into the category of *grand corruption* in the organisation. In addition to this, accepting petty corruption, with its effect to erode social norms, reinforces and facilitates an approach where actors of grand corruption have no moral doubts about the grand corrupt practices they are involved in.

The planned construction of the new nuclear power plant mainly carries the potential for grand corruption: as the state is a decisive factor not only as a regulator but also as a client, while the volume of the investment is huge.[41]

2.2.2. Corruption risks of large investments

While grand corruption may occur at the highest level of the government as well, large investments typically carry high risks of corruption. By awarding concessions and public procurement contracts, the state often distributes large sums to private businesses. This carries the potential for abuse and misuse for all the parties, right from the moment when the government's intention is formed, be it either a government actor or a private contractor. In the following section, the corruption risks of large investments are examined from their point of view.

For actors of the government or public administration, such large investments are particularly attractive: due to the volume of the investment, government actors can make huge corruption profit. The less the market is competition based, the more it applies: with a public procurement on an oligopol or monopol market it is easier to carry out corrupt transactions than on a completion based market. Because of that, corrupt managers prefer capital intense public tenders to other investment projects (Rose-Ackerman 1999).[42] This is clearly visible at a macro level as well: there is a strong relation between the level of corruption and the high proportion of public tenders to the GDP. In countries where the latter is high and the sums spent on the operation and maintenance of projects are lower, government actors are more likely to spend state resources on projects that, from an economic point of view, are little or not at

[41] It shows well in the fact that with a start date of 2015 and an end date of 2023, if one divides the total planned cost of the investment proportionately into all the years, the Paks II project alone would account for 7-10% of the national economy investments.

[42] This is one of the reasons why politicians of the government or of local authorities are so keen to promote construction investments: renewing the pavement of a village or town, building stadiums etc.

all justifiable (Tanzi-Davoodi 1997). What is more, it often happens that they support 'white elephant' projects, which make no contribution to creating economic value. In addition, several examples from the past show that very often the construction projects of large investments were in fact overpriced and not adequately justified. (Rose-Ackerman 1999). Another important factor for a government actor is the ability to decide on protracted projects because they guarantee a quick income from the corrupt transactions, while the costs of the investment can be widely spread out. (Rose-Ackerman 1999). This way, a corrupt government actor can promote investments that are even more unfavourable for citizens.

In this context, it is not surprising that in a corrupt economic and social environment where the government does not create real competition among the parties (and is therefore unpredictable and not credible), private investors also prefer large investments based on such spot-like contracts. Because of the corrupt nature of the state therefore, economic actors and investors have a tendency to think in the short term, which again leads to less efficient business decisions. In the case of such large, protracted investments, companies will be interested in securing long term contracts, which again carry the potential for corruption and automated rents of corruption. In democracies, this also creates corrupt, large coalition agreements between competing political parties (Rose-Ackerman, 1999).[43]

Corruption related to large investments is not restricted to non-democratic or autocratic systems and by no means is it only a problem of the developing world. *Grand corruption* was involved during the construction of the Frankfurt airport or the construction of the Milan metro, but the same could be said about certain military expenditures of the United States as well (Rose-Ackerman 1999). The level of corruption occurring in large investment projects is by no means marginal. An indirect indicator of this is the fact that in cases when the implementation of an investment was accompanied by successful anti-corruption policies, one third or in certain cases even half of the original investment cost, calculated to include the costs of corruption, could be saved (Rose-Ackerman 1999).

2.2.3. Markets: products on competing and non-competing markets

From an economic point of view, it is important to note that the nature of a product may have a significant effect on the corruption risks. The likelihood of corruption could be affected by the product (i) as well as the quality of private markets (ii).

Homogeneous products that are easily definable and contain only one component have a low corruption risk. It is mainly due to the fact that in the case of simple products, it is easy to spot when the government pays more for a product than its market price. Besides, product sellers are not interested in bribing a government actor as they can easily sell their products on the market too. (Menezees 2000).

By contrast, in the case of heterogeneous products, which contain more than one component and can only be defined with several quality parameters, corruption risks are significantly higher. When it comes to heterogeneous products, it is much more difficult to choose between the different products and decide which one suits the client's (in our case the government's) needs the most. And that creates ample room for corruption for both parties (the client representing the government and the private business as the seller). In these cases, corrupt transactions, that is, public procurement for a price way above the market price is more

[43] One manifestation of this phenomenon in Hungary was the case when the treasurers of parties on opposite sides carried out corrupt transactions in co-operation and counted the bribe together (Szántó-Tóth, 2008: 48).

difficult to detect than in the case of homogeneous products.

Besides the quality of the product, another important factor in defining the presence and scope of corruption is how fierce the competition is on a given product market.

Corruption risks are also low in the case of market competition of products that are easily differentiated because the differences between the products are easy to see for all actors of the market and therefore corruption is likely to be spotted. In such cases open tenders are a good solution to reduce corruption. If, on the other hand, there is no market competition between the potential actors, corruption is likely to appear. The actor offering the highest price might easily succeed, while the lowest price will probably be offered by the party with the most efficient production (Menezees 2000). Under such circumstances, it is mainly increasing the penalty for corruption that might deter parties from making offers involving corruption (Menezees 2000).

If, however, there is no competition-based market for a product, the risk of corruption might be higher (Mauro 1995). Large state investment such as infrastructural development projects or, like in this case, nuclear power plant constructions, are often characterised by these market conditions. The products to be purchased are, in these cases, pre-defined and special, unique products the specifications of which are determined by the client. Here the contractors are interested in bribing government actors as it is not possible for them at all to purchase such products under average market conditions. The risk of corruption here is very high. The way to reduce this risk is to create competition for the market actors: to publish a tender and award the contracts to the bidder that offers the lowest price, and after announcing the results, to make all the bids accessible for the public (Menezees 2000).

2.2.4. Number of participants: corruption of oligopol markets and bilateral monopolies

The possible corruption risks of a state investment also depends on the number of potential contractors who co-operate with the government. In the case of nuclear power station investments, the market is narrow, where state actors or market actors with links to the state can become potential contractors for the construction of the nuclear power plant.

The market of nuclear power plant construction has a very limited number of participants: In Europe, it basically consists of the French Areva and the Russian state owned technology owner and construction partner (Rosatom). Apart from them, it is mainly US partners that might potentially want to get involved in the construction. The market is therefore a supply driven one with few participants, and although the products are easily differentiated in many aspects (the technology itself or even the presence of inter-state loans), it can be regarded as an oligopol market.

Besides having the characteristics of a supply driven market, the market is also very small on the demand side. Nuclear power plant investments are rare and are typically ordered by states as the volume and the risks are so great that state participation or state guarantee are indispensible (for example, apart from the specific owners and clients, this might be either the guarantee of the state from a regulatory side or for national safety reasons). Another reason is that due to the high costs, very few countries can afford such investments, while nuclear power plant investments are also controversial because of the recent Fukushima disaster.

With such low number of participants, the risk of corruption is high because there are opportunities for several bilateral deals and multi-round offers which might involve a corrupt deal (Rose-Ackerman 1999). If the

procurement of the investment takes place with tenders, in the form of an open competition, corruption risks can be reduced, although the low number of participants will inevitably trigger high corruption risks for the tender.

In the case of the Paks nuclear power station, already when the investment was announced, it was clear that among the few potential participants it will be Rosatom State Atomic Energy Corporation that will carry out the construction. The process and criteria of the selection were not open, which creates opportunities for abuse, bribery and corruption for both parties. From the state's side, because certain criteria can only be met with governmental consent (in this case for example obtaining technical and safety permits) and from the constructor's side, because there is clearly a monopoly of the necessary technology and information, which derives from the oligopol market conditions: without active, interested and competing market actors there is no real market control.

As in this case it is not clear what specific conditions the two parties' agreement contains, again, only broad conclusions can be drawn regarding the nature of corruption among the suppliers. As the Hungarian market for large infrastructural constructors is very small with a low number of participants (oligopol market), corruption levels will be high at the suppliers' level as well: setting a compulsory rate of Hungarian constructors in the agreement will therefore not reduce the risk of corruption.

In the case of the Paks Nuclear Power Plant, already when the investment was announced, it was clear that among the few potential participants it will be Rosatom State Atomic Energy Corporation that will carry out the construction.

In addition to oligopol markets, another source of corruption is when a market actor (Rosatom in this case) is so strong that it can easily demonstrate its market strength against the government. Rose-Ackerman discusses the occurrence of corruption related to large state projects in this theoretical context (Rose-Ackerman, 1999, Rose-Ackerman, 2006).

In this model, the party opposing the government is strong enough to force the government to engage in corruption; and the corrupt deals are closely linked to the parties' rent-seeking activities (Tullock, 1996; Klitgaard, 1988; Johnson, 2005; Lambsdorff, 2007; Rose-Ackerman, 2006). This way, the revenue from bribery is shared between the government and the party on the seller side, their proportion depending on how effectively they can push their interests. What is more, their agreement determines not only the distribution of the bribes but also the amount of the sum to be distributed, as it is the government that decides on the amount to be spent on the investment. This model assumes that the representatives of the state, by default, act in their own interest and their interest is to carry out corrupt transactions.

In the case of Paks II for example, this might provide an answer to why the cost of implementation was set so high at the beginning of the project, which provides ample room for manoeuvre for the constructor company Rosatom.

The state party can receive rents in a way that the selling party (Rosatom or any business belonging to their interest) awards contracts to the business selected by the hidden client (Szántó et al. 2012a) for providing certain services at a price significantly higher than the market price.

One of the reasons why co-operation and rent sharing is typical between the government and the constructor side is that there are certain rents that can only be gained with the consent of the government (in the case of Paks II for example, such rents might be related to the technical and safety permits). And during the construction, both parties try to improve their

position in the contest for rents, which leads to further decline in efficiency and to cost overruns. According to the model of bilateral monopolies, in such cases, although the degree of bribery is low (as the corrupt deal is in the interest of both parties), the amounts of bribe paid might in fact be very high (Rose-Ackerman 1999). That is partly why open competition tenders and contracts based on open, accessible and traceable conditions are crucial in investments like the construction of the new Paks blocks.

The correlations above are summarised in Figure 3. On a competition based market, companies sell quantity *q* at price *p*, while with eliminating competition, a rent-seeking actor offers (and sells) product *mq* at a price *mp* which is significantly higher than the market price *p*. After the rent-seeking market actor has eliminated the other market actors, they will obtain a rent equivalent of the area bounded by points A,C,D,E.

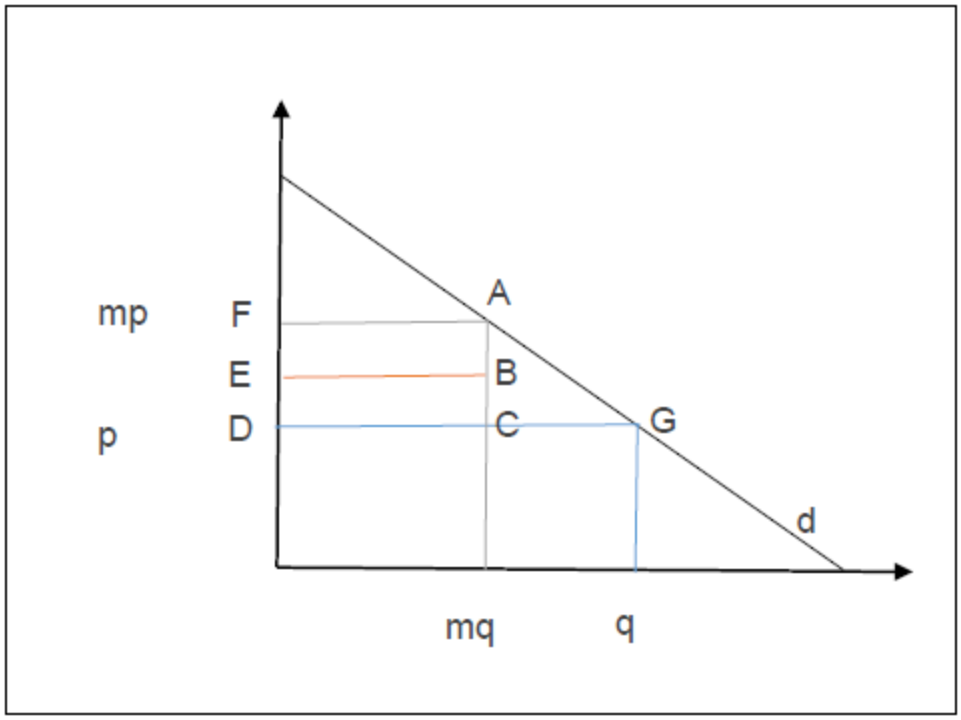
That would be the reward for their rent-seeking activities. However, what also needs to be taken into account is that the rent-seeking activity has costs as well. First of all, rent seekers need to build and operate the organisations, pay the lobbyists and pay for the services through which they can create opportunities for obtaining rents on the market; in other words, they need to maintain a *rent-seeking industry*.[44] Secondly, if rent seeking takes place through corruption, the rent-seeking seller needs to pay a bribe to the corrupt state representative. Only after deducting these costs can they earn the amount of their rent, which, in this case is shown by the area bounded by points A,B,E,F, while the costs of the rent-seeking activity is the area bounded by points B,C,D,E. In what proportion the parties (the corrupt state representative and the rent-seeking seller) share the rents and what proportion of that they need to 'feed back' to the contractors, depends on the market strength of the two parties.[45] Naturally, the social costs of rent seeking and the corruption it involves is a lot higher. First, the area bounded by points A,C,G as a deadweight effect of rent seeking needs to be factored in, as output is reduced (from *q* to *mq*) as a result of bonus seeking. Second, the cost of direct corruption is not the same as the amount of bribe paid during the corrupt transactions. It goes far beyond that. With rent seeking, the whole rent-seeking industry needs to be maintained, which is unnecessary on a competition based market.

It needs to be added though that the actual cost of corruption could be even higher than that if the process involves more than two parties and more than one transaction, and if we consider the fact that rent seeking on a market has an effect on the structure of other markets, too. It does not only mean that successful rent seeking will make it attractive for other businesses to do the same on their markets, but also that the suppliers of the rent-seeking actor might also want a share of the rent. With a corrupt market actor, suppliers can make deals with more favourable conditions and higher prices than in a competitive market environment.

[44]On this concept, see Tullock, 1989 and 2002.

[45]Experience in Hungary shows that 13-16% of the amount of a corrupt public procurement needs to be fed back to the government party in the form of a bribe or rent (MKIK GVI, 2011a; MKIK GVI, 2011b).

Figure 3: The effects of rent seeking on prices and on market output



2.2.5. Corruption risks of relation-specific investments

One of the characteristics of the planned investment is that it is highly dependent on the financing opportunities offered by the Russian party, because without those, the Hungarian state is unable to finance the project. This way, however, the method of implementation is very much determined by the model offered by the Russian party. In economic literature, this phenomenon is referred to as a relation-specific investment, which is an investment that only delivers the profit expected by the investor through one single relation (Chikán 2008).

In our case, one feature of a relation-specific investment is that during the nuclear power station investment, the constructor does not only provide guarantees for the physical construction but for other activities related to the construction as well: for example the necessary technology, preparation works and follow-up works, operation, fuel supply, training of professionals, waste storage, safety measures etc. In this respect, the construction of a nuclear power plant is a truly complex product, and it becomes increasingly complex due to the relation-specific nature of the Hungarian-Russian agreement.

The complexity of the product in this case may cause serious information asymmetry (Easley-Maureen, 1988). Clearly, the Hungarian state is not able to build a nuclear power plant alone; in addition, it does not have enough information on the complex product that is the subject of the agreement and therefore is not able to control the construction and its circumstances. Such degree of information asymmetry is not necessarily inevitable with large investments but it is usually the case when the investor is not in possession of the necessary technology. This is therefore the most important manifestation of the relation-specific nature of the Hungarian-Russian agreement.

Information asymmetry carries a very high risk of corruption (Easley-Maureen, 1988) as it aggravates the basic principal-agent problem.

The constructor can be confident that the principal is not aware of the features and financing needs of the various parts of the product; besides, high priority is given to certain important horizontal aspects such as safety, which are difficult to price. This way, in many cases, the constructor can set a higher price, mask its corrupt activities and spreads them out to little amounts, and is able to unilaterally change the conditions of the long term agreement. Taking all these factors into account, the construction of a nuclear power plant has high corruption risks, it has greater costs for the citizens who pay for it and completion is likely to be delayed, which again potentially increases costs.

2.2.6. Impacts described in the economic theory: summary

The following section provides a summary on the factors that encourage and create corruption, based on the theories of economics. All these factors assume that the participants act rationally and with the aim of increasing their wealth under the given circumstances (regulatory and institutional environment, market structure). As a result, they initiate corrupt transactions and maintain institutions and organisations that serve corruption, and try to shape regulations so that they enable corruption. The basic corrupt transactions taking place are well described by the principal-agent model (Lambsdorff, 2007; Szántó et al., 2012), while the factors discussed in this section act as catalysts in the process of corruption.

The possible impacts based on theoretical works are summarised in Table 3. The first column lists the given factors that affect corruption, while the second column contains the unwanted consequences expected in the case of a nuclear power plant construction (e.g. the Paks II project), while the third column shows the mechanisms that create those negative, unwanted consequences.

Table 3: Summary of conclusions in a table

Factors increasing the risk of corruption	Possible consequences in the case of a nuclear power plant construction	The main reason why the consequences appear
Grand corruption	May lead to the decay of good governance, the rule of law and the confidence in economic stability.	Corruption of an investment of such a large scale provokes palpable distrust both in the public and in the actors of the business sector.
Large investment	High corruption risk, delayed delivery	A large investment is beneficial both for the government actor and for the constructor but only in the short term
Heterogeneous product and non-competing market	High corruption risk	On non-competing markets the constructor takes advantage of the fact that the product is not clearly definable and there are no competitors
Oligopol markets and bilateral monopoly	High corruption risk, high constructor profit	Small number of actors on the selling and on the purchasing side; the constructor and the government share the benefits of corruption in proportion to their power.
Relation-specific investments	High corruption risk, delayed delivery	The principal has a limited amount of information on the product and therefore it is easy to set a higher price

3. PRACTICAL EXPERIENCE FROM OTHER INVESTMENTS

Theoretical models of corruption provide a good description of the risks occurring at large investments in many aspects and help to better understand the corruption risks of Paks II as well. At the same time, we find it important to present the practical experience coming from similar nuclear power plant investments, too. In the following sections, first, the experience from recent international nuclear power plant constructions is outlined, followed by a brief description of the experience from Hungarian investments similar to the Paks nuclear power plant project.

3.1. Experience from recent international nuclear power plant constructions

One of the typical features of recent nuclear power plant investments is that the target dates for delivery and commissioning were not met, which, in all cases, added extra costs to the original budget. In the section below, conclusions drawn from recent North American and European investments are summarised.

3.1.1. Delays and cost overruns

The nuclear power plant investments in progress in Europe are mainly being carried out with EPR (European Pressurized Reactor

or Evolutionary Power Reactor) technology, which means third generation pressurised water reactors developed by the French Areva Group. Currently, the third block of Olkiluoto in Finland and the third block of Flamanville in France are being constructed with this technology.

A consortium of Siemens-Areva, the main constructor of the third block of Olkiluoto obtained the first permit needed for the construction in 2000, while the Finnish government gave its final approval to the construction in 2005. This has made Finland the first European country to approve the construction of a new nuclear power plant within 15 years; and Olkiluoto 3 will be the first reactor built with EPR technology (Schneider, Frogatt, Thomas 2011).

Constructions started in 2005 with a target deadline of May 2009, which was changed first to the summer of 2011 and later to the summer of 2012. On 1st September 2014 the Siemens-Areva consortium announced that completion was expected for the second half of 2018 the earliest, which means that based on the current plans, the plant project will be completed with a delay of about ten years. The delay is accompanied by increased costs as well: while the investment was initially planned with a budget of €3 billion and later €3.8 billion, first, a cost overrun of 50% was estimated, and [46]now the news quote a cost of €8.5 billion, which is almost triple of the original cost estimations.[47] The construction is surrounded by a lively legal dispute between the Finnish TVO and the Siemens-Areva consortium, which again triggers additional costs.

The construction of the third block of the Flamanville plant in France, ordered by the French EDF, is facing similar problems. Constructions started in 2007 with a target completion date of 2012. In March 2012 EDF announced that the completion of the block was going to be delayed until 2016 and the original target budget of €3.3 billion was expected to climb up to €8.5 billion.[48]Among the reasons of the delays and cost overruns there were problems around the permit processes: the French Nuclear Safety Authority (*ASN, Autorite de Surete Nucleaire*) found deviations from the safety standards in the examined material samples already in 2008.[49]

Exceeding the original target budget is not only a general occurrence of recent investments, nor is it typical only with European nuclear power plants. It is a general phenomenon that characterises the construction of nuclear power plants (Severance, 2009). In the case of the nearly 75 nuclear power plants that have been built since the 60s, the overnight capital costs per kilowatt hour on average amounted to 2.88 times more than what was originally planned, with a pace of cost increase between 2 and 3.8 times of the original costs.

Rationally speaking, the Paks II investment should be no exception: the overnight capital cost may amount to HUF 6,000-8,000 billion at current prices, that is, 1.5-2 times more than the initial cost estimation of HUF 4000 billion. Because there is no reason to assume that this investment will be different in the organisation and implementation from the 76 examined nuclear power plant projects in the past.

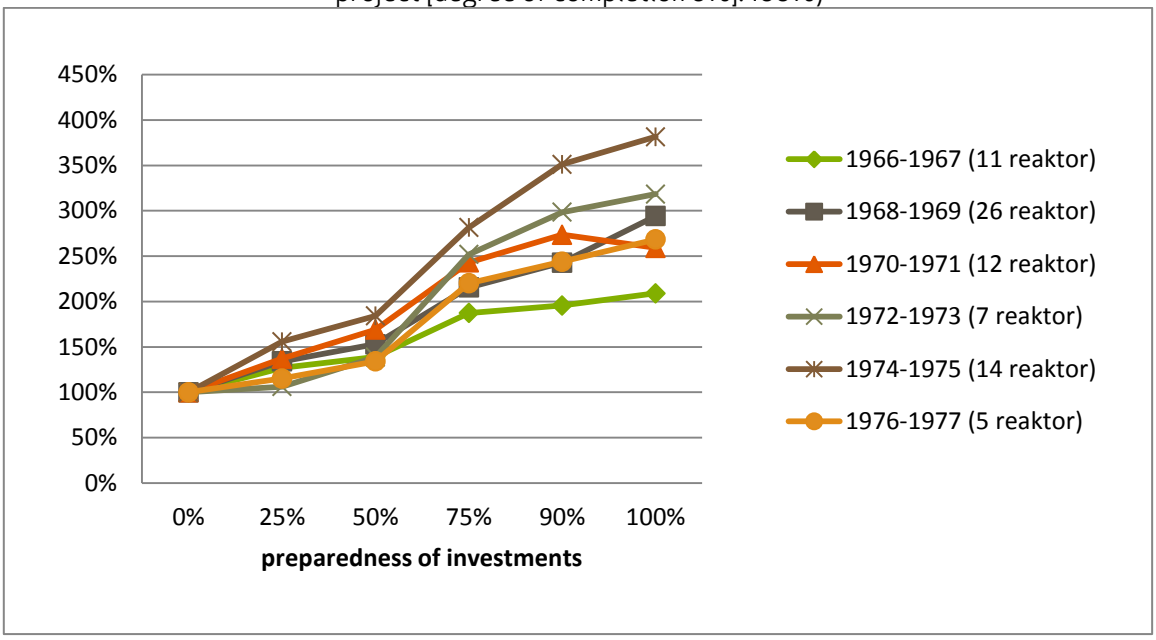
Such an assumption would only be well-grounded if the following three conditions were met: if we possessed the information that accounted for the cost overruns in the previous projects (i) and in the light of that, those factors were taken into account during the organisation and implementation of the project (ii), and effective tools were found and

[46] Felsmann [2009], Reuters [2014]
[47] See Wikipedia: http://en.wikipedia.org/wiki/Economics_of_nuclear_power_plants

[48] Le Monde [2012]
[49] Felsmann [2009]

applied to eliminate the impact of the factors causing the cost overruns (iii).

Figure 4: Overnight capital cost per kilowatt hour as a percentage of the target budget, by the degree of completion, with nuclear power plant investments launched between 1966-1977 (start date of project [degree of completion 0%]: 100%)



Source: Personal calculation based on data from the Energy Information Administration, An Analysis of Nuclear Power Plant Construction Costs, DOE/EIA-0485 (Washington, DC March 1986: p.18) Original data quoted by Severance [2009: 11]; in Hungarian: Felsmann [2009].

With the Paks II investment, it is especially recommended to examine the experience from the construction of power plants using the Russian WER technology, as the planned power plant in Hungary will also operate with this technology.

The WER 1200 type reactors, similarly to EPR, are also new generation technologies that have not been tried yet. Currently, this technology is being applied in the construction of the two new blocks of the Leningrad Nuclear Power Plant in Saint Petersburg (LAES) and in the construction of the two blocks of the Novovoronezh Nuclear Power Plant. In addition, constructions of a power plant operating with WER 1200 technology started in Belarus in November 2013. [50]

The first of the two Leningrad II blocks in Saint Petersburg was originally planned to be completed in 2013 and the second one in 2016.[51]By now, the target completion date of the first block has been delayed to 2016, due to various deficiencies identified during the construction.[52]The Russian state-owned company Atomenergoprom signed contracts for the construction with a value of $5.8 billion.[53] The completion of the Novovoronezh Nuclear Power Plant blocks is also being delayed: in an announcement in 2013, the representative of Rosatom estimated that instead of the originally targeted completion date of 2016 would be delayed to 2023. Just

[50] IAEA [2013]
[51] WNN [2010]
[52] Bellona [2011a]
[53] WNN [2010]

like in other cases, this investment is burdened by financing and permit problems as well; and there have also been changes in the type of the reactor. The total cost of the investment is estimated to be $8.21 billion.[54]

From the examples it is clear that the projects similar to the Paks II investment are all burdened with cost overruns and delays; implementing and obtaining permits for the new technologies impose difficulties almost everywhere. Western European examples show that the original cost estimates were already very high, and the final costs could reach double or triple the amount originally planned. At the same time, there are no clear data available on the cost overruns of Russian investments. International experience and in particular the experience with the type of reactor that is planned to be used in Hungary indicates that similar problems can be expected with the Paks II investment.

3.1.2. Corruption risks

Although revealing grand corruption that potentially accompanies large investments is very difficult, there have been cases when evidence of corrupt transactions were found related to the construction and operation of nuclear power plants. Of course, one must not draw general conclusions from these cases; however, they should definitely be taken into consideration during the Paks II investment.

Most of the corruption cases related to nuclear power plant investments occur in East Asia. Yet, corruption cannot be regarded as a region specific phenomenon as the majority of nuclear power plant constructions in the last decades have taken place in that region.

The most important corruption related experience might be one related to the Fukushima accident: the relationship between the company operating the nuclear power plant (TEPCO) and the regulatory authority (NISA), characterised by corruption, fraud and nepotism, contributed to the deficiencies of the plant to a great extent and therefore played an important role in the world's second greatest nuclear disaster (Tanter 2013). The movement of people between the regulatory authority and other actors of the nuclear energy industry was a general occurrence, which Jeff Kingston in an article describing this phenomenon calls a *nuclear village* (Kingston 2012). In many cases, the decision makers who were in the position of shaping regulations could later expect high positions at some of the energy companies as well, and this way, with the view of not ruining their future career prospects, many times they were more forgiving and co-operative as decision makers and regulators than they should have been. It was the result of this process that in Fukushima, even in spite of the subsequent plans, a bigger dam was never built, although it could have mitigated the severity of the disaster (Kingston 2012).

In Taiwan in 2012, investigations were launched against four senior executives of the energy company Taipower with the suspicion of involvement in public procurement corruption: charges included the procurement of equipment and cables with no radiation protection for a price higher than the market price.[55]The damage caused by the case is estimated to be more than $190 million. Other corrupt transactions were also revealed.[56]

Corruption made an appearance in the South Korean nuclear energy industry as well: charges of corruption were pressed against the former vice president of Korea Electric Power Corp (KEPCO) and an additional 99 people. Several chief executives were arrested during the proceedings.[57]Charges include falsifying safety and permit documents in the course of purchasing materials with a value of

[54] Bellona 2013

[55] Kao [2012]
[56] Napsnet Policy Forum [2012]
[57] Reuters [2013]

more than $5 million.[58]Out of the 23 reactors in South Korea, 6 are still inactive due to the fact that the equipment purchased is not suitable.[59]

When discussing the Paks II investment, it should be highlighted that in Russia too, major corruption scandals have broken out recently, related to nuclear energy investments. Former nuclear energy minister Yevgeny Adamov was arrested in 2005 in Switzerland, with charges of being responsible for fraud worth of $9 million related to American aids provided to improve the safety of Russian nuclear power plants. In the end, he was extradited to Russia by Switzerland, prosecuted and sentenced to 5 years of community service, which was later waived due to his old age.

Rosatom, the main constructor of the Paks II investment is not free of corruption scandals either. A study by Greenpeace provides a factual summary on the company's position in the Russian economy, its relations to public administration as well as on the cases of corruption linked to the them. (Greenpeace, 2014). The history of Rosatom indicates that it is defenceless against corruption risks. In this study, among the factors that contribute to the high corruption risks of Rosatom, only two are discussed. First of all, the top management of the company has been involved in corrupt deals. This is apparent from the fact that in the summer of 2011, Yevgeny Yevstratov, the former deputy CEO of Rosatom was arrested, charged with embezzlement of $1.8 million in the course of public procurement processes related to nuclear fuel[60]. His trial has never been held; in 2012 he was released on bail worth $160 000.[61]

After this incident, Russian Anti-Corruption Committee Chairman Kirill Kabanov sent an open letter to Prime Minister Putin and warned him about the harmful and dangerous level of corruption in the Russian nuclear energy industry.[62] Jelena Panfilova, Head of the Russian Transparency International (TI) said in 2010: Rosatom State Nuclear Energy Corporation basically operates beyond the control of the controlling authorities; neither the Russian Court of Auditors or the Competition Authority can substantially monitor their operation.[63] As a result of the TI report, some improvements were made in the following years, one of the signs of which is the co-operation between TI and Rosatom, announced in 2010;[64] but there are still no news on what anti-corruption and integrity measures have been taken at the organisation after the corrupt deals had been revealed.

3.2. Experience from large investments in Hungary

In Hungary, since the completion of the Paks nuclear power plant in the 1980s, there have been no investments that come close to the Paks II project in cost and volume. Therefore, when building on previous experience, the basis for comparison for the Paks investment should be the infrastructural investments with similarly high costs. And such investments have been plenty. Most important of these are the constructions of motorways and expressways, the construction of metro line 4 in Budapest, the renovation of railways and the construction and renovation of bridges. The following sections outline the experience coming from those projects.

3.2.1. Delays and cost overruns

In the 2010s, several motorway and expressway projects have been completed in Hungary. Among those, we are focusing on the experience from the latest motorway section projects. In 2008 and in 2011 the State Audit Office of Hungary evaluated these infrastructural investments in a report.[65] Both

[58] Davis [2014]
[59] Reuters [2013]
[60] Bellona [2011b]
[61] The Moscow Times [2012]
[62] Bellona [2011c]
[63] Nuclear Power Daily [2010]
[64] Rosatom [2010]
[65]State Audit Office [2009], State Audit Office [2011],

reports state that a substantial part of the investment was not completed to the deadline and in many cases, due to inadequately assessed costs, public procurement with social damages and variations to the contract: extra works and subsequent contract modifications, costs increased significantly, by up to 10-15% of the contract value. All this is apparent from the report on the investments completed between 2009-2010, from the paragraph summarising the cost and budget overruns:

"The contracts for the construction of the motorways M31 and M43 investments were signed on 30th May 2008 (M43 sections) and on 22nd September 2008 (M31). Neither the deadline for project completion (M31: 27 months, M43 sections I, II, II: 18, 27, 27 months) nor the amounts set in the contracts (M31 net HUF 21.9 billion; M43 sections net HUF 12.8 billion, net HUF 26.8 billion, net HUF 17.6 billion) were met. As a result, the contracts were amended on multiple occasions to include the variations on deadlines and amounts. The projects were completed with a delay of several months (200-300 days); and cost changes surpassed (M31) or could surpass (M43) 10% of the original contractual price. In 2010, M31 and section I of M43 were completed, while the M43 motorway sections were temporarily opened for traffic in 2011."[66]

Besides motorway constructions, one of the largest national investment was the construction of metro line 4 in Budapest. The costs of the construction exceeded the original target to an exceptional degree (in the end, the cost of the first, completed section came to HUF 452.5 billion compared to the planned HUF 195 billion);[67] and the project was completed with a delay of 6 years compared to the target completion date: instead of 2008 the metro was opened in March 2014. The project was accompanied by bad contracts, additional claims on the contractor's side, inadequate project management and scandals around permit procedures.[68]

Similar in the scale of problems but smaller in volume was the renovation project of Margaret Bridge in Budapest, which again was completed with a delay of several months[69] and with costs double the original ones. Compared to the initial estimates of HUF 15 billion, the bridge cost the capital city HUF 30 billion. Among the reasons of cost overruns were inadequate publishing of public procurement tenders, the lack of competition among constructors and the huge number of extra works carried out by the constructor.[70]

[66] State Audit Office of Hungary [2011] p. 44.
[67] Szalai [2012]
[68] HVG.hu [2014b]
[69] HVG.hu [2011]
[70] Rényi [2009]

Table 5: Promises to completing the first section of metro line 4

Date of announcement	**Promised date of completion**	**Announcement made by**
28th February 1998	July 2003	Gábor Demszky (Mayor of Budapest)
14th January 2004	end of 2008	Gábor Demszky
8th June 2006	end of 2009	Gábor Demszky
3rd April 2007	end of 2010	Gábor Demszky
25th October 2007	30th June 2011	Gábor Demszky
5th November 2008	end of 2011	Gusztáv Klados (Project Director of DBR Metro Project Directorate)
9th April 2009	end of 2012	Gusztáv Klados
15th October 2009	end of 2012	Gusztáv Klados
	mid 2013	
13th October 2010	(2014-2015)	István Tarlós (Mayor of Budapest)
25th May 2011	first quarter of 2015	Gyula Hutiray (Deputy Mayor Responsible for Developments)
26th August 2011	beginning of 2014	István Tarlós
		DBR Metro Project Directorate
16th April 2012	spring of 2014	István Tarlós
2nd November 2012	spring of 2014	Balázs Szeneczey (Deputy Mayor)
21st December 2012	31st March 2014	István Tarlós
26th January 2013	March 2014	István Tarlós
29th July 2013	31st March 2014	István Tarlós
25th March 2014	9:00 28th March 2014	István Tarlós

Source: Wikipedia [2014]

3.2.2. Corruption risks

Due to the lack of data available, it is difficult to provide a precise estimate on the scope of financial abuse committed during the Paks investment. In Hungary, deals related to public procurements constitute a particularly sensitive issue. In the period from 2006 to 2009, the rate of the media coverage of such cases varied between 14% and 45.5%, while corruption related to permits may have occurred in at least 14% of the cases (Szántó-Tóth-Varga, 2012:52-53.). As for the scope of corruption related to public procurement, no reliable data are available.

In Hungary, experts in the sector believe international assessments to be the most authoritative sources: [71] a 2012 report (ACFE 2012) by the Association of Certified Fraud Examiners (ACFE), giving an average estimation, highlights that the amount involved in corruption is 5% of the investment cost.

According to managers of Hungarian companies, in the case of public procurements in Hungary, the rate of corruption commission is about 13-16% of the value of a public procurement – an amount the winner is obliged to pay back to the publisher of the public

[71] See: Figyelő, 2012.

procurement (MKIK GVI, 2011a, MKIK GVI, 2011b). This commission is only a part of the rent of corruption:

$r = b + xp$

and

$r = p_{corr} - p_{comp}$ where $p_{corr} > p_{comp}$

where:
r: the total amount of the rent (or extra charges) generated in the course of corruption, $r > 0$

b: bribe (corruption commission)
xp: the net rent that remains with the company involved in corruption
p_{corr} : the price of product / service in the corrupt transaction
p_{comp} : the market prices of the product / service

Obviously – and as discussed above – the social damage resulting from a specific corrupt transaction is considerably higher than the amount of the rent (r).

Corruption, *a priori*, is a possible scenario in the case of each public procurement; however, the probability of its occurrence varies. Possibly, there are procedures which exclude the probability of corruption (for instance, a well designed and controlled e-public procurement), while there are procedures where it is almost certain that the public procurement will involve corruption ("tailor-made" tenders, a single tenderer and a contract price that is considerably higher than the market price). Therefore, it is possible to attribute a probability rate of the occurrence of corruption ($PP_{corr=1}$) to each public procurement (PP).

For this, it holds true that

$$0 \leq PP_{corr=1} \leq 1.$$

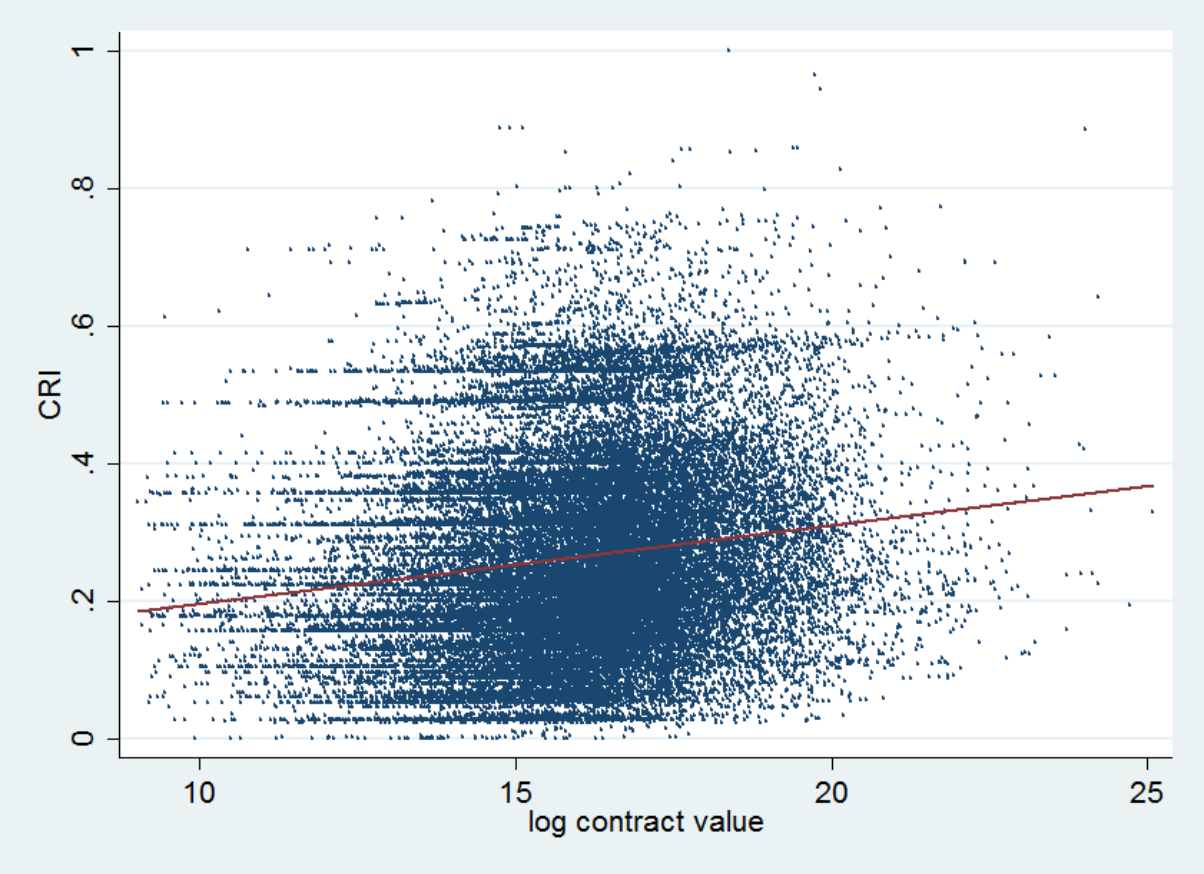
Literature specialised on corruption risks in the sector of public procurements (Fazekas et al. 2013a, Fazekas et al. 2013b) identifies several aspects of corruption in public procurements and offers several means to assess corruption risks.

A common feature of the recommended indicators is that the generated indicator number that measures the scope or occurrence of corruption is not based on the perception of the involved parties or of outsiders, but relies on objective information related to the parties' behaviour and attempts to gather such information. One of the indicators is the Corruption Risk Index (CRI) recommended by the researcher CRCB. CRI is a composite indicator generated from several simple features of public procurement procedures, which, as evidenced by validation tests, measures the corruption exposure of public procurements successfully (Fazekas et al. 2013b). The CRI value ranges from 0 to 1, where the higher value represents higher corruption risk. Corruption risks differ greatly in terms of the amount of public procurement, the sector, the institutions involved in the public procurement and the nature of the product market (competitive vs. non-competitive). For the purpose of this paper, a key correlation is the correlation with the amount involved in public procurement, because – as highlighted above – the scale of the Paks investment is extraordinarily large.

The investigation of the correlation between the amounts of and the corruption risks involved by public procurements evidences that in Hungary when a greater amount is associated with a public procurement then the corruption risk index values are significantly higher. This means that the probability of corruption may rise as the scale of the investment increases. A comparison of the amount of the public procurements implemented in Hungary from 2008 to 2012 and the corresponding CRI values give the same results (see Figure 5). If in the case of the Paks II investment – the estimated value of which is HUF 4,000 billion – we calculate with several thousands of subcontracts, *ceteris*

paribus it is possible that these contracts are concluded at extremely high risks of corruption.

Figure 5: Variation of corruption risks dependent on the contract amount of public procurements, 2005-2012 (the x axis is the natural logarithm of the contract amount, the y axis is the Corruption Risk Index)



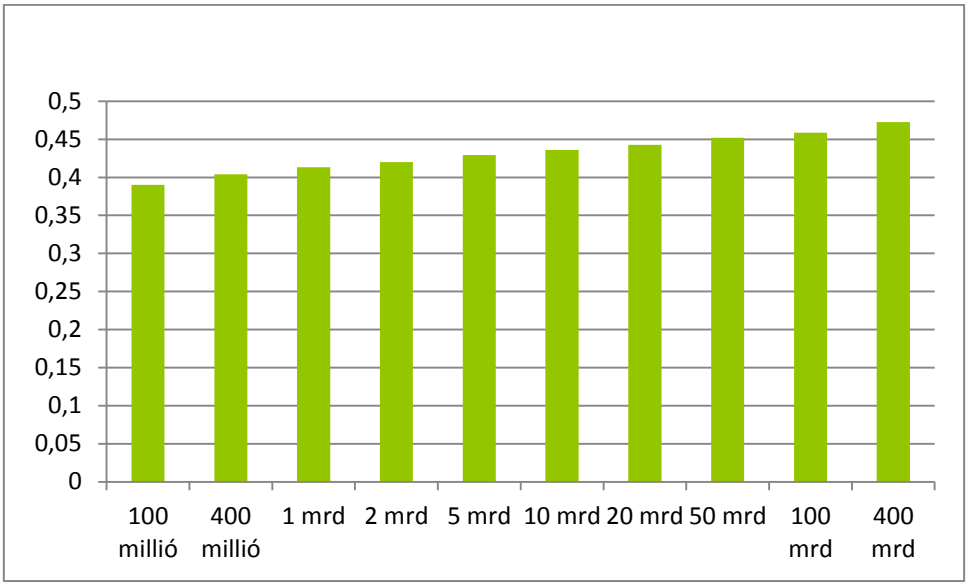
Source: Calculation by CRCB on the basis of MaKAB data (N = 48.853; period covered: 2008-2012)

When for the purpose of calculation not only the amount of the public procurement is taken into consideration, but information on the Tenderer, the Bidder and the subject of public procurement as well, a significant positive link continues to be detected between the amount of the public procurement and the corruption risks. *In Hungary, the greater the scale of a public procurement, the higher the associated corruption risks.*[72] This is indicated by the results of the regression estimate (OLS) published in Annex 3. If the tenderer is a firm in the energy sector (e.g. ROSATOM) and the

subject of the procurement is construction works, then for a contract value of HUF 100 billion the value of CRI is 0.39; with HUF 5 billion it is 0.43 while with a contract of HUF 100 billion, the CRI value is 0.46 (see Figure 6).

[72]This correlation is not to be generalized for other countries. Our calculations performed on data on England came to an opposite conclusion: In England, the lower the amount of a public procurement, the greater the corruption risk involved.

Figure 6: Estimated corruption risks (CRI) for construction subcontracts of various scales for the Paks II investment.

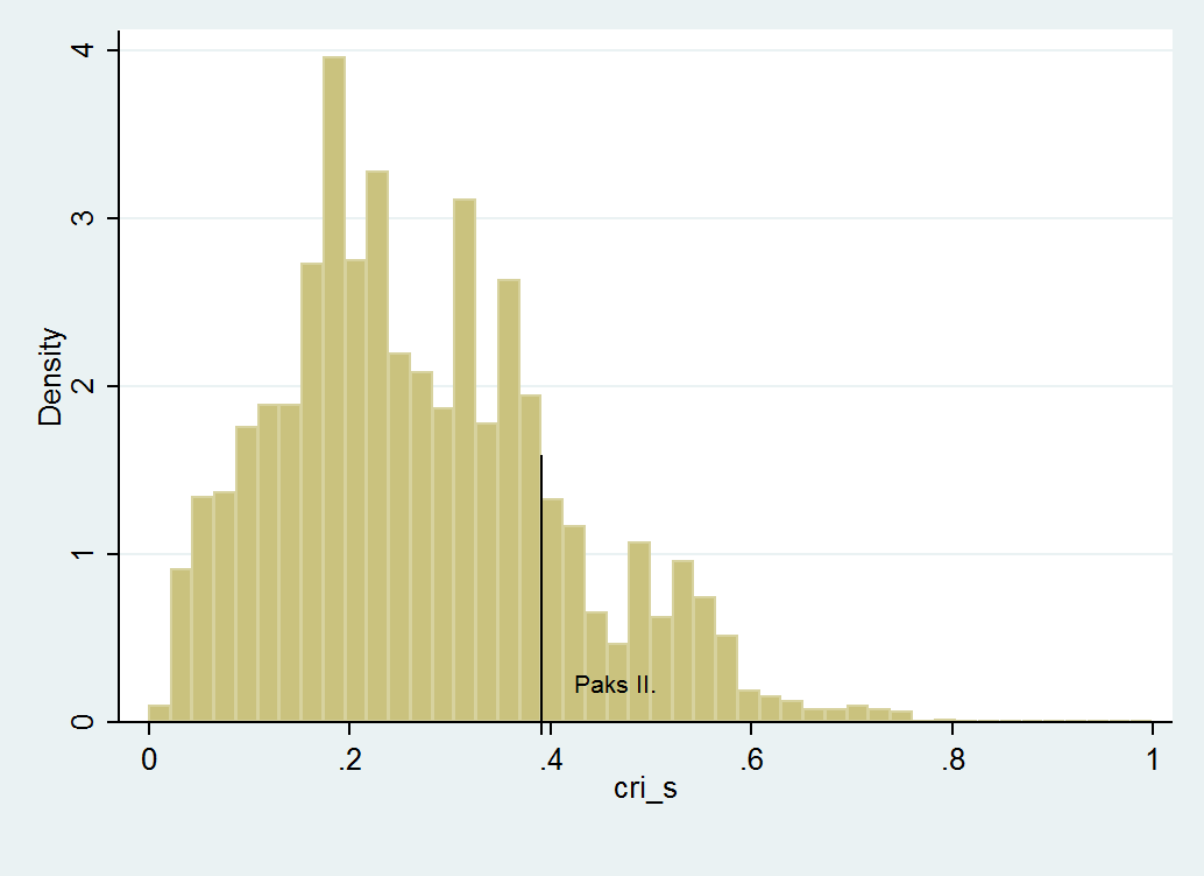


Source: Calculation by CRCB on the basis of MaKAB data (N = 40.332; period covered: 2009-2012)

Another conclusion of the estimation is that if a public procurement is implemented by an enterprise (categorised as "other organisation") then a significantly greater corruption risk is likely than it would be in the case of implementation by central-level organisations (e.g. ministries). Similarly, it is concluded that if the tenderer who publishes the given public procurement operates in the energy sector then the estimated risk is higher than it would be in other sectors. Beside the scale of the investment, these two factors also contribute to higher risks in the case of Paks II.

Accordingly, those subcontracts related to the Paks II investment whose amount exceeds HUF 100 million are likely to fall into the category of procurements that involve the highest corruption risks when analysed against the background of the historical data (pertaining to 2009-2012) of the distribution of the public procurements on the basis of corruption risks (see Figure 7).

Figure 7: The hypothetical position of subcontracts above HUF 100 million of the Paks investment against the background of the distribution of the public procurements on the basis of corruption risks



4. EXPECTED CORRUPTION RISKS OF THE PAKS II INVESTMENT

4.1. Corruption risks of the investment in the light of corruption theories

As discussed briefly in Section 2.2.6. above, the corruption risks of the Paks II investment are high. The investment is exposed to a great risk of *corruption*. The agreement is concluded between two states, while the agreement itself is not transparent and the available information about its background is inadequate (i). Furthermore, the investment – with its projected cost of €12 billion – is one of the biggest investments in Hungary's history (ii). Therefore, the high corruption risks and cost increases involved in large investments are relevant consequences for the Paks II investment as well.

The method and mode of the agreement also suggest a high level of corruption. It is expected that Rosatom (the Russian contractor), with the support of the Russian state, will be able to promote its own interests efficiently against the Hungarian state and regulatory authorities (iii); furthermore, in such a closed situation it will be easier for the Hungarian party to come to a deal on how to share the rents (iv). Such bilateral monopolies involve high corruption risks. In addition, a nuclear plant is a specific and heterogeneous product which is difficult to define and about the specification of which – due to the lack of technology – the Hungarian party as the Principal has no information (v) in this case. This offers an opportunity for further abuse on the part of the constructors, as constructors

have more room for manoeuvre and are in a better bargaining position.

4.2. Corruption risks arising from the nature and circumstances of the investment

One of the most valid concerns about corruption related to the Paks II investment might be rooted in the experience coming from large investment projects in Hungary in the past. One characteristic of Hungarian investments is the lack of preliminary project assessment and the fact that public tenders are not necessarily published and formulated in a way to serve the interest of the Hungarian national economy. State organisations as clients cannot always represent effectively the public interest; and the quality of project management is variable, poor in fact in certain cases.

All this is topped with the small size of the Hungarian constructor market, the small number of competent constructors, the limited competition that is so typical in such situations and the fact that cartels are tolerated on many markets. Although according to the agreement, the ratio of Hungarian suppliers involved in the investment could be as much as 40%, the infrastructural construction companies operating in Hungary set prices 20-30% higher than the amount originally set. Unfortunately there is no preliminary information on the potential supplier activities and therefore, about the role of Hungarian suppliers only general conclusions can be drawn.

The subject of the investment carries further corruption risks. Nuclear power plant investments are completed with huge delays everywhere, as the example of European investments show in chapter 3. Costs may go up to double of the initial estimates and contract amendments and variations provide opportunities for further abuses, due to the lack of information on the client's side. In addition, similarly to the current European investments, in the Paks II project too, the nuclear reactors are to be built with a new generation technology that has not been applied before. Because of that, costs will increase even further and problems are likely to occur around the permit process and during the construction. The significance of all that should not be underestimated because both the French and the Finnish examples clearly show the dangers of such a situation; besides, among the recommendations of the IAEA (see chapter 2.1), the importance of preparing for the application of new technologies is also a key point. Furthermore, due to the high safety standards of nuclear power plants, costs are expected to be high and regulatory monitoring is expected to be strict both from the Hungarian and form the EU institutions' part. And meeting the requirements of all the checks and audits might result in serious extra costs and delays.

The choice of the Russian contractor Rosatom also increases the chances of corruption because the company has been actively involved in a few corrupt deals over the last decade, as it is described in detail in chapter 3.1.3. With the present contract structure, the Paks II investment carries the risk of corruption at several points which the Russian party, taking advantage of its current position, could abuse.

4.3. Corruption risks arising from the contracts already signed

When studying the agreement signed between the Hungarian and the Russian parties from a corruption point of view, it can be concluded that the agreement is particularly unfavourable in many respects.

Already the agreement itself and the structure of the investment hold higher corruption risks: pursuant to the agreement, the Russian party

pledges to design, construct, commission and decommission the two new blocks, while the completed nuclear power plant will be the property of the Hungarian state. With this construction, it is not in the interest of the constructor to complete the project as soon as possible because the capital costs are borne by the other party. Thus, rising costs and the earliest possible recovery are in the client's interest.

By contrast, if the Hungarian party as Client guaranteed to purchase the produced electricity at a fixed price, and did not pay for the construction, the corruption risks could be avoided. The costs of an investment in a PPP model would be borne by the constructor; and in return, it would be given ownership over the power plant. This would make the constructor interested in a cost effective and time saving construction as well as in mitigating corruption occurring during the project. Such a PPP model was chosen when Russia and the government of Turkey signed an agreement in 2010 regarding the construction of the Akkuyu Nuclear Power Plant, [73] but the new blocks of the Hinkley Point Nuclear Power Plant will also be built with a similar construction.[74] In the case of nuclear power plants, the PPP model is a realistic construction, which holds lower corruption risks.

Besides its construction, another major deficiency of the agreement is that it does not provide for the possibilities and conditions of variations such as extra works and it does not set penalties for non-performance, defects and missed deadlines. As described earlier, all those missing factors are highly typical during nuclear power plant constructions and result in a situation where the constructor can take advantage of their negotiating position and extra information. These shortcomings of the agreement do not only bring along bad incentives but they will also trigger high corruption risks because the cost overruns, in a bad scenario, might amount to several hundreds of billions of forints.

4.4. A possible model of corrupt transactions

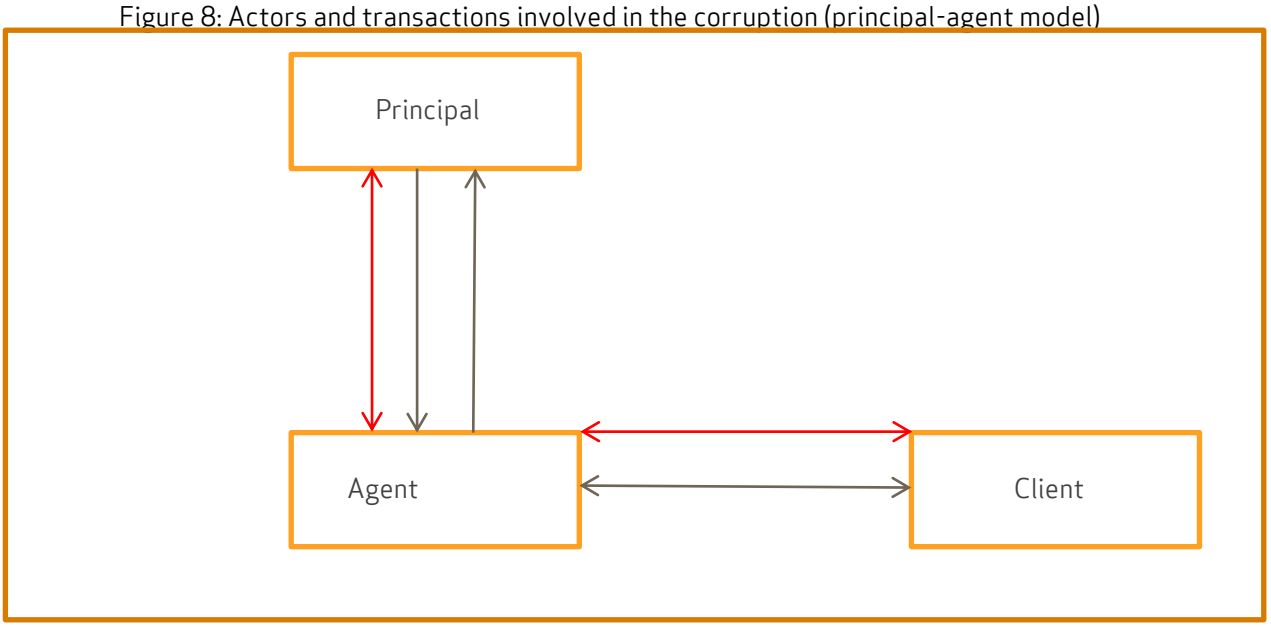
With grand corruption, it is always possible to identify the transactions and decisions that are involved in the corrupt transactions. In a theoretical model like this, the so called grand corruption may basically take place in a 'legal' way, which means that the corrupt transactions are disguised as legal transactions, without cash movements or personally handing over bribes (i), and the *petty corruption* coming from and related to these transactions takes place by ordinary means: by bribery and by handing over cash bribes (ii). In the following section, first, a brief description is provided on the first model, followed by the summary of the second one.

The occurrence of corrupt transactions is described here based on the principal-agent model developed by economic theories (Lambsdorff, 2007; Szántó-Tóth, 2008; Szántó et al., 2011). In this model, the principal (for example the Hungarian government) assigns certain powers to the agent (for example the leader of a state institution). In the course of this, the principal (i) delegates a certain task to the agent, (ii) lays down the formal rules of completing the task and (iii) remunerates the agent for completing the task, who, in return, (iv) remains loyal to the principal, in other words, fulfils the task following the rules laid down by the principal. The agent contacts the client following the rules above but within legal boundaries (iv), for example, by taking part in a public tender published by the given institution (v) (Szántó et al., 2011). The corrupt transactions either take place in the agent-client relation (blackmail or bribery) or the agent receives unlawful financial benefits without the principal being aware, by violating regulations and the rules laid down by the latter (fraud or misappropriation).

[73] Akkuyu NPP [2011]
[74] EDF [2013]

The corrupt transactions related to the Paks II investment, the occurrence of which cannot be ruled out, can be easily described with these models. Therefore it is useful to study them in more depth, to examine how they work and what the interactions between the participants are like.

Figure 8: Actors and transactions involved in the corruption (principal-agent model)



Source: Szántó et al. 2011
Key ⟷ : interactions; ⟷ : corrupt transaction

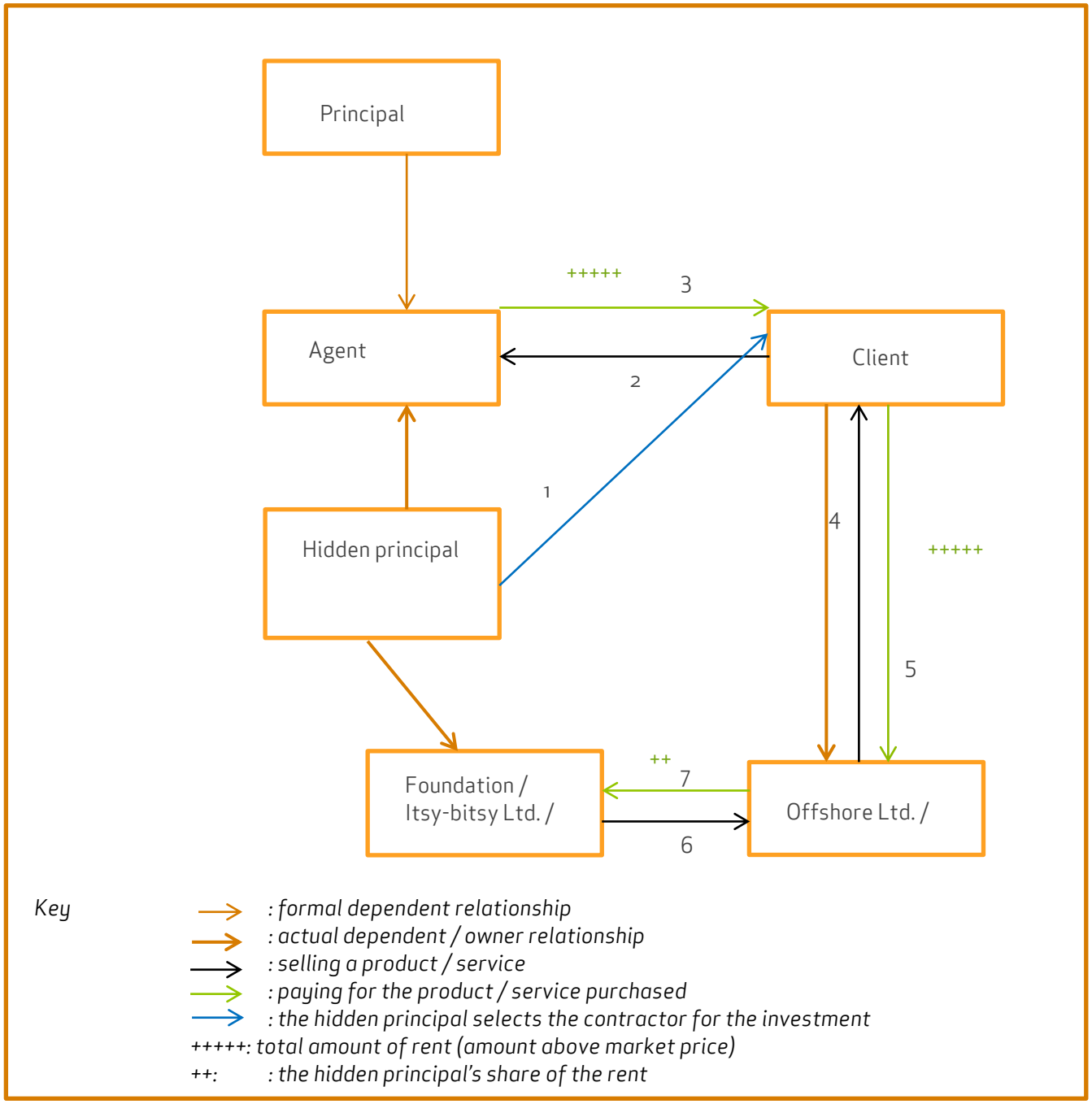
The following section is focusing only on the first two types: bribery (i) and blackmail (ii). The difference between these two cases is that in the first one, it is the client who takes steps actively and bribes the state institution or the leader of the given state organisation, whereas in the second case, the latter are the active parties and force the company participating in the public tender to pay a 'commission'.[75]

A more simple version of these two cases is when the corrupt officials simply steal for themselves: they keep the commission received for the corrupt deal. In this case, the payment may be made to a business belonging to their interest or the bribe has to be paid to a certain bank account chosen by them (normally a bank account abroad).

A slightly more complicated version is when the corrupt agents do not steal for themselves but instead there is a so called *hidden principal* in the background, the interest of whom they actually represent (Szántó et al., 2012b). In this case, the corrupt transaction could be facilitated by other actors as well. These mediators provide the "institutional system" (Szántó-Tóth, 2008) required for the corruption, they play an important role in making the transaction happen and in carrying out the transaction (della Porta-Vannucci, 2012). Figure 9 shows a model like that.

[75] *"You only stand a chance to win if you feed back X million forints to us from the amount you win. This will need to be paid to the account of AB foundation" or "The way it goes is this: you contract Itsy-bitsy Ltd. for preparing a study titled Nopointwhatsoever."*

Figure 9: Seven steps of grand corruption: carrying out a corrupt transaction with a hidden principal and mediators



This hypothetical model demonstrates a possible scenario of the corrupt transaction in seven steps. Assuming that we have a large-scale state investment project: The principal in this case is no other than the government, which creates the state organisation (project office, project company etc.) for implementing the investment; and the 'agents' are the representatives of this organisation. The 'client' is the company that is the main contractor of the project. The 'hidden principal' could be a certain business circle, a business closely linked to the political party that won the elections, a party foundation or even a business of certain members of the government or their friends.

As a first step, (1) the agent or even the principal itself selects the contractor for the

project. This could take the form of publishing a public tender or by negotiating with the potential businesses and then choosing from them. They agree on the details of the investment, on the conditions of the implementation, on the amount to be paid for completion and on the conditions of financing. Already at this stage, corruption turns up because the agent acts according to the intentions of the hidden principal. The latter either specifies which company to contract and also at what price, or just tells the agent which company to choose and how lenient they have to be when negotiating the details of the contract. The hidden principal chooses among the potential businesses in a way that they make it very clear during the negotiations how much money will need to be 'fed back' to them (i); or they pick the company that offers the highest amount of bribe (ii); or they choose a 'friend' company that has already been selected (iii), through which the corrupt transaction will be managed.

The contract signed this way will enable the client to gain a rent. The contract price normally goes considerably above the market price; or, it might be the case that it is only slightly higher or the same as the market price, but the contract is made in a way that it provides opportunities for the contractor to charge additional fees for variations or downtime fees on the grounds of outside factors, unforeseeable problems or delays outside of their control, and this way achieve a price substantially higher than the market price (Fazekas et al., 2013a). The three parties' interactions thus create the rent of corruption (marked with +++++ on the diagram).

In the second step (2) the contractor company delivers (completes a part of the project) and invoices it to the principal – at the price agreed in advance, which is significantly higher than the market price or, as mentioned before, collects its rent through variations and extra works. The investor company gets paid (3), which books the rent coming from the corrupt transactions in the company's revenues. But this is only the beginning of the process: a certain part of the rent has to go back to the organisation or business that the hidden principal selected. As the fourth step of the process, the contractor company (client) contracts a company (Offshore Ltd) belonging to its interest (directly or indirectly owned by the client) and purchases some kind of product or service from them, again at a price that is higher than the market price. This is typically a foreign company or one with an off-shore background, which provides better conditions for taxation and makes it easier to mask the corrupt transaction. After Offshore Ltd has delivered (4), the investor company pays for the service or product (5) and the rent is now in the accounts of Offshore Ltd. As the sixth step of the transaction (6), Offshore Ltd purchases a hidden service from a company belonging to the interest of the hidden principal (Itsy-bitsy Ltd) also at price above the market price, or orders a study '*Nopointwhatsoever'* from them, or financially supports a party-linked foundation selected by the hidden principal (Foundation). That is how the hidden principal receives its share of the rent in the end (7). This amount is much lower than the total rent, sometimes only fractions of that, so it is marked with ++ on the diagram.

The hypothetical model above shows very well that grand corruption might take place in a way that all the accounting and tax regulations are complied with and there is no cash movement. Another important lesson already mentioned before is that the amount of the total rent involved might be significantly higher than the amount the hidden principal eventually receives. This highlights the fact that the corruption network operated by the hidden principal operates with low efficiency: the hidden principal can only obtain the rent that gives purpose to the whole network by causing huge social damages. The more participants are involved in the process, the greater the damages are to social welfare for the corruption network to operate.

Besides causing rent and deadweight effect, grand corruption demonstrated by the model further increases social damages in four different ways. First, it distorts wages in the organisations involved in the corruption and leads to additional corrupt transactions within those organisations and businesses. Because the employees of those organisations will also find out about the corrupt transactions and their loyalty and silence will be 'bought' by paying them a salary that is higher than the market one either legally, by officially employing them with that salary or by enabling them to take part in other corrupt transactions and gain an extra income this way.[76] A further result of that is that for employees, it becomes attractive to work for corrupt organisations, and the qualified, more productive workforce will flow to the actively rent-seeking, corrupt businesses instead of the businesses operating on the production market. Third, the amount of rent gained by corrupt businesses is higher than the profit that could be obtained on the production markets and that encourages other businesses, which have been focusing on the production market, to turn to rent seeking (Murphy et al, 1993). The fourth effect takes place through the changes of social norms and the cost of the corrupt transactions: the processes triggered by grand corruption encourage market actors to perform further corrupt activities and at the same time make corruption more acceptable for them (Hauk-Saez-Marti, 2001; Fisman-Miguel, 2006). In the meantime, they *ceteris paribus* decrease the chances of getting caught: with a given controlling capacity, the increased number of corrupt actors lowers the chances of getting caught (Becker, 1968, Rose-Ackermann, 1978, Lambsdorff, 2007).

4.5. Paks II: corruption risks and corruption damages to be expected

In the sections above, we have described what corruption risks the agreement on the Paks II investment signed on 14th January 2014 carries. The investment has high corruption risks and this is not only based on corruption theories. The circumstances of the investment, the method and the content of the agreement are also likely to trigger a high level of corruption.

Large state investments like this typically involve high corruption risks, and the construction and commissioning of a nuclear power plant carries an even greater potential for corruption. Although it is usually the procedure of the public procurement and the process of selecting the contractor that are exposed to the risk of corruption the most, in this case, there is limited information about the background of how and why the Russian contractor was selected and therefore it is difficult to gain an insight into the deals behind the agreement. The agreement itself also has gaps regarding extra works, variations and penalties, which might bring up a number of problems already seen in other international investments and trigger additional risks.

If one wants to identify the minimum level of corruption that can be expected, the 5% corruption level estimated by the ACFE in 2012 based on empirical data is a good starting point. This 5% of corruption rate already includes the various possible elements of corruption: the direct cost of corruption (the difference between the regular and the corrupt price), the extra profit of the investor (the amount they charge for their own interest during the corrupt transaction), the commission (the amount paid by the investor to the organisation selected by the hidden principal for the contract) and other costs such as the cost of submitting tenders. In this scenario, with the Paks investment the total amount of rent involved in corruption could amount to HUF 200 billion, assuming that the planned budget of HUF 4000 billion already contains the rent gained in corruption.

[76] On the latter phenomenon see Jávor-Jancsics, 2013

However, this 5% is only an average that may apply to state investments, to which other risks arising from the specifics of the investment should be added. The Hungarian construction environment and the corruption norms, the volume and the length of the investment as well as the technical, safety and construction specifications of the nuclear power plant indicate that during the Paks II investment the rent of corruption could exceed the 5% that is internationally estimated as a minimum level.

The 10-15% of corruption rate found in similar large investments would mean a taxpayer loss of HUF 400-600 billion in the case of the Paks investment. When compared to other large investments, merely this amount involved in corruption would be enough to cover the costs (burdened by problems and overruns) of the Budapest metro line 4 investment. All the risk factors of corruption that have been previously analysed could result in an even higher corruption rate.

So far, it has not been taken into account what will happen if the planned costs of the project, which are high already, go up during the implementation process. Additional corruption may take place through deadline and cost overruns – only the latter will provide collateral for that. In that case, the indicator of corrupt transactions during the investment will be the frequency of cost overruns.

Another important indicator of the level of corruption related to the investment is how transparent the project will be. The higher the transparency, the lower the expected level of corruption risks. The project plan, the scheduling of the investment, the public accessibility of sub-contractor contracts and the transparency of the main contractor and the project co-ordinating office both separately and all together decrease the corruption risks of the investment.

5. RECOMMENDATIONS:

In the light of the *a priori* high corruption risks, it is definitely advisable to take this aspect into consideration when planning the project implementation. A state investment that could take up as much as 7-10% of the national investments in a year may cause huge direct losses to taxpayers if corruption is involved.

Nuclear power plant investments can be financed in many different constructions. The current form (Russian financing and construction, Hungarian ownership) comes with exceptionally high corruption risks.

The authors of this study believe that during the implementation of this investment it is imperative to factor in the corruption risks that can be expected and take steps to mitigate them.

- It is necessary to prepare an anti-corruption plan which analyses the steps and decisions of the investment from a corruption point of view and makes recommendations for mitigating corruption risks.
- It is necessary to perform risk analysis during the project implementation and monitor the steps, decisions and procurements of the construction from a corruption point of view.
- The issue of variations, extra works and penalties have to be discussed with the contractor as soon as possible; it is recommended to set high penalties and limited possibilities for extra works.
- The foundation of the successful implementation of such a project is effective project management It is recommended to set up a highly experienced project management team at the very beginning of the project and provide them with the necessary powers.
- It is advisable not to fragment the investment into small jobs, strictly regulate supplier levels and set very clear

responsibilities for the main contractor's consortium.

- It is recommended to separate the institutions with different roles (client, constructor and regulator) and provide adequate protection and support to the regulatory authority.
- When carrying out such a project, it is indispensable to prepare, record, archive and verify the necessary project documentation as it will be needed for planning, for traceability, for future amendments and for tracking down corrupt transactions.
- It is good practice to set up a strong corruption prevention office and provide it with extensive powers. Similar offices have been very successful in controlling and reducing corruption in the nuclear industry in South Korea.
- Transparency of the investment needs to be ensured with all possible means. Transparency should be as high as possible: public contracts, periodic reports, informing the public about assessments carried out by independent experts. The higher the level of transparency is, the lower the corruption loss will be.
- Providing continuous and factual information on the project to the public is of key importance.

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