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SELECTED MEGAPROJECTS WITHIN EUROPE UNION, PERFORMANCE AND THEIR IMPACT ON PUBLIC FINANCE

Abstract

Projects united by their extreme complexity both in technical and human terms are called Megaprojects. Inability of these large scale projects to be designed appropriately and delivered on time and to budget has profound implications not only for the construction organizations delivering them but also for the client organizations commissioning them (often national governments spending public money).
These project have without any doubt significant impact on society. Designing and delivering successful megaprojects provides a direct way to impact upon the huge environmental and economic challenges facing Europe at this time.
Within Slovak Republic at currently only one project should be categorized as a Megaproject - The completion of 3&4th block of the nuclear power plant in Mochovce as sole alive Megaproject within the country and with heavy participation of the National government and public finance.

Introduction

In general megaprojects are extremely large-scale investment projects that usually cost more than 500.000.000 EUR. These projects are united by their extreme complexity both in technical and human terms [1]. Inability of these large scale projects to be designed appropriately and delivered on time and to budget has profound implications not only for the construction organizations delivering them but also for the client organizations commissioning them (often national governments spending public money).
Megaprojects have significant implications for society. Designing and delivering successful megaprojects provides a direct way to impact upon the huge environmental and economic challenges facing Europe at this time.

The growing interest during last years in the exploitation of nuclear energy has been driven mainly by the escalation of fossil fuel prices and global warming concerns, nuclear energy being virtually free from CO 2 and greenhouse gas emissions [2]. These have led to the planning and construction of new nuclear power plants and to the planning of other several others, especially in China, Russia and developing countries, to ensure in meeting future global energy needs.

Against this background, cost escalations and delays in the two nuclear reactors under construction in Europe by AREVA (an organization involved in the construction of NPPs in Flamanville and Olkiluoto) and by Siemens in NPP Mochovce could dramatically affect the customer profitability and increase the risk premium required by investors [3]. Unfortunately,

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these projects are not an exception: cost escalation is common also in other megaprojects in construction or transportation sector.
The goal of this paper is to explore the performance problems of nuclear power plant projects with respect to cost and time schedule overruns using a case study approach.

The results of the analysis will be used to posit themes for consideration in the execution of other large projects, in particular nuclear reactors or projects subjected to a high degree of regulation.

This paper presents cases of the three nuclear power plants or their reactors under construction within Europe union in Slovak Republic, Finland and France.

For each Nuclear power plant, I specified milestones from the project point of view and the key stakeholders involved in governance of the project to explain, that different megaprojects in different countries and cultures have important similarities which affected or interfere public finance and performance of the project.

According to www.world-nuclear.org, as of May 2013, there are 67 nuclear reactors under construction in the world. Most of them are in China - 28, Russia -10 and India - 7.
The distribution in Europe and the USA: Finland -1, France - 1, Slovakia - 2 and the USA - 3.

Megaprojects case studies in the Europe union energy sector

- Completion of 3 and 4th block of nuclear power plant Mochovce / Slovak Republic
- Construction of the Nuclear power plant Olkiluoto 3 case / Finland
- Construction of the Nuclear power plant Flamanville 3 case / France

The completion of the VVER (Vodo-Vodyanoi Energetichesky Reactor) reactors in Slovakia - Mochovce 3&4th blocks started in the 1980s, but owing to poor financial control, lack of funds and mainly political reasons they were temporarily abandoned and only restarted construction a few years ago. Therefore the only ‘new’ reactors in the EU and the USA are the EPRs under construction in Finland and France.

The investigation of these three case studies provides an appropriate representation of future construction in the EU especially since nuclear power plants are more specific projects than others within energy sector with higher importance from the government point of view.

Completion of the 3&4th block of nuclear power plant Mochovce

Budget: € 2.800.000.000

Start of construction: 2008

Over budget: € 800.000.000

Delayed: 4 years

The building or completion of Slovakia's Mochovce 3&4 nuclear reactors is the longest running nuclear construction project anywhere in Europe. The reactors were designed by the Soviet Union back in the 1970s. Construction began back in 1987 but in 1992, soon after the collapse of the communist regime, it was suspended. Economic studies in 2000 showed the project to be a financial disaster. Nuclear power plant in Mochovce is currently sole nuclear power plant in Slovak Republic which is in operation.

In October 2007 ENEL/Slovenské elektrárne (SE) as the owner of MPP Mochovce announced the conclusion of a record corporate 7-year credit facility, totalling Euro 800 million from a consortium of international private banks, including ING, Calyon, Mizuho, Intesa San Paolo and KBC/CSOB (Mandated Lead Arrangers), Slovenská sporitelna (Lead Arranger), Komercní banka Praha, Komercná banka Bratislava and Dexia (Junior Arrangers).
85% of SE's investment portfolio exists of the Mochovce 3&4 nuclear power plant. The remaining 15% is smaller than 800 Million Euro. It is therefore clear that this corporate loan was at least partly meant for financing the completion of two new reactors [12].

Unit 1 supplies electricity to the power grid since the summer of 1998, and Unit 2 since the late 1999. Their gross power output was up-rated from 440 to 470 MW per each unit.
Each Mochovce NPP unit generates over 3,000 GWh of electricity annually, which represents approximately 11% of Slovakia's electricity consumption [4].

Key players

Enel SpA – 66% stake within the company
Enel is a multinational group based in Italy, operating in 40 countries across 4 continents overseeing with power generation from 98 GW of net installed capacity and distributing electricity and gas through a network spanning around 1.9 million km to serve 61 million customers.
The most important of Enel’s shareholders is the Italian Ministry of Economy and Finance which holds 31.24% of the Company’s shares [5].

National property fund of the Slovak Republic – 34% stake within the compayny
The National Property Fund of the Slovak Republic („NPF“) was established as a special purpose institution for the purpose of transferring State-owned property to other entities. The main role of the fund is the implementation of privatization projects on the basis of privatization decisions.
NPF is under 100% control of the government of Slovak Republic.

Construction of the Nuclear power plant in Olkiluoto

Budget: € 3.000.000.000

Start of construction: 2005

Over budget: € 5.300.000.000

Delayed: 5 years

1600 Megawatt nuclear power plant, is the fifth nuclear power plant built in Finland.
TVO as the owner of the power plant and it has selected construction company AREVA to deliver the entire power plant as a lump-sum turnkey delivery. As the main contractor AREVA is responsible for organizing both the engineering and construction of the entire plant.

Key players

Teollisuuden Voima (TVO)
Is a private limited company founded in 1969 to produce electricity for its shareholders at cost price. It states its mission as: "To produce electricity for shareholders safely, reliably and economically while preserving the environment." TVO's largest owners are Fortum Power and Heat and Pohjolan Voima, with a combined ownership of over 80%.
TVO already owns the two NPPs operating in Olkiluoto.

National government
The Finnish government interacts with the project through authorities. The supreme management and supervision in the nuclear energy sector are vested with the Ministry of Employment and the Economy.
In addition, many other governmental and local organizations, as well as the municipalities locating the nuclear power plants, participate in the supervision of the nuclear power plants required by the nuclear energy law or other legislation.

Construction of the Nuclear power plant in Flamenville

Budget: € 3.300.000.000

Start of construction: 2006

Over budget: € 5.200.000.000

Delayed: 4 years

The second European EPR - European Pressurized Reactor is under construction in Flamanville, a commune in the Manche department in northwestern France on the English Channel. Flamanville 3 has already two operational reactors commissioned in 1986 and 1987.
This is the first of several plants scheduled to substitute the aging reactors providing the 75% of the country's electricity [6].

Key players

EDF
Électricité de France - the main French Utility.
The French government owns 85% of its shares. EDF operates 59 nuclear reactors with the total capacity of over 63 GWe [7]. It is in charge of managing the project at the highest level,

defining technical reference standards, allocating, managing and overseeing, contracts, and interfacing with the safety regulator (ASN). Compared to the role of a main contractor, the role of the architect–engineer emphasizes the overseeing of planning and design while a considerable degree of responsibility for construction is carried by other project actors [8].

French government

The government controls directly the Authority - ASN, the buyer/utility - EDF, and the most important contractor - AREVA.

Conclusion

The progress and outcomes from the economic point of view in above mentioned case studies or projects are compared by the following issues:

- project being over budget
- delays on schedule
- one major stakeholder – government
- significant impact on society

EDF thus French government as the major shareholder of Flamenville 3 estimated at the beginning of the project a total cost around 3.3 billion Euros. Media sources report that the project is 3–5 billion Euro over budget. Therefore the total cost can be estimated at about 5–8 billion Euros and the power plant is still not closer to operation and many points and problems are still pending.

The situation is the same in Olkiluoto nuclear power plant in Finland. The original budget of 3 billion Euros has been exceeded at least by 100%. Delay in the start of the production of electricity in Olkiluoto 3 has been estimated to cost AREVA an additional 2.3 billion Euros. TVO as the owner will suffer the loss in revenues of three years of production of electricity [9].

Completion of Mochovce nuclear power plant hope, will not cost so dramatically more than Flameville and Olkiluoto, but we must take into consideration, that finance which will be use to finalized the projects are at the end of the day public, because the over budget and delayed of the company behind the project will reflected in the final consumer price. Or the new investments are paid from the national budget. This huge amount finance or money could be used in more effective and reasonable way within economy.
Due to the high financial risks for investors, the Slovak government provides generous state aid that is very likely illegal under EU legislation.

However, it should be noted that Mochovce, Olkiluoto 3 and Flamanville 3 are proceeding in different phases. Mochovce and Olkiluoto 3 have progressed considerably further than Flamanville 3.

In all of above mentioned case studies which have in common over budget and delays on time schedule issues is there one fact with highest importance from the public finance point of

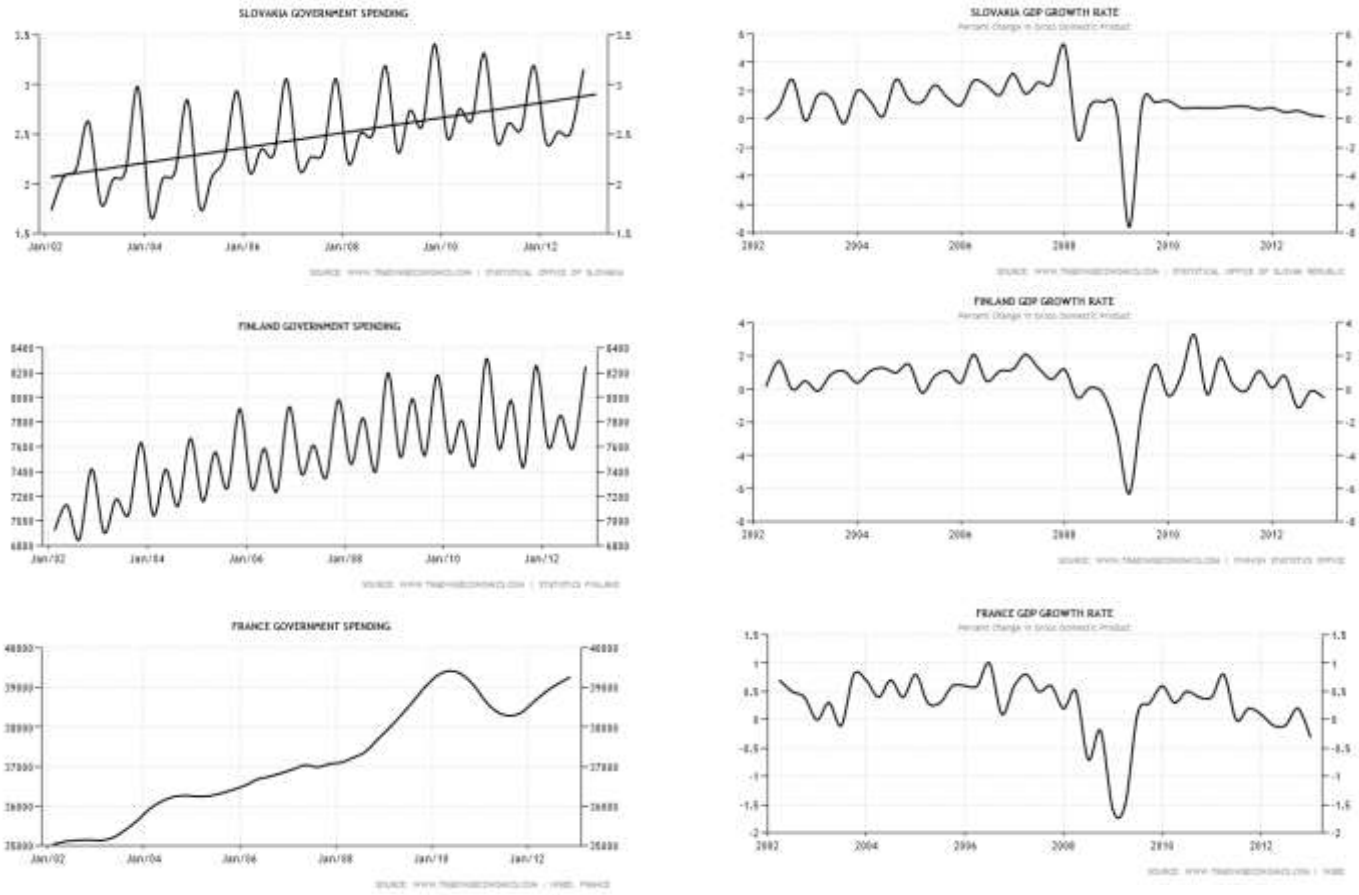
view: In each case study or megaproject acts as a major stakeholder the national government of the country through special vehicles, companies or agencies.
According to the fact, that the energy projects are delayed and markedly over budget the additional costs are paying from the public finance – collected from taxes of residents or through increase the national debt.

Based on **Picture No.1 - Economic indicators** the government spending increasing during specified period of time in all three countries involved in the energy megaprojects but the successful conclusion, completion and operation of the megaproject is still far and costs more and more public finance.

From the global point of view there is a fact, that the economy is in recession and the GDP growth rates are at this time very close to zero or negative values.

This is the main reason, why Megaprojects have significant implications for society.
Designing and delivering successful megaprojects provides a direct way to impact upon the huge environmental and economic challenges facing Europe at this time.

Picture No.1: Economic indicators



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Notes

Government spending

Government spending (also called government expenditure or consumption) is the amount of money that federal, state, and local governments spend on public services provided to its citizens. Government expenditure covers spending on goods and services like defence, judicial and education system. Yet, it excludes government transfers like social security and unemployment benefits [10].

The GDP Growth Rate

The GDP Growth Rate shows a percentage change in the seasonally adjusted GDP value in the certain quarter, compared to the previous quarter. Because of climatic conditions and holidays, the intensity of the production varies throughout the year. This makes a direct comparison of two consecutive quarters difficult. In order to adjust for these conditions, many countries calculate the quarterly GDP using so called seasonally adjusted method. The Gross Domestic Product can be determined using three different approaches: the product, the income, and the expenditure technique, which should give the same result. In sum, the product technique sums the outputs of every class of enterprise. The expenditure technique works on the principle that every product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying products and services. The income technique works on the principle that the incomes of the productive factors must be equal to the value of their product, and determines GDP by finding the sum of all producers' incomes [11].

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