

GOVERNMENT OF THE CZECH REPUBLIC
RESOLUTION

[Translated from Czech by Jan Haverkamp, Greenpeace]

THE GOVERNMENT OF THE CZECH REPUBLIC on 6 August 2014, number 668 concerning the Final report of the government envoy for the expansion of the Temelín nuclear power station.

The Government **takes note of** the final report of the government envoy for the expansion of the Temelín nuclear power station as contained in part II of documentation no. 937/14.

President of the government

Mgr. Bohuslav Sobotka, v. r.

Final report of the government envoy for the expansion of the Temelín nuclear power station

Report summary

The reason for submitting this material is the conclusion of the mandate of the government envoy for the expansion of the Temelín nuclear power station (JETE) which was carried out from 2010 to 2014 by Mr. Václav Bartuška.

The government installed Mr. Bartuška as envoy for the JETE project on 21 June 2010 in its resolution 492/10, and that for the period from 1 July 2010 to 31 May 2012. Resolution 49/12 of 18 January 2012 extended the government mandate to the envoy to 30 June 2014. On 30 June 2014, the mandate of the envoy was therefore fulfilled.

This report summarises the activities of the envoy for the entire period of the mandate. The envoy worked in the Office of the Government, where on the basis of the above-mentioned resolution, he had at his disposal an office and its operation, including all economic costs.

The report is submitted as non-legislative material as an overview of the facts for the attention of the government. In this regard, an exemption is requested from the amendment procedure under Article II of the Rules of Procedure of the Government.

Introduction

The government named an envoy for the expansion of the Temelín nuclear power station in June 2010, when the project for extension of Temelín by the company ČEZ was already under way for four years. I am submitting my final report in June 2014; two months after ČEZ cancelled the tender for Temelín 3+4 without announcing a winner. This final report, therefore, not only covers the scope and work of the envoy, but also the story of the entire project and its context.

What preceded the tender?

The project to expand Temelín happened from 2006 to 2014, with the tender in a preparatory phase from 2008-2010, and a sharp phase from 2011-2014. So it took eight years to reflect on whether Temelín 3+4 would be build or not.

The internal discussion on this theme took place within ČEZ for a long time, practically from the finalisation of the units 1 and 2 in 2000-2001. Many Czech firms lobbied the government and ČEZ for the finalisation of Temelín: build Temelín as it was planned in the 1980s, which meant with four units of the type VVER 1000. The decision to announce a tender for *expansion* instead of *finalisation* of Temelín was one of the key-moments in the Czech energy world: It meant not giving the multi-billion contract to the “old friends” from the Soviet times, but to search in an open competition for the best suited solution.

Also for a firm like ČEZ – with thousands of employees, six nuclear power stations and a multi-billion profit – creating a team for a tender was a difficult task. One issue was to find the necessary experts from a line of branches, from “ordinary” constructors to nuclear physicists to machine engineers, from project preparation to licensing. The second, significantly more complicated, issue was to convince them to leave their current position and go into a project with an uncertain future. The team was established in 2006 and had at the start only three members; in total around a hundred people [were involved] over five years. When anyone considers converting the Temelín 3+4 project or Dukovany 5 into a new state enterprise, and starting from scratch, this experience should be taken into account.

In 2008, ČEZ requested five construction companies of pressurised water reactors (PWR) to express their interest in an order for Temelín 3+4; this was practically a pre-round in the tender. Areva (France), Kepco (South Korea), Mitsubishi (Japan), Rosatom (Russia) and Westinghouse (USA-Japan) were notified. Two companies declined the offer (Kepco and Mitsubishi) in 2009 and the resulting choice was between the companies Areva (an EPR reactor with 1600 MW capacity), Rosatom (VVER 1200, 1200 MW) and

Westinghouse (AP 1000, 1150 MW). The Russian state company Rosatom participated in the end in the tender as the so called “Czech-Russian consortium” of Škoda JS (owned by the Gazprombank) and the companies Atomstroyexport and Gidropres (daughter firms of Rosatom).

At that moment it was already also likely that the expansion of Temelín could not take place without a direct and decisive role for the government. Everywhere in the world, nuclear power is the exclusive domain of the state; the total concept and individual projects are decided by presidents and prime ministers, not by private firms or banks. Those are prepared to participate in a concrete project, but only if there are clear conditions and guarantees promised by the sovereign power. When the Temelín 3+4 project moved to the tender phase, the Czech government should have said loud and clear what it wanted.

The role of the government envoy

The envoy for the extension of the Temelín nuclear power station was installed by the temporary (“executive”) government of Jan Fischer in June 2010. It was one of its last acts, after the parliamentary elections and after meetings with the presidents of the three parties in the upcoming coalition (ODS, TOP 09, Věci veřejné) and the main opposition party (ČSSD). The aim was that the government and opposition consider Temelín 3+4 as a project of national interest that should not become a victim of internal political strife.

I was requested to take this role, and my condition was that I would be informed about all following steps in the tender on the same level as the Prime Minister and the government, as also the president of the main opposition party. The first task was to gain certainty about the time-span of the tender. The state security council approved in October 2010 the “11-12-13” time-line: in 2011 ČEZ handed over the tender documents to the participants, in 2012 the offers from the participants were submitted; in 2013 the decision was taken.

I proposed this time-frame, because all participants – Areva, Westinghouse and Rosatom – clearly stated that they would finalise in 2013 their first reactors of the so-called third generation, the types that were offered in our tender.

At the highest political level, a number of contacts were made with the three candidate companies. Our country is not used to the attention of superpowers, but Temelín 3+4 made it very visible: It was at that time *the only* open tender in the world. For that reason, Prime Minister Petr Nečas met in 2011 one after another with the presidents of France, the USA and Russia: Nicolas Sarkozy, Barack Obama, Dmitri Medvedev.

On my level, I have regularly socialised with representatives of the candidates. For Areva that was Anne Lauvergeon, later Luc Oursel; for Rosatom Sergej Kirijenko; and for Westinghouse Aris Candris and later Daniel Roderick. However, as interesting as it was to meet the bosses, I was the most rewarded by the visits to the construction and supplier firms. I visited all construction sites of the so called third generation of all our candidates, most of them several times: Olkiluoto 3, Flamanville 3 and Taishan 1+2 (Areva), Leningraskaya II/1+2 and Novovoronyezhkaya II/1+2 (Rosatom), Sanmen 1+2, Haiyang 1+2, Vogtle 3+4 and Summer 2+3 (Westinghouse). The information about the real state of those projects was for us very important; there are things that no firm ever describes in presentations, but that cannot be hidden during a detailed excursion to a construction site. I have not seen any construction that did not have a multi-year delay. It was the fear of the slipping of the timetable and the higher costs that would follow that led us to demand a fixed-construction price and other, very hard, conditions from the candidates.

The tender itself was completely under the direction of ČEZ, the government did not interfere in that. If I take credit for anything, it is the experience that we managed to give complete independence to the team that evaluated the bids. Nobody – not even the management of ČEZ, nor the government – told anyone who should win. It was an open, balanced tender. To what extent that was an anomaly under the current Czech circumstances, I leave to others to judge.

The story of the tender

ČEZ submitted the tender documentation to the three candidates on 31 October 2011. It had six thousand pages and was the result of three years of work by several hundred people. The tender was held under the law for public procurement, clearly stipulating that in case the exclusion criteria were not fulfilled, a candidate had to be eliminated [from the process].

The offers came on 2 July 2012. Unfortunately, it soon became clear that one of the candidates – the French Areva – was not willing to face the hard conditions in the tender and did not fulfil several of the exclusion criteria. I have to value here, that while the government was uncomfortable excluding the only European candidate, and no matter how this complicated the entire situation, nobody demanded tweaking the rules. Areva was excluded on 5 October 2012. The companies Rosatom and Westinghouse stayed in the tender. In the preliminary assessment in 2013, Westinghouse was leading Rosatom on points, thanks to its large lead in the technical part of the evaluation; in the remaining three out of four categories, however, Rosatom was scoring better.

During 2013, ČEZ came with the demand for a guaranteed sales price for the electricity from the new nuclear power station; several possible schemes were discussed that would ensure the viability of the project, but, after the bad experiences with the support for photovoltaics, the government decided on 9 April 2014 not to grant any guarantees. The next day, 10 April 2014, ČEZ cancelled the tender for Temelín 3+4.

Apart from the situation on the European energy market, we also had become cautious because of the fact that none of the candidates finalised in 2013 their first “third generation” construction, and with the highest probability that also will not happen this year. Although I am a proponent of nuclear energy, I insist that it makes sense to buy a reactor type that is already in operation somewhere. The Finnish experience with Olkiluoto 3, that should have gone on-line in the 2009 and is currently targeted for the end of 2016, clearly shows that relying only on the word and assurance of the supplier is not a good idea.

The candidates

I visited all construction sites of all our candidates. It is remarkable, with what effort the nuclear industry in the world seeks to counter its many years of decline. Nevertheless, the weaknesses of the entire sector are evident. There is a lack of basic blue-collar workers, above all specialised welders and installation workers for valves and fittings, but also higher experts: project managers on all levels.

But the largest shortage is in experts that prepare the start-up of the reactor and its connection to the grid. Those who commissioned the reactors of the second generation are likely retired. (The newest reactors in the EU, Temelin 1+2, were started up in 2000-2001; the majority of the 437 reactors in the world are older than thirty years, the average age of the 143 reactors in the EU is even higher.) Furthermore, the power stations of the third generation are different from those older ones. The reactor itself has changed relatively little – but all control and safety systems, sensors and computers have undergone decades of large transformation.

The candidates – Areva

1600 megawatt, nothing less

Twenty years ago, in the times of the nuclear dusk, the French decided their way forward. Their reasoning was roughly like this: the world has to again build nuclear power stations, without them the energy system cannot function; create the demand for hundreds of new reactors and the larger they are, the better that will be for sales. Therefore, they chose a capacity of 1600 megawatts and called the new project EPR (European Pressurised Reactor).

The start was promising: Finland chose the EPR for the Olkiluoto power station (2003); further the home player EDF agreed to build one in Flamanville (2003), and after that Areva won a contract for two reactors in the Chinese location of Taishan (2007). Since that time they have been waiting for another success.

Olkiluoto 3

The first reactor of the EPR type is under construction in Olkiluoto, Finland. Originally, Olkiluoto 3 was to go on-line in May 2009; the current target is 2016. I have been to the site three times, and I take every date mentioned for hand-over with reserve. Besides the problems of the entire sector, this construction site has a unique feature: there are people working from 57 nations and basic manuals are available in 8 languages. There is a lot of talk about a lack of people with technical education in Europe; here you can see that with your own eyes.

Flamanville 3

The first and, for the time being, last EPR project in France. EDF will not let Areva construct a turnkey plant, it controls everything itself, Areva is only one of the 150 contractors. EDF has directly on the site over 1000 people to coordinate subcontractors, still the project has a four-year delay (it is to be delivered in 2016, EDF's current promise).

Taishan 1+2

China chose in 2006 the Westinghouse AP 1000 reactor as the backbone of its new nuclear programme.¹ Then, in 2007, it offered France the opportunity to build as a “consolation prize” two EPR reactors in the East-Chinese town of Taishan. The planned start-up date was 2013. The Chinese wanted their project to follow the first two (Olkiluoto and Flamanville) with a roughly three-year interval – so that they could learn from their mistakes. On the construction site in Taishan, they told me quite openly that they would prefer to start up at least half to one year after the other EPR projects. But it is hard to wait to the year 2016; it is possible (although that has so far not been officially confirmed) that Taishan 1 will go on-line in the year-break from 2014/2015.

Three times the same is not the same

The favourite argument from Areva is that their first projects may proceed with birth pains, but the result will be a standard model that will have none of these problems. (You also hear that from the Americans and Russians about their models – but also they don't tell the truth).

Let's start for instance with the capacity of the reactor. Olkiluoto 3 should have the capacity of 1600 MW, Flamanville 3 1660 MW and Taishan 1+2 more than 1750 MW. Because only roughly one third of the thermal capacity (indicated with MWt, megawatt thermal) is converted into electricity, the difference of 150 MWe (megawatt electrical) between the different projects means, the thermal capacity of the Chinese reactors will be roughly 450 MWt higher than the Finnish one. That is a lot in a field, where a fifteen meter reactor is measured with the accuracy of a tenth of a millimetre.

As a result of the changes requested by different investors, the level of standardisation of the EPR reactor is still further reduced. That is not only true for the different turbines (in Finland Siemens, in France Alstom, in China Alstom/Dong Fang), but above all for differences between the reactor islands themselves (that means the heart of the power station, where the reactor is situated). I have run through, with the help of experts of [Czech nuclear regulator] SÚJB, all three projects and finally I received, on the right question to Areva, the honest answer: the nuclear island (that is the part that falls completely in the domain of Areva, from design to delivery) is only for about 50% the same.

The candidates – Rosatom

Variations on a tested theme

France could afford years ago to have a generous view on the future and think about which reactor the world would order; Russia couldn't. It was at the bottom, its nuclear industry was affected by Chernobyl (1986), even more by the disintegration of the Soviet Union and the resulting confusion. Therefore, when the West started talking about “generation III+”, the Russians chose the path of modification of the proven model VVER. For Temelín they offered a VVER 1200 under the brand name MIR (Modernised International Reactor) that goes back to a concept from the 1960s. Exactly following the model VVER was the largest strength of the Russian offer for Temelín: all six commercial reactors in the Czech Republic are of the VVER type, and also the Czech nuclear industry (or what is left of it) is adjusted to that type.

Leningradskaya II/1+2

“We have a delay of around three years,” the project manager of Leningradskaya 2 told me during my first visit.

¹ The Chinese chose the same three as we: Areva, Rosatom, Westinghouse. Their tender took three years, 2003 - 2006

"How much more expensive will the project be?" I asked.

"Nothing. It will cost exactly the same," he answered.

I do not have a more concise summary of the differences between our candidates. We had in the tender a private firm (Westinghouse), a state company (Areva) and a ministry (Rosatom). Asking about some things – for instance the price of delay – sometimes just made no sense.

Otherwise, the fate of both Russian projects of the third generation are quite similar with the story of the others: the construction was agreed well before the final project was in the world; the supply chain fell apart, so that for special parts unique, time- and finance-consuming solutions have to be found; a lack of mid-level project managers. In Russia on top of that still always the splitting rivalry between Moscow and St. Petersburg.

When I was last year for the third time at Leningradskaya II, the shift against the original timetable was four years.

Novovoronyezhskaya II/1+2

The construction of Leningradskaya II/1+2 and Novovoronyezhskaya II/1+2, at first sight, is not very different: Both have their difficulties and both their small victories. And both are very similar – if you take the blueprints in your hand.

Russia does not have one construction agency, but three – and two of them work on the VVER project – the Moscow-based *Atomenergoproject* (AEP) and the St. Petersburg-based *Sankt-Petersburgskiy Atomenergoprojekt* (SpbAEP). In addition, *Nizhegorodskiy Atomenergoproject* (NiAEP) is increasingly involved in construction work. Rosatom management characterises their relationship as a "healthy rivalry": all three agencies compete for contracts in the Russian Federation and abroad.

The result is, however, that the project MIR 1200, that was offered to us in the tender, de facto did not exist; a brand name, nothing more. There exist two versions of the project VVER 1200/AES 2006, which is the modern (and more powerful) version of the VVER 1000 that we know (Temelín currently has VVER 1000s – nicknamed "veverky tisícovky" or one-thousander squirrels): the Moscow AES 2006 with the code name B-491 is under construction in Novovoronyeskiy II, the St. Petersburg B-392M in Leningradskaya II. They have different designs for the primary circuit and the safety concept, that is, in the amount of active and passive elements. We sometimes have the tendency to see the Russians like a great chess player, thinking through their moves far ahead. That picture should be more coloured: sometimes they play chess with themselves.

The candidates - Westinghouse

AP 1000

At Westinghouse, they like to boast that around half of the civil reactors in the world are built according to their design. Considerably less, if we talk about the last thirty years. The company went through a very bad time, in which the pride of American craftsmanship went through several bankruptcies and was sold to become part of the Japanese conglomerate Toshiba. For the American nuclear industry, – except for Westinghouse also GE and B&W – it can be concluded that the know-how has so far not woken up from the sedation after the accident in the Three Mile Island nuclear power plant (1979).

Its version of "generation III+" is called AP 1000 (Advanced Pressurised). So far they are commercially the most successful: Areva and Rosatom are currently building four units of the "third generation", and Westinghouse eight – in China (Sanmen, Haiyang) and in the US (Vogtle, Summer).

Sanmen 1+2

When Westinghouse won in 2006 the Chinese tender, it got a contract for the construction of four reactors (two each in Sanmen and Haiyang) and a promise for around 40 more units according to their design. But the disintegration of supply structures also hit Westinghouse – manifested most strongly in loss of control over their

sub-contractors and their other suppliers. In short, in a globalised world, it is very easy to enter production, but it is very difficult to control where and how that production indeed takes place. The time when producers indeed produced their reactors and key-components (for instance like Westinghouse in long ago times), is over. It is difficult to get back [to that time], if the only decisive criterion is the lowest price.

This means concretely for Sanmen 1, which should have been the first reactor of the type AP 1000 in the world, a delay of at least two years. The original completion date was November 2013, now Westinghouse and Toshiba both say “in the year 2015”. They don't give any more precise date. After three visits to the construction site, I estimate the start-up of the unit in 2016.

Haiyang 1+2

Haiyang 1 should have started up exactly half a year after Sanmen 1, which means in May 2014. The construction more or less copies the development in Sanmen, and there is at least a two-year slide.

Vogtle 3+4, Summer 2+3

The construction of four AP 1000 reactors in two locations in the USA originates from the end of the last decade and started fully after the licensing in 2012. After repeated visits to both locations and with the knowledge of the development of the Chinese projects, I do not expect the completion of any unit in the USA before 2017.

The world around us

The Temelín project started moving halfway in the last decade, at a time when many talked about a “nuclear renaissance” and hundreds of new reactors around the world. I am sceptical about those big words; in 2007 I wrote that before a future *renaissance* there first has to be a *resuscitation* of nuclear, and the experience showed that even more was needed. No, I do not talk about the accident at Fukushima Daiichi (March 2011) that influenced the future of the atom probably only in Japan and parts of Europe but not the entire world. Much more important appears to be something that is rarely admitted: the loss of technical knowledge and skills in the West. We are still able to produce cars, computers and a plethora of consumer goods. But every large, complicated project virtually always ends in massive delays, from the new Berlin Airport (delay two years) to the motorway tunnel system in Boston (delay two decades).

In the meantime, the situation with the European energy market is getting more complicated. Massive support for renewable energy sources (RE) has led to a split into two kinds of electricity costs: the price of so-called power electricity is falling, while the costs for network services and subsidies to RE are growing, and with that the price for the end-consumer grows. This has an even larger impact on potential investors. The return on investment of projects is calculated in the price of power electricity – and that moves in our region today around €40 per megawatt hour, whereby investment costs for new power stations (coal, natural gas, nuclear) are €50 per MWh and upwards. In other words, to invest today in Europe in power stations, when there is no previously fixed sale price, does not make sense.

Several countries in the European Union are conscious of that danger and have a proposal on how to secure the return on investment: in France, the income of EDF from nuclear power stations is guaranteed by the law. Germany introduced in the framework of the *Energiewende* a *de facto* system of system back-up, mainly gas, and now will introduce a system of capacity payments (which is another name for subsidising loss brought on by back-up power stations). Great Britain probably continues with its proposed *contract for difference* system for new nuclear power stations. The truth is that although Europe talks about an energy market, its actions push that market ever further away.

Those two factors – loss of technical skills and an unpredictable energy market – will stay with us for a long time. It is furthermore true that we create the biggest part of the problems ourselves at home.

Do we have it?

I like Temelín 3+4, because before us stands the uncomfortable question – and there is no way to “wait it out”. That question is: “Is the Czech Republic still able to manage such a large project?”

After my appointment, I was often asked if I wanted a special law, a *Lex Temelín*, to enable bureaucratic procedures to be speeded up and ensure that the power station indeed will be built. I answered that I do not

want Temelín 3+4 in a country that does not have a ready network of motorways, high-speed trains, the basic infrastructure of a modern state. I still hold on to that. I see Temelín 3+4 in the same light as the (not built) Prague – Ceske Budejovice motorway; the (non-existing) Hradec Kralove – Olomouc motorway; and the (missing) high-speed railways Prague – Berlin and Prague – Munich. As a warning that nothing happens by itself.

I have worked now seven years in government. I have seen five prime ministers. Show me a big, functioning firm that would have five bosses in seven years: that does not exist. We have gotten used to falling cabinets, political instability. But the rest of the world perceives this very sharply. I had the honour to be in a meeting that former Prime Minister Mirek Topolánek had six years ago with German chancellor Merkel and Polish Prime Minister Tusk; both these neighbouring politicians still govern.

It is easy to hold your hands in your lap and weep that without political stability you cannot build a “nuke”. It is just that our country needs a positive vision that would help to create political consensus at least about the most basic issues. I was the government envoy for Temelín 3+4; thank you for your trust, it was interesting work.

Václav Bartuška

In Prague, 1 July 2014