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# КТО КОГО?

Why Bulgaria should abandon NPP Belene

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## Why Bulgaria should abandon NPP Belene

### Introduction

Bulgaria suffers from a lack of informed public debate on the construction of NPP Belene. Discussion is limited to declaratory statements about energy security, while actual decisions are opaque and short-sighted. It is disturbing that a project with a value equal to one quarter of Bulgaria's GDP pays such scant regard to basic economic reasoning.

In this brief paper, we seek to dispel five myths about NPP Belene created and spread by local politicians. These are that NPP Belene will produce cheap electricity; that it will satisfy Bulgaria's growing energy needs; that it will boost electricity exports; that it will guarantee Bulgaria's energy security; and possibly the weakest of them all, that Bulgaria has already spent some €600mn on the project so it should not stop now.

### Myth 1: NPP Belene will produce cheap electricity

While it is true that today NPP Kozloduy and other old plants produce cheap electricity this is only because the huge initial investment is excluded from the price composition. Only variable costs (O&M, fuel and waste disposal) are included: The main fixed cost of investment is not.

This would not be the case for NPP Belene. In a recent report the International Energy Agency calculates that the levelised cost of energy (LCOE) in the Czech Republic, Slovakia and Hungary ranges between €51 and €80 per 1MWh

(*International Energy Agency, 2010*). If we assume similar LCOE costs would apply for Bulgaria, then NPP Belene would have to sell electricity anywhere between its variable cost (€21) and its

total cost (€51-€80). This is between 3 and 10 times higher than the price NPP Kozloduy sells at today on the regulated market, which takes 59% of its output (*NPP Kozloduy, 2010*).

If the government is serious about attracting a private European investor in the project, then it will have to revise its regulation of the energy market. One possibility is that SEWRC would stop regulating wholesale electricity prices, but given that regulated levels are artificially low in Bulgaria, this would lead to a substantial increase in prices. A second option is to set wholesale price of NPP Belene at the plant's variable cost of production (€17 in the Czech Republic for example). But this

Levelised cost of nuclear energy (LCOE) per 1MWh				
OECD Country	Fixed costs	Variable costs		Total
	Investment s *	O&M	Fuel and waste disposal	
Assuming 5% discount rate				
Czech Republic	€ 32.86	€ 10.60	€ 6.71	€ 50.17
Hungary	€ 31.00	€ 21.43	€ 6.31	€ 58.74
Slovakia	€ 24.40	€ 13.92	€ 6.71	€ 45.03
<b>Average</b>	<b>€ 29.42</b>	<b>€ 15.32</b>	<b>€ 6.58</b>	<b>€ 51.31</b>
Assuming 10% discount rate				
Czech Republic	€ 65.46	€ 10.60	€ 6.71	€ 82.78
Hungary	€ 59.43	€ 21.47	€ 6.60	€ 87.50
Slovakia	€ 51.58	€ 12.15	€ 6.71	€ 70.45
<b>Average</b>	<b>€ 58.82</b>	<b>€ 14.74</b>	<b>€ 6.68</b>	<b>€ 80.24</b>

\* Investment costs include decommissioning, overnight costs as well as the implied interest during construction. Source: *Projected Costs of Generating Electricity, 2010 edition*, by International Energy Agency. Dollar denominations from the original report are converted to euro at \$1.39 per €1

option will discourage investments in other energy sources with higher variable costs, such as coal (€33) and gas (€53) (*International Energy Agency, 2010*). Setting wholesale price at variable cost will also fail to address the fixed cost, which means that private companies will be unable to recover their huge initial investments in the nuclear plant. A third option would be setting the regulated price at the total cost of production (€51-€80), which will certainly attract energy firms. But since unregulated industrial prices (€46.53 for H1/2010<sup>1</sup>) are below the total costs of production, taxpayers will have to pay the difference and therefore subsidize the construction of the plant.

*Myth 2: NPP Belene will satisfy Bulgaria's growing energy needs and compensate for installed capacities that will soon have to be shut down*

Building a 2GW nuclear plant to solve fictitious energy problems is poor planning.

First, no substantial growth in electricity consumption can be expected. Even the most aggressive forecast by the state-owned transmission company NEK assumes that consumption will not grow by more than 1.2% p.a. until 2020 (*NEK EAD, 2010*). Instead of adding new capacities, Bulgaria should work to improve the energy efficiency of its economy, which is nearly 6 times less efficient than the EU27 average (*Eurostat, 2010*). If the Bulgarian economy were to work at EU average energy intensity level, then annual energy savings would equal the annual output of 16 plants the size of NPP Belene<sup>2</sup>.

Second, the state has already planned 2.4GW substitutes for the plants that are about to shut down. In one of the variants for the new Renewables Act (*Ministry of Economy and Energy, 23 September 2010*) there is a planned cap on installed capacities from RES: 0.6GW from solar and 1.8GW from wind (with applications for 12-14GW (*Atlantic Council, Centre for Study of Democracy, 2010*)). The state expects the private sector quickly to add 2.4GW to the grid (one reason for the planned cap). It is much easier for hundreds of small private companies to look for project financing for their RES plants than for a cash-strapped country with a mediocre credit rating to raise €9bn for two nuclear reactors.

Third, the possibility of electricity imports in the case that NPP Belene is not built is somehow felt to be shameful. Today, Bulgaria supplies 70% of its gross energy consumption from imports (*Ministry of Economy and Energy, June 2010*). In 2009, nine EU states consumed more electricity than they produced, with an average deficit of 11% (*ENTSO-E, 2010*). If we assume that NPP Belene does not happen and Bulgaria maintains a similar electricity deficit with 1.2% growth in consumption, then the €6.4 - €9bn investment would be enough to pay for the deficit for the next 27 - 36 years<sup>3</sup>. If the project is not built then the state will not be burdened by a large and unnecessary investment, and electricity consumers will be motivated to become more energy efficient.

*Myth 3: NPP Belene will export electricity*

Nobody can predict what regional demand for electricity will be when NPP Belene is completed. The plant is too big for the needs of the local market and will have to rely upon exports to be sustainable. However, neighbouring countries will increase their own installed capacities and it is a mistake to

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<sup>1</sup> The price that the largest (>150MWh p.a) industrial consumers pay before all taxes, as reported by the Bulgarian NSI (National Statistical Institute). Spot prices on EEX show similar results – €41.80 Phelix intraday spot price on 11 November 2010.

<sup>2</sup> We use 2008 figures, the latest available. We also assume that NPP Belene would produce the same level of electricity as NPP Temelin in the Czech Republic, which has the same installed capacity of 2x1000MW. Temelin produced 12.4TWh in 2008, or approximately 43,910TJ (CEZ, 2010). Reducing the energy intensity to EU levels means reducing energy usage from 838,772TJ down to 148,718TJ (Eurostat, 2010).

<sup>3</sup> Assuming Cal16 Phelix futures prices of €57.35 (intraday 10<sup>th</sup> November) on the European Energy Exchange

assume that Bulgaria will continue to export electricity at the current or higher rate. In the Balkans there are now more than 8,500MW large projects under construction (*Boyko Dimitrachkov, 2009*). If we add Turkey, which several months ago started a 4.8GW NPP project with Atomstroyexport, it is unlikely that any country will need Bulgaria's electricity in 10 years time.

The government expects a shortage of electricity without a second nuclear plant. In our view, it would be wiser for Bulgaria to drop NPP Belene and all the risks associated with it, and instead extend the life of reactors 5 and 6 of NPP Kozloduy, or participate in other countries' projects. It would be cheaper and more flexible for Bulgaria to participate in Romania's expansion of Cernavoda NPP or in Turkey's nuclear expansion in exchange for a fixed buy-back price of electricity.

### *Myth 4: NPP Belene will guarantee Bulgaria's energy security*

If we define energy security as diversification of routes and suppliers of energy, then NPP Belene does not fulfill this requirement. We are asked to accept that Bulgaria should assign a Russian contractor to build a nuclear power plant using Russian technology that will run on Russian fuel in order to reduce its exposure to another Russian gas crisis.

If we define energy security as decreasing dependency on imported energy resources with "unstable and uncontrolled prices" (*Ministry of Economy and Energy, June 2010*), then NPP Belene does not fulfill this requirement either. The price of uranium in 2006 was \$40, peaked at \$138 in 2007 and has fallen back to \$50 today (*UX Consulting Company*). Stable prices are an illusion.

In the latest draft of the National Energy Strategy we read that "energy security is a foundation for economic stability" (*Ministry of Economy and Energy, June 2010*). It is far from obvious how NPP Belene contributes to Bulgaria's economic stability. Economist Georgi Angelov has written about the risks of a government loan guarantee in the case of NPP Belene (*Angelov, 2009*). Such a guarantee would be interpreted by investors as if the state had borrowed this amount, which would weaken not only Bulgaria's already poor credit rating but government bonds and the country's ability to service debt payments as well. In short, it is hard to predict the collateral damage that would be caused by a government backed loan on NPP Belene. The only good news here is that the finance minister refuses outright to provide such a guarantee (*Dnevnik Daily, 2010*).

### *Myth 5: We have already spent €600mn on NPP Belene, so we should not stop*

It is estimated that between €600mn and €1bn has already been spent on consultants and equipment, and that this would be wasted if the project was dropped at this stage. In economics, this behaviour is known as sunk cost fallacy or throwing good money after bad. Every rational investment requires periodical assessment of yields. If expected profits are negative, the project is cancelled and losses limited. In this case, the government is behaving like a gambler who bets his wife to win back the family home.

### *Conclusion*

This would not be the first time that financial projections for nuclear investment plants have been spectacularly wrong. The Finnish reactor in Olkiluoto, estimated to cost €2.5bn and to be completed by 2010, is now four years behind schedule and the price tag has jumped to €5.9bn and rising. In India, the last ten reactors cost three times the initial plans. In the United States, in the case of 52 reactors, budgets were overrun by an average of 420% (*Beránek, 2010*).

Well prepared governments have built nuclear power plants only to discover later that they have made a very expensive mistake. Take the example of Britain in the 1960s. Britain had a serious electricity deficit which led to power cuts and the election of a Labour government in 1964. The incoming Minister of Energy, a former trade unionist called Fred Lee, was a great supporter of nuclear energy. He decided to build five AGR reactors by British design as a part of the Magnox programme. The minister argued that the programme would deliver cheap electricity and boost exports. “I think we hit the jackpot” he declared (*Henney, 1988*).

British economist John Kay described Fred Lee’s policy as “the worst economic decision ever made by the government of a rich state” (*Kay, 2004*). It took on average 20 years to build a reactor, and another 30 until the output matched the planned capacity. In the meantime, investments surpassed £50bn<sup>4</sup> (*Green, 1995*), way beyond initial projections. And when the reactors were privatized by British Energy (now EDF) in 1996, the British government received just £1.9bn, and only because it agreed to underwrite future decommissioning costs and included one more reactor in the deal (which alone had cost £3bn to make). As Kay points out, if this had been a commercial company “the write-off would have represented by far the largest loss made by any company, anywhere, in business history.” Kay concludes that “for twenty years after Fred Lee’s announcement, the right commercial decision would have been to forget the billions that had already been spent and abandon the project” (*Kay, 2004*).

It is not too late for Bulgaria to give up misguided plans to build NPP Belene.

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<sup>4</sup> By 1996 prices

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