ECONOMICS MYTHBUSTER

TEŠ6

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Introduction

Judging by the amount of new coal developments in a number of countries, anyone not looking carefully might think that coal must be the bright energy future. As the developers claim, the new or replacement coal projects ensure positive economic impacts, such as opening new jobs, provide opportunities for local businesses, and help to reduce the price of electricity because of producing electricity from domestic sources.

However, the harsh reality of today's energy markets raises a large question mark over all of these claims. This briefing aims at providing all the necessary arguments and tools for discovering what is the reality behind the economic arguments of the promoters of coal projects and how to address their arguments.

TEŠ6 ID and short history of the project

Šoštanj in North Slovenia 30km from the Austrian border is the location of an existing lignite-fired power plant - Termoelektrarna Šoštanj or "TEŠ" owned by HSE (Holding Slovenske Elektrarne d.o.o.), a 100% state-owned electric utility. The plant is presently comprised of five units. Units 1-2 built in the 1950s have closed, 3 is about to close and 4-5 are set to close in 2016. A new sixth unit of 600MW started test operations in 2014 and this project is known as TEŠ6.

The TEŠ6 project was proposed in 2003 and included in the government development programme of 2007. The project was originally expected to cost €690m, but over the years the costs have escalated to €1.43bn. In September 2007 the EIB loaned an initial €350m loan which was increased to €550m in April 2010. In January 2011 the EBRD signed a €200m loan for the project (including €100m syndicated to commercial banks). HSE is adding €400m to the sum, while for the moment it is unclear who will finance the remaining almost €300m. The Slovenian government has provided a loan guarantee for €440m of the loan from the EIB.

Operating TEŠ6 without carbon abatement will result in emissions of about 3.1 mtCO_2 a year, in spite of improving the efficiency to around 46% as opposed to the 35% efficiency of the current units. The coal used at the TEŠ6 plant will come from the nearby Velenje coal mine.

The main assumptions for TEŠ6 are the following:
- The power plant will be operational for 40 years.
- The total installed capacity is 600 MWe or 545.5 MW.
- The power plant plans 6650 hours of operation annually.
- The electricity production is planned to be about 3.5 TWh p.a.
- The CO2 emissions are planned to be about 3 150 kt p.a.
- The usage of lignite is about 440 kg/h or 2.926 million tonnes p.a.

What TEŠ promised at the beginning of the project

When the public communication about the project started, at the end of 2009 (triggered by the public consultation of the EBRD), TEŠ6 was to be the 'Slovene energy future'[1]. Although the initially set price in 2006 was €690mln[2], in 2009 the price was already at the level of €1.1bln[3]. However, the investor claimed that the investment would be paid back in a mere 6 years[4], that the production price of electricity would be 25-30 % lower than the production price of units 1-5 (about €55/MWh and that the investment would ensure at least 3500 jobs for the coming 40 years[5].

TEŠ6 today

The final estimated cost for the TEŠ6 project is at the moment at the level of about €1.43 bln[6]. Of this, €550 mln come from an EIB loan, €200 mln from an EBRD loan, €515 mln from the owner's capital, €83 mln loan from HSE and €80 mln from commercial loans.

According to media reports about the latest draft of the 6th revision of the investment programme[7].(which is not publicly available yet), the currently estimated production price of the electricity ranges from €55-61/MWh. Based on this price, the estimated profit would be about €4 mln in the first year of operation, almost €40 mln per year by 2020 and €100 mln per year by the end of TEŠ6 lifetime. The investment should be paid back in 15 years. The internal rate of return is 7.42% and the rate of return on capital is 12.63 %. The project is estimated to maintain 200 jobs until 2050[8].

However, a critical review and calculations in relation to the average prices of electricity at the EEX shows that the economic estimates remain heavily unrealistic. Some estimates from the media show that at the current electricity prices, TEŠ6 would produce electricity at €14/MWh more than the market price, resulting in about €50 mln annual losses in the first years of production, while the losses could become higher later on[9]. If we base the calculations on currently valid average sales price of electricity, €31.4/MWh[10], the initial annual losses would reach over €82 mln (own calculation).

Reality shows that the coal-based 'Slovene energy future' will cost Slovenia heavily, not only in terms of huge investments, but also in terms of operational costs.

What happened in between?

Although working as environmental campaigners, at some point we in Focus concluded that the economic arguments might be heard better by the decision-makers and banks than the environmental ones. This is why we decided, together with CEE Bankwatch, to commission an independent assessment of the investment plan of TEŠ6. In 2011 an assessment of the 4th investment plan was commissioned to a Dutch consultancy CE DELFT[11] and a year later, in 2012, a Slovene economist, teaching at Faculty of Economics in Ljubljana, analysed the 5th

[1] http://www.umanotera.org/upload/files/Rotnik_1.pdf
[2] http://www.te-sostanj.si/nip5/index.html
[3] http://www.umanotera.org/upload/files/Rotnik_1.pdf, http://www.umanotera.org/upload/files/Rotnik_1.pdf
[4] http://www.umanotera.org/upload/files/Rotnik_1.pdf
[5] http://www.te-sostanj.si/blok6/files/default/blok6/broura_b6.pdf
[6] http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html
[7] http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html
[8] http://www.te-sostanj.si/nip5/index.html
[9] http://www.dnevnik.si/posel/novice/ekonomika-tes-6-se-podira
[10] http://www.ise.fraunhofer.de/de/downloads/pdf-files/data-nivc-/folien-electricity-spot-prices-and-production-data-in-germany-2014-engl.pdf
[11] http://bankwatch.org/sites/default/files/Sostanj-TES6-economics.pdf

investment plan[12].

Both analyses showed that the project's economic picture is heavily dependent on several factors:

- Price of electricity: The project is very sensitive to changes in the price of electricity, as even a 10 % decrease of the price of electricity causes the project evaluation to become negative.
- Price of coal: the project is less sensitive to change in the price of coal, yet reductions in the price of coal and the increase of efficiency of the coal mine are estimated to be difficult to achieve. Also the planned prices of coal are too low.
- Price of emission allowances: The project is less sensitive to changes in the price of emission allowances, yet they do impact the production price of electricity and are estimated to be too optimistic in the investment plans.

The warnings were neglected by the investor, the lenders (EIB and EBRD) and the Slovenian government, which granted a state guarantee for a part of the EIB loan. Time has shown that most of the warnings were justified. Let us analyse what happened.

Price of investment

The base of TEŠ6's economic and democratic failure lies in its overall cost. In spite of not being in Slovenia's official energy plans[13], the project appeared for the first time in the Resolution on National Development Projects for the Period of 2007-2013[14], which was adopted by the Slovenian government in October 2006. The document evaluates the total value of the project TEŠ6 to be €602 mln and it says no public money will be invested into it (only private funds)[15]. The first investment programme for TEŠ6, developed in April 2006, however, gives the price tag of €637 mln. Already in the beginning of the project it was clear that decision-makers were not properly informed of the value of the project and this trend continued throughout the project's development. Table 1 presents the investment costs from the different variants of the investment programme for TEŠ6. As can be observed in Table 1, the investment costs more than doubled over the period from 2006 – 2014.

Table 1: Investment costs of TEŠ6 according to the different investment programmes

in 000 EUR	Investment programme (April 2006)	REV1 (Nov. 2006)	REV2 (Mar. 2009)	REV3 (Oct. 2009)	REV4 (Aug. 2011)	REV5 (Sep. 2012)	REV6 (2014)
Construction work	92,292.9	93,575.5	96,896.2	78,857.2	74,868.2	67,589.7	?
Equipment	444,622.9	775,800.0	1,010,062.3	908,240.9	964,273.6	1,126,738.5	?
Other	61,740.0	20,670.0	22,116.9	10,116.9	34,107.5	26,067.9	?
Financing expenses	38,305.0	63,874.6	213,662.7	106,579.8	122,678.7	82,096.2	?
Total	636,960.0	953,920.1	1,342,738.2	1,103,794.8	1,195,928.1	1,302,492.3	1,430,000.0

Source: Investment program of TEŠ6, 5th revision from September 2012 and http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html

The last publicly available revision of the investment plan, which provides an estimate for the figure REV5, estimates the average investment cost per installed kW to be 1788.7 EUR/kW. The average electricity production price is not given in the most recent revisions of the investment programme, but in the last publicly available revision the production prices are estimated to be from 66.9 EUR/MWh in 2015 to 104.9 EUR/MWh in 2054 (see Table 2).

[12] http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf
[13] TEŠ6 is not mentioned as a possible project in the last valid energy policy of Slovenia, Resolution on National Energy Program – ReNEP. Official Journal of Republic of Slovenia No. 57/2004.
[14] www.vlada.si/teme_in_projekti/arhiv_projektov/resolucija_o_nacionalnih_razvojnih_projektih_za_obdobje_2007_2023/
[15] ibid

Table 2: Production price of TEŠ6 electricity throughout the project's life span

Year	2016	2020	2025	2035	2045	2054
Total cost of electricity (in 000 EUR)	237295.8	238749.7	242955.8	260958.5	222591.1	253160.6
Production (GWh)	3549.3	3549.3	3549.3	3345.7	2412.3	2412.3
Production price (EUR/MWh)	66.9	67.3	68.5	78	92.3	104.9

Source: Investment Program, Revision 5, http://www.te-sostanj.si/nip5/index.html

The other key economic indicators are presented in Table 3.

Table 3: Key economic indicators of TEŠ6 project

	Invest. program (Apr. 2006)	REV1 (Nov. 2006)	REV2 (Mar. 2009)	REV3 (Oct. 2009)	REV4 (Aug. 2011)	REV5 (Sep. 2012)	REV6 (2014)
Average generation cost	34.25 EUR/MWh	39.6 EUR/MWh	41.7 EUR/MWh	55.83 EUR/MWh	NA	67-105 EUR/MWh	55 - 61 EUR/MWh
Payback period	16 years	14.7 years	16 years	17 years	15 years	15 years	15 years
Net present value with a 6 % discount rate	88.97 million EUR	502.3 million EUR	237.8 million EUR	17.0 million EUR*	83.6 million EUR	112.9 million EUR	?
Internal rate of return	7.5 %	11.1 %	9.11 %	7.17 %	7.59 %	7.75 %	7.42 %
Relative net present value	0.19	0.79	0.29	0.022	0.108	0.116	?

* At 7% discount rate.

Source: Investment program of TEŠ6, 4th and 5th revisions, and http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html

As the investigation by the Slovenian police reveals, a large part of the price tag increase is due to the corruption. Two issues are relevant here: public procurement and briberies.

Public procurement

The first problem was that although TEŠ should legally have been subject to the principles of public procurement, legal loopholes meant that this was not the case until too late to prevent corruption. According to the Slovenian public procurement law[16] and Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors[17], TEŠ should be subject to the public procurement rules because it is a state owned energy company. However, several governments made sure that the position of TEŠ was not clarified under the public procurement act[18] and although some kind of a tender was carried out, it was possible to select the suppliers in an un-transparent manner, which has likely contributed to the significant increases of price. TEŠ was only formally listed as being subject to public procurement in 2013, when damage was already done[19].

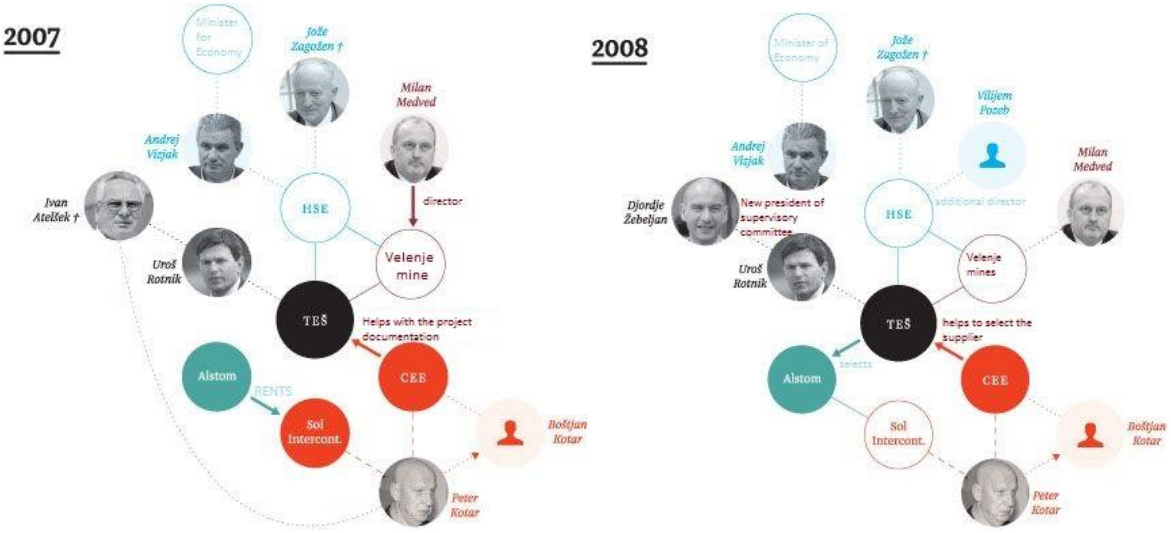
Bribery

The un-transparent manner of dealing with the selection of the suppliers made it possible for dodgy deals to be made under the table. According to information from the Slovenian criminal police, Alstom, the main supplier of equipment for TEŠ6, unduly gained almost €285 mln in the case of TEŠ6[20]. The first step was selection of Alstom as supplier: Alstom's Croatian representative office, Sol Intercontinental, was owned by the same owner as consultancy

[16] http://www.racunovodja.com/go.asp?stran=5121&url=http://www.uradni-list.si/1/content?id=111850#!/Zakon-o-javnem-narocanju-(uradno-precisceno-besedilo)-(ZJN-2-UPB5)
[17] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0017:EN:NOT
[18] http://www.rtvslo.si/gospodarstvo/vizjak-in-krizanic-naj-bi-preprecila-javno-narocanje-v-tesu/348914
[19] ibid. In 2011, Focus with the support of Frank Bold, filed a complaint to the EC on the failure of TEŠ to oblige with the rules for public procurement. This complaint is estimated to be one of the reasons that led the National Review Commission for Reviewing Public Procurement Procedures to finally resolve the question on whether or not TEŠ should be subject to public procurement rules.
[20] http://www.rtvslo.si/crna-kronika/alstom-naj-bi-pri-tes-6-neupraviceno-pridobil-skoraj-285-mio-evrov/348667, http://www.dnevnik.si/kronika/tes-6-kriminalisti-kazensko-ovadili-10-oseb, http://www.finance.si/8811182/Ovadbe-zaradi-Te%C5%A1-6-Kam-je-izpuhtelo-284-milijonov-evrov?&cookie_dialog=1&cookietime=1414141992

company CEE, which received €3 mln provision in a form of 'consultancy contracts' for preparing the tender, review of the offers and similar. A similar story with a sham consultancy contract also happened in 2006, when Alstom was contracted to reconstruct Block 5 in TEŠ, whereby the 'consultants' received €0.365mln[21]. The investigation further reveals that the initial contract with the supplier Alstom was €654 mln, but with annexes it eventually reached €1.18 bln; €166 mln had to be added for montage, €93 mln was added due to escalation clause (TEŠ had to carry the increase in prices of materials) and €25 mln were lost for the reservation of equipment.

Figure 1: Connections in the TEŠ6 deal



Source: http://www.dnevnik.si/posel/novice/tes-6-od-nesojenega-ponosa-do-matere-vseh-afer

Price and caloric value of coal

Another key element of TEŠ6 project is its fuel: coal – or more precisely: lignite. TEŠ6 was promoted as the salvation for lignite mining in the nearby Velenje mine, whereby the links between TEŠ and Velenje mine were always close, even to the extent that they would cross-subsidize each other as needed[22]. The price of coal is one of the key elements of the economics of the project, but so is the energy, contained in the lignite (calorific value). Those two elements moved in the wrong direction after the project was deemed to be a fait accompli.

Change of price

One of the conditions for the state guarantee for the loan from the EIB was that the price of lignite from Velenje mine does not surpass 2.25 EUR/GJ in 2015 and remains in line with the maximum prices, set in the fifth revision of investment programme (up to 2.73 EUR/GJ in 2054)[23]. Bearing in mind that the market prices of lignite are 2.6-2.8 EUR/GJ and the production cost of Velenje mine is 2,.9 EUR/GJ, it becomes obvious that the price upon which the investment was calculated is not realistic[24]. In mid-2014, the miners of Velenje mine went on strike to demand that the price of lignite is fair and covers realistic costs, which would mean 3.25 EUR/GJ instead of the 2.25 EUR/GJ[25]. The end result was signing a contract about a

[21] ibid
[22] http://bankwatch.org/sites/default/files/Sostanj-TES6-economics.pdf, http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf
[23] http://www.mf.gov.si/nc/si/medijsko_sredisce/novica/article/43/1456/, http://www.te-sostanj.si/nip5/index.html
[24] http://www.razgledi.net/2011/03/25/prejeto-samo-neumen-gospodar-vlaga-v-preteklost/
[25] http://www.dnevnik.si/posel/novice/stavka-rudarjev-ekonomika-tes-6-ujeta-v-velenjskih-rovih

different price between the Velenje mine and TEŠ[26], but the price from the agreement remains secret. This is an absurd situation, especially because this price lies at the heart of several contracts of TEŠ (with the EIB and EBRD, with the government of Slovenia). In this situation it is impossible to estimate the effects of the price change on the project, but according to the economic analysis of CE Delft[27] (for more details on the price of coal, see the study), the higher price of coal can significantly impact the economics of the project.

Change of calorific value

Lignite from Velenje mine has a low calorific value: in recent decades the average calorific value ranged from 9-10 GJ/t[28], although some classifications give over 16GJ/t as the average lignite calorific value[29]. The assumed calorific value of the fuel for TEŠ6 was on average 10.46 GJ/t (variations throughout the years show values between just under 10 and 11 GJ/t)[30]. However, just recently the Velenje mine changed the calculation method for the calorific value, which results in a calorific value that is several percentage points lower than the one assumed in investment plans[31]. The change of method is attributed to the fact that recent deliveries of lignite have been more moist, meaning that the calorific value is lower. This fact contributes to the conclusion that it is highly likely that the Velenje mine lignite will not suffice to fuel TEŠ6 until the end of its days, plus the cost of the fuel will increase.

Profits for coal importers?

Warnings have frequently been issued that Velenje mine does not sit on sufficient reserves of lignite to sustain the production of TEŠ6 until the end of its lifetime[32]. Thhis issue was raised loudly by the president of supervisory committee of HSE, Jadranko Medak, in 2011, upon which he was dismissed from his duties at HSE[33]. The lack of lignite in Velenje mine is likely the reason that when the technical parameters of TEŠ6 were designed, they allowed for burning of 6-8% of coal with better caloric value and Alstom was contracted to supply such equipment[34]. The grey eminence of TEŠ6, Ivan Atelšek, saw a business opportunity in this: he tried to persuade Velenje mine to become the official importer for Indonesian coal for Slovenia, but as the Velenje mine management did not agree, another local company, Gorenje, took over the role of official importer (with Ivan Atelšek as long-time manager and member of the supervisory committee). In 2014 it seems that this business opportunity is finally blossoming. Velenje mine cannot produce the promised amounts of lignite due to technical difficulties in one part of the mine. Apart from that, the calorific value of Velenje lignite has been reduced (see above), which means that imported coal is very likely to be needed, amounting to 170,000 – 200,000 t of coal or about €20 mln annually. At the moment there are ongoing guessing games on where the import could come from: the Bosnian Lešljani mine, owned by Swiss company Edelweiss Investment (supposed owner Russian Oleg Burlakov) – which would have to be re-opened for this purpose - or Indonesian coal through Gorenje and Ljubljana-based TETOL. The fact that TEŠ requested a change in its environmental permit of TEŠ6 in autumn 2014 at the Agency for Environment to allow for burning imported coal means that the importers of coal could soon win some profits.

All in all, in spite of 'thoroughly' studying (according to the former director of Velenje mine[35]) the availability of lignite supplies, pushing for efficiency in the mine and adjusting the lignite prices so that they would fit the economic picture of the TEŠ6 project, it has now become clear that the warnings of the experts and civil society were fully justified. The described changes in the price and availability of lignite will play a strong negative role in the economics of TEŠ6.

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[26] http://www.energetika-portal.si/novica/arhiv/2014/07/n/stavka-rudarjev-v-pv-prekinjena-sledi-podpis-aneksa-k-tripartitni-pogodbi-8994/
[27] http://bankwatch.org/sites/default/files/Sostanj-TES6-economics.pdf
[28] http://www.delo.si/clanek/131957
[29] http://www.coalmarketinginfo.com/coal-basics/
[30] http://www.te-sostanj.si/nip5/index.html
[31] http://www.dnevnik.si/posel/novice/uradno-v-tes-6-bi-kurili-tudi-uvozeni-premog
[32] http://zofijini.net/wp-content/uploads/2013/03/Tes6.pdf, http://www.rtvslo.si/gospodarstvo/kopac-o-tes-u-6-ce-ni-premoga-ni-projekta/244309
[33] http://www.dnevnik.si/posel/novice/uradno-v-tes-6-bi-kurili-tudi-uvozeni-premog
[34] http://www.dnevnik.si/posel/novice/uradno-v-tes-6-bi-kurili-tudi-uvozeni-premog
[35] http://www.delo.si/clanek/131957

Price of electricity

Both independent economic reviews[36] that were commissioned by Focus, Greenpeace and CEE Bankwatch show that sales prices of electricity is one of the elements, to which the economics of the project TEŠ6 is very sensitive, yet it is hard to predict. The risk of inability to properly predict the sales price is materializing already at the testing phase of the project[37], revealing that the sensitivity analysis of the investment has several gaps, as the above-mentioned analyses warned.

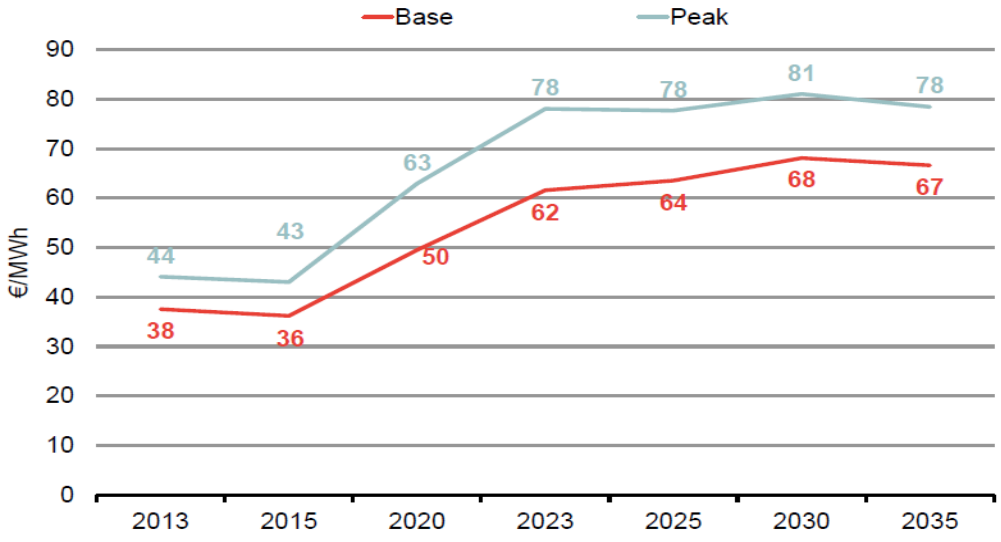
Predicted prices of electricity

The project's investment plans build on predictions for electricity sales prices, carried out by the Slovene Institute Jozef Štefan for the National Energy Program[38], based on which the last publicly available investment plan (Revision 5) sets the sales prices at the level of 63.50 EUR/KWh in 2015 and 150.81 EUR/KWh in 2054[39]. As the prices of electricity in Slovenia are strongly correlated with the prices of EEX[40], it is at the moment more relevant to have a look at what is going on with the prices at EEX.

New developments in wholesale electricity prices

From the peaks in 2008 until the lows in 2012, the prices of the major European wholesale electricity benchmarks decreased by 35–45 %[41]. Apart from the traditional supply and demand, the wholesale prices have started to be significantly influenced by renewables generation, which drives the wholesale prices down[42]. In spite of the current developments, the wholesale prices are expected to rise again (see Figure 2), although they do not reach the TEŠ6 production price until after 2020.

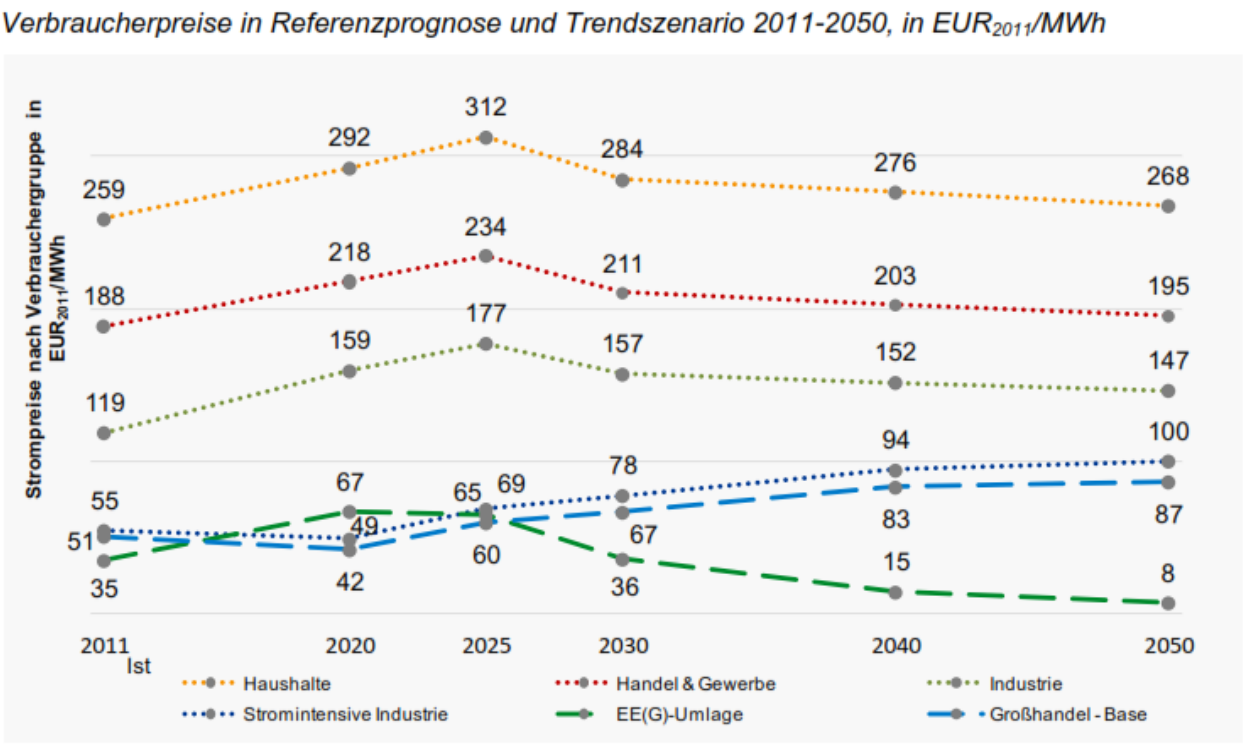
Figure2: Predicted development of sales prices in Germany



Source: Frontier Economics. 2014. Strommarkt in Deutschland – Gewährleistet das derzeitige Marktdesign Versorgungssicherheit?

[36] http://bankwatch.org/sites/default/files/Sostanj-TES6-economics.pdf, http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf
[37] http://www.dnevnik.si/posel/novice/ekonomika-tes-6-se-podira
[38] http://www.mg.gov.si/fileadmin/mg.gov.si/pageuploads/Energetika/Porocila/EB_RS_0626_0.pdf
[39] http://www.te-sostanj.si/nip5/index.html
[40] http://www.elektro-ljubljana.si/portals/0/dokumenti/dokumenti/moj%20paket/moj%20paket%20gibanje%20cen.pdf, http://www.te-sostanj.si/blok6en/files/default/blok6/eng/zgibanka_blok6_ang.pdf
[41] http://ec.europa.eu/energy/doc/2030/20140122_swd_prices.pdf
[42] http://www.renewableanalytics.com/Resources/Upload/Germany_Wholesale_Power_Report_2013/RA-January-2013_Germany-Wholesale-Power-Report.pdf

Figure 3: Price trends 2011-2050



Quelle Prognos/EWI/GWS 2014

Source: Prognos/EWI/GWS 2014

Impacts on TEŠ6

According to the investment programmes, the production price in TEŠ6 is estimated to be 55 – 61 EUR/MWh[43]. The average base wholesale price for 2014 so far has reached 31.4 EUR/MWh[44], which means that if TEŠ6 was on the market now, it would produce a 23.6 EUR/MWh loss. At the planned production level of 3.5 TWh p.a., this means about €82.6 mln loss annually (calculation done with the lower end of estimated production price, 55 EUR/MWh). Should the upper end of the production price estimate be reached because of increase in the price of fuel or the price of CO2 allowances, the loss would increase.

If the upper forecast of the wholesale prices materializes, TEŠ6 might start to operate on a profitable basis only some time after 2020, and even this is uncertain. In this case, the first 4-5 years of its operations would actually be digging a deeper hole into the finances. However, it is not necessary to only look at predicted prices: real market data for EEX futures shows no sign of recovery, as for 2017[45] and 2018[46] the prices remain at the level of 32-35 EUR/MWh. For TEŠ6 this means about €70-80 mln loss annually, if it operates at full power.

Price of financing the project

The costs of financing TEŠ6 are significant: according to the latest publicly available investment programme, they amount to €82 mln[47]. However, only a year before, in 2011's Revision 4, the costs of financing the project were estimated to be over €128 mln.

[43] Revision 5 gives a different price range, as can be seen from Table 3. However, estimates from the latest revision are at the level of 55-61 EUR/MWh.
[44] http://www.ise.fraunhofer.de/de/downloads/pdf-files/data-nivc-/folien-electricity-spot-prices-and-production-data-in-germany-2014-engl.pdf
[45] Argus European Electricity. Issue 14-211 (28 October 2014)
[46] https://www.eex.com/en/market-data/power/derivatives-market/phelix-futures#!/2014/10/29
[47] http://www.te-sostanj.si/nip5/index.html

Manipulation of the price of financing the project

The costs were not miraculously decreased because the project needed fewer loans, but because a significant difference in terms of interest rate risk was adopted[48]. In Revision 4, the loan structure in terms of the nature of the interest rates was as follows:
- 13% of total loans at floating interest rates,
- % of total loans at fixed interest rates.
In Revision 5 the loan structure in terms of the nature of the interest rates is as follows:
- 50.5% of total loans at floating interest rates,
- 49.5% of total loans at fixed interest rates.

The data above shows that the financing costs during construction were mainly lowered due to an increase in the share of loans with a floating interest rate and due to the decline of Euribor rates. The latter experienced a sharp decline from Revision 4 in August 2011 (6 months Euribor rate at 1.82 %) to Revision 5 in September 2012 (6 month Euribor rate at 0.533 %), which contributed significantly to the reduction of the financing cost itself. However, now the risk due to potentially higher future floating interest rates has increased. This manipulation of the financing cost was one part of the reason that the current leadership of TEŠ and HSE named Revision 5 'a falsification'[49]. The consequence of increasing the financing risk due to potentially higher future floating interest rates is that the investment is now seriously exposed to interest rate risk. Risk analysis is not included in the Investment program, but it is possible to observe that the level of the six-month Euribor was at historically low levels at the time of composing the fifth revision of the Investment programme. In the event that the 6 month Euribor rate increases by as little as 1 %, the risk that TEŠ6 exposed itself to with the amended policy for hedging interest rates can significantly exceed the savings generated by the amended policy for hedging interest rates.

Additional burdens for TEŠ6

Apart from this, the project needs to find more capital to finish the investment due to the increase in the total price of the investment. Apart from the EIB's and EBRD's loans (together €750 mln), the investor will increase its share of invested capital from the initially planned €470 mln to €515 mln (€30 mln from HSE and €15 mln from TEŠ), borrow €83 mln from HSE and take an additional €80 mln in loans from commercial banks[50]. At the moment it is not known how much this will increase the cost of financing. A recapitalisation of TEŠ is being discussed as a possible option for servicing the loans[51].

Will consumers and taxpayers pay in the end?

A large part of the €550 mln EIB loan – €440mln – is supported by a state guarantee, which was mandated to TEŠ by less than 1/3 of MPs in mid-July 2012[52]. There were serious reservations about providing the state guarantee[53], yet MPs of all political colours united to support it. Again, the warnings are becoming a reality now and estimates that the guarantee will have to be cashed in are more and more common[54]. Not only that: the key energy actors are designing a new contribution for TEŠ6, which would be paid by all electricity consumers in Slovenia[55]. Slovenia is planning to request participation in the capacity remuneration mechanism (CRM)[56], which would allow an extra charge for end consumers. One analysis

[48] Section based on findings from http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf
[49] http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html
[50] http://www.delo.si/gospodarstvo/podjetja/novelirani-investicijski-program-cena-za-tes-6-nespremenjena.html
[51] http://www.dnevnik.si/posel/novice/nove-tezave-v-velenjskem-rudniku-udarjajo-po-hse
[52] http://www.delo.si/gospodarstvo/makromonitor/dz-podprl-zakon-o-porostvu-za-tes6.html
[53] http://www.sejecas.si/
[54] http://www.rtvslo.si/gospodarstvo/vizjak-in-krizanic-naj-bi-preprecila-javno-narocanje-v-tesu/348914, http://www.rtvslo.si/crna-kronika/alstom-naj-bi-pri-tes-6-neupraviceno-pridobil-skoraj-285-mio-evrov/348667
[55] http://www.rtvslo.si/gospodarstvo/vizjak-in-krizanic-naj-bi-preprecila-javno-narocanje-v-tesu/348914, http://www.rtvslo.si/crna-kronika/alstom-naj-bi-pri-tes-6-neupraviceno-pridobil-skoraj-285-mio-evrov/348667, http://www.dnevnik.si/posel/novice/na-poloznicah-ze-kmalu-dodatek-za-tes
[56] The final decision on participating in CRM is in the hands of the Slovene finance ministry and infrastructure ministry, but an Energy law revision would be needed before that can happen. http://www.dnevnik.si/posel/novice/na-poloznicah-ze-kmalu-dodatek-za-tes

reveals that the 'surcharge for TEŠ6' would bring over EUR30 mln revenue per year. This would be used to fill the gap of TEŠ6 losses and through this the end consumers would fill the financial holes of the TEŠ6 project[57].

Price of CO2 allowances

As with the wholesale prices of electricity, there is a high degree of uncertainty about the fluctuation of emission credit prices in the future. The economics of TEŠ6 is highly sensitive to the fluctuation of allowance prices and their influence on variable costs. The last publicly available investment programme (Revision 5), basing CO2 allowance prices on the Slovene projections, concludes that only a 20% rise in the prices of allowances would represent a too big shock for the finances of the project, whereas all other scenarios would not harm the project[58]. However, further sensitivity analysis shows that project is actually quite vulnerable, if the projections of the EC (from the Energy Roadmap) are used: analysis shows, that for five different scenarios and with consideration of two different discount rates (7 % and 9 % discount rate, the latter being stipulated by the sectoral policy for the energy industry in Slovenia), the net present value of the project remains negative in all cases[59].

Table 4: Sensitivity analysis regarding different emission credit prices at two different discount rates

Scenario	NPV considering a 7 % discount rate (million EUR)	NPV considering a 9 % discount rate (million EUR)
Scenario no. 1	-44.707	-179.979
Scenario no. 2	-521.722	-528.038
Scenario no. 3	-379.743	-416.814
Scenario no. 4	-921.458	-778.604
Scenario no. 5	-667.853	-607.539

Source: http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf

So far the movements in the CO2 market have been very favourable for the project, yet in combination with the low sales price, the project still produces a loss.

Employment

One of the key arguments for construction of TEŠ6 was that it would enable long-term employment in the Šaleška valley, which would face a social disaster if TEŠ6 would not employ people. Numbers amounting to as many as 3500 long-term jobs were cited in presentation brochures of TEŠ6[60]. However, the investment programmes were more realistic in the employment field, as they consistently quoted a figure of 200 long-term workplaces (until 2054)[61]. Unfortunately this was a fact that not many people were familiar with.

Recently, in October 2014, the management of TEŠ announced its plans to optimize the functioning of TEŠ: reorganization of the company would ensure that half – 226 of the current 452 – employees are laid off[62]. Although the investment plans show only 200 jobs in TEŠ in the long run, this is only planned from 2028 onwards; in 2014 and 2015 it is planned that TEŠ

[57] CRM is meant to support new production units, in which investors are reluctant to invest because of current electricity market movements. As the TEŠ6 promotoes have always presented the project as 'profitable', this mechanism will not be applicable for TEŠ6. However, it is likely that TEŠ and HSE will try to enlist unit 5 of TEŠ on the list for CRM and use unit 5 to cover the financial holes of TEŠ6. http://www.dnevnik.si/posel/novice/na-poloznicah-ze-kmalu-dodatek-za-tes
[58] http://www.te-sostanj.si/nip5/index.html
[59] http://www.focus.si/files/programi/energija/2012/EXPERT_OPINION_AIP5.pdf
[60] http://www.te-sostanj.si/blok6/files/default/blok6/broura_b6.pdf
[61] http://www.te-sostanj.si/nip5/index.html
[62] http://www.delo.si/gospodarstvo/podjetja/zagon-bloka-6-delavci-na-cesto.html

would still employ 450 and 400 people respectively[63]. Apart from jobs in TEŠ, also the jobs in Velenje mine, which should have been 'protected' by the construction of TEŠ6, are under question[64]. In this aspect we can again see that economic reality is harsher that the perfectly painted employment picture for the Šaleška valley in the period when construction of TEŠ6 was planned.

Costs that are not accounted for

As in many fossil fuel projects, there are many costs that are not included properly in the economic picture of the project. This section focuses on only two such cost categories, health costs and CCS costs.

Health costs

Coal-fired power plants are among the worst sources of toxic air pollutants in the EU and globally. Acid gas, soot and dust emissions from coal are the biggest industrial contributors to microscopic particulate pollution that penetrates deep into the lungs and into the bloodstream. The pollution harms the health of babies, children and adults, causing heart attacks and lung cancer, as well as increasing asthma attacks and other respiratory problems. Toxic metals such as mercury, lead, arsenic and cadmium are spewed out of the stacks, contributing to cancer risk and harming children's development. However, governments are failing to assess these health risks and properly present them to the public when deciding on the continuation of coal burning in their countries.

In the past years many new reports on health impacts of burning coal have been published, coming from a varied group of authors – institutes, health organisations, environmental groups etc[65]. Greenpeace's Silent Killers[66] report estimates that pollution from coal-fired power plants in the EU resulted in thousands of premature deaths, shortening the lives of Europeans by an estimated total of 240,000 lost life years in 2010. In countries with heavy coal use, the results indicate that more people are killed by coal than in traffic accidents. HEAL's report[67] offers the first-ever economic assessment of the health costs associated with air pollution from coal power plants in Europe, revealing that over 4 million working days are lost each year and the overall economic costs of the health impacts from coal combustion in Europe are estimated at up to €42.8 billion per year. Adding emissions from coal power plants in Croatia, Serbia and Turkey, the figures for mortality increase to 23,300 premature deaths, or 250,600 life years lost, while the total costs are up to €54.7 billion annually.

Greenpeace in Slovenia checked the health costs of TEŠ6 in its report the Social Cost of Energy from Šoštanj[68]. The key finding is that the operation of TEŠ6 will cause on average 33 deaths annually and cost the national economy up to 242 mln annually, which means about €6.7-9.7 bln over 40 years of operation. Of course, this cost is not included in the economic picture of TEŠ6. This is about five fold the current investment cost and will represent a burden for Slovene tax payers as the health system will have to carry the cost.

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[63] http://www.te-sostanj.si/nip5/index.html
[64] http://www.dnevnik.si/mnenja/komentarji/mora-za-drzavo-in-sanje-trgovcev-s-premogom
[65] To list a few:
Silent Killers - Why Europe must replace coal power with green energy (Greenpeace, June 2013)
The report investigates the health impacts of each of the 300 operating large power plants in the EU, as well as the predicted impact of the 50 new projects if they come online. Using a sophisticated health impact assessment model, the report estimates that pollution from coal-fired power plants in the EU resulted in thousands of premature deaths, shortening the lives of Europeans by an estimated total of 240,000 lost life years in 2010. In countries with heavy coal use, the results indicate that more people are killed by coal than in traffic accidents. Full report: http://www.greenpeace.org/international/Global/international/publications/climate/2013/Silent-Killers.pdf
The Unpaid Health Bill - How coal power plants make us sick (HEAL, March 2013)
The report provids an overview of the scientific evidence of how air pollution impacts health and how emissions from coal power plants are implicated in this. It presents the first-ever economic assessment of the health costs associated with air pollution from coal power plants in Europe. Full report: http://www.env-health.org/IMG/pdf/heal_report_the_unpaid_health_bill_-_how_coal_power_plants_make_us_sick_finalpdf.pdf
Revealing the costs of air pollution from industrial facilities in Europe (European Environment Agency, November 2011)
The report assesses the damage costs to health and the environment resulting from pollutants emitted from industrial facilities.
Full report: http://www.eea.europa.eu/publications/cost-of-air-pollution
[66] http://www.greenpeace.org/international/Global/international/publications/climate/2013/Silent-Killers.pdf
[67] http://www.env-health.org/IMG/pdf/heal_report_the_unpaid_health_bill_-_how_coal_power_plants_make_us_sick_finalpdf.pdf
[68] www.greenpeace.org/slovenia/Global/slovenia/Dokumenti/Poro%C4%8Dilo%20kon%C4%8Dno%20s%20hiperlinki.pdf

CCS costs

TEŠ claims that TEŠ6 is CCS ready[69]. This is still being legally challenged in Slovenia, but economically speaking, CCS readiness is also challenging. Although most estimates of the CCS costs are reluctant to give concrete figures, claiming that the price is related to the used technology, the local situation etc., the available information shows a cost of 18-72 EUR/t CO2[70]. If CCS becomes obligatory anytime within the lifetime of TEŠ6, this would mean an additional cost of between €56.7 – 226.8 mln per year, which is not included in the economic picture at all.

Conclusions on TEŠ6

In August 2014 the media reported that the auditors of the Annual Report of HSE (owner of TEŠ) have for the first time ever expressed reservations in their opinion about the Annual Report[71]. This is the first time that an external audit warns that TEŠ6 could cause trouble for the whole HSE group: because of the holes in the TEŠ6 project, TEŠ will not be able to pay back its loans, which will burden HSE. There are three key ingredients for the concern of the revisers (Deloitte):
- TEŠ did not comply with the commitments, given to the banks that lent money for TEŠ6, mainly in regard to the promised relationship between debt and cash flow, which increases the risk of cashing in the guarantees that HSE gave to TEŠ.
- The sales price of electricity is lower than the production price of TEŠ6.
- The price of lignite will not be at the planned level of 2.25 EUR/GJ, but significantly higher, which will adversely affect the economics of the TEŠ6 project.

This warning, although it comes too late to significantly change the course of the project, summarizes very well the warnings that civil society and economists were voicing when it was still possible to cancel or at least drastically change the project. Coal or lignite project doesn't make a profitable business, especially when many 'advisors' are feeding on the project.

Environmentally speaking, TEŠ6 was a disastrous idea, especially taking into account the need to abandon fossil fuels to limit the consequences of climate change. Operating TEŠ6 without carbon abatement will result in emissions of 3.1mtCO_2 a year in 2030 and 2.1mtCO2 in 2054[72]. This is not in line with the European Roadmap for moving to a competitive low carbon economy in 2050, which projects the power sector to achieve 54-68% reductions by 2030 and almost zero emissions by middle of century[73].

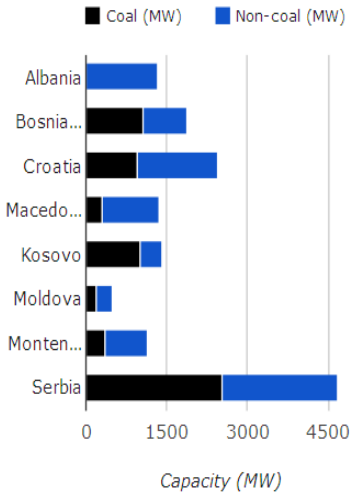
However, economically speaking this project also does not make sense. Although there are still numerous uncertainties, it seems that the first few years of operation will result in annual losses of €70-80 mln and only as late as some time after 2020, the project may create a positive balance from operations. As about one third of the investment value is supported with a state guarantee for a loan from European Investment Bank, this estimate brings gloomy predictions on the necessity to cash in the state guarantee, which basically means that the taxpayers in Slovenia will have to pay for the project, which was managed poorly from the beginning and of which only now the complex net of connections and relations is starting to be disentangled by the police. One of the key problems is that the state guarantee was given without being backed up by availability of funds in the state budget, so it is not clear what will happen if the state guarantee has to be cashed in.

[69] Elektroinštitut Milan Vidmar. 2009. Poročilo o vplivih na okolje izgradnje bloka 6 v TE Šoštanj. (Environmental Impact Assessment for TEŠ6)
[70] http://www.globalccsinstitute.com/publications/costs-ccs-and-other-low-carbon-technologies
[71] http://www.dnevnik.si/posel/novice/hse-zaradi-tes-6-prvic-pridrzek-revizorjev-
[72] http://www.te-sostanj.si/nip5/index.html
[73] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52011DC0112&from=EN

Why is TEŠ6 experience relevant for other countries?

According to Bankwatch figures[74], almost half of the planned new electricity generation capacities in the Western Balkans are planned to come from coal. Major new investments are planned, for example 2 540MW in Serbia (see Figure 4 for details) and if the economics of these investments is planned in a manner similar to TEŠ6, these projects will make a hole into public finances that generations to come will have to fill.

Figure 4: Share of coal in planned generation capacity, figures for 2012-2030



Source: Energy Community

Although Slovenia has always been perceived as the most progressive part of Yugoslavia and economically most advantageous country in the Balkans, the TEŠ6 case dispels this picture. TEŠ6 shows that even Slovenia is prone to corruption and how a whole country can become a hostage to a lobby group, whose interests are imposed over a net of actors in the energy sector and political arena.

Market integration

In addition to the corruption and poor planning that plague the TEŠ6 project, Western Balkan governments must also take into account the fact that the regulatory environment is changing fast and that raising standards makes coal less economically attractive than it seemed previously.

One of the most obvious examples is the need to comply with EU legislation on industrial emissions. In October 2013 the Energy Community Ministerial Council decided that new electricity generation plants need to comply with certain provisions of the EU Industrial Emissions Directive (IED) by 2018, including on limiting emissions of SO2, NOx and dust. This means that any plant now planned that will enter operation after 1 January 2019 needs to comply with the IED. Some governments have taken this into account and changed their project plans but most have not treated the change seriously and re-examined whether the economics of the plants still make sense.

Another issue is climate change: the countries of the Energy Community do not yet have CO2 emissions reduction targets or any measures to reduce emissions such as emission trading or carbon taxes. Future changes in this area will certainly impact on projects planned now, as a coal plant's lifetime is generally around 40 years.

Environmental legislation is not the only change which will affect the viability of investments. Energy Community members must comply with EU state aid provisions which regulate their ability to hand out subsidies for fossil fuels, make long-term power purchase agreements or give state guarantees.

In spite of this uncertain future, governments in the Western Balkans all have ambitious plans to invest in new generation capacity, with most of them aspiring to become net electricity exporters (only Bosnia and Herzegovina is already one). Considering the drop in demand for imports in recent years in potential markets such as Italy, Greece and Germany, as well as the fact that other nearby countries such as Bulgaria and Romania already export electricity, this may prove to be a very risky strategy.

All in all, with such an uncertain future ahead, southeast European governments would be well-advised to take a step back and plan for smaller, more decentralised electricity generation facilities that carry fewer risks than projects like TEŠ6, which may seem modest on a global

[74] http://bankwatch.org/campaign/coal

level but have the potential to destabilise smaller economies.

Corruption

A recent look at the Western Balkans region from the perspective of corruption in energy cases[75], reveals a notable level of corruption, which 'has driven reputable investors away and raised costs. It has also meant reduced opportunities for sustainable energy development, by wasting resources, distorting markets, diverting public interest towards private interests, biasing decision making against rational-sustainability criteria and in favour of vested interests.'

Slovenia has been considered a country where corruption cannot find a favourable environment. However, the perception is proven wrong, not only by the TEŠ6 case, but by many others[76] (among them a former prime minister charged with arms deal participation[77]). Corruption played an important role in the rise in costs of the TEŠ6 project and in the Western Balkans the story could easily be repeated in cases of coal power plants. The end result of dodgy deals is normally that the taxpayers and energy customers have to pay to clean up the mess.

[75] http://bankwatch.org/sites/default/files/SEE-energy-corruption.pdf
[76] http://podcrto.si/dosje/nezakonito-poslovanje-obcin/, https://www.kpk-rs.si/upload/t_datoteke/Ocena_stanja_korupcije_v_RS.pdf, http://www.sta.si/en/vest.php?s=a&id=2075096, http://www.eubusiness.com/news-eu/parliament-britain.96h
[77] http://www.bbc.com/news/world-europe-22781752, http://en.wikipedia.org/wiki/Patria_case