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Reaction to comments HSE

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HSE Group falsely claims that FOCUS and CE Delft have misled the public in their report (CE, 2011)¹. HSE Group has raised a number of issues in a press release, dated November 29th, 2011. None of these issues has a material impact on our main finding that the Internal rate of return of Unit 6 is less than the required 7% (law) or 9% (government policy). We therefore object strongly to HSE Group's accusations.

In this statement, we respond to HSE's criticism, as far as it concerns the major results of our study: the decrease of the IRR by methodological mistakes and unsubstantiated claims.

Methodological mistakes in HSE's Investment Plan 4 as identified by CE Delft

1. The major methodological mistake which CE Delft has identified in HSE's Investment Plan 4 is that the cost price of lignite is too low. The reason is that income of subsidiary companies should not have been included in the cost price calculation.

In their press release, HSE Group provides the counterargument that the lower price of coal in the future is a compensation for the higher price in the past due to restructuring activities.

HSE's counterargument makes no sense from an economic perspective. Only costs that can be attributed to the production of lignite should be included in the cost price, as well in the past as in the future. The counterargument only emphasizes that HSE has neglected fundamental basics for cost price calculations.

HSE also states that a price increase to 2.62 €/GJ does not result in a cost increase of € 50 mln to € 70 mln. We agree. However, our calculations are based on an € 11 million cost increase. We regret a textual mistake from our side which suggests that the cost increase would be higher. A cost increase of € 50 mln to € 70 mln would have a dramatic effect on the profitability of the plant. It was intended to state that the original costs of € 50 mln to € 70 mln would be increased by € 0.5 mln to € 11 mln. We repeat that this textual mistake has no influence on the results, as the correct numbers have been included in our calculations. The decrease of income can be seen in the figure in Paragraph 3.2, which are the basics for our calculations.

2. The second methodological mistake which CE Delft has identified in HSE's Investment Plan 4 is that there is an unjustified increase of the efficiency of the power plant.

¹ CE Delft (2011) A critical examination of the investment proposals for Unit 6 of the Sostanj Power Plant. Sander de Bruyn, Geert Warringa, Maarten Afman, Harry Croezen, Delft 2011.

In their press release, HSE's counterargument is: *" The efficiency of conversion of coal into heat energy is not increased, but by 2028 it is intended that on limited scale block 5 thermal station will be operating, which has significantly lower thermal efficiency than unit 6. This is the reason that the consumption of coal, despite the identical heat production, will fall after 2028."*

However, HSE's own Investment Plan 4 does not support HSE's counterargument. Data in the Investment Plan indicate that the specific conversion efficiency is improving after 2030, which is *after* Unit 5 will have been phased out.

The following tables show our calculations in more detail:

Year		2015	2020	2025	2030	2035	2045	2054	
Electricity produced by Unit 6 (table 13.3)	A	3529.3	3529.3	3529.3	3598	2998.3	2398.7	2398.7	GWh/y
Heat produced, total (table 13.3)	B	416	416	416	432	432	432	432	
Heat produced, by Unit 6 (table 13.3)	C	352.5	352.5	352.5	432	432	432	432	GWh/y
Heat produced, by other units (table 13.3)	D	64	64	64					GWh/y
Coal consumption, Unit 6, electricity (table 13.4)	E	2928	2928	2928	2870	2370	1870	1870	kt/y
Coal consumption for heat, total (table 13.4)	F	127.6	127.6	127.6	129.7	129.7	129.7	129.7	kt/y
Coal consumption, Unit 6, total (table 13.4)	G	2928	2928	2928	3000	2500	2000	2000	kt/y

		2015	2020	2025	2030	2035	2045	2054	
Conversion efficiency coal -> heat	H=F/C				0.300	0.300	0.300	0.300	kt/GWh
Coal for heat produced in Unit 6 (calculation for 2015-2025)	I=H*C	105.8	105.8	105.8	129.7	129.7	129.7	129.7	kt/y
Coal for electricity in Unit 6	J= G-I	2822.2	2822.2	2822.2	2870	2370	1870	1870	kt/y
Conversion efficiency coal -> electricity	J/A	0.800	0.800	0.800	0.798	0.790	0.780	0.780	kt/GWh

For the years after 2030, the only unit operational will be Unit 6 according to the financial information from the IP4. Dividing row F by row C shows that the conversion efficiency from coal to heat is at 0.300 kt/GWh. This is kept constant to be able to calculate the coal usage for heat from Unit 6 in the years 2015-2027 (row I). The coal usage for electricity is derived in row J. Note, that row E from table 13.4 specifies a higher coal use for electricity in Unit 6, but clearly in the years 2015-2027 in the IP4

the value should be taken to include coal for heat, whereas after this year, it is only the electricity part.

Having derived the coal usage for electricity, the specific conversion efficiency is improving after 2030. This has nothing to do with the phasing-out of Unit 5, which happens before 2028 according to the IP4 (Table 13.3). If TES plans to keep Unit 5 longer in operation, also for the years after 2028, this is new information to us and not found in the investment plan. We point out here that the use of an old brown-coal fired power unit for heating purposes solely is not energy-efficient and very obsolete from an environmental point of view.

- CO₂ costs have, according to TES, correctly been calculated, including auctioned allowances for heat and the desulphurization unit. According to TES, chapter 13.1 clearly states that these costs have been included from 2015 onwards. Furthermore, according to TES, this could be easily calculated if we divided the cost of CO₂ from Annex 3 with the price of the coal from Table 13.5 in IP4. This is a very strange statement, as if one could calculate the CO₂ prices from the *price* of coal(!). Probably, TES implies that the CO₂ costs could be calculated by the physical consumption of coal. However, if we undertake this exercise, and assume that TES statement that the CO₂ emissions from heat generation and the desulphurization unit have been included in the cost calculations, we see a serious underestimation for the true costs of CO₂ of the unit for all years of operation of the Unit 6. The following table gives this result.

	Unit	2015	2020	2025	2030	2035	2040	2045	2050
Stated coal consumption Unit 6	A 1000t	2928	2928	2928	3000	2500	2000	2000	2000
Stated oil consumption Unit 6	B t	1392	1392	1392	1392	1392	1392	1392	1392
CO ₂ emissions	t	3153612	3153612	3153612	3229644	2701644	2173644	2173644	2173644
From coal	t	3091968	3091968	3091968	3168000	2640000	2112000	2112000	2112000
From desulphurisation unit	t	57190	57190	57190	57190	57190	57190	57190	57190
From oil	t	4454	4454	4454	4454	4454	4454	4454	4454
% Free CO ₂ allowances		1,4%	0,5%	0%	0%	0%	0%	0%	0%
CO ₂ emission prices	€	22,3	24,9	28,8	34,6	41,5	49,7	59,6	71,4
Stated CO ₂ costs	1000 €	68823,8	78070,6	90806,4	111738,2	111575,4	106956,3	128160,5	153568,4
Real CO ₂ costs calculated	1000 €	69324,9	78160,9	90824,0	111810,3	112118,2	108030,1	129440,5	155111,3
Methodological error	1000 €	-501,1	-90,3	-17,6	-72,1	-542,8	-1073,8	-1280,0	-1542,9

In these calculation we compare the stated consumption of coal and oil, and multiply these with the emission factors of 1.056 kg CO₂/kg coal and an emission factor of 3.2tCO₂/t oil. This gives the CO₂ emissions in t where the process related emissions from the desulphurization unit have been included as stated in the IP4. When we multiply these emissions with the CO₂ emission prices from the IP4, and the assumed amount of free allowances from the IP4, we see that the expanses for CO₂ emissions have been underestimated for all years, most remarkably for the years after 2040. Between 2020-2030, the difference is very small and could probably be attributed to rounding errors, but for the other years the differences are quite substantial

Unsubstantiated claims in HSE's Investment Plan 4 as identified by CE Delft

Next to the methodological mistakes CE Delft has also observed unsubstantiated claims that have a significant impact on the IRR:

1. The first unsubstantiated claim which CE Delft has identified is that the cost price of lignite will be lower in 2054 than today's cost price (because of an unsubstantiated efficiency increase of the mine). Considering economic growth, raising wage levels and decreasing output of the mine, an increasing price is more likely. HSE has not responded to this observation.
2. The second unsubstantiated claim which CE Delft has identified is that HSE will be able to sell an additional 1.000 GWh of electricity. The reaction of TES is that non-production of Unit 5 does not change the economics of Unit 6 in any case, since the economics of investment is only calculated for Unit 6. We disagree with this statement. Non-production of Unit 5 should clearly be included in the economics, as they can be classified as opportunity costs directly related to the investment of Unit 6. HSE also claims that Unit 5 operates at break-even, i.e. that the costs are equal to the revenues. If this is correct, this is a satisfactory substantiation of HSE.

HSE has also responded to our observation that they have not adhered to the EU guidelines for Cost-Benefit Analysis (CBA). According to HSE, TES carried out many studies before the time of investment, in which alternative variants have been considered, apparently including all welfare effects. As we have not seen these studies, we are not able to comment on it. However, the statement (written in the IP4) that the IP4 adheres to the guidelines of CBA, is still not valid.

Conclusion

In a press release HSE has responded to our report that FOCUS and CE Delft have drawn false conclusion and misled the public. Most of the counterarguments HSE provides are clearly incorrect. The most obvious and important methodological mistake is that the lignite price is too low due to unjustified inclusion of income of subsidiaries. The counterargument is not satisfactory and only emphasizes the methodological mistake. The unsubstantiated claim of increasing mine efficiency has still been unanswered yet. Concerning the extra market output, HSE have substantiated the claim satisfactory, as far as Unit 5 does actually not result in opportunity costs. The argument that Unit 5 should not be involved in the investment economics anyhow, is another clear methodological mistake of HSE.



The publication 'A critical examination of the investment proposals for Unit 6 of the Sostanj Power Plant', can be downloaded from the following website:
http://www.cedelft.eu/publicatie/a_critical_examination_of_the_investment_proposals_for_unit_6_of_the_%C5%A0%C5%A1tanj_power_plant/1205