

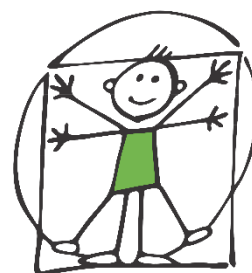
CENTAR ZA ŽIVOTNU SREDINU/CENTER FOR ENVIRONMENT

ECONOMIC ANALYSIS

of the document

Study on the economic feasibility of the construction and operation of the Gacko II power plant, capacity 350 MW, in the Gacko municipality, with elements of environmental protection

(Feasibility study)



**Centar za
životnu sredinu**

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INTRODUCTION

The basic aim of this analysis is to establish the validity of the economic parameters and conclusions drawn in the *Study on the economic feasibility of the construction and operation of the Gacko II power plant, capacity 350 MW, in the Gacko municipality, with elements of environmental protection*¹ (hereinafter referred to as the Study), carried out by the *Institut za građevinarstvo „IG“ Banjaluka Poslovni centar Trebinje* in February 2016 for the needs of the investor *MH Elektroprivreda RS MP a.d. Trebinje – ZP RITE Gacko a.d. Gacko*.

Considering that the Study in question was carried out, methodologically speaking, in line with the legal requirements and that the methodology used generally corresponds to the rules of the profession, the subject of this analysis is the validity of the input parameters used in the Study, and consequently, also the validity of the conclusions drawn on the basis of these. The analysis is limited to exclusively financial and economic effects, from the perspective of the investor, and of the wider society, and does not include an assessment of the technical-technological, spatial or other aspects which were dealt with in the Study in question.

The intention is that this analysis serves as a basis to open a serious public discussion in Republika Srpska about the economic reality, needs, impacts and justifiability of building the Gacko II power plant.

The positions, conclusions and recommendations laid out in this analysis represent solely the personal opinion of the author and do not reflect the positions of the Center for Environment, nor any other participant or actor connected to this issue.

1 Original title: Studija ekonomske opravdanosti sa elementima zaštite životne sredine za izgradnju i korišćenje „Termoelektrane Gacko II“ snage 350 MW na području opštine Gacko (Feasibility study)

Basic characteristics of the Gacko II power plant construction project

The Study which forms the subject of this analysis was carried out in order to obtain a concession for the construction and operation of Gacko II power plant with a nominal capacity of 350 MW, which is to be a replacement for the existing Gacko I and would rely on existing natural resources in the Gacko municipality.

ZP RITE Gacko a.d. Gacko is named in the Study as the project promoter, or investor, (1 - p.9) while the whole project is considered to be a so-called greenfield investment, in other words completely independent of the investor's current and future business, which cannot be considered methodologically correct. If the investor will really be ZP RITE Gacko, which would be logical considering the location of the planned investment, then it would be methodologically correct to consider the project and its effects within the framework of the investor's future business, especially as Gacko II is planned as a replacement power plant. Of course this approach would open up a whole range of questions for example about the economic and financial suitability of the investor, considering that RITE Gacko has generally operated at a loss and unprofitably in recent years. Questions would also arise about bearing the costs of closing the existing power plant at the end of its operational lifetime and the costs of taking care of the excess of workers, which would certainly significantly negatively impact the economic, financial and social feasibility of the realisation of the new power plant.

The Study foresees that the total lifetime of the Gacko II project is 45 years: 1 year for the project preparation, 4 years construction, 25 years operation and 15 years operation after rehabilitation (1 - p.396).

The total investment is planned to amount to BAM 1,625,185,949 or over EUR 800 million (1 - table 11.1. p.412), with the following structure:

Investment structure for Gacko II power plant

<i>Description</i>	<i>Sum in BAM</i>	<i>%</i>
Land, preparation and primary infrastructure, depot	48,398,101	2.98
Building works	344,937,890	21.22
Equipment	581,923,713	35.81
Founding investment	41,734,074	2.57
Project reserves	15,254,907	0.94
Permanent working capital	11,013,551	0.68
Total until replacement	1,043,262,236	64.19

Replacement equipment after 25 years	581,923,713	35.81
TOTAL	1,625,185,949	100.00

Here it is interesting to note that the Study authors have foreseen the total reserves for the project at under 1% of the investment costs, or at 1.5% of the investment in the fixed assets in the first phase, while for the rehabilitation phase, no reserves are foreseen in the total investment costs. The project reserves represent a sum which is foreseen for possible additional spending in the investment period due to unforeseen or additional costs. If the project reserves were calculated at the usual standard of 3%, this would increase the total investment costs in the project by BAM 33,500,671 and would definitely put the whole project into the zone of unfeasibility, considering that the net present value of the project (NPV) according to the Study (1 - table 11.1. p.413) is only BAM 20,104,039. Among other things, the sensitivity analysis carried out in the Study shows that a rise in investment costs of 5% brings the whole project into the zone of unfeasibility, considering that the NPV of the project would in this case be negative, amounting to BAM -24,514,638 (1-table 11.1. p.413).

Financing the construction of the Gacko II power plant is shown by means of two scenarios (1 - p.21):

- a) In the first (basic) scenario, the construction would be completely financed through loans;
- b) In the second scenario, 75% of the construction would be financed through loans, and the remainder from internal sources.

In both scenarios, replacement of the equipment after 25 years is foreseen as being financed from the investor's internal sources, ie. accumulated profit and depreciation.

Considering the economic and financial situation at RITE Gacko and MH Elektroprivreda RS, the second scenario is clearly completely unrealistic because neither company has the means to part finance the investment from its own resources.

The financial construction in the first scenario foresees 100% loan financing, as follows:

Financing structure for Gacko II power plant

<i>Description</i>	<i>Sum in BAM</i>	<i>%</i>
Long-term loan	886,772,901	85.00
Medium-term loan	156,489,336	15.00
TOTAL	1,043,262,237	100.00

It is planned to take the long-term loan for 20 years with a 4-year grace period and an interest rate of 3% annually. The medium-term loan is assumed to be taken for 15 years without a grace period, and with an annual interest rate of 5%.

Considering the financial state of the investor, either MH Elektroprivreda RS or the budget of Republika Srpska will need to be a guarantor, which, if the planned economic effects are not realised, may represent an exceptionally large financial burden for the guarantor and may call into question also the guarantor's operations.

Expected effects of the project

In addition to the parameters mentioned in the previous section, the expected impacts of the Gacko II project are calculated on the basis of the following assumptions:

- a) that 100% of the electrical energy generated in the Gacko II power plant will be sold on foreign markets and only exceptionally on the domestic market;
- b) that the sales price per MWh will be EUR 50 for export and BAM 38.90 for domestic sales (1 – p.11);
- c) that the coal used in Gacko II will be supplied from the existing mine at a price of BAM 26.73/tonne;
- d) that the total annual generation of electricity for sale from Gacko II will be 2,252,456 MWh (1 – p.413);
- e) that altogether 180 workers will be employed at Gacko II, with average net pay of BAM 1067 (1 – p.414);

On the basis of the parameters provided, a static and dynamic assessment of the project has been carried out, which includes a financial and socio-economic (Cost-benefit) assessment, according to which the project is economically and socially feasible and profitable, and is liquid throughout its entire lifetime of 45 years (1 – chapter 11).

During its whole lifetime, Gacko II thereby operates profitably, achieving an after-tax profit of more than BAM 40 million annually, with the assumption that all electrical energy will be sold as exports at the aforementioned price of 50 EUR/MWh (1 – chapter 11).

Balance for Gacko II – 11th year (1 - p.432 and p.433)

<i>Description</i>	<i>Sum in BAM</i>
Income from sales of electrical energy	220,271,026
Income from sales of heat energy	3,495,332
Income from sales of dry ash	810,238
TOTAL INCOME	224,576,596
Costs of coal supply	63,406,547
Other direct material costs	7,842,204
Gross workers' pay	3,870,720
Costs of production services	11,303,894
Depreciation	38,430,342
Non-material costs without	

bill for contributions for CO ₂ emissions	12,030,131
Financial costs	36,658,984
TOTAL EXPENSES	173,542,822
Pre-tax profit	51,033,774
Tax on profit 10%	5,103,377
NET PROFIT	45,930,397

The internal rate of return of the project, formulated in this manner, amounts to 8.19%, and the NPV of the project is positive and amounts to BAM 20,104,039 (1 - p.413).

In the socio-economic analysis, only positive impacts are calculated, without taking into account potential harm for society, for example impacts on health or the opportunity costs of the spent resources, so it is therefore concluded that the socio-economic impacts of realising the project are positive.

An analysis was carried out within the framework of the Study to assess the sensitivity of the project to changes in total income, changes in investment costs and changes in direct costs. All the sensitivity analyses show that the project is exceptionally sensitive to changes in the parameters of 5%, as any reduction of income by 5%, increase of investment costs by 5% or increase of direct costs by 5% brings the project into the zone of negative NPV and therefore unprofitability (1 - p.413 and p.414).

For the aforementioned reasons it is clear that the Gacko II project is on the edge of profitability and that a positive assessment of its success rests entirely on the realism of the input parameters for the calculation. We will deal with this issue in the remainder of the analysis.

Analysis of the project's input parameters

The chosen model of supply of basic raw materials, ie. coal, and the price used in the calculation, represents one of the basic parameters crucial for the assessment of the economic, social and financial effects of building the Gacko II power plant.

Even with careful reading of the study, the author of this analysis was not able to clarify how the supply of coal for the new Gacko II power plant is foreseen for the period which overlaps with the operational lifetime of the existing RITE Gacko plant. The study mentions that the capacity of the mine is aligned with the needs of RITE Gacko, so it is unclear how the existing mine will double coal production during the period of parallel operation of the two plants, nor are the effects of additional investment and employment in the mine calculated in the Cost-Benefit analysis. An additional dilemma is presented by the fact that it is not explained anywhere whether the mine will continue operating as an independent business after the closure of the Gacko I power plant or whether it will become part of the Gacko II structure, as all projections on employees and their costs over the whole economic lifetime of the new plant are based on 180 workers. **The dilemma is all the more so as the Study mentions that coal will be procured at cost price (1 – p.433), and not at sales price, which does not make sense unless the mine is within the structure of the power plant, as no business should operate without a profit.**

There is even greater confusion in the study about the price assumed for the coal needed by Gacko II. On p.237 of the Study (1), it says that in the basic model a lignite price of 2.25 EUR/GJ or 18.225 EUR/tonne will be used (BAM 36.65 per tonne), yet in the calculation of financial and economic effects of the project, a price of 1.69 EUR/GJ or BAM 26.73 per tonne (1 – p.424) was used, ie. a price 27% lower than that which would be realistic. Data from the auditor's report for RITE Gacko (2) also support the fact that the coal price used for the calculation is unrealistic, as it can be seen that in 2015 the mine incurred losses of as much as BAM 12,544,416 supplying the existing plant with coal at an internal price of BAM 27.39 per tonne, and that the mine would operate at zero if it supplied coal at a price of BAM 32.34 per tonne.

It is therefore completely realistic to suppose that the real price of coal procured for Gacko II would need to be BAM 36.65 per tonne, as it is indeed stated that it will be on p.237.

If we apply this price of coal to the calculation and the projections in the Study, the costs of coal supply would rise from an unrealistic BAM 63,406,547 annually to a realistic BAM 86,937,895, ie. they would be higher by 37% or by BAM 23,531,348 annually. This would decrease the net profit of the project over its economic lifetime by as much as BAM 847,128,539 and therefore threaten the profitability and feasibility of investing in the project, as well as calling into question the rehabilitation of Gacko II after 25 years using internal sources of financing.

As well as the questionable realism of the coal purchase price, a special problem is presented by the sales price per MWh of electrical energy used to calculate

total income and effects on Gacko II's business. The Study foresees that all the electricity generated would be exported, except in exceptional cases when 30% would be sold on the domestic market and the remainder exported (1 – p.421).

The power exchange price for export is thereby taken as 50 EUR/MWh or BAM 97.79 per MWh, and the price on the domestic market as 19.90 EUR/MWh or BAM 38.90 per MWh. (1 – p.11).

The scenario with 30% of electricity sold on the domestic market is not analysed in detail in the Study. Here it is interesting to note that if Gacko II had to sell its electrical energy exclusively on the domestic market at domestic prices, it would operate with large losses and unprofitably, so the authors of the Study base the profitability and feasibility of the investment exclusively on sales to the market abroad.

Considering that Stanari power plant has started operating, and that RITE Gacko and RITE Ugljevik are continuing to operate, it is justified to ask what the basis is for the assumption that Gacko II will succeed in exporting all the electricity generated, especially now that the Stanari power plant represents direct competition in exporting?

The planned export price of 50 EUR/MWh is particularly problematic considering that Elektroprivreda RS has in recent years exported at prices much lower than those mentioned (3) and that there is a tendency towards falling export prices:

	2011	2012	2013	2014	2015
Exported electricity GWh	1,615	1,447	2,680	1,995	1,706
Value of exported electricity in BAM 000	135,746	124,383	218,808	160,013	132,331
Price in EUR/MWh	43.92	45.35	42.3	41.3	39.68

Even in the study itself it is shown that prices in the southeast Europe region are around 40 EUR/MWh, that experts and brokers expect they will continue to be around this level (1 – p.104), and that all projections of the electrical energy market foresee prices below 40 EUR/MWh while prices in the EU in 2018 are projected to fall to 25.7 EUR/MWh (1 – p.108–110).

Considering all the above and the fact that Stanari power plant has increased the electrical energy available for export, which should impact on power exchange prices, the calculated sales price for electrical energy from Gacko II of 50 EUR/MWh over the whole economic lifetime of the plant can be considered unrealistic. It would have been more appropriate to use a price of max. 40 EUR/MWh for the calculation of effects and total income.

Using a realistic price to calculate the total income and effects of Gacko II, would drastically change the effects. Planned income would be lower by BAM 44,915,319 annually, bringing the power plant to the edge of profitability, in which the slightest change in quantity or price of the energy supplied or in direct costs would bring the plant into the zone of losses; in the first period of operations, while the loans are still not being paid off, liquidity would also be seriously reduced. Considering that the net profit of Gacko II for the economic lifetime of the project would in this case be lower by as much as BAM 1,616,951,451, it is clear that with an export price of 40 EUR/MWh of electrical energy, the project becomes economically and financially unfeasible.

The third input parameter that will be considered in this analysis is the contribution for CO₂ emissions which the authors of the Study mention in relation to the Kyoto protocol and obligations to pay 15–40 EUR/tonne CO₂. They state that countries within the EU Emissions Trading Scheme (Croatia, Slovenia, Hungary, Romania, Bulgaria) are obliged to pay EUR 35 per tonne of CO₂ emitted (1 – p.84). Without mentioning any source of this information or giving any arguments, the Study mentions that for the Balkan countries, including Bosnia-Herzegovina and the new Gacko II plant, this obligation will amount to only 5 EUR/tonne CO₂. (1 – p.84).

Without going into the argument of why 5 and not 35 EUR/t CO₂, it is interesting to note that an item on „Contribution for CO₂” is included in the costs and projections but that for the entire economic lifetime of the project it has not been calculated and amounts to zero. (1 – p.430). If we accept that Gacko II will produce 316 tonnes CO₂ per hour of operation (1 – p.430) the correct calculation of annual payment for CO₂ would be:

$$\begin{aligned} 7,304 \text{ hours annual operation} \times 316 \text{ tonnes CO}_2 &= 2,308,064 \text{ tonnes CO}_2 \\ 2,308,064 \text{ tonnes CO}_2 \times 5 \text{ EUR} &= 11,540,320 \text{ EUR} = \text{BAM } 22,503,624 \text{ annually} \end{aligned}$$

Over the economic lifetime of Gacko II, CO₂ costs would amount to a total of BAM 900,144,960, rendering the investment completely unfeasible.

Analysis of the project's effects

In the previous section we analysed just three input parameters from the Feasibility Study for the construction of Gacko II power plant, as follows:

- a) Input coal price,** for which we established that it is unrealistically low and that the real price should be BAM 36.65 per tonne, and not BAM 26.73 per tonne as it is in the projections.

If the real price was included for example in the 11th year of the project, the balance would look as follows:

Balance for Gacko II power plant – 11th year (1 - p.432 and p.433)

<i>Description</i>	<i>Study</i>	<i>Coal BAM 36.65/t</i>
Income from electricity sales	220,271,026	220,271,026
Income from heat sales	3,495,332	3,495,332
Income from sales of dry ash	810,238	810,238
TOTAL INCOME	224,576,596	224.576.596
Coal costs	63,406,547	86,937,895
Other direct material costs	7,842,204	7,842,204
Gross workers' pay	3,870,720	3,870,720
Costs of production services	11,303,894	11,303,894
Depreciation	38,430,342	38,430,342
Non-material costs, without calculation of CO ₂ costs	12,030,131	12,030,131
Financial costs	36,658,984	36,658,984
TOTAL EXPENSES	173,542,822	197,074,170
Pre-tax profit	51,033,774	27,502,426
Tax on profit 10%	5,103,377	2,750,243
NET PROFIT	45,930,397	24,752,183

It is visible that if including the real coal price, Gacko II's profit would be almost halved.

- b) The export price of electrical energy of 50 EUR/MWh** used in the Study is too ambitious and does not portray either the current nor the

future market relations, as it would be more realistic to calculate the effect of the investment at least using a price nearer to the real market relations and projections of 40 EUR/MWh, in which case the effect would be as follows:

**Balance for Gacko II power plant, year 11
(1 – p.432 and p.433)**

<i>Description</i>	<i>Study</i>	<i>MWh = 40 EUR</i>
Income from electricity sales	220,271,026	176,216,821
Income from heat sales	3,495,332	3,495,332
Income from sales of dry ash	810,238	810,238
TOTAL INCOME	224,576,596	180,522,391
Coal costs	63,406,547	63,406,547
Other direct material costs	7,842,204	7,842,204
Gross workers' pay	3,870,720	3,870,720
Costs of production services	11,303,894	11,303,894
Depreciation	38,430,342	38,430,342
Non-material costs, without calculation of CO ₂ costs	12,030,131	12,030,131
Financial costs	36,658,984	36,658,984
TOTAL EXPENSES	173,542,822	173,542,822
Pre-tax profit	51,033,774	6,979,569
Tax on profit 10%	5,103,377	697,957
NET PROFIT	45,930,397	6,281,612

With an assumed sales price of 40 EUR for 1 MWh electrical energy, Gacko II would operate positively only on the condition that coal could be supplied at a price lower than the cost of production.

c) Although the price of CO₂ is included as an item in the costs of operating Gacko II, it is not calculated at all for the whole lifetime of the project, and if it is calculated in line with the authors' assumption that it amounts to 5 EUR per tonne of CO₂, the result would be as follows:

Balance for Gacko II – year 11 (1 – p.432 and p.433)

<i>Description</i>	<i>Study</i>	<i>CO₂ = 5 EUR/t</i>
Income from electricity sales	220,271,026	220,271,026

Income from heat sales	3,495,332	3,495,332
Income from sales of dry ash	810,238	810,238
TOTAL INCOME	224,576,596	224,576,596
Coal costs	63,406,547	63,406,547
Other direct material costs	7,842,204	7,842,204
Gross workers' pay	3,870,720	3,870,720
Costs of production services	11,303,894	11,303,894
Depreciation	38,430,342	38,430,342
Non-material costs, without calculation of CO ₂ costs	12,030,131	12,030,131
Financial costs	0	22,503,624
TOTAL EXPENSES	36,658,984	36,658,984
Pre-tax profit	173,542,822	196,046,446
Tax on profit 10%	51,033,774	28,530,150
NET PROFIT	5,103,377	2,853,015
TOTAL INCOME	45,930,397	25,677,135

As can be seen in the table, in case of a CO₂ price, and that of only 5 EUR per tonne, the planned profit of Gacko II would be almost halved. If it had to pay a CO₂ price as high as the one assumed by the authors for countries of the EU, it would operate with enormous losses.

From this short analysis of effects it is totally clear that Gacko II can operate profitably only under the condition that it does not pay for CO₂ emissions, that it buys coal below the price of production and that exports are realised at a price of at least 50 EUR/MWh and to a known customer, because under power exchange conditions of fluctuating prices and trends of falling prices, it will operate with losses.

If Gacko II bought coal at real prices, sold electricity at 40 EUR/MWh and paid for CO₂ it would operate at a loss even if it had no loan repayment obligations:

Balance Gacko II – 11th year (1 – p.432 and p.433)

*Simulation applying all three parameters and simulation without loans

<i>Description</i>	<i>Study</i>	<i>U + C + D</i>	<i>Without loans</i>
Income from electricity sales	220,271,026	176,216,821	176,216,821
Income from heat sales	3,495,332	3,495,332	3,495,332

Income from sales of dry ash	810,238	810,238	810,238
TOTAL INCOME	224,576,596	180,522,391	180,522,391
Coal costs	63,406,547	86,937,895	86,937,895
Other direct material costs	7,842,204	7,842,204	7,842,204
Gross workers' pay	3,870,720	3,870,720	3,870,720
Costs of production services	11,303,894	11,303,894	11,303,894
Depreciation	38,430,342	38,430,342	38,430,342
Non-material costs, without calculation of CO ₂ costs	12,030,131	12,030,131	12,030,131
CO ₂ emissions costs	0	22,503,624	22,503,624
Financial costs	36,658,984	36,658,984	
TOTAL EXPENSES	173,542,822	219,577,794	182,918,810
Profit / Loss before tax	51,033,774	-39,055,403	-2,396,419
Tax on profit 10%	5,103,377	0	0
NET PROFIT/ LOSS	45,930,397	-39,055,403	-2,396,419

Considering that the basic economic parameters used as a basis for the Feasibility Study for Gacko II are controversial, this analysis does not attempt any analysis of the socio-economic parameters of the project, as it is clear that there are none. If this investment is realised it will harm society as a whole.

Conclusion and recommendations

An analysis of the economic parameters and effects of the *Study on the economic feasibility of the construction and operation of the Gacko II power plant, capacity 350 MW, in the Gacko municipality, with elements of environmental protection (Feasibility study)* has shown the following:

- a) That the parameters on which the conclusions about the economic, financial and socio-economic feasibility of investing in the construction of the Gacko II power plant are based are debatable and partially unrealistic;
- b) That the whole setting of the project is more a result of a wish to carry it out than a real need for its realisation, considering the situation in the energy sector and needs for development, and European and global trends;
- c) That the realisation of the Gacko II project highly risky and uncertain, both from the side of the investor as well as the potential guarantor for the loans planned for the construction. The risk is even greater because the investment could easily end up with losses which would then negatively reflect on the operations and sustainability of the whole system within MH Elektroprivreda RS as well as on the Republika Srpska budget in the case that Republika Srpska acts as guarantor for the loans;
- d) That the potential realisation of Gacko II will bring very little socio-economic benefit to Republika Srpska, but most likely large socio-economic damage, not only because of debatable parameters for the calculations, but also because of the fact that the harmful impacts of the investment on public health, ability to work and the environment were not taken into account.

Considering all the above, it would be best to withdraw from issuing a concession for the construction of Gacko II power plant and until the end of lifetime of RITE Gacko, direct efforts towards the development of the local community in other economic activities in order to maintain its self-reliance in the period when there is no longer a power plant.

As well as the aforementioned, Elektroprivreda RS should concentrate its efforts on achieving economic feasibility and profitability of the operations of the existing power plants, on the development of renewable energy, and get involved in the technological competition to develop models for the storage of electrical energy.

SOURCES

1. „Studija ekonomske opravdanosti sa elementima zaštite životne sredine za izgradnju i korišćenje „Termoelektrane Gacko II" snage 350 MW na području opštine Gacko (Feasibility study), Institut za građevinarstvo „IG“ Banjaluka, 2016
2. Banja Luka stock exchange website: Revizorski izvještaj za RITE Gacko 2015, <https://www.blberza.com/Pages/DocView.aspx?Id=22912>
3. Elektroprivreda RS website – reports section, <http://www.ers.ba/>