Is Coal The Cheapest Solution?

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MUSINE KOKALARI
INSTITUTI PËR POLITIKA SOCIALE

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Is Coal The Cheapest Solution? is a project which aims to calculate the health externalities of coal based energy production in Kosovo in recent years. The project is supported by the **Kosovo Foundation for Open Society – KFOS**. The contents of this publication are the sole responsibility of IPS Musine Kokalari and it does not necessarily reflect the views of KFOS.

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The health threatening situation of air pollution in Kosovo is an urgent matter. Further in-depth studies of air pollution and its impact on human health and environment are of utmost importance. The cost of externalities have to be included in all energy projections and strategies, which thereby enables a more informed policy decision on Kosovo’s energy sector.

1. Executive Summary

The air we breathe is fundamental to our health. Air pollution as a consequence substantially affects our health. Energy production and consumption have a health cost, which is not priced into the total cost of its generation (Chen et al. 2015). Like in most countries, no one pays for the health cost at the point of consumption in Kosovo, which leads to the decoupling of energy's true cost, thus leading to over use. The lack of alternative energy sources results in over-dependence on the current coal based power plants in Kosovo.

When we say 'no one pays', we mean that the health cost is not visible in the electricity bill of the Kosovan citizens. They, of course, pay with their health in the form of quality of life or medical bills. The health costs falls burden onto the state as well, considering the high numbers of new cancer cases in Kosovo (ASK, 2019). These type of indirect costs are known as externalities: a side effect or consequence of an industrial or commercial activity that affects other parties without this being reflected in the cost of the goods or services involved (Oxford Dictionary).

This publication provides a study of these externalities in Kosovo for the year 2019. The cost of electricity production, emissions data and general demographic information was gathered by our staff and was analyzed by experts at the Institute of Aarhus University in Denmark, based on the impact-pathway methodology according to the principles of the integrated assessment model EVA (Economic Valuation of Air Pollution) developed at Aarhus University's Department of Environmental Science.

The results conclude that the sum of the external cost of conventional air pollutants from the coal plants in Kosovo reaches 11,057,000.00 €, with an uncertainty range of 5,528,640€ - 16,585,920€ for the year 2019. Due to lack of sufficient health statistics on morbidity, it was not possible to include the data in the overall calculation, although it can add up to 10% of the total cost.

In order to present a clearer picture of the situation, our staff interviewed several representatives of public institutions, such as the Mayor and the Director of the Family Medicine Care Center in Obiliq municipality, the director of the Institute of Oncology, and the head of the newly established worker's trade union of the Energy Corporation of Kosovo. Our authors attempted to interview the executive director of the Energy Corporation, unsuccessfully. The official response said '*due to objective reasons we cannot meet with you*', but it remains unclear as to what these objective reasons were.

It is important to clarify that this publication is specifically focused on the health externalities due to air pollution caused by the coal plants for the Pristina region. Externalities must be calculated for morbidity and environment (land and water) as well, but this was beyond the scope of this project.

The health threatening situation of air pollution in Kosovo is an urgent matter. Further in-depth studies of air pollution and its impact on human health and environment are of utmost importance. The cost of externalities have to be included in all energy projections and strategies, which thereby enables a more informed policy decision on Kosovo's energy sector.

2. Overview

Due to their emerging economies, developing countries have an ever-growing need for larger energy production (Silvia et al., 2021). It is widely believed and accepted that renewable energy systems are more costly than the conventional coal plant. But is it really so? Critics argue that this cheap price tag results as a lack of consideration for environmental and health externalities of coal power plants (Galetovic & Munoz, 2013).

Coal plants emit sulfur oxides – SOx, nitrogen oxides – NOx, particulate matter – PM, and they release CO2 – damaging health, environment, and causing global warming. These pollutants mainly affect the surrounding area, but the health and environmental effects can be measured further in perimeter (Galetovic & Munoz, 2013), even in other countries, which is known as trans-boundary pollution (Czarnowska & Frangopoulos, 2010). In addition to production emission, it is crucial to mention that coal mining, mainly surface mining (the case in Kosovo), enhances the health damages especially for mining workers. Most European countries have stopped subsidizing coal mining and since 2000 only import from other countries (BP, 2018), and also invested in new emission abatement technologies such as carbon capture and storage (for a thorough policy review on coal mining consult Silvia et al., 2021).

Health externalities account not only for respiratory diseases, lung cancer, heart and kidney diseases and overall reduced quality of life (Colagiuri et al., 2012), but also for a community's health and life, such as demographic measures like marriage, fertility, and migration (Shandro et al., 2011; Mactaggart et al., 2016). It is important to note that mapping between exposure to these pollutants and health damage is subject to considerable uncertainty. Extended exposition increases morbidity (chronic and acute illness) and mortality (life expectancy) rates, which however are also influenced by many other factors, such as hereditary illness, smoking, lifestyle etc. (Galetovic & Munoz, 2013).

> "Externalities – side effects or consequences of an industrial or commercial activity that affects other parties without this being reflected in the cost of the goods or services involved"
>
> Source: Oxford Dictionary

Even though the external cost of energy production through coal plants is not reflected in market prices, due to changing climate and health conditions governments (especially the EU) have started to take these costs into consideration to determine energy policy on a national and international level and to calculate the actual economic performance of a given energy production system (Czarnowska & Frangopoulos, 2010).

Kosovo's main energy supply comes from its two coal/lignite based power plants Kosova A and Kosova B, managed by the Energy Corporation of Kosovo. Both were established and started production in the years between 1962 and 1984, thus are considered to be quite old. The average lifespan of a coal power plant is considered to be 40 years (HEAL, 2013). Kosovo is considered to be the fifth largest reserve in the world, although exploitable it is of poor quality and highly polluting (WB, 2016) as can be seen from the results of the EVA modeling in the next chapter.

1/3 of produced electricity is lost due to old grid"

Source: WB, 2021

Like all Western Balkans countries, Kosovo adopted its National Emissions Reduction Plan – NERP in 2018 (Kosovo Government, 2018). Due to breaches of the limits set out in the NERP in 2018 and 2019, in March 2021 the Energy Community Secretariat opened a dispute settlement case against Kosovo. This came mostly as a result of exceeding the dust emission ceiling of Annex 2 of the Energy Community Treaty by 4.25 times at 5,867 tons, an increase from the 5,042 tons emitted in 2018 (Energy Community, 2021). Even though Article 15 of this Treaty specifies that "*After the entry into force of this Treaty, the construction and operation of new generating plants shall comply with the Acquis Communautaire on environment*.", the government program leaves open the possibility for the reconstruction of the Kosova A plant.

On November 18, 2021 the government presented a new working group for drafting the National Energy Strategy 2022-2031. The main objectives of the strategy will be to secure stable energy production, to remain affordable for low income categories, to generate alternative and sustainable energy sources, and to reach carbon neutrality by 2050 (PM Office, 2021). The government declared that the process will be led by experts of the field and that it will be transparent. Our authors tried to obtain more information about the process, unsuccessfully.

In the mission statement the Energy Corporation of Kosovo expresses its dedication to creating a stable energy production, remaining at cost to further development, and to 'advance conditions for environment, security and health', while in the vision statement the main goal is to be accepted by the public for its good practices and for offering good, trustworthy and competitive services. As was noted in the winter of 2021-2022, Kosovo's dependence on, and sky-rocketing prices of, energy import proved once again the unstable energy supply. As studies have shown, the negative impact on health and environment prove to be an urgent matter.

The World Bank provided two thorough studies in 2013 & 2019 regarding air and environment pollution. The former concluded that the economic cost due to air pollution with health impacts to be an estimated midpoint of 98 million €, or 2.3% of GDP for the year 2010 (World Bank, 2013). The latter report offered an economic calculation for the year 2016 which was an estimated 160 to 310 million $ (144 to 280 million in € for average exchange rate in 2016), or 2.5 to 4.7 % of GDP, suggesting that around 760 people die prematurely each year in Kosovo due to air pollution (World Bank, 2019). It is important to note that the study included many sources of pollution and was not solely focused on power plants.

Both studies suggested a broad range of policy recommendations, such as enhancing the effectiveness of environmental standards and the importance of implementing fines and charges as economic instruments against main polluters. Further suggestions were to conduct a comprehensive study of the wood quality that is used by citizens for heating purposes and a pilot project to replace old heating stoves with new ones. The legislative and administrative recommendations are of command and control nature, but they recommend financial incentives as well. One crucial aspect is the regional cooperation between states, as pollution is not a unique problem in Kosovo (World Bank, 2013; 2019). Trans-boundary pollution is affecting not only the region, but the rest of Europe.

According to a study conducted by the United Nations Environment Program (2019), the healthcare cost in the EU lies between 6 and 11 billion €, a third of which is accounted to the Western Balkans. Most of the dangerous chemicals are considered to be emitted by coal power plants in the region and most of them exceed the limit set out in the national action plans for reducing emissions (Balkans United, 2021). According to the reports submitted to the European Environment Agency by 37 countries in 2018, eight have exceeded the limit level of exposure of PM 2.5 (considered to be the most dangerous for human health), five of which are Western Balkan countries (Balkans United, 2021). It is estimated that in 2020 the SO 2 emissions from coal power plants in the region were 2.5 higher than the total from all coal plants in the EU (Comply or Close, 2021). According to a study which was undertaken by a coalition of regional organizations in 2021, an estimated 19 thousand deaths occurred in the years 2018-2020 due to coal power plants in the Western Balkans, half of it was considered to have occurred in the EU, and around 30% in the WB. The estimated health cost was 23 to 51 billion € (Comply or Close, 2021).

The Balkans United for Clean Air Initiative (2021) pointed out the fragile healthcare systems in these countries and strongly recommend the inclusion of the healthcare sector in the decision making process to integrate healthcare policies and the proper measures for the energy sector. It is of utmost importance to emphasize that the effect on health due to air pollution significantly impact vulnerable social groups. Low income households cannot afford technological equipment to protect themselves in their homes. Furthermore, due to the lack of strong healthcare system, these groups are at risk of not receiving proper healthcare services.

CSOs in Kosovo have voiced their concern regarding air quality due to coal based energy generation, transportation and heating. The Balkan Green Foundation and INDEP in 2019 have jointly proposed an array of recommendations for public institutions, some of which have been implemented, such as real-time publication on emissions data through a mobile app and not passing the law amendment which would allow the import of cars older than ten years. During the same year the BGF proposed further measures, of which in regard to air pollution due to energy production, an urgent measure is considered the creation of the energy efficiency fund to be used for immediate relief (such as house insulation).

All studies express a common concern: the lack of sufficient data. Although there has been some improvement since 2013 and 2019, our authors struggled to find proper statistics and information from Kosovo public institutions. The Institute for Public Health in Kosovo and the Energy Corporation of Kosovo do not publish updated information regarding air pollution on their web-sites. In order to complete our project our organization had to contact these and other entities to retrieve the latest data by phone and by submitting official requests for public information – which should have been available on their platforms.

The next chapter provides an estimation of health externalities for the Pristina region for the year 2019. The study was conducted by Mikael Skou Andersen, professor of environmental policy analysis and Lise Marie Frohn, senior scientist in air pollution modeling at Aarhus University in Denmark, based on the impact-pathway methodology according to the principles of the integrated assessment model EVA (Economic Valuation of Air Pollution) developed at Aarhus University's Department of Environmental Science.

For further information on EVA, we recommend visiting:
https://envs.au.dk/en

3. Research Note: Health costs of air pollution from Kosovo's coal-fired plants

By Mikael Skou Andersen, professor of environmental policy analysis and Lise Marie Frohn, senior scientist in air pollution modelling at Aarhus University (DK)

The purpose of this research note is to provide an estimate of the external health costs of emissions of conventional air pollutants from Kosovo's two coal-fired power plants located in the vicinity of the capital, Pristina. The note is a contribution to the evaluation project "Is coal the cheapest solution?" led by Musine Kokalari Institute for Social Policy.

The estimation is based on the impact-pathway methodology according to the principles of the integrated assessment model EVA (Economic Valuation of Air Pollution) developed at Aarhus University's Department of Environmental Science. Based on WHO's guidance document [1] on exposure-response functions for premature mortality from air pollution and OECD's methodology for mortality valuation [2], the EVA model establishes a pathway from emissions to health effects and their costs [3].

To establish a link between emissions and changes in the annual mean of air pollution concentrations in the local scale of Pristina we rely here on the existing detailed results of the SHERPA model of the EU's Joint Research Centre [4], rather than new in-house atmospheric modeling at AU. It shows that the energy sector (in practice the coal plants) contributes about 43% to the annual average air pollution concentrations of $PM_{2.5}$ in Pristina.

To establish a link between emissions and changes in the annual mean of air pollution concentration in the regional scale of Kosovo, the EMEP source-receptor matrices data for neighboring North Macedonia is used [5]. Kosovo is not detailed in the EMEP matrices, as the country is not a party to the CLRTAP (Convention on Long Range Transport to Air Pollution) and a recent World Bank report [6] on Kosovo stipulates that using source-receptor relations for North Macedonia is an adequate second-best solution.

To estimate premature mortality per unit of air pollution exposure a lifetable of Kosovo's population in 2019 [7] is used, featuring its distribution on 1-year age groups (for males and females respectively) and the associated background mortality rates for these. Simulations with the lifetable show that for a one year 1 microgram of $PM_{2.5}$ exposure increase, Kosovo can be expected to lose about 83 life years per 100,000 inhabitants above the age of 30 years.

To assign a value to premature mortality, the procedure for benefit transfer developed by OECD is used (The value of preventing a statistical fatality represents the willingness to pay for reductions in risks of dying, it is not the value of a human life per se). The value recommended for EU27 by OECD is transferred, adjusting for differences in GDP/capita and purchasing power parities between EU and Kosovo. Thus, the value of a statistical life in Kosovo can be estimated at €356,700 with an uncertainty of +/-€178,400.

However, as air pollution mortality is considered to affect mainly elderly, the metric of the value of a life year is used. From the above value of a statistical life (with an average latency period of five years) a value of a life year at €13,290 for chronic mortality is derived, based on the age distribution and average expected lifetime for Kosovo citizens. The formula in OECD [2] to derive the value of a life year was used. For the discounting involved a rate is identified with the Ramsey formula (as recommended by the European Commission [8]) providing a social discount rate for Kosovo of 3,3%.

		LOCAL SCALE (Pristina)	REGIONAL SCALE (Kosovo, outside Pristina)
A	Coal plants' contribution to annual air pollution exposures	7.9 µg $PM_{2.5}/m^3$	0.3 µg $PM_{2.5}/m^3$
B	Years of lost life per µg/m^3 per 100,000 (above 30 years)	83 YOLL/100,000	83 YOLL/100,000
C	Population > 30 years	100,000	801,000
D	Years of lost life (A x B x C)	652 YOLL	180 YOLL
E	Value of a Life Year	€13,290	€13,290
F	External costs (D x E)	€8,665,080	€2,392,200
	SUM of external costs Uncertainty range	**€11,057,000 (€5,528,640-€16,585,920)**	

Table 1 External costs of conventional air pollutants (excl. GHG) from KEK coal plants in 2019.

The results are shown in Table 1. Based on the above data, the emissions from the coal plant has a high health impact in Pristina itself, with an estimated premature mortality impact of 652 lost life years annually – corresponding to about 52 premature deaths annually, i.e. the victims will lose in average a decade. The impact for the rest of Kosovo is also noteworthy. Although the contributions to exposures with air pollution at only 0.3 ug/m^3 are estimated to be lower, it is here the entire Kosovo population outside Pristina that is exposed, whereby a premature mortality of 180 lost life years annually is predicted – corresponding to about 14 premature deaths annually [9].

Producing economic estimates for the premature mortality with the OECD recommended value as transferred to Kosovo, one finds external costs in Pristina from the two coal plants of about €8.7 million and in the rest of Kosovo of €2.4 million, in total of about €11 million annually. However, these estimations hinge on the specific value applied for premature mortality, and the uncertainty range is from €5.5 million to €16.6 million annually for the total.

Besides premature mortality there will be morbidity health impacts and costs associated with hospitalization and chronic diseases due to air pollution. Unfortunately, due to the absence of background incidence rates for Kosovo they cannot be accounted for. In other countries morbidity adds about 10% to the overall health costs of air pollution.

The above estimations refer to the coalfired power plants, but other local and trans-boundary pollution sources influence air quality and have health implications in Pristina too. The monitored annual average concentration of air pollution for Pristina's two measurement stations stated in Kosovo's State of Environment report 2018/19 is 18.5 ug $PM_{2.5}/m^3$ [10]. There is hence a residual from other sources than the coal plants of about 11 ug $PM_{2.5}$/m3 (18.5-7.9=10.6), for which a further loss of 880 YOLL or about 70 instances of premature deaths annually can be predicted. The most important residual source within Kosovo to air pollution in Pristina is residential heating with biomass used as fuel.

There will also be health implications of Kosovo's emissions to the neighboring countries. Based on the EMEP source-receptor matrices [5] for North Macedonia, about 40% of the primary $PM_{2.5}$ particles are likely to end up in other territories, while about 35% of SOx and 80% of NOx emissions impact neighboring countries. It would require new and detailed atmospheric modeling to disentangle the health impacts to the respective countries.

Costs of greenhouse gas emissions are not included in the above estimates.

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4. Interviews and Recommendations

The primary objective of this publication is to present the external cost of coal based energy generation in Kosovo, specifically the municipalities of Obiliq and Pristina. The numbers, however, present an incomplete picture of the situation. Our authors conducted interviews with the representatives of several public institutions, the findings of which are presented below.

The problems regarding pollution from coal-based energy generation come from one of two main reasons: poor implementation of the applicable legislation that is in disregard with the situation on the field and secondly lack of proper policies, especially regarding the high-risk areas in Obiliq and the localities in its vicinity.

> **"We notice when they shut off the filters, especially during the night"**
>
> Source: Interview with Haki Jashari, April, 2022

The municipality of Obiliq is located in close proximity to the power plants and is the most polluted area in Kosovo. The mayor, Xhafer Gashi, is concerned about the situation, especially with citizens' health. According to him many citizens suffer from acute and chronic respiratory conditions. Gashi pointed out the non-existence of a public heating system for the winter months though co-generation for the municipality and citizens are obliged to use coal or wood which adds to the overall pollution. He emphasized the breaching of the Law for Obiliq Nr.05/L-044 of 2016, whereby citizens of the area should pay a lower tariff for energy consumption. "*We pay the same tariffs like the rest of Kosovo*" - Gashi said. He also said that all citizen displacements were imposed by the Energy Corporation in order for them to expand their exploitation area and not due to a highly polluted environment and air. This is a disturbing fact that reflects the priorities of the state towards the community in Obiliq and their welfare. The community in the surrounding areas of the mines are constantly threatened by the idea of the potential displacement which leaves them with no opportunity to build houses or invest in their lands, says Mayor Gashi.

Mayor Gashi named several anti-pollution projects of the municipality, one of which is being implemented jointly with the Energy Corporation of Kosovo. "*A twenty-meter wide and several hundred meters long tree belt, or the green belt, is being planted this year and the selected trees are of a certain type that cleanse the air more than ordinary trees*" he explained. When asked whether the municipality was contacted by the Ministry of Environment and Spatial Planning or by the new working group for the National Energy Strategy 2022-2023, Gashi said that they did not have any contact in the past year in relation to this, however, he asked Minister Aliu to include them in the decision-making process.

"We receive up to 12 thousand visits a year in our clinic" – says Haki Jashari, the director of the Family Medicine Care Center in Obiliq. The number is quite high for a municipality with less than twenty thousand inhabitants. Jashari is especially concerned for the village Dardhishte, closest to the power plants – "There are two to three persons with cancer in one family in that area. What they are doing in Dardhishte is an **environmental crime**".

According to him, respiratory diseases have increased in children in the past year. He said that they do not have proper staff and equipment to collect statistics on morbidity or mortality in relation to air pollution, but they try to keep a track record nevertheless. Jashari remains disappointed as there were no major medical investments from the government for the municipality - "We received an x-ray machine in 2002 and two dental chairs in 2012, the rest of the equipment is usually donations from our Diaspora".

Our team asked Ilir Kurtishi, director of the Oncology Institute in Pristina, about the situation in the region of Pristina. Collecting data and calculating the cost of cancer patients can be a challenging process. The many types of malign tumors can be of various stages and lifestyle (smoking, eating habits) alongside with hereditary disease play a crucial role in the outcomes. Kurtishi estimates that on average a patient with cancer in the respiratory organs can cost up to 8 thousand per year in Kosovo. He explained that the clinic maintains and internal database on patients, but when confronted with the reports of the Statistics Agency of Kosovo he was appalled – "I am not sure where they get these numbers, but I can say with certainty that the number is much higher and rising every year. Most affected area remains Pristina". The clinic has very well-trained professionals, Kurtishi says, and the team is able to provide expertise in the field, especially preventive screening measures that should be taken. The Institute was not contacted by any public entity to consult on the National Energy Strategy for 2022-2031.

> **"They think that they are making more money by working 16h shifts, but in the end they are losing years of their lives"**
>
> Source: Interview with Nexhat Llumnica, April, 2022

The most affected category by the pollution are the workers in Kosova A and Kosova B power plants. Nexhat Llumnica, head of the newly established workers' trade union of the Corporation, says that the protection equipment has not been updated in years. Llumnica points out that there aren't sufficient workers for the plants and that the current ones get tricked into working overtime – "They think that they are making more money by working 16h shifts, but in the end, they are losing years of their lives". One of the biggest problems for this category is the lack of carrying periodical risk assessments of the work place by the employee as required by Article 7 of Law NO. 04/L-161 on Safety and Health at Work. A report on risk assessment on the work place was carried by INKOS but the Corporation does not recognize it, with the justification that they are not licensed, Llumnica explains. If this assessment would be carried according to the law, workers would be categorized based on the risks they face in the work place hence would have better working conditions, shorter working hours, longer vacation days and other measures according to the Labor Law. In a report on decent work by ILO in 2021, Kosovo lacks data on occupational health. One of the concerning findings is that medical professionals who were trained in the field are retiring and there are no new medical programs in the field.

Further problems such as insufficient pay for weekend shifts and non-implementation of the 30-day annual leave due to exposure are breaching the Labor Law. He said that the workers are waiting for the private bailiff to execute a court order, which the workers won against the Corporation for breaching the Labor Law. "We don't even have a collective contract. Up until now nobody wanted to hear it, but now finally we had a meeting" – Llumnica continues, for which he remains pessimistic.

The grievous situation of air pollution in Kosovo poses a danger to human health. The urgency of the matter should dictate immediate measures to be taken by the government and other public institutions. Initially the findings of this report stipulate, among others, the pressing need for further, comprehensive and more indebt studies to ascertain the real cost of coal produced energy. The cost of externalities have to be included in all energy projections and strategies, which thereby enables a more informed policy decision on Kosovo's energy system design. Relevant authorities have to include medical professionals and institutions in the decision making process for the National Energy Strategy for 2022-2031.

Studies such as ours will determine whether coal is the cheapest solution for energy supply and security. By keeping the price of coal artificially low, and by not calculating externalities in the price of production, we are maintaining the myth (potentially) that coal remains the cheapest way to produce energy and therefore disregard other energy sources (renewables) as non-affordable. It is high time that we start analyzing and calculating all costs and design projections based on these data.

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