



# THE GREAT COAL JOBS FRAUD

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**How unrealistic employment claims are  
deceiving coal mining communities in southeast  
Europe and delaying a just transition to  
sustainable energy**

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# EXECUTIVE SUMMARY

In several southeast European countries<sup>1</sup>, new coal-fired power plants are planned. This is in contrast to most of the EU, where no new coal plants are planned, due to their climate and health impacts, and their poor economics. The southeast European plans are accompanied by promises of creating new workplaces or saving current ones.

This study, an update of our November 2016 analysis<sup>2</sup>, examines the claims and finds that in almost all cases, they are exaggerated. In fact, even the current levels of employment cannot be maintained and some companies such as Elektroprivreda Srbije and the Pljevlja coal mine in Montenegro have already begun reducing their workforce. A fair and inclusive plan is urgently needed to transform coal-dependent communities.

The planned 500 MW<sup>3</sup> Kosovo e Re power plant is perhaps the regional prize winner in terms of exaggerated employment claims. Media statements by the concessionaire suggest that 10 000 jobs would be created during the construction phase and 500 during operation. Yet our analysis shows that no more than no more than 1200 workers should be required during the construction stage - and many of them are likely to be imported specialists - while no more than 190 should be required during operation.

In other cases such as Tuzla 7 and Banovići in Bosnia-Herzegovina or Pljevlja II in Montenegro, no exact numbers of new workplaces are mentioned, but claims are frequently made about preserving the workplaces in the mines.

However, in fact, most of the plants and mines are already uneconomic. But continuing to subsidise the sector is not an option. All the countries have committed to participate in a regional electricity market either as part of EU membership or through the Energy Community Treaty, which means that subsidies can no longer be handed out to the energy sector at will, but must follow strict rules aimed at ensuring a level playing field.

Whether new plants are built or not, the number of workers, particularly in the mines, will have to be reduced.

This may not make for comfortable

reading, especially in a region with high unemployment, but in fact it is already happening in most countries. Recognising this fact and being prepared for it is crucial.

Trying to delay the inevitable with promises of new plants will have very little impact on this overall trend. The table on the right sums up the claims made by proponents compared to our findings on jobs in the plants and associated mines. **While proponents have overall claimed that 10 030 jobs would be maintained and 17 600 new jobs created, a reduction of workplaces by around 5170 is more likely.**

This is because although some new jobs would be created, they would be fewer than usually claimed, and would do little to offset the staff reductions needed at the coal mines to bring them into line with EU average labour productivity. These calculations are approximate and should be followed by more in-depth analyses, but they give an idea of the scale of the misleading messages being sent to the public and mining communities.

As well as the economic pressures on coal, climate change has gathered pace. It has been calculated that at least 80 percent of coal reserves need to stay in the ground if we are to avoid catastrophic climate change of more than 2 degrees celsius. Even this is considered too large a change to ensure the safety of climate-vulnerable countries and in the 2015 Paris Agreement, parties agreed to try to limit change to 1.5 degrees. According to a 2016 report by Oil Change International, this means no new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for such activities.

With the Paris Agreement coming into force, the broader policy framework for clean energy investments is also expected to move to the forefront. Meanwhile, worldwide employment related to renewable energy continues to grow significantly, reaching 10.3 million in 2017<sup>4</sup>, up 5.3% from the previous year. These include 3.4 million jobs in the solar photovoltaic industry and 1.15 million in the wind industry. Figures on job creation in the energy efficiency sector are also projected to rise.

All this means that a well-planned and just

<sup>1</sup> For the purposes of this paper, southeast Europe includes Albania, Bulgaria, Bosnia and Herzegovina,

Croatia, Greece, Kosovo, Macedonia, Montenegro, Romania and Serbia. According to the UN, Kosovo is "under the United Nations Interim Administrative Mission in Kosovo (UNMIK) established pursuant to Security Council Resolution 1244"; in this paper it is referred to as "Kosovo". According to the UN, the official name of Macedonia is "the former Yugoslav Republic of Macedonia"; in this paper it is referred to as "Macedonia".

<sup>2</sup> CEE Bankwatch Network: The great coal jobs fraud: unrealistic employment claims in southeast Europe, November 2016 <https://bankwatch.org/publication/the-great-coal-jobs-fraud-unrealistic-employment-claims-in-southeast-europe>

<sup>3</sup> The precise capacity is not yet known: The power purchase agreement signed between ContourGlobal and the Kosovar government in December 2017 states 430-470 MWe net.

<sup>4</sup> IRENA: Renewable Energy and Jobs - Annual Review 2018, May 2018, [http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA\\_RE\\_Jobs\\_Annual\\_Review\\_2018.pdf](http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_RE_Jobs_Annual_Review_2018.pdf)



Table 1: Job claims for new plants compared with our findingsa

Country	Plant name	Claimed jobs	Our findings
Bosnia-Herzegovina	Ugljevik III	+800 unclear	-1000 mining +700 operation and mine
	Gacko II	+400 construction	-1911 operation and mining +400 construction +330 mining +180 operation
	Tuzla 7	3500 maintained	-2960 mining +450 construction
	Kakanj 8	-	-
	Banovići	+1000 construction 2780 maintained 200 operation	-2545 mining +450 construction 125 operation
	Kamengrad	+1000 construction +800 operation	+450 construction +800 operation
Kosovo	Kosova e Re	+10 000 construction +500 operation	+1000 construction
Macedonia	Oslomej reconstruction	-	-
Montenegro	Pljevlja II	Unspecified "new jobs" 750 maintained	+100 operation -200 mining
Romania	Rovinari	3000 maintained +1800 mining +500 operation	-1468 mining +231 operation
Serbia	Kostolac B3	+600 construction	+300 construction -600 mining
Total		10 030 maintained 17 600 new jobs created	Net reduction of 5168 jobs

transition for the workers and communities that depend on coal is needed. Countries which have already restructured and in some cases closed their coal mining industries, such as the UK and the Romanian hard coal sector, have shown what can happen if coal mine closure is carried out without good planning and adequate inclusion of those affected.

In Europe and beyond, trade unions themselves have started pushing decision-makers to come up with restructuring plans for coal-based economies and generate alternative employment for coal industry workers. The European Commission launched this year a Platform for Coal Regions in Transition, aimed at supporting regions moving away from coal: among the pilot regions for the Platform are

some in Central and Eastern Europe.

In Europe at large, it is slowly being accepted as the norm that the coal era is coming to an end. The challenge is to plan alternatives as soon as possible and do so in a manner that is representative of the interests of workers and communities from the coal regions.

While some attempts have been made to start a dialogue on just transition in coal regions of Romania and Greece, so far, not one southeast European country has an adequate plan for a just transformation of their mining areas. Such a transition represents both a threat of future social unrest and an opportunity to let the people of these regions imagine the future they want and plan for life beyond coal.

# INTRODUCTION – PLANS FOR NEW LIGNITE MINES AND PLANTS

Back in 2004, the World Bank warned that the current level of employment in the coal industry in southeast Europe was unsustainable. It estimated that the workforce needed to be reduced between 68 and 83 percent in order for the industry to become viable. Such a political hot potato was never

going to be easy to deal with, and successive governments have failed to either plan or implement coherent strategies for a well-organised and just re-organisation of the industry.

World Bank, 2004: Current and future employment in the coal industry

	Current employment (2004)	Labor force in viable industry	Required labor force reduction %
Bosnia & Herzegovina	15 000	3 000	80
Bulgaria	40 000	5 000	80 [sic]
Romania	40 000	7 000	83
Serbia	25 000	8 000	68

<http://documents.worldbank.org/curated/en/272791468776978759/pdf/305190Energy1TradeStrategy.pdf>

In the meantime, climate change has gathered pace. It has been calculated that at least 80 percent of coal reserves need to stay in the ground if we are to avoid catastrophic climate change of more than 2 degrees celsius<sup>5</sup>. Even this is considered too large a change to ensure the safety of climate-vulnerable countries and in the 2015 Paris Agreement, parties agreed to try to limit change to 1.5 degrees.

A 2016 report by Oil Change International<sup>6</sup> found that the potential carbon emissions from the oil, gas, and coal in the world's currently operating fields and mines would take us beyond 2°C of warming and that the reserves in currently operating oil and gas fields alone, even with no coal, would take the world beyond 1.5°C. It therefore found that:

- No new fossil fuel extraction or transportation infrastructure should be built, and governments should grant no new permits for them.
- Some fields and mines – primarily in rich countries – should be closed before fully exploiting their resources, and financial

support should be provided for non-carbon development in poorer countries.

- This does not mean stopping using all fossil fuels overnight. Governments and companies should conduct a managed decline of the fossil fuel industry and ensure a just transition for the workers and communities that depend on it.

The last point is of crucial importance for southeast Europe. Countries which have already restructured and in some cases closed their coal mining industries, such as the UK<sup>7</sup> and the Romanian hard coal industry, have shown what can happen if coal mine closure is carried out without good planning and adequate inclusion of those most affected.

However it is questionable how much has been learnt from such experiences. Today, a transition to cleaner energy system is well under way in most of the EU and in the US, while even China's coal use appears to have peaked<sup>8</sup>. The coal industry is being recognised in many parts of the world as an economic liability.

5 <http://www.nature.com/nature/journal/v517/n7533/full/nature14016.html>

6 <http://priceofoil.org/2016/09/22/the-skys-limit-report/>

7 [http://news.bbc.co.uk/onthisday/hi/dates/stories/march/12/newsid\\_3503000/3503346.stm](http://news.bbc.co.uk/onthisday/hi/dates/stories/march/12/newsid_3503000/3503346.stm)

8 <https://www.theguardian.com/environment/2016/jul/25/china-coal-peak-hailed-turning-point-climate-change-battle>



Tougher pollution legislation and the development of various forms of carbon pricing, together with the rapidly falling costs of solar and wind generation, mean that coal is no longer an economic option. A stark example of this Vattenfall's 2016 sale of its lignite power plants and mines in Germany - a deal in which it clocked up a loss of EUR 2.1 billion.<sup>9</sup> The company still considered this cheaper than keeping hold of them.<sup>10</sup>

Another example, closer to home, is the disastrous Šoštanj 6 lignite plant in Slovenia, whose costs more than doubled from around EUR 600 million to EUR 1.4 billion.<sup>11</sup> In 2017 the Šoštanj power plant generated losses of more than EUR 32 million due to the new unit.<sup>12</sup>

Many of the changes have happened extremely fast, and have often not been predictable.

This situation has led some trade unions<sup>13</sup> and other civil society organisations to recognise that a transition to a cleaner energy system is necessary, while emphasising that the transition must be a just one, with adequate planning, financing and inclusion of workers in decision-making. In 2015 the International Labour Organization adopted principles for such a just transition.<sup>14</sup>

Since then, trade unions in Europe and beyond have been increasingly pushing decision-makers to come up with restructuring plans for coal-based economies and generate alternative employment for coal industry workers.

The European Trade Union Confederation (ETUC) representing over 48 million workers from 39 countries, is not only pushing EU institutions and governments to dedicate resources to the just transition of coal communities but it is also educating workers across Europe that a transition away from coal is inevitable and that workers must get involved as soon as possible to shape it.

At the end of 2017, the European Commission launched a Platform for Coal Regions in Transition, meant to assist regions moving away from coal. If the Platform concentrates on assisting just transition rather than keeping the coal industry on a life support machine, it could prove a great tool to help communities shape their post-coal futures. NGOs and unions are also pushing for more funds from the next EU budget, currently being shaped, to be dedicated to just transition.

Just transition is expected to be a major theme of this year's COP in Katowice, Poland. Trade unions and NGOs will be pushing for high-level discussions and agreements on the topic. In the run-up to the COP, pressure is building up on host country Poland to accept the inevitability

of moving beyond coal.

This increasing global recognition on the need for change is only just starting to reach southeast Europe. The region's coal industry is largely based on lignite/brown coal rather than hard coal, so the mines need to be near to the power plants because of the low calorific value, high moisture content, and consequently high costs of transportation. This short supply chain has given rise to all sorts of measures aimed at keeping lignite costs low for the power plants while enabling uneconomic mines to continue working, such as the state covering mines' social welfare contributions in the Federation of Bosnia-Herzegovina from 2009-2015.<sup>15</sup>

Such measures, however, cannot continue. It is hardly fair to subsidise one - highly polluting - industry from the public purse while others have to fend for themselves. Instead, these funds should cease going towards the companies and be used to benefit the communities.

Moreover, all the states covered in this report are either EU Member States or Contracting Parties of the Energy Community Treaty. In both cases state aid to the energy sector is strictly controlled and is not allowed if it could distort competition. Operating aid for the mining sector is not allowed at all - only aid to assist with closure of mines<sup>16</sup>. While there is little or no competition between lignite mines, there is competition between different types of energy generation and different energy generation companies that could easily be distorted by subsidies.

At the same time as the non-EU southeast European countries are opening up their energy markets and subsidies are becoming more and more tightly regulated, a second challenge is looming. Apart from the new Stanari plant in Bosnia-Herzegovina, the remaining 36 coal units currently in operation in Bosnia-Herzegovina, Kosovo, Macedonia, Montenegro and Serbia, with an installed capacity of 8358 MW, need to either implement investments to bring them into line with the EU Large Combustion Plants Directive or be closed during the next few years. Plans exist to improve pollution control measures on many of these plants, but they face increasing problems due to their old age and will gradually need to be phased out.

Numerous plans exist for new lignite plants in the region - some to replace existing ones, and some completely new ones. Governments and electricity companies often promote these projects as creating new jobs and saving existing jobs in lignite mines, but this report shows that these claims are almost always exaggerated and in some cases downright fraudulent.

<sup>9</sup> [https://corporate.vattenfall.com/globalassets/corporate/investors/annual-reports/2017/vattenfall-annual\\_and\\_sustainability-report\\_2016\\_eng.pdf](https://corporate.vattenfall.com/globalassets/corporate/investors/annual-reports/2017/vattenfall-annual_and_sustainability-report_2016_eng.pdf)

<sup>10</sup> <https://corporate.vattenfall.com/press-and-media/press-releases/2016/vattenfall-to-sell-german-lignite-operations/>

<sup>11</sup> [http://www.focus.si/files/programi/energija/2014/myth\\_buster\\_short.pdf](http://www.focus.si/files/programi/energija/2014/myth_buster_short.pdf)

<sup>12</sup> [http://www.hse.si/en/files/default/letna-porocila/Annual%20report%20of%20the%20HSE%20Group%20and%20the%20Company%202017\\_final.pdf](http://www.hse.si/en/files/default/letna-porocila/Annual%20report%20of%20the%20HSE%20Group%20and%20the%20Company%202017_final.pdf)

<sup>13</sup> See for example: <http://www.ituc-csi.org/what-s-just-transition?lang=en> and <https://www.verdi.de/presse/pressemitteilungen/++co++29a33326-7a86-11e6-a6c7-525400b665de>

<sup>14</sup> [http://www.ilo.org/wcmsp5/groups/public/---ed\\_norm/---relconf/documents/meetingdocument/wcms\\_420286.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_420286.pdf)

<sup>15</sup> [http://bankwatch.org/sites/default/files/EnCom-state-aid-cases-08Jun2015\\_0.pdf](http://bankwatch.org/sites/default/files/EnCom-state-aid-cases-08Jun2015_0.pdf)

<sup>16</sup> <http://bankwatch.org/publications/risks-coal-and-electricity-investments-western-balkans-ukraine-and-moldova-due-state-ai>



New coal plants planned in southeast Europe

Name of plant	Capacity	GPS co-ordinates	Status
Tuzla 7	450 MW	44.5199934,18.5969717	Planned
Banovići	350 MW	44.4110183,18.528319	Planned
Ugljevik III	600 MW	44.6829417,18.9672664	Planned
Kakanj 8	300 MW	44.0872443,18.079071	Announced
Gacko II	350 MW	43.1737378,18.5141892	Announced
Kamengrad	430 MW	44.7849023,16.5919924	Announced
Kostolac B3	350 MW	44.7280865,21.2047371	Planned
Pljevlja II	254 MW	43.3341603,19.3224299	Planned
Oslomej reconstruction	129.5 MW	41.5823169,20.995483	Planned
Kosova e Re	500 MW	42.6937069,21.0561425	Planned
Rovinari 7	500 MW	44.9093587,23.1283379	Announced
Ptolemaida V	660 MW	40.4801856,21.6574806	Under construction
Meliti II	450 MW	40.4101914,21.7825933	Announced

The greatest need for workers comes in the coal mines and during the construction stage of the plants. However, while construction does temporarily require some local labour, the numbers cited by decision-makers often overlook the fact that many of the workers will need to be imported from China or elsewhere due to the need for specialist knowledge. Mines in the region tend to be overstaffed compared to their counterparts in nearby countries, putting the associated power plants at a disadvantage on the electricity market. Whether new plants are built or not, the number of jobs in the mines needs to be reduced if the existing power plants are to be anything like economically viable.

Just transition, however, is not just about gradual and planned reduction of jobs in the fossil fuel industry. It focuses on the redevelopment of the entire region, aiming to

cover all interconnecting needs, from education to infrastructure. It is therefore crucial for communities currently dependent on fossil fuels to start defining their own future and plan for life beyond coal. This is not something that will happen in fifty years, when regions run out of coal – the process is already ongoing, and it is in danger of being an unmanaged decline rather than a planned transition. Towns like Pljevlja and Gacko are already suffering from their overdependence on coal, and the answer is not more coal but transformation and diversification.

This paper takes a look at the employment situation in lignite mines and plants across southeast Europe and promises regarding future employment levels. For the planned power plants, where possible it compares them to employment levels in Šoštanj 6, Slovenia,



## Lignite mine productivity, 2015, EU countries

Country	Tonnes lignite 2015	Employees lignite 2015	Tonnes/worker 2015
Bulgaria	35,900,000	11,765	3,051
Czech Republic	38,100,000	7,869	4,842
Germany	178,100,000	15,428	11,544
Greece	45,400,000	4,919	9,230
Hungary	9,300,000	1,655	5,619
Poland	63,100,000	9,574	6,591
Romania	24,000,000	10,600	2,264
Slovakia	1,800,000	2,190	822
Slovenia	3,200,000	1,274	2,512
Total	398,900,000	65,274	6,111

Source: Euracoal <https://euracoal.eu/info/country-profiles/>

for lignite power plants. This has been chosen as the only southeast European country with a new coal power plant for which plant-specific employment figures are available.

For mining, a comparison is made with the European average for 2015 according to Euracoal figures. This is quite a conservative approach as many of the mines across Europe are uneconomic, so in reality mines should be aiming for much higher than average productivity if they plan to continue operating.

For the plants and mines where no separated data is available, we compared employment levels to Stanari in Bosnia-Herzegovina as an example of a new privately-owned plant in a comparable setting. However no separate data on Stanari's division of labour between the plant and mine is available, and it is also not clear whether Stanari's employment levels are sustainable in the medium term.

The authors of the paper are aware that the calculations below are quite approximate and that each plant and mine has its own characteristics. However, the aim is to give an overview and to point out a general problem present across southeast Europe - that decision-makers are making unrealistic promises about preserving lignite industry jobs. They have not addressed - or in many cases acknowledged - the fact that the number of jobs in the lignite industry needs to be reduced, whether new power plants are built or not.

All the countries have committed to run their energy sectors according to market principles, which means that the electricity industry no longer needs to simply generate electricity, but that it needs to do so at a price that can compete with other producers. Many of the existing plants in the region already have serious financial problems and we expect that lignite will become even less viable in the medium term.

However even those who do not share our vision of a decarbonised electricity system within the next two decades need to recognise that the process of creating a just transition away from over-employment in the lignite sector is already long overdue. The longer it is left the more drastic and less just the transition will be. With an earlier start, a better quality social dialogue can take place. More workplaces can be reduced through employees retiring rather than enforced redundancies, and more funds can be raised for ensuring a well-planned sustainable transformation of the mining regions.





# WHAT HAPPENED SO FAR WITH NEW LIGNITE PLANTS IN THE REGION



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[http://www.focus.si/files/programi/energija/2014/myth\\_buster\\_short.pdf](http://www.focus.si/files/programi/energija/2014/myth_buster_short.pdf)

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<http://www.rlv.si/si/files/default/Letna%20porocila/LETNO%20POROCILO%20PV%202016.pdf>

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[http://www.hse.si/en/files/default/letna-porocila/Annual%20report%20of%20the%20HSE%20Group%20and%20the%20Company%202017\\_final.pdf](http://www.hse.si/en/files/default/letna-porocila/Annual%20report%20of%20the%20HSE%20Group%20and%20the%20Company%202017_final.pdf)

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<http://www.eft-stanari.net/sr/tpp-economic.html>,  
<http://www.nezavisne.com/ekonomija/privreda/Pustena-u-rad-TE-Stanari-vrijedna-milijardu-maraka-FO-T0/388209>

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<http://www.eft-stanari.net/sr/tpp-economic.html>

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<http://balkans.aljazeera.net/vijesti/stanari-veliki-projekt-ili-veliki-zagadivac>

<http://www.avaz.ba/clanak/196388/stanari-uz-400-kineza-i-400-nasih-radnika?url=clanak/196388/stanari-uz-400-kineza-i-400-nasih-radnika>

## A CAUTIONARY TALE FROM SLOVENIA...

Slovenia's 600 MW Šoštanj unit 6 project started life in relative obscurity around 2006 but has become one of the most controversial topics in Slovenia in recent years, after massive cost increases doubled the cost to EUR 1.4 billion and the project was plagued by corruption scandals resulting in 10 people being charged.<sup>17</sup> In 2016 the Šoštanj power plant as a whole ran up losses of EUR 47 million and in 2017 EUR 32.5 million.<sup>18</sup>

Among the numerous promises made about the project was that would preserve around 3500 workplaces would be preserved for 40 years in the nearby Velenje underground lignite mine.<sup>19</sup>

Presumably this figure included indirect employment through goods and services supplied to the mine as there were 1243 people employed in the mine in 2016<sup>20</sup> - far from 3500 - but this was never made clear to the public. Indirect employment is a notoriously slippery concept that can include activities clearly linked to the industry in question but often includes occupations like cleaners, caterers, bakers etc. who may well operate regardless of whether the leading industry in the region is a

coal mine or something else.

The investment programmes for the new unit were more modest in the employment field, as they included only the plant and not the mine. They stated that Šoštanj power plant as a whole would still employ 450 and 400 people in 2014 and 2015 respectively but from 2028 as unit 5 closes, leaving only unit 6, this number would decrease to 200 workplaces, until 2054.

However, with the Šoštanj 6 project going so badly wrong, in October 2014, the management of the Šoštanj plant announced its plans to optimize its functioning of TEŠ and to lay off 226 of the 452 employees.<sup>21</sup> This has so far been only partially implemented: At the end of 2017, TEŠ still had 311 employees,<sup>22</sup> possibly partly as a result of the fact that the lifetime of unit 4 has been extended<sup>23</sup> to help cover for TEŠ 6's losses.

Unit 6 itself employs around 200 people and generates around 3500 GWh of electricity annually<sup>24</sup>, making around 17.5 GWh per person per year.

## AND FROM BOSNIA AND HERZEGOVINA...

The only other coal power plant in the region to be built in recent years is the 300 MW Stanari plant near Doboj in Bosnia and Herzegovina. The plant started commercial operation in September 2016 and by August 2017 reported employing 780 people in the mine and plant together.<sup>25</sup> EFT has announced that the complex will eventually employ 900 people.<sup>26</sup> The Republika Srpska government could not resist pumping it up to 1000 in its statements about the plant.<sup>27</sup>

Nevertheless, the construction stage highlights issues that are likely to be relevant for other plants in the region. For the construction stage 1200 workplaces were promised.<sup>28</sup> In reality, however, the figures cited by the media once construction got going suggested that there were about 400-450 workers from BiH, along with 350-400 Chinese workers.<sup>29</sup> In other words, little more than one third of the proclaimed workplaces for construction materialized for local workers.

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# EMPLOYMENT TRENDS IN THE EU LIGNITE SECTOR

## GERMANY

Germany is often cited in southeast Europe as an example of the EU's continuing use of lignite. But the question is: for how much longer? Germany is not planning to build any new coal power plants and plans to satisfy at least 35% of its electricity consumption from renewable energy by 2020, at least 50% by 2030 and at least 80% by 2050 (with 60% of total energy from renewables).<sup>30</sup>

A closer look shows that even with much more efficient production than in southeast Europe, Germany's lignite sector is currently uneconomic.

A leaked document from the German coal phase-out commission<sup>31</sup> acknowledges the country's pledge to become "largely greenhouse gas-neutral" by 2050 and confirms the government's 2030 target of reducing emission by 55% compared to 1990 levels. It also underlines the commission's strategic priority of ensuring local economies' resilience during the phase out of both coal mining and coal-fired power production.

During the last two decades, Germany has undergone a massive reduction in the number of people employed in the lignite industry. In 1989 there were 156 731 employees in the lignite mining sector across Germany.<sup>32</sup> By

2015 this figure had dropped to 15 428.<sup>33</sup> Most of the job losses took place in the former East Germany, as one might expect, but even in the Rhineland the number of workplaces dropped by almost a third.<sup>34</sup>

Given total German lignite production of 178.1 million tonnes in 2015, it appears that productivity per person reached 11 543 tonnes per worker that year.<sup>35</sup> This does not appear to be evenly spread, as LEAG had around 8000 employees within its Lusatian operations in 2017, and production of 61.2 million tonnes of lignite. So this would be nearer 7650 tonnes per person per year.<sup>36</sup>

Around 5000 people were employed in lignite power plants in Germany in 2017, and the plants generated around 147 500 GWh - around 29.5 GWh per employee.<sup>37</sup>

As we will see later, this is many times more efficient than the lignite industry in southeast Europe. Yet even with such apparently high efficiency, in 2016 Vattenfall sold its lignite power plants and mines in Germany with a loss of SEK 22.1 billion (EUR 2.1 billion).<sup>38</sup> The company still considered this cheaper than keeping hold of them.<sup>39</sup>

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<http://www.bmwi.de/BMWi/Redaktion/PDF/V/vierter-monitoring-bericht-energie-der-zukunft,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf>

31  
<http://www.climatechangenews.com/2018/05/17/german-coal-phase-commission-balance-jobs-climate/>

32  
[http://www.braunkohle.de/index.php?article\\_id=98&fileName=debriv\\_statistikfaltblatt\\_en\\_20140205.pdf](http://www.braunkohle.de/index.php?article_id=98&fileName=debriv_statistikfaltblatt_en_20140205.pdf)

33  
<http://euracoal.eu/info/country-profiles/germany/>

34  
[http://www.braunkohle.de/index.php?article\\_id=98&fileName=debriv\\_statistikfaltblatt\\_en\\_20140205.pdf](http://www.braunkohle.de/index.php?article_id=98&fileName=debriv_statistikfaltblatt_en_20140205.pdf)

35  
<http://euracoal.eu/info/country-profiles/germany/>

36  
[https://www.leag.de/fileadmin/user\\_upload/pdf-en/LEAG\\_facts\\_figures\\_2017.pdf](https://www.leag.de/fileadmin/user_upload/pdf-en/LEAG_facts_figures_2017.pdf)

37  
AG Energiebilanzen: Energieverbrauch in Deutschland im Jahr 2017: <https://www.ag-energiebilanzen.de/>

38  
[https://corporate.vattenfall.com/globalassets/corporate/investors/annual-reports/2017/vattenfall\\_annual\\_and\\_sustainability\\_report\\_2016\\_eng.pdf](https://corporate.vattenfall.com/globalassets/corporate/investors/annual-reports/2017/vattenfall_annual_and_sustainability_report_2016_eng.pdf)

39  
<https://corporate.vattenfall.com/press-and-media/press-releases/2016/vattenfall-to-sell-german-lignite-operations/>



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# POLAND

Poland has also seen significant changes in its lignite industry over the past 15 years. In 2001 there were a total of 24 020 workers in lignite mines, producing 2500 tonnes of coal per employee per year. By 2013 the number of miners had decreased to 13 598 but they produced 4800 tonnes of coal per employee per year - a 92% increase of productivity.<sup>40</sup> By the end of 2016 a more rapid increase in efficiency took place. According to the Polish Mining Authority, 59 576 100 tonnes of lignite were produced at 11 mines, and the number of people employed was 6001,<sup>41</sup> making up 9927 tonnes of lignite per worker.

In 2015 Poland had 9.2 GW of installed lignite generation capacity, which generated 52 900 GWh.<sup>42</sup> Country-wide data on average generation per employee was not found but Poland's largest power plant, Belchatow, had

3 165 employees<sup>43</sup> at the end of 2017 and generates around 34 000 GWh per year,<sup>44</sup> making around 10.7 GWh per employee per year.

The Polish government remains largely wedded to coal, and as a result too little attention has been paid to planning for a just transition. However some initiatives have already taken place. A relatively recent one is the inclusion of the Silesia region - mostly mining hard coal - as a pilot region in the EU's European Platform for Coal Regions in Transition. However the list of projects proposed by the Polish government so far gives rise to concerns that it is far more interested in delaying the inevitable phase-out of coal with dead-end "clean coal" projects rather than actually assisting the communities affected.<sup>45</sup>

<sup>40</sup>  
[http://www.ppw.org.pl/Static/upload/File/wegiel\\_86\\_1\\_2014.pdf](http://www.ppw.org.pl/Static/upload/File/wegiel_86_1_2014.pdf)

<sup>41</sup>  
[http://www.wug.gov.pl/english/supervised\\_plants](http://www.wug.gov.pl/english/supervised_plants)

<sup>42</sup>  
<https://euracoal.eu/info/country-profiles/poland/>

<sup>43</sup>  
<https://elbelchatow.pgegiek.pl/O-oddziale/Pracownicy>

<sup>44</sup>  
<https://elbelchatow.pgegiek.pl/O-oddziale>

<sup>45</sup>  
<https://bankwatch.org/wp-content/uploads/2018/06/Briefing-EC-platform-briefing.pdf>

<sup>46</sup>  
<http://www.just-transition.info/lessons-from-czech-republic>

<sup>47</sup>  
[https://www.restartregionu.cz/content/uploads/2016/10/Strategicky\\_ramec.pdf](https://www.restartregionu.cz/content/uploads/2016/10/Strategicky_ramec.pdf)

<sup>48</sup>  
<http://euracoal.eu/info/country-profiles/czech-republic/>

<sup>49</sup>  
[http://www.ey.com/Publication/vwLUAssets/EY\\_European\\_Lignite\\_Mines\\_Benchmarking\\_2014/\\$FILE/EY-European-Lignite-Mines-Benchmarking-2014.pdf](http://www.ey.com/Publication/vwLUAssets/EY_European_Lignite_Mines_Benchmarking_2014/$FILE/EY-European-Lignite-Mines-Benchmarking-2014.pdf)

# CZECH REPUBLIC

The Czech Republic too has been undergoing changes in its energy sector. Although coal still makes up around half of electricity generation, it is in decline, along with the hard coal and lignite coal mining sector.

This led the three coal mining regions to approach the Government asking for a financial injection to re-start their economies<sup>46</sup> - an initiative which led to the development of a Strategic Framework for the Economic Restructuring of the Ústecký, Moravskoslezský and Karlovarský Regions in 2016.<sup>47</sup> The discussion around this strategy

has taken place outside of the framework of debates about the future of the energy sector, due to the fact that a plan for the transition of coal regions is needed irrespective of the exact closing date of mines because reductions in the number of workers start much earlier.

In 2015 the Czech Republic produced 38.1 million tonnes of lignite. The sector employed 7869 workers, equalling 4842 tonnes per worker per year.<sup>48</sup>

# OTHER EU COUNTRIES

In 2014, Ernst and Young published a benchmarking report examining 7 top lignite producers in Europe, including 20 open cast mines in total, from Bulgaria, Czech Republic, Greece, Hungary, Poland and Romania. The results are anonymised so it is not possible to know which companies were involved or which countries had which results, but the benchmarking findings demonstrated a production cost ranging from EUR 5.1 to 20.3 per tonne. This is mainly affected by the geological characteristics of the mine and the volume produced. The average lower calorific

value of the mines ranges from approximately 1100 to 4200 Kcal/Kg, leading to a range of production cost per Gcal of 3.2 to 10.4 EUR/Gcal. Productivity per employee varies massively, from 1 626 tonnes per year per employee to 11 192.<sup>49</sup>

These figures can be applied to the southeast European mines below to see where they fit on the scale, however due to the anonymity of the survey it cannot be assessed whether all of these lignite producers are economically feasible or not.

# BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina (BiH) has for several years been a net exporter of electricity to neighbouring countries like Croatia and Montenegro. However its lignite sector is marked by a very low level of efficiency in terms of both electricity generation and mining. Costs of electricity have so far been kept down by failing to invest sufficiently in pollution control equipment and by power plants paying prices for coal that do not cover production costs - meaning that the mines have had to be subsidised.<sup>50</sup>

A lack of capital investments in new generation capacity has also delayed increases in electricity prices. However this situation now has to change as in 2016 the average age of BiH's coal power plants was 39 years old, and during the next few years they either have to be retrofitted to comply with the Large Combustion Plants Directive or closed. With energy efficiency measures, electricity demand can be reduced, but in any case investments

in generation will need to be made, inevitably raising the price of electricity.

At the same time, BiH's participation in the Energy Community means that it has to open its electricity market and will be exposed to competition from countries like Bulgaria and Romania which are net exporters of electricity, so there will be pressure to keep prices down. BiH therefore needs to weigh up carefully which investments are worth making and which are in danger of ending up as stranded assets due to their high investment and operational costs.

Amer Jerlagić, former Director of the Elektroprivreda BiH utility (EP BiH) has backed up this point, saying that with prices at 35-40 EUR MWh across Europe, depending on the electricity exchange, it is questionable whether the Federation of Bosnia-Herzegovina needs the planned units Tuzla 7 or Banovići,<sup>51</sup> and even the current Director of EP BiH, Bajazit Jašarević, has admitted that both plants are unfeasible.<sup>52</sup>

50 <http://bankwatch.org/sites/default/files/EnCom-state-aid-cases-08Jun2015.pdf>

51 <http://www.zurnal.info/novost/19890/pogledajte-film-vladar-iz-podzemlja-o-mirsadu-kukicu>

52 <http://www.energetika.ba/termoenergija/12161-jos-malo-priprema-za-blok-7-exim-banka-zeli-provjeriti-poslovanje-ep-bih.html>

53 Data for 2017 is available at: <https://www.blberza.com/Pages/DocView.aspx?Id=69333>, however the plant was offline for 110 days due to works so it is not considered a representative year.

54 <http://ers.ba/ers/planovi-i-izvjestaji/finansijski-izvjestaji/>

55 <http://ers.ba/ers/planovi-i-izvjestaji/finansijski-izvjestaji/>

56 <http://www.usaideia.ba/wp-content/uploads/2015/12/prezentacija-eprs.pdf>

57 <http://www.faktor.ba/vijest/u-dugovima-do-guse-rudnici-i-termoelektrane-gacko-i-ugljevnik-u-milionskim-gubicima-177338>

58 <http://ers.ba/ers/planovi-i-izvjestaji/finansijski-izvjestaji/>

59 <https://www.blberza.com/Pages/DocView.aspx?Id=69333>

## REPUBLIKA SRPSKA

### Ugljevik power plant - existing

The Ugljevik mine and power plant complex consists of a 300 MW lignite-fired power plant and the Bogutovo Selo opencast mine, as well as a half-built second unit that was never finished due to the collapse of Yugoslavia. A new 2x300 MW unit is planned (usually known as Ugljevik III) by Comsar Energy, along with new opencast mines.

Ugljevik I started operating in 1985 and in 2016<sup>53</sup> generated around 1750 GWh,<sup>54</sup> while the mine produced 2 027 457 tonnes of lignite.<sup>55</sup> It is projected that the plant will operate until

2039<sup>56</sup> although this will depend on whether it is considered economic to keep upgrading it, and does not seem particularly likely given its current financial woes. In 2014 the mine and power plant company reported losses of 5.5 million 2014, rising to EUR 9 million in 2015<sup>57</sup>. In 2016 it made a small profit<sup>58</sup> but in 2017 ran up losses of nearly EUR 3.4 million.<sup>59</sup> The plant also needs investments to comply with the EU Large Combustion Plants Directive and Industrial Emissions Directive, which will further increase operating costs.

60  
<http://www.narodnaskupstinars.net/?q=la/narodna-skupstina/poslanicka-pitanja-i-odgovori/narodni-poslanik-miladin-stani%C4%87-ministarstvu-industrije-energetike-i-rudarstva>

61  
<http://www.capital.ba/ers-priznala-samo-prosle-godine-zaposleno-600-novih-radnika/>

62  
<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>

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<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>

64  
<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>

65  
[http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/Imper/Documents/Energetska%20strategija%20Republike%20Srpske%20do%202035%20finalni%20nacrt\\_373822299.docx](http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/Imper/Documents/Energetska%20strategija%20Republike%20Srpske%20do%202035%20finalni%20nacrt_373822299.docx)

66  
<http://www.capital.ba/ers-priznala-samo-prosle-godine-zaposleno-600-novih-radnika/>

67  
<http://comsar.com/projects-technologies/hpp-ugljevnik/engine-local-economy>

68  
 Environmental Impact Assessment for Ugljevik III power plant p.108, final version

69  
<http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/IPRP%202017-2026%20-%20Prijedlog.pdf>

70  
 Environmental Impact Assessment for Ugljevik III power plant, final version

71  
<http://bankwatch.org/sites/default/files/Sostanj-TES6-economics.pdf>

A breakdown of how many employees work at the mine vs. the power plant does not appear to be publicly available. For the Ugljevik mine and power plant the number of employees were:

Year	Employees - mine and power plant
2013	1851 <sup>60</sup>
2014	1915 <sup>61</sup>
2015	1983 <sup>62</sup>
2016	1867 <sup>63</sup>
2017	1954 <sup>64</sup>

Some figures for mine efficiency are provided in the 2017 draft Republika Srpska Energy Strategy: 2399 tonnes per person, for a total of 2 030 000 tonnes mined in 2015.<sup>65</sup> However this looks odd as it implies the mine employs 846 people. Given that open cast mines in the region employ many more people than the power plants themselves, this raises the question what the remainder of the 1983 people employed in 2015 were doing. It seems that the figure exclude peoples employed in the administration.

67 people were newly employed at RiTE Ugljevik in 2014, an election year, a pattern which was repeated across Elektroprivreda Republike Srpske. No fewer than 601 new workers were recruited that year.<sup>66</sup>

Altogether the mine and plant employ at least 1000 more people than the Stanari mine and plant which has the same installed capacity as Ugljevik but a higher power output.

## Ugljevik III, 600 MW - planned

Ugljevik III, a new plant planned by Comsar

Energy, is claimed by the company to lead to 800 new job openings.<sup>67</sup> However Comsar does not specify whether these would be permanent or temporary and whether they would be for the mine or power plant.

This figure seems feasible, based on the experience with Stanari, but it would be useful if the company indicated how many of these jobs would be available to people from Bosnia-Herzegovina.

However, the environmental impact assessment predicts 303 workers for the plant itself,<sup>68</sup> which is possible but on the high side compared to Šoštanj 6, also a 600 MW plant, which is projected to have around 200 workers once the other units close. If the plant generates 3371 GWh annually as forecasted,<sup>69</sup> this would only result in 11 GWh per worker per year.

This would be comparable to Belchatow in Poland - but Belchatow also comprises several old units, so should not be a standard for a new plant. Šoštanj 6 generates 17.5 GWh per worker and German lignite plants an average of 29.5 GWh, but are still having financial problems, so the number of employees foreseen at Ugljevik III seems impossibly high.

On one hand it is possible that more employees per unit of output would be needed than at Šoštanj 6, since the net thermal efficiency would be much lower (34.1%<sup>70</sup> compared to 43% at Šoštanj 6<sup>71</sup>), and because there would be two units and not one. But on the other hand, the lower thermal efficiency will also disadvantage the plant on the market so it should have fewer employees to be more competitive.





Overall it seems that 200 employees is more realistic for the coal plant - if it is ever built - so at least 100 of the promised jobs seem to be non-existent, putting the total for the new plant and mine at 700, not 800. If we assume that the 1000 excess jobs at the current Ugljevik I plant are offset by those estimated 700 planned for the new plant and mine, then the result is still minus 300 jobs compared to today, not 800 additional ones. Even this is generous as the existing plant may also have to close earlier than planned.

## Gacko power plant - existing

The existing power plant at Gacko started operating in 1983, has a capacity of 300 MW and is planned to operate until 2035. In order to do so, it would have to improve its financial performance significantly and be refitted in line with the EU Large Combustion Plants Directive and Industrial Emissions Directive.

Mine production in 2017 was 2 715 904 tonnes<sup>72</sup> and power generation around 1 586 GWh<sup>73</sup> - more coal than Ugljevik but less power. The employment figures for the mine and power plant together for recent years are:

Year	Employees - mine and power plant
2013	1600 <sup>74</sup>
2014	1774 <sup>75</sup>
2015	1808 <sup>76</sup>
2016	1725 <sup>77</sup>
2017	1911 <sup>78</sup>

This represents over 1000 more workers than Stanari for a lower power output.

Some figures for mine efficiency are provided in the 2017 draft Republika Srpska Energy Strategy for Gacko: A total of 2 532 000 tonnes was mined in 2015, at 3549 tonnes per person<sup>79</sup>. This implies the mine employs 713 people, whereas total employment at RiTE Gacko in 2015 was 1808 persons. Given that open cast mines in the region employ more people than the power plants, this leaves a gap and seems that the figure exclude peoples employed in the administration.

72  
<http://ritegacko.com/ostvareni-rezultati-r/>

73  
<http://ritegacko.com/proizvodnja/>

74  
<http://www.narodnaskupstinar.net/?q=la/narodna-skupstina/poslanicka-pitanja-i-odgovori/narodni-poslanik-miladin-stani%C4%87-ministarstvu-industrije-energetike-i-rudarstva>

75  
<http://www.capital.ba/ers-priznala-samo-prosle-godine-zaposleno-600-novih-radnika/>

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<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>

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<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>

78  
<http://www.capital.ba/hamovic-na-te-stanari-zaradio-36-miliona-km/>





Ana Constantinescu

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[http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/Documents/Energetska%20strategija%20Republike%20Srpske%20do%202035%20finalni%20nacrt\\_373822299.docx](http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mper/Documents/Energetska%20strategija%20Republike%20Srpske%20do%202035%20finalni%20nacrt_373822299.docx)

80

<http://www.capital.ba/ers-priznala-samo-prosle-godine-zaposleno-600-novih-radnika/>

81

<http://www.capital.ba/novosti-kinezi-ulaze-u-gacko-2/>

82

Studija ekonomske opravdanosti sa elementima zaštite životne sredine za izgradnju i korišćenje "Termoelektrane Gacko II" snage 350 MW na području Opštine Gacko ( Feasibility study ), 2016

Unlike most mines and plants in the region, the number of workers is rising. It is hard to escape the impression that new workers are being taken on for political reasons rather than because they are really needed. The parent company of RiTE Gacko, Elektroprivreda Republike Srpske, has itself attributed the move to helping to solve unemployment in Republika Srpska, rather than claiming that the workers are really crucial.<sup>80</sup>

## Gacko II, 350 MW - planned

A new 350 MW unit has also been announced at Gacko. Claims made publicly about the jobs available for construction have so far been feasible compared with Stanari: that 1000 workers would be needed, of whom around 400 from Republika Srpska. However still misleading claims have been made about "hundreds of new jobs",<sup>81</sup> when in fact an overall reduction is needed compared to today.

The feasibility study shows that the plant itself, once built, would employ 180 workers, and would require around 2 million tonnes of coal per year.<sup>82</sup> If we assume efficiency levels equal to the 2015 EU average, ie 6111 tonnes per worker per year, then only around 330 workers

would be needed in the mines as well.

Since the plant would replace the existing one, the mines jobs would not be additional to today's. And since the workforce is already excessive, even construction would not soak up all the employees who would have to be laid off if RiTE Gacko's staffing levels were to reach that of eg. Stanari. Overall, we estimate that compared to today's 1911 jobs at the plant and mine, only around 510 would remain if the plant is built.

# FEDERATION OF BOSNIA AND HERZEGOVINA

Of the Federation's two public electricity companies, Elektroprivreda BiH (EP BIH) and Elektroprivreda HZHB (EP HZHB), only the former owns coal power plants and mines, although EP HZHB occasionally expresses aspirations of building a plant at Kongora near Tomislavgrad. Banovići coal mine near Tuzla is also majority state-owned, and the company plans to build a coal power plant at the site.

EP BIH owns the Tuzla coal power plant, which is fed by the Kreka, Đurđevik and Banovići mines, and the Kakanj plant fed by the Kakanj, Breza, Zenica, Gračanica and Bila mines.<sup>83</sup> EPBIH, unlike some of the other companies in the region, has admitted for years that it needs to reduce the number of workers, and in 2008 a law on coal mine consolidation<sup>84</sup> was passed in order to provide BAM 272 million (EUR 136 million) in subsidies while the company restructured.<sup>85</sup>

In reality though, the money was provided, but there has not been substantial restructuring. EP BIH's projections about how much of a reduction in the workforce are needed also appear unrealistically low. In its long-term plan, the company estimates that a 25% reduction is needed compared to 2012 for the mines, in order to reach 7 200.<sup>86</sup> Along with other production improvements, it believes that this would triple efficiency. The company also speculates that in the long term, after this stabilisation period, if

there is an increase in production, it would also be possible to take on more workers. As we will see, all this seems rather optimistic.

There have been some reports of increased productivity in EP BIH's mines and a decrease in overall employment in EPBIH,<sup>87</sup> but productivity is still very low.

## Tuzla units 3-6 - existing

Tuzla power plant units 3-6 have a total capacity of 715 MW and output of around 3100 GWh annually. In 2014 the plant had 727 employees,<sup>88</sup> and by 2016 this had reduced to 665.<sup>89</sup> This means that Tuzla generates 4.6 GWh per employee while Šoštanj 6 generates 17.5 GWh. If Tuzla was to achieve 17.5 GWh per employee it would need only around 177 employees. Such a reduction may not be possible spread over several old units, but it gives an idea of what market conditions require. Since the existing units 3-6 at Tuzla are planned to gradually close during the next fifteen or so years, the number of employees would be further reduced.<sup>90</sup>

## Tuzla unit 7, 450 MW - planned

One of the justifications given for constructing Tuzla 7 is employment: "Salvation for 4000

83  
<http://www.elektroprivreda.ba/upload/documents/odluke/dugorocni-plan.pdf>, p.224

84  
Zakon o finansijskoj konsolidaciji rudnika uglja u Federaciji Bosne i Hercegovine prema obračunatim, a neuplaćenim javnim prihodima u periodu od 2009. do 2015. godine

85  
<http://www.elektroprivreda.ba/upload/documents/odluke/dugorocni-plan.pdf>

86  
<http://www.elektroprivreda.ba/upload/documents/odluke/dugorocni-plan.pdf>, p.257

87  
<http://www.avaz.ba/clanak/255784/rudari-obaraju-rekorde?url=clanak/255784/rudari-obaraju-rekorde>, [http://www.elektroprivreda.ba/upload/documents/tacka\\_2\\_dnevnog\\_reda\\_Usvajanje\\_lzvjestaja\\_o\\_poslovanju.pdf](http://www.elektroprivreda.ba/upload/documents/tacka_2_dnevnog_reda_Usvajanje_lzvjestaja_o_poslovanju.pdf)

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[http://www.elektroprivreda.ba/upload/documents/GI\\_bosanski\\_2014.pdf](http://www.elektroprivreda.ba/upload/documents/GI_bosanski_2014.pdf)

89  
[http://www.elektroprivreda.ba/upload/documents/2016%20GI%20\\_%2015\\_8%20final.pdf](http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf)

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<http://www.elektroprivreda.ba/stranica/organizacija-drustva>

<http://www.elektroprivreda.ba/upload/documents/materijali286MB.pdf>



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92  
 See eg. <https://www.fokus.ba/vijesti/bih/odustajanjem-od-izgradnje-bloka-7-bez-posla-ostaje-3-500-radnika/504986/>

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<http://www.elektroprivreda.ba/stranica/koncern-epbih>

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<http://www.elektroprivreda.ba/upload/documents/materijali286MB.pdf>

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<http://www.energetika.ba/termoenergija/12161-jos-malo-priprema-za-blok-7-exim-banka-zeli-provjeriti-poslovanje-ep-bih.html>

96  
[http://www.elektroprivreda.ba/upload/documents/2016%20GI%20\\_%2015\\_8%20final.pdf](http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf)

97  
<http://www.usaideia.ba/wp-content/uploads/2015/10/Prezentacija-EPBiH-NERP-Ugljivik-20.10.2015..pdf>

Number of workers	2010	2011	2012	2013	2014	2015	2016
Kakanj	639	626	628	631	625	596	614
Tuzla	730	724	723	724	727	694	665

Source: Federalno Ministarstvo Energije, Rudarstva i Industrije: Informacija o stanju u elektroenergetskom sektoru Federacije BiH sa prijedlogom mjera, januar 2016. godine. p.17, Elektroprivreda BiH Annual Report 2016, p.41

workers from the Kreka mine, but also the whole BiH energy system”, proclaimed one rather optimistic news item on the project.<sup>91</sup> 3500 workplaces maintained is a more frequently cited figure.<sup>92</sup> However, Kreka had only 2462 workers in 2017,<sup>93</sup> down from 3010 in 2014, and will need to further decrease this number in the future.

The environmental impact assessment does not give the number of expected workers for the Tuzla 7 unit itself but mentions 800 workers, which presumably includes the existing units as well. The projected generation per year is 2632 GWh.<sup>94</sup> Tuzla 7 is planned despite the fact that it is currently financially unfeasible due to low electricity prices<sup>95</sup>. Therefore if built, it can be assumed that the number of employees will be kept to an absolute minimum in order to minimise losses.

If we assume that the production ratio per worker will need to be the same as Šoštanj, for 2632 GWh annually, only 150 workers would be needed in unit 7. If we balance this out with the reductions needed in the Kreka mine, below, it turns out that not 3500 jobs would be maintained, but 540 in the mine - even with production for the other units. The 150 jobs for operating the plant would most likely not be additional to today's figures for plant operation, but rather instead of some of them.

## Kakanj units 5-7 – existing

In 2016 there were 614 workers at the Kakanj thermal power plant.<sup>96</sup> With generation of around 2300 GWh per year, this makes only 3.75 GWh per employee, while Šoštanj 6 generates 17.5 GWh per person. If Kakanj's output per employee were to equal to Šoštanj 6's, there would only be 131. Kakanj is planned to operate until 2027 (unit 5) and beyond 2030 (units 6 and 7),<sup>97</sup> however this depends whether it will be economic to do so.

An eighth unit is planned at Kakanj, but as yet the authors are unaware of any claims about employment made regarding the plant, so it is not covered here.

## EP BIH mines supplying Tuzla power plant

### Kreka mine

Kreka mine, which supplies Tuzla power station, consists of the Šikulje and Dubrave open cast lignite mines and the Mramor underground mines. In 2013 the mines produced 2 109 000 tonnes of lignite and had 3255 employees, with a production rate of 648 tonnes per employee per year. In 2017, 2462 workers produced 2 215 748 tonnes of coal<sup>98</sup> - nearly 900 tonnes per worker. This is quite an improvement but still more than six times lower than the EU average. With EU average productivity levels of 6111 tonnes per worker, Kreka would need only 363 employees.

Together with the need to supply the remaining existing units, EP BIH's long-term plan shows two jumps in production at the Kreka mine leading to a doubling of production by 2030 to 5 million tonnes.<sup>99</sup> These correspond to the planned units Tuzla 7 and Tuzla 8 coming online. Since Tuzla 8 is highly unlikely to be built in an era of EU decarbonisation policies, we do not believe that production could pass 3.3 million tonnes even if Tuzla 7 is built. With productivity levels improved to the EU average, this would imply only 540 workers at Kreka.

### Đurđevik

In 2017 the Đurđevik mine, which also supplies Tuzla power plant, produced around 495 938 tonnes of brown coal, with 834 employees, making only 595 tonnes per employee.<sup>100</sup>

## EP BIH mines supplying Kakanj power plant

### Kakanj

The Kakanj mines consist of the Vrtlište opencast mine and Haljinići underground mine. In 2017, 1694 people were employed in the mines, producing 1.3 million tonnes of brown coal – in other words, only around 767 tonnes of coal per employee.<sup>101</sup>

### Zenica

The Zenica underground brown coal mines consist of Stara jama, Raspotočje and Stranjani and supply the Kakanj power plant. In 2017, 415 989 tonnes of brown coal were produced by the mines' 1472 employees – a mere 282 tonnes per person.<sup>102</sup>

### Breza

The Breza mine consists of the Sretno and Kamenice underground brown coal mines and supplies Kakanj power plant.<sup>103</sup>

### Abid Lolić d.o.o. Travnik – Bila

includes the Grahovčići underground and opencast mine and supplies Kakanj power plant. Brown coal production in 2017 was 138 923 tonnes and the number of employees was 412, making only 337 tonnes per person.<sup>104</sup>

### Gračanica, Gornji Vakuf – Uskoplje –

supplies Kakanj with lignite and comprises the Dimnjače opencast mine. Annual production in 2017 was 331 923 tonnes, and there were 189 employees, making 1756 tonnes per person - by far the highest in EP BIH but still much lower than production levels in other countries.<sup>105</sup>

The tables below show that although mine productivity is slowly improving in EPBIH, it is still around nine times as low as the EU average. If the EU average was achieved, only 912 employees would be needed, instead of 8283.

EPBIH mine employees							
Number of workers	2010	2011	2012	2013	2014	...	2017
Kreka	3872	3657	3475	3255	3010	...	2462
Đurđevik	1147	1106	1037	972	945	...	834
Kakanj	2092	2024	1952	1989	1906	...	1694
Zenica	1423	1439	1508	1504	1469	...	1472
Breza	1255	1265	1268	1252	1262	...	1220
Bila	292	280	276	280	354	...	412
Gračanica	210	210	209	200	199	...	189
<b>Total</b>	<b>10 291</b>	<b>9981</b>	<b>9725</b>	<b>9452</b>	<b>9145</b>	<b>...</b>	<b>8283</b>
<b>Total EP BIH coal production in tonnes</b>	<b>4 892 000</b>	<b>5 497 000</b>	<b>5 479 000</b>	<b>4 904 000</b>	<b>4 710 000</b>	<b>...</b>	<b>5575066</b>

98 <http://www.elektroprivreda.ba/stranica/koncern-epbih>

99 <http://www.elektroprivreda.ba/upload/documents/odluke/dugorocni-plan.pdf>, p.253

100 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

101 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

102 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

103 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

104 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

105 <http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark96>

EPBIH mines productivity per employee tonnes/year							
Number of workers	2010	2011	2012	2013	2014	...	2017
Kreka	598	723	718	648	622	...	900
Đurdevik	456	540	565	495	493	...	595
Kakanj	514	552	596	543	577	...	767
Zenica	139	222	224	231	199	...	282
Breza	342	366	373	369	361	...	554
Bila	324	367	425	571	500	...	337
Gračanica	1206	1213	1471	1320	1754	...	1756
<b>Average</b>	<b>475</b>	<b>551</b>	<b>563</b>	<b>519</b>	<b>515</b>	<b>...</b>	<b>673</b>

Sources: Federalno Ministarstvo Energije, Rudarstva i Industrije: Informacija o stanju u elektroenergetskom sektoru Federacije BiH sa prijedlogom mjera, January 2016, EP BIH website: <http://www.elektroprivreda.ba/stranica/koncern-ep-bih#bookmark9>

106  
<http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/Juli%202016/IPRP%202017-2026%20-%20Final.pdf>

107  
 Rudarski institut d.d. Tuzla: IZMJENE I DOPUNE STUDIJE O UTICAJU NA OKOLIŠ ZA TE „BANOVICI“, Tuzla, May 2015, p.31

108  
<http://www.kameleon.ba/89d9b6.php/lifestyle/lzgradnja-termoelektrane-Banovici-Nova-radna-mjesta>

109  
<http://rmub.ba/onama.html>

110  
<https://avaz.ba/vijesti/teme/358546/otvoreno-pismo-rmu-banovici-mi-poslujemo-pozitivno-a-rudnici-u-koncernu-su-gubitasi>

111  
<http://www.rmub.ba/proizvodni-rezultati-2017-godine>

112  
[http://www.sase.ba/v1/Tr%C5%BEi%C5%A1te/Emitenti/Profil-emitenta/symbol/RMUBR#tab\\_FinancialReportsTab](http://www.sase.ba/v1/Tr%C5%BEi%C5%A1te/Emitenti/Profil-emitenta/symbol/RMUBR#tab_FinancialReportsTab)

113  
<http://indikator.ba/Vijest.aspx?p=1&id=18466&naslov=Termoelektrana+Kemengrad+zaposlit+%C4%87e+najmanje+1.000+ljudi>

## Banovići plant, 350 MW, planned

According to the 2015 environmental impact assessment for the plant, 1706 GWh will be generated annually. This is extraordinarily little if one considers that Stanari, which is 50 MW smaller and has a low net efficiency of 34.1%, is expected to generate 2000 GWh. Indeed NOS BIH's indicative generation capacity plan 2017-2026 expects 2200 GWh.<sup>106</sup>

There are also inconsistencies about the number of people to be employed. On p.31 of the environmental impact assessment it states 200 people,<sup>107</sup> while on p.156 it says 250. If we accept that the number is 200 and generation 2200 GWh, generation per employee would be 11 GWh annually per person - much lower than Šoštanj 6. If its productivity was similar to Šoštanj 6, only 125 workers would be needed.

In public, however, jobs during construction have been emphasised, with claims that around 1000 workers will be needed.<sup>108</sup> However it is not stated how many of them would be from Bosnia-Herzegovina. The experience with Stanari suggests 450 maximum would be more realistic.

## Banovići mine

Around 70% of the brown coal from the Banovići underground and opencast mines is sold to the Tuzla power plant,<sup>109</sup> primarily for Unit 6. As of 2018, 2780 people are employed at the mine.<sup>110</sup> 1 434 651 tonnes of coal were mined in 2017<sup>111</sup> making only 516 tonnes per person. For now, the mine is profitable, but with these production

ratios, it is questionable for how long.<sup>112</sup> If it reached EU average staffing levels it would have only 235 employees - ten times fewer. Altogether, this means that rather than the current 2780 plus 1000 additional work places, a reduction of 2095 is more likely (450 new plus 235 maintained).

## Kamengrad, 430 MW, planned

This project has been around for years but took a step forward in 2017 when representatives of Chinese companies began to take an interest in it. It is claimed that at least 1000 jobs will be created during construction and at least 800 after that,<sup>113</sup> as the project would involve re-opening the lignite mine at the site. As we have seen for Stanari, 450 jobs for people from Bosnia-Herzegovina looks more realistic for the construction stage. For operation, 800 is comparable to Stanari.



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# BULGARIA

Bulgaria's electricity generation is dominated by lignite and nuclear, and even though the country reached its 2020 renewable energy target under the Renewable Energy Directive already in 2012<sup>114</sup> - demonstrating the country's low ambition compared to its potential - in recent years government policy has focused on obtaining derogations<sup>115</sup> for its old lignite fleet, which would allow it to operate at the minimum of environmental safeguards.

While Bulgaria does not have any plans to build new coal generation capacity, it features in this report as it has made several mistakes in its lignite mines' closure and power plants' ownership structure that are in stark contrast with the just transition and regional redevelopment concept, which should be avoided by the rest of the countries in the region.

In 2017 Bulgaria generated 39.9 percent of its electricity from lignite and brown coal, 33.3 percent from nuclear, 15 percent from renewables (other than hydropower), 7.7 percent from hydropower, 3.5 percent from gas and 0.6 percent from hard coal.<sup>116</sup>

Opencast lignite mining is mainly carried out in the mines of Mini Maritza Iztok EAD (MMI), whose production accounted for 90 percent of the country's total in 2015.<sup>117</sup> Its mines cover an area of some 240 km<sup>2</sup> - the largest mining site in southeast Europe. MMI is also the biggest employer in Bulgaria. Mini Maritza supplies five power plants with lignite: the state-owned Maritsa East 2 (1620 MW) and the privately owned ContourGlobal Maritsa Iztok East 3 (908 MW), AES Galabovo (670 MW) and Brikell power plant (200 MW). MMI also supplies lignite to the 120 MW Maritsa 3 power plant in Dimitrograd.

Other smaller lignite mining companies operate the Beli Bryag mine (1.9 percent of lignite production in 2015), Stanyantsi mine (2.4 percent) and Chukurovo mine (0.2 percent).

Bulgaria's brown coal deposits are mostly

located in the western part of the country (Bobov Dol, Pernik and Pirin coalfields and the Katrishte deposit) and near the Black Sea (Cherno More coalfield). In 2015, production of brown coal from both underground and surface mines totalled 2.1 million tonnes.<sup>118</sup>

Vagredobiv Bobov Dol EOOD mines in the Bobov Dol coalfield is the largest deposit of brown coal in the country with reserves and resources amounting to some 100 million tonnes.<sup>119</sup> Coal from the single opencast mine and two underground mines is supplied mainly to the nearby 210 MW Bobov Dol TPP. In 2015, a total of 1 million tonnes of brown coal was produced from the three mines. About 10% to 12% of the coal mined by Vagredobiv Bobov Dol is used by households.

The largest of the two underground coal mines in Bobov Dol is shutting down by the end of 2018,<sup>120</sup> with 400 people to be laid off by the end of the year. The mine owner's decision took the employees so much by surprise, that they organised a press conference to express their concerns.

A neighbouring mine, Babino, with the same (private) owner closed down in 2017 already, and 650 employees were left with no choice of other employment, but financial compensation.

In 2016, when the mine owner had already showed signs of wanting to close the two underground mines, over 100 miners staged an underground sit-in.<sup>121</sup> This has had little impact on the profit-oriented mine owner, who has not committed to any post lay off plans for over one thousand workers who had kept the business running.

Two opencast mines in the Pernik coalfield are also privately owned, by Otkrit Vagledobic Mines EAD, and produced 1 million tonnes of brown coal in 2015.

Underground coal mining in the Oranovo coalfield is carried out by the private company Balkan MK OOD, which produces approximately 0.7 million tonnes per year.

114  
<https://renewablesnow.com/news/bulgaria-hits-early-2020-renewables-target-eurostat-408763/>

115  
<https://serbia-energy.eu/bulgaria-deadline-application-derogation-coal-fired-tpps-extended/>

116  
<https://www.entsoe.eu/data/power-stats/monthly-domestic/aggregated-data>

117  
<http://euracoal2.org/download/Public-Archive/Library/Coal-industry-across-Europe/EURACOAL-Coal-industry-across-Europe-6th.pdf>

118  
idem

119  
idem

120  
<http://www.just-transition.info/bulgarian-authorities-forced-to-think-about-just-transition>

121  
<https://www.novinite.com/articles/176767/Underground+Protest+at+Bulgaria+%27s+Bobov+Dol+Mines+Continues>

The brown coal is supplied mainly to the Bobov Dol power plant.

Other small privately-owned mines are the Vitren mine located in the Katrishte deposit, with an annual capacity of around 0.1 million tonnes, and the Cherno More mine in the Black Sea coalfield, with an annual capacity of 0.25-0.3 million tonnes.

In 2014, two of the mines were sold to companies registered in the UK and Cyprus.<sup>122</sup> Stockett Limited, registered in London, thus became the new owner of Mini Chukurovo. The company bought the former owner of the mine, Shallots Corporation, registered in the Seychelles, which holds 74.94 percent of the capital of Mini Chukurovo. The new owner, however, will acquire 100 percent of the mine. Mina Cherno More was bought by the

Cypriot company, Magiva Holdings.

Hard coal output is not significant (35 000 tonnes annually) and its extraction is carried out by Mina Balkan 2000 EAD.

Overall employment numbers for lignite and brown coal mining in 2015, according to Euracoal, stood at 11 765, for overall production of 36 million tonnes and 18.8 TWh electricity generated.<sup>123</sup>

No information on employment in the privately-owned lignite and brown coal mines in Bulgaria is publicly available. However, considering the state-owned Mini Maritza Iztok mines cover close to 90 percent of the country's coal production, this gives a good overview on trends in employment and productivity.

<sup>122</sup> [http://www.standartnews.com/english/read/seychelles\\_shopping\\_britons\\_and\\_cypriots\\_buy\\_7\\_bulgarian\\_power\\_plants\\_-4285.html](http://www.standartnews.com/english/read/seychelles_shopping_britons_and_cypriots_buy_7_bulgarian_power_plants_-4285.html)

<sup>123</sup> <https://euracoal.eu/info/country-profiles/bulgaria/>

<sup>124</sup> [https://www.bgenh.com/OTCHETI/MMI/MMI%202016/GFO\\_MMI\\_2016\\_EN.PDF](https://www.bgenh.com/OTCHETI/MMI/MMI%202016/GFO_MMI_2016_EN.PDF), page 16

<sup>125</sup> Ibid. page 12

<sup>126</sup> [http://www.marica-iztok.com/cms/user/files/finansi/2013g\\_MMI.pdf](http://www.marica-iztok.com/cms/user/files/finansi/2013g_MMI.pdf), page 17 (data for 2011, 2012 and 2013)

### Mini Maritsa Iztok lignite mines

Year	Total coal produced (million tonnes)	Total employees mines	Productivity mines (tonnes/employee/ year)
2016	27.76 <sup>124</sup>	7308 <sup>125</sup>	3798
2015	No data available	No data available	N/A
2014	No data available	No data available	N/A
2013 <sup>126</sup>	25.47	6975	3652
2012	29.85	6972	4281
2011	33.02	7084	4661



Bulgaria's lignite mining sector is different from the rest of the region's in several ways. First of all, even though the vast majority of the country's lignite is extracted by a state owned company, the amount produced in privately owned mines is not negligible. And because these companies' data on employment is not publicly available, it has been impossible to calculate their efficiency or draw any conclusions related to the trend in laying off people, if one actually exists.

This brings us to the second major difference between Bulgaria most of the neighbouring countries: the state-owned lignite mine actually employed more people in 2016 than in 2011, in spite of minor drops in the years in-between.

The only similar trend is in the overall lignite production, which declined from 33 million tonnes in 2011 to almost 28 million tonnes in 2016, but because of a rise in employees, productivity has decreased from 4661 tonnes/employee/year in 2011, to 3798 tonnes in 2016.

If Mini Maritza Iztok managed to achieve the EU average labour productivity of 6111 tonnes per year, it would have needed only 4542 employees in 2016 - 2766 fewer.

#### Lignite power plants in Bulgaria

- State-owned Maritsa East 2 thermal power plant (1 620 MW)
- ContourGlobalMaritsa Iztok East 3 (908 MW),
- AES Galabovo (670 MW)
- Brikell (200 MW).
- Maritsa 3 (120 MW)
- Bobov Dol (210 MW)
- Pernik (180 MW)
- Sliven (30 MW, supplying only district heating)

Compared to the lignite mining, the share of privately owned power plants in Bulgaria is much higher - 2318 MW capacity is privately owned. Only 1620 MW of lignite fired capacity is state-owned - the Maritsa East 2 power plant - and has annual and up-to-date public records related to employment. It would be therefore unwise to extrapolate the numbers available to the whole country, however the absence of such data tells a story in itself.

In 2014, as well as acquiring the mines mentioned above, seven newly established companies, some of which have their head offices in the UK and others in Cyprus, received permits from Bulgaria's Commission for Protection of Competition (CPC) to acquire



several heating companies in the country.<sup>127</sup>

These included district heating plants in Burgas, Ruse, Pernik, Pleven, and the Brikell power plant. All these were previously owned by companies registered in the Seychelles.

Brikel is now managed by a UK company named Bakkar Limited, and publishes no data on employment.

The owner of TPP AES Galabovo reports creating 300 jobs at the power plant and supporting a further 1900 at the Maritza Iztok mines.<sup>128</sup> However it is unclear whether the 300 jobs are direct or include indirect ones, and for

which year the data is valid.

Maritza Iztok 2 power plant appears to suffer from major over-employment, generating only 3.4 GWh per person in 2016. If it generated as much as Šoštanj 6 per worker - 17.5 GWh per year - it would need only 472 employees, or 1961 fewer. This may be difficult to achieve for an older plant, but if it cannot cut staff costs then it needs to cut costs in other areas if it is to have any chance of being competitive.

127  
[http://www.standartnews.com/english/read/seychelles\\_shopping\\_britons\\_and\\_cypriots\\_buy\\_7\\_bulgarian\\_power\\_plants\\_-4285.html](http://www.standartnews.com/english/read/seychelles_shopping_britons_and_cypriots_buy_7_bulgarian_power_plants_-4285.html)

128  
<http://aes.bg/our-business/tpp/?lang=en>

129  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202016/GFO\\_TPP\\_2016%20consol\\_EN.PDF](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202016/GFO_TPP_2016%20consol_EN.PDF), page 8

130  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202015/TPP\\_AR\\_%202015\\_CONSOL\\_EN%20translation%20+%20BG.pdf](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202015/TPP_AR_%202015_CONSOL_EN%20translation%20+%20BG.pdf), page 9

131  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202014/TPP\\_AR\\_2014\\_CONSOL\\_EN.pdf](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202014/TPP_AR_2014_CONSOL_EN.pdf), page 11

132  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202013/TPP\\_AR\\_2013\\_EN%20%28Consolidated%29.PDF](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202013/TPP_AR_2013_EN%20%28Consolidated%29.PDF), page 9

133  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202012/TPP\\_Annual%20Report\\_2011\\_BG%20%28Consolidated%29.pdf](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202012/TPP_Annual%20Report_2011_BG%20%28Consolidated%29.pdf), page 8

134  
[https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202011/TPP\\_Annual%20Report\\_2011\\_EN%20%28Consolidated%29.pdf](https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202011/TPP_Annual%20Report_2011_EN%20%28Consolidated%29.pdf), page 11

## Mini Maritsa Iztok lignite mines

Year	Total electricity produced (GWh)	Total employees power plant	Power plant productivity (GWh/employee/ year)
2016	8271	2433 <sup>129</sup>	3.40
2015	9523	2439 <sup>130</sup>	3.90
2014	8803	2453 <sup>131</sup>	3.59
2013	7833	2486 <sup>132</sup>	3.15
2012	9270	2504 <sup>133</sup>	3.70
2011	10970	2411 <sup>134</sup>	4.54

# GREECE

In spite of the automatic association one tends to make when thinking of Greece – that of sunny beaches and abundant renewable energy potential – the country's electricity generation is still very much reliant on lignite.

The share of lignite in Greece's electricity generation decreased from 53 percent in 2006<sup>135</sup> to 32 percent in 2016.<sup>136</sup> This decrease has been offset by an increase in the shares of RES and hydropower (from 13.4 percent to 29 percent) as well as additional imports.

Apart from a very small amount of private mining, all production is carried out by the mining division of the Public Power Corporation (DEI). The Public Power Corporation (PPC) is Greece's main electricity provider. Exclusive rights for production of electricity from lignite are granted to the PPC, now a public company traded on the Athens and London stock exchanges, but in which the Greek Government holds an indirect 51 percent share.<sup>137</sup>

Total annual lignite extraction reached its peak in 2004 at 72 million tonnes,<sup>138</sup> before dropping to 31.4 million tonnes in 2016.<sup>139</sup>

Based on the current technical-economic data, the exploitable lignite reserves in the country total approximately 3.2 billion tonnes. The main deposits are located in:

- Western Macedonia (Ptolemaida, Amynteo and Florina) with estimated reserves of 1.8 billion tonnes;
- the Peloponnese (Megalopoli), with reserves around 223 million tonnes;
- Drama, with reserves of 900 million tonnes;
- Ellassona, with 169 million tonnes.

Of these deposits, the ones in Drama and Ellassona remain unexploited.<sup>140</sup>

The gross installed capacity of lignite-fired generation plants in Greece currently stands at 4375 MW (Agios Dimitrios = 1595, Aminteo = 600, Megalopoli A = 300, Megalopoli B = 300, Meliti = 330 and Kardias = 1250).<sup>141</sup>

The permanent employment figures in

lignite mining across the country have been, alongside lignite production, on a downward trend, from 4108 in 2011, to 3433 in 2016.<sup>142</sup> In 2016, total coal production was 31.4 million tonnes.<sup>143</sup> This places the average productivity per miner per year at 9,146.5 tonnes, an absolute record in the scope of this report, but much lower than the productivity rate in 2014, of 14 710 tonnes/worker/year.

PPC's employment figure in electricity generation stood at 4,671 in 2016, while it produced 14,937 GWh<sup>144</sup> of electricity, an all time low in Greece's history. This ratio translates into a productivity level of 3.19 GWh/employee/year, much lower than in 2014, when it stood at 4.79 and way lower than for example in Slovenia (17.5) or Germany (28.2).

Acknowledged by the company itself, the most notable change, in comparison with 2015, is the lignite power stations' reduced electricity generation by 4.5 TWh (23.3 percent).<sup>145</sup> This major change, despite the increased availability of lignite fired power units in comparison with 2015 (77.4% to 74.8%), was due to the decreased usage of lignite units (just 44.7 percent) which have had to compete with reduced natural gas prices. The low price for gas led to an increase of 143 percent in natural gas generation operated by PPC's competitors making it evident yet again that lignite cannot compete on a liberalised energy<sup>146</sup> market and predicting a dark future for its economic viability.

The two productivity figures make for an intriguing paradox - on one hand Greece has the highest productivity level when it comes to lignite mining, but on the other it has one of the lower levels when it comes to generated electricity per worker. Presumably, there is some compensation within the PPC Group, so that one part of the production chain can still keep employment numbers at an artificially high level and claim it is a major source of job creation and maintenance.

In order to comply with the Industrial Emissions Directive, the oldest and most polluting lignite-fired plants will have to be shut down. This means that, after 2023, only the four more modern plants will be operational, with a total capacity of 2256 MW.

135 <https://www.iea.org/statistics/statisticssearch/report/?country=GREECE&product=electricityandheat&year=2006>

136 <https://www.iea.org/publications/freepublications/publication/EnergyPoliciesofIEACountriesGreeceReview2017.pdf>

137 <https://www.dei.gr/en/i-dei/enimerwsi-ependutwn/xrimatistiriaka-stoixeia/metoxiki-sunthesi>

138 <http://energytransition.de/2016/02/lignite-in-the-greek-energy-system-facts-and-challenges/>

139 PPC Annual Report 2016, page 38 [https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual\\_Report\\_2016\\_EN\\_WEB.pdf](https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf)

140 [https://www.dei.gr/Images/mining-map-large\\_en.gif](https://www.dei.gr/Images/mining-map-large_en.gif)

141 <https://www.dei.gr/en/i-dei/i-etairia/tomeis-drastiriotitas/paragwgi/analutikos-xartis-stathmwv>

142 PPC annual report 2016, page 10: [https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual\\_Report\\_2016\\_EN\\_WEB.pdf](https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf)

143 Ibid. page 21

144 PPC Annual Report 2016, page 21: [https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual\\_Report\\_2016\\_EN\\_WEB.pdf](https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf)

145 PPC Annual Report 2016, page 21: [https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual\\_Report\\_2016\\_EN\\_WEB.pdf](https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf)

146 Ibid., page

147  
<http://tdm.tee.gr/wp-content/uploads/2015/04/paremvasi-tee-tdm-anaforika-me-tin-kataskeyi-tis-monadas-ptolemaida-v.pdf>

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<http://www.welt.de/wirtschaft/article118285358/Bund-buerger-fuer-Braunkohlekraftwerk-in-Griechenland.html>, <https://energypress.eu/ppc-pays-second-deposit-for-ptolemaida-v-power-station/>

149  
<http://www.hellenicparliament.gr/UserFiles/67715b2c-ec81-4f0c-ad6a-476a34d732bd/9668159.pdf>

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<https://www.dei.gr/en/anakoinwseis/xrimatistiriakas-etairikes-prakseis-katavoli-merismatos-ka/xrimatistiriakas-anakoinwseis-2016/upegrafi-to-mnimonio-sunergias-me-tin-cmec>

151  
<https://www.naftemporiki.gr/story/1237868/deal-between-greek-power-company-chinas-cmec-on-hold-after-commission-objection>

152  
[https://www.dei.gr/Documents2/MELITI-MEGALOPOLI/Invitation%20for%20Expression%20of%20Interest%20\(31%2005%202018\).pdf](https://www.dei.gr/Documents2/MELITI-MEGALOPOLI/Invitation%20for%20Expression%20of%20Interest%20(31%2005%202018).pdf)

153  
[https://ec.europa.eu/info/sites/info/files/smou\\_final\\_to\\_esm\\_2017\\_07\\_05.pdf](https://ec.europa.eu/info/sites/info/files/smou_final_to_esm_2017_07_05.pdf)

154  
[https://www.wwf.gr/images/pdfs/Roadmap\\_PostLignite\\_EN.pdf](https://www.wwf.gr/images/pdfs/Roadmap_PostLignite_EN.pdf)

155  
<https://www.internationallawoffice.com/Newsletters/Energy-Natural-Resources/Greece/Rokas-Law-Firm/Divestment-of-PPCs-lignite-fired-plants>

## Unit V of Ptolemaida Station - new unit, under construction

The unit, of an installed capacity of 660 MW (+ 140 MWth for District Heating) is planned to create 250 permanent jobs, according to the 2011 Environmental Impact Assessment - which seems to be a fair estimate if we look at Šoštanj in Slovenia - and 820 indirect jobs according to the Technical Chamber of Greece, Division of Western Macedonia.<sup>147</sup>

Some media articles quoted that 2500-3000 jobs would be created during the construction phase.<sup>148</sup> However, after construction started, in an answer<sup>149</sup> to a parliamentary question, PPC's CEO stated that 1000 jobs would be created in the construction phase, a significant downgrade from the initial promise.

According to the 2011 environmental impact assessment, the new Ptolemaida V unit will produce 4620 GWh (gross) per year. If the 250 permanent jobs figure listed in the EIA report is accurate, this unit's generation productivity would be at 18.48 GWh/ person. However, in the same answer to the parliamentary question mentioned above, the company's CEO mentions 430 permanent jobs, which would translate into a lower productivity of 10.74 GWh/employee, higher than in the rest of the SEE countries, but still way below that of Šoštanj 6 in Slovenia. With Šoštanj's productivity level of 17.5 GWh per worker, it would need only 264 workers, so the environmental impact assessment was far more accurate.

In 2016, a memorandum of understanding was signed between PPC and China's CMEC for the

construction of a new unit at the Meliti plant in Florina.<sup>150</sup> However, the deal, which didn't go through a public tender procedure, was contested by members of the Cabinet in 2017 and is currently at a standstill.<sup>151</sup> No claims are known to have been made by the company or authorities regarding the employment levels at the plant.

In May 2018, PPC made an announcement for the sale of three of its lignite fired power plants, Meliti 1 and Megalopoli 3 and 4, the associated mines, and licences for Meliti II.<sup>152</sup> Selling off 40 percent of PPC's lignite capacity is part of a deal signed between Greece and the European Stability Mechanism.<sup>153</sup>

The deal raises some concerns related to the fate of the workers and the communities, especially in regions like Kozani and Florina, where regional just transition and redevelopment plans are quite advanced<sup>154</sup> and where the state had a say, because of its shares in the power plants and mines.

The Greek government has announced a national just transition fund and in the new law on the sale PPC lignite assets,<sup>155</sup> the responsibilities for land rehabilitation plus funds to the local communities will be provided by PPC and the new owner(s) of the 3 coal plants and mines. The main question now is who would buy the plants and how long the new owners will keep the plants operating in a Europe which is phasing out coal?







Jagoda Munic

# KOSOVO

## Kosova A, existing plant, 2x200 MW + 1x210 MW operating

The Kosova A power plant near Prishtina consists of five installed units, of which only three are still operating. Kosovo originally committed to close the plant by the end of 2017<sup>156</sup> due to its high level of pollution, but later rescinded until the planned Kosova e Re is built.<sup>157</sup>

In 2017, 2084 GWh was generated.<sup>158</sup> It is not clear how many people currently work at the plant as the latest figures identified are from January 2010, when 777 people worked there.<sup>159</sup> A European Commission study estimated that 600 people would be a more appropriate number of people to run the plant until it is closed,<sup>160</sup> but it is not clear whether the number of employees has been reduced since then.

The same study estimated how many people would be needed for the decommissioning works at Kosova A, with the following findings:

- Decommissioning engineering: 30 engineers for 3.5 years
- Preparation & cleaning works: 100 unskilled workers for 1.5 years
- Safety measures: 25 maintenance workers + 50 unskilled workers for 1.5 years
- Disaggregation works: 50 skilled workers + 50 unskilled workers for 2.5 years
- Demolition works: 50 skilled workers + 50 unskilled workers for 7 years

In other words, a fairly large proportion of the workers in the existing plant could also be employed on the decommissioning for some time. Although this would be temporary it would help to cushion the impacts of the closure by reducing the workforce more gradually.

## Kosova B, existing plant, 2x339 MW

The two units of Kosova B generated 3641 GWh in 2017.<sup>161</sup> No data was found about the current number of employees, but in January 2010 there were 705 workers.<sup>162</sup> The aforementioned EU study estimated that the plant only really needed 500 employees for its operation,<sup>163</sup> but it is not clear whether a reduction in staff numbers has taken place. Even with 500 employees, the plant would generate only 7 GWh per worker per year.

## Kosovo C/Kosova e Re, 500 MW, planned

Plans for a new Kosovo C lignite power plant have been around for more than a decade, and have gradually shrunk from 2000 MW<sup>164</sup> down to current plans for 500 MW<sup>165</sup> (450 MW net).<sup>166</sup> The Kosovo government expects 3370 GWh of electricity to be generated per year by the new plant.<sup>167</sup>

Kosova e Re may be the regional prize winner for most outrageous claims regarding coal plant employment. In February 2015, ContourGlobal's Executive Vice-President, Garry Levesley, promised 10 000 workplaces during construction and 500 once the plant comes online.<sup>168</sup>

This claim is now being repeated by the Kosovar Government.<sup>169</sup> Only if one digs deeper

156 [http://mzhe-ks.net/repository/docs/HLFSOS\\_-\\_MED\\_presentation.ppt](http://mzhe-ks.net/repository/docs/HLFSOS_-_MED_presentation.ppt)

157 [https://mzhe-ks.net/repository/docs/Kosovo\\_Energy\\_Strategy\\_2017\\_-\\_26.pdf](https://mzhe-ks.net/repository/docs/Kosovo_Energy_Strategy_2017_-_26.pdf)

158 <http://kek-energy.com/kek/raportet-auditura-financiare/>

159 [http://eeas.europa.eu/archives/delegations/kosovo/documents/press\\_corner/decommissioning\\_study\\_kosovo\\_a\\_power\\_plant\\_en.pdf](http://eeas.europa.eu/archives/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf)

160 [http://eeas.europa.eu/archives/delegations/kosovo/documents/press\\_corner/decommissioning\\_study\\_kosovo\\_a\\_power\\_plant\\_en.pdf](http://eeas.europa.eu/archives/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf)

161 <http://kek-energy.com/kek/raportet-auditura-financiare/>

162 [http://eeas.europa.eu/delegations/kosovo/documents/press\\_corner/decommissioning\\_study\\_kosovo\\_a\\_power\\_plant\\_en.pdf](http://eeas.europa.eu/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf)

163 [http://eeas.europa.eu/delegations/kosovo/documents/press\\_corner/decommissioning\\_study\\_kosovo\\_a\\_power\\_plant\\_en.pdf](http://eeas.europa.eu/delegations/kosovo/documents/press_corner/decommissioning_study_kosovo_a_power_plant_en.pdf)

164 <http://www.reuters.com/article/kosovo-energy-idUSBYT53946520090715>

165 <http://mzhe-ks.net/sq/lajmet/nis-projekti-me-i-madh-ne-vend-tc-kosova-e-re1-miliard-investime-mijera-vende-pune#V-D2hdEvCb8>



166  
[http://mzhe-ks.net/repository/docs/DSERKS\\_VERSIONI\\_FINAL\\_3\\_GUSHT\\_2016\\_Anglisht.pdf](http://mzhe-ks.net/repository/docs/DSERKS_VERSIONI_FINAL_3_GUSHT_2016_Anglisht.pdf)

167  
[http://mzhe-ks.net/repository/docs/DSERKS\\_VERSIONI\\_FINAL\\_3\\_GUSHT\\_2016\\_Anglisht.pdf](http://mzhe-ks.net/repository/docs/DSERKS_VERSIONI_FINAL_3_GUSHT_2016_Anglisht.pdf)

168  
<http://www.reuters.com/article/kosovo-energy-contourglobal-idUSL6NOVE2DW20150204>

169  
[http://mzhe-ks.net/repository/docs/Kosova\\_e\\_Re\\_Brochure\\_ENG.pdf](http://mzhe-ks.net/repository/docs/Kosova_e_Re_Brochure_ENG.pdf)

170  
<http://mzhe-ks.net/repository/docs/Faq-ENG-Web.pdf>

171  
[http://mzhe-ks.net/repository/docs/2\\_Implementation\\_Agreement\\_\(Execution\\_Version\).pdf](http://mzhe-ks.net/repository/docs/2_Implementation_Agreement_(Execution_Version).pdf)

172  
 Answer to enquiry from Director of Corporate Services, Kosovo Energy Corporation (KEK), September 2016

173  
 Grant Thornton Independent Auditors' Report and financial statements, Kosovo Energy Corporation JSC, As at and for the year ended 31 December 2015. <http://kek-energy.com/kek/en/financial-audit-reports/>

174 Answer to enquiry from Director of Corporate Services, Kosovo Energy Corporation (KEK), September 2016

30 pages into a Frequently Asked Questions document about the project does one find that the 10 000 jobs include direct, indirect and induced jobs.<sup>170</sup> In other words, someone who sells bread to the construction workers in Obiliq counts as one of the jobs created by the construction, irrespective of the fact that people would buy bread whatever their source of income.

If we consider that Stanari power plant in Bosnia and Herzegovina required around 800 workers during the construction stage, there is no reason why a plant with less than twice as much capacity as Stanari would require more than ten times as many workers: 1000-1200 should be plenty.

Nor is there any reason that a plant with a smaller capacity than Šoštanj 6 in Slovenia would require two and a half times more employees. Around 190 would more appropriately correspond to Kosova e Re's output. It should also be taken into account that Kosova A will close by the time Kosova e Re comes online, if it ever does. So it cannot be expected that the operation jobs created will be additional to the existing ones.

Anticipating that many of the jobs created would not go to local people, an attempt has been made in the Implementation Agreement with ContourGlobal to make sure local people are trained in the development, construction, operation, and maintenance of the plant. ContourGlobal has agreed to "use reasonable commercial efforts to employ citizens of Kosovo for the development, design, construction, operation, and maintenance of the Kosova e Re Project to the extent reasonable, taking into consideration availability, experience and required skills of such citizens of Kosovo", and to submit reports annually to the Ministry of Economic Development detailing the progress made on this.<sup>171</sup>

While it is clear that any company would seek to retain its freedom to engage properly skilled workers, such wording guarantees absolutely nothing.

## Sibovc mine - existing, to be extended

The main field currently being exploited is the South West Sibovc field. The coal production division of Kosovo's public electricity company, KEK, had 3249 employees in 2016.<sup>172</sup> In 2014 the mine produced 7.2 million tonnes of lignite and in 2015 it produced 8.2 million tonnes.<sup>173</sup> This means 2216 tonnes per employee in 2014 and 2523.8 tonnes in 2015 - making it one of the more efficient mines in the region per employee but still lower than the EU average of 6111 tonnes.

It has been estimated that if maintenance, overhauls and production of mining equipment was outsourced, the mine would need about 2 000 employees.<sup>174</sup> Some of these jobs would stay in Kosovo, while it is likely that some would not.

There is no clear data available on the necessary lignite production if the Kosova e Re plant was to be built. On one hand the fact that it would generate more electricity than Kosova A (3370 vs. 1905 GWh) may indicate that more coal would be needed, however the efficiency of the new plant would be higher than the ancient Kosova A and therefore may not require much more coal, if any. If this is the case then not only would new mining jobs not be created, but as we have seen above, the number of workers could easily be reduced if it is decided to outsource some tasks.



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# MACEDONIA

Macedonia relies predominantly on low-grade lignite and hydropower for electricity, and is dependent on electricity imports. The total generation of electricity in 2016 was 5,303 GWh, and another 2,191 GWh was imported to satisfy the total domestic electricity demand.<sup>175</sup>

The lignite installed capacity is 800 MW in two power plants and four units at Bitola and Oslomej. The smaller thermal power plant REK Oslomej is not currently in operation and talks about the need of modernization of the obsolete equipment have been going on for over two years.

Reviews of existing studies about the availability of lignite on the eastern fringe of the Pelagonia basin, which hosts the three Bitola power plant units, lead to the overall conclusion is that even if two new lignite mines were to be opened in the region, Macedonia would still need to start importing coal from 2025 onwards. Imports of coal would contribute to more than half of the country's total electricity production beyond 2030.

It is also important to note that the two new mines would involve underground operations, with which the country has no experience to date. Also, an increase in the price of such locally-sourced lignite is anticipated due to the higher cost of 'coal production in the new mines and transport with longer distances/on rough terrain'.<sup>176</sup>

**Suvodol mine**, which supplies the Bitola power plant, produced 5.9 million tonnes of lignite in 2015.<sup>177</sup> No recent employment figures for the mine alone are available.

For the future, of the overall determined 664 million tonnes geological coal reserves in Macedonia, it is estimated that 38 percent could be exploited with opencast excavation, and the rest with underground technology. ELEM, the state-owned utility which operates both the lignite power plants and the lignite mines, has plans to develop an underground mine at Sudovol - "deep underlying coal seam" - with a planned annual capacity of 6.5 million tonnes.<sup>178</sup> There is no information available with regards to the number of jobs this mine expansion would bring, nor for what period of time, but the fact remains that Macedonia has no experience in underground mining, which may mean the jobs in this planned mine would be outsourced.

**Bitola power plant** has an installed capacity of 675 MW in three units which were commissioned in 1982, 1984 and 1988 respectively, and consumes about 2 million tonnes of coal annually.<sup>179</sup> Bitola power plant has undergone major modernisation in recent years. This plant, combined with the 125 MW Oslomej lignite plant, made up about 50 percent of domestic electricity generation in 2016.<sup>180</sup>

Bitola units 1-3 generate an average of 4200 GWh and<sup>181</sup> - together with the mine - employed 2800 people at the end of 2016 according to ELEM's website<sup>182</sup> and 2720 in the previous year.<sup>183</sup> No data is available for the plant alone.

The first unit of Bitola power plant is expected to be shut down by 2024, while no official date has been set for the remaining two. However, under the Energy Community Treaty obligations, all power plants need to become

175 <https://www.energy-community.org/implementation/IR2017.html>

176 [http://etnar.net/wp-content/uploads/2014/03/energetski\\_moznosti\\_en.pdf](http://etnar.net/wp-content/uploads/2014/03/energetski_moznosti_en.pdf), page 11

177 <https://www.braunkohle.de/files/euracoal-coal-industry-across-europe-6th.pdf>

178 [http://www.elem.com.mk/index.php?option=com\\_content&view=article&id=123&Itemid=152&lang=en](http://www.elem.com.mk/index.php?option=com_content&view=article&id=123&Itemid=152&lang=en)

179 [http://elem.com.mk/index.php?option=com\\_content&view=article&id=429%3A-2012&catid=64%3A2012-07-06-07-26-18&Itemid=128&lang=en](http://elem.com.mk/index.php?option=com_content&view=article&id=429%3A-2012&catid=64%3A2012-07-06-07-26-18&Itemid=128&lang=en)

180 [http://www.erc.org.mk/odluki/2017.03.30\\_Godisen%20izvestaj%20za%20rabota%20na%20Regulatornata%20komisija%20za%20energetika%20na%20RM%20za%202016%20godina-final.pdf](http://www.erc.org.mk/odluki/2017.03.30_Godisen%20izvestaj%20za%20rabota%20na%20Regulatornata%20komisija%20za%20energetika%20na%20RM%20za%202016%20godina-final.pdf)

181 [http://www.elem.com.mk/wp-content/uploads/2015/struktura\\_na\\_ad\\_elem\\_en.html](http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html)

182 [http://www.elem.com.mk/?page\\_id=312&lang=en](http://www.elem.com.mk/?page_id=312&lang=en)

183 [http://www.elem.com.mk/wp-content/uploads/2015/covecki\\_resursi\\_en.html](http://www.elem.com.mk/wp-content/uploads/2015/covecki_resursi_en.html)



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compliant with the Industrial Emissions Directive emission limit values for existing plants by 2028 so further rehabilitation must be carried out.

**Oslomej power plant** entered operation in 1980, with an installed capacity of 125 MW, and generates an average of 500 GWh annually.<sup>184</sup> It is supplied with coal from the Oslomej open cast mine, which has annual production of 1.2 million tonnes of coal and an exploitation lifetime of 22 years starting in 1980 (it has not been running continuously).

There is no available data on employment for the power plant alone, but the Oslomej complex which includes both the mine and the power plant had 974 employees in 2015,<sup>185</sup> according to ELEM's website. Also, the energy company's website states that the number of employees at REK Oslomej was at 1002 in 2016,<sup>186</sup> so this is the number used in calculations below.

**Oslomej** is expected to undergo a "revitalisation" process in the coming years to run on imported coal.<sup>187</sup> There is no indication, however, as to how this process would be reflected in the job availability, or what the

projected number of employees would be once the power plant would go back in operation.

Since the employment numbers for the mine and the power plant are aggregated, it is difficult to calculate the productivity per employee for Bitola and Oslomej. However they can be roughly compared to Stanari in Bosnia-Herzegovina.

- Stanari: 2000 GWh, 780 people = 2.56 GWh per person
- REK Bitola: 4200 GWh, 2800 people = 1.5 GWh per person
- Oslomej: 500 GWh, 1002 people = 0.49 GWh per person

As they include the mines they cannot be compared to the other figures in this report, but we can see there is an over-employment issue. If Bitola had the same productivity level as Stanari it would need only 1641 staff, while if Oslomej had, it would need only 195 (not taking into account the planned reconstruction).

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<sup>184</sup>  
[http://www.elem.com.mk/wp-content/uploads/2015/struktura\\_na\\_ad\\_elem\\_en.html](http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html)

<sup>185</sup>  
[http://www.elem.com.mk/wp-content/uploads/2015/covecki\\_resursi\\_en.html](http://www.elem.com.mk/wp-content/uploads/2015/covecki_resursi_en.html)

<sup>186</sup>  
[http://www.elem.com.mk/?page\\_id=312&lang=en](http://www.elem.com.mk/?page_id=312&lang=en)

<sup>187</sup>  
<http://www.elem.com.mk/wp-content/uploads/2017/04/Modernization-of-TPP-Oslomej-EN-12.08.2015.pdf>



# MONTENEGRO

## Pljevlja I – existing plant, 220 MW

The number of workers at the existing Pljevlja power plant has been steadily decreasing in recent years, from 333 in 2010 to 171 in 2017.<sup>188</sup> Pljevlja I generated 1265 GWh in 2017,<sup>189</sup> making 7.4 GWh per employee. If Pljevlja's output per employee were equal to Šoštanj 6 in Slovenia, there would only be 72. Even with the decrease in the number of employees in recent years, Pljevlja I was in July 2016 reported as being on the border of feasibility due to the low price of electricity on the market.<sup>190</sup>

## Pljevlja II – planned, 254 MW

The main two justifications for the construction of Pljevlja II are that pollution in Pljevlja will decrease and that much-needed jobs will be created in the town. Government officials have also claimed that without the new unit, there would be no jobs in the plant and mine.<sup>191</sup> All of these claims are false.

The Pljevlja II project does not include the construction of a district heating system, so smoke from individual stoves will persist. Nor will pollution from the plant be carried out of the Pljevlja valley, as it is planned for the pollution to be emitted from the cooling tower, not the existing 250 metre tall chimney.

Jobs are likely to further decrease rather than increase. The feasibility study for the new plant estimates that 147 workers would be employed.<sup>192</sup> Generation would be around 1700 GWh annually.<sup>193</sup> This would make 11.5 GWh per worker - much less than Šoštanj 6 in Slovenia with 17.5 GWh per worker, in a situation where Šoštanj 6 has huge financial problems. This may lead to further decreasing the number of workers at Pljevlja. In order to achieve the same output per employee as Šoštanj 6, only 97 employees would be needed at the new plant.

In fact, as it now looks unlikely that Pljevlja II will be implemented, the Government of Montenegro has finally prioritised pollution reduction at Pljevlja I. Considering it is now planned to extend its lifetime for several more years, labour force reduction measures will continue to be needed at the mine in any case in order for the modernisation to have a chance of paying off. But it does mean that government claims that there would be no more work in the mine without Pljevlja II were false - it was simply a matter of political will to prioritise modernisation over new-build. It is true that mining does need to be phased out.

## Existing mine, to be expanded (Potrlica + potentially others)

The existing number of workers and production

188  
[http://www.mrt.gov.me/rubrike/javna\\_rasprava/148445/Javna-rasprava-o-Nacrtu-Detaljnog-prostornog-plana-za-Termoelektranu-Pljevlja-i-Nacrtu-Izvjestaja-o-strateskoj-proceni-uticaja.html](http://www.mrt.gov.me/rubrike/javna_rasprava/148445/Javna-rasprava-o-Nacrtu-Detaljnog-prostornog-plana-za-Termoelektranu-Pljevlja-i-Nacrtu-Izvjestaja-o-strateskoj-proceni-uticaja.html), <http://www.cdm.me/ekonomija/te-pljevlja-nakon-33-godine-rada-uspjesan-rezultat>, [https://www.epcg.com/sites/epcg.com/files/multimedia/gallery/files/2014/04/378\\_online.pdf](https://www.epcg.com/sites/epcg.com/files/multimedia/gallery/files/2014/04/378_online.pdf)

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<http://www.epcg.com/o-nama/proizvodnja-i-elektroenergetski-bilans>

190  
<http://www.rtcg.me/tv/emisije/informativni/Akcenti/135558/akcenti-18072016.html>

191  
<http://pvportal.me/2016/11/bez-drugog-bloka-nema-radnih-mjesta-u-rudniku-i-te-pljevlja/>

192  
[www.gov.me/ResourceManager/Download.aspx?rld=244860&rType=2](http://www.gov.me/ResourceManager/Download.aspx?rld=244860&rType=2), p.55





in the last few years is shown in the table below. The number of mineworkers has been decreasing.

One of several factors that will make a difference as to whether a new coal plant could be feasible is the price of coal. In order to reduce the coal production cost to a feasible level, Fichtner and Poyry have calculated that the number of employees in the mine would need to be reduced to 544 or 520, depending on the scenario, by around 2025.<sup>194</sup> This may be possible, based on the reductions in recent years, but it certainly means that promises of additional employment are not realistic.

Altogether, if Pljevlja II is built, the new unit should bring no more than 100 jobs, while in order to have a chance of being feasible, at least 200 more employees should be laid off at

the mine. Modernising Pljevlja I does extend the mine's lifetime but continued layoffs will most likely be needed. Therefore it should not be seen as a reason to delay planning a just transition which Pljevlja has needed for a long time already now.

The number of people needed for the mine and unit 2 of Pljevlja should be compared with the number of people that would be needed for rehabilitation and landscape restoration if Pljevlja II is not built. Unfortunately no figures are available for this, but it is not impossible that for at least the first few years, a large proportion of the employees from the mine could continue to be employed in rehabilitation work, considering the scale of the mine, ash dump and spoil heap and their impact on Pljevlja.

<sup>193</sup>  
[www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&rType=2](http://www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&rType=2),  
 p.57

<sup>194</sup>  
[www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&rType=2](http://www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&rType=2),  
 p.43

Year	2010	2011	2012	2013	2014	2015	2016	2017
Number of workers	1200	1076	1062	1013	921	935	872	750
Annual production in tonnes	1 937 855	2 063 170	1 785 014	1 692 542	1 655 037	1 349 736	1 734 771	1 420 022
Tonnes per year per worker	1614.8	1917.4	1680	1670.8	1797	1443	1961	1893

Sources: [http://www.rupv.me/sites/rupv.me/files/2013\\_-\\_izvjestaj\\_nezavisnog\\_revizora\\_rudnik\\_uglja\\_ad\\_pljevlja.pdf](http://www.rupv.me/sites/rupv.me/files/2013_-_izvjestaj_nezavisnog_revizora_rudnik_uglja_ad_pljevlja.pdf), <http://www.scmn.me/fajlovi/RUPV201109.pdf>, <http://www.scmn.me/fajlovi/RUPV201212.pdf>, <http://www.scmn.me/fajlovi/RUPV201606.pdf>, <http://www.scmn.me/fajlovi/RUPV201412.pdf>, <http://www.gov.me/ResourceManager/FileDownload.aspx?rId=223118&rType=2>, <http://www.scmn.me/fajlovi/RUPV201712.pdf>



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# ROMANIA

Romania has a balanced energy mix, one of the most diversified in the region, generating 59.82 TWh of electricity in 2017,<sup>195</sup> of which 14 TWh from lignite, 1.1 TWh from hard coal, 10.56 TWh from nuclear, 10.04

TWh from gas and oil, while hydropower electricity production was 14.54 TWh and other renewables produce 9.57 TWh. This mix makes Romania sufficiently independent and places the country in the top electricity exporters of the region.

## THE DECLINE OF HARD COAL

Coal mining was once a thriving industry in Romania, employing almost quarter of a million people directly, including both underground and open cast mines, and enabling some other 700,000 indirect jobs.<sup>196</sup>

The industry has been hardest hit by a programme launched in 1997 with World Bank funds<sup>197</sup> aimed at closing unprofitable hard coal mines.

By 2000, the population of the Jiu Valley – Romanian's main hard coal mining region – was estimated at 160-170,000 inhabitants, largely concentrated in the region's six mining towns – Petroșani, Lupeni, Vulcan, Uricani, Petrila, and Aninoasa, but also including small villages such as Câmpul lui Neag and Lonea. In the late 1990s eighty percent of the workforce still depended upon the mines for work and income, and by 2015 this number was still high, although the economic demographics of the region had undergone significant changes in recent years.

Through mine closures, forced layoffs and voluntary severance, the number of actual miners in the Jiu Valley has decreased considerably. The mine closures were accompanied by large lay-offs of miners. It is estimated that in 1989 there were some 50,000 mine workers (including both actual underground miners and auxiliary workers). The number of mineworkers in the Jiu Valley in 2000 was estimated to be between 18,000-20,000, decreasing to 4700 today.

The impact of unemployment has been considerable, and with eleven of the original fifteen mines closed by 2015, the social disruption is only going to increase. There have been no long-term social programmes. The laid-off miners and their families, though, no longer rise up in rebellion as they used to in the early 90s when the fear of losing their jobs was first felt. Some have left to find work abroad, some waste away in decaying ghettos, and almost none have found new work in the area, which remains mono-industrial, leaving

<sup>195</sup>  
<https://www.entsoe.eu/data/power-stats/monthly-domestic/>

<sup>196</sup>  
[http://www.puterea.ro/evenimente\\_puterea/conferintele\\_puterea-modernizarea-sectorului-de-carbune-necesita-investitii-de-2-miliarde-de-euro-84778.html](http://www.puterea.ro/evenimente_puterea/conferintele_puterea-modernizarea-sectorului-de-carbune-necesita-investitii-de-2-miliarde-de-euro-84778.html)

<sup>197</sup>  
<http://documents.worldbank.org/curated/en/791121468295193557/Romania-Mine-Closure-and-Social-Mitigation-Project>

198

The measure endorsed by the Government is in accordance with the Council Decision 2010/787/EU of 10 December 2010 on state aid to facilitate the closure of uncompetitive coal mines and the European Commission decision C(2012) 1020 final, through which the European Commission has authorized Romania to grant from public funds a state aid worth 1.169 billion lei (approximately 270 million euros) to close the uncompetitive coal mines (...) from 2011 to 2018,”

199

[http://www.romania-actualitati.ro/minele\\_lonea\\_si\\_lupeni\\_inchise\\_in\\_2027\\_iar\\_nu\\_in\\_2024\\_cum\\_era\\_prevazut-101993](http://www.romania-actualitati.ro/minele_lonea_si_lupeni_inchise_in_2027_iar_nu_in_2024_cum_era_prevazut-101993)

200

<http://www.cenhd.ro/images/File/Situatii%20financiare/2017/Raportul%20administratorilor%20-%202017.pdf>

201

<http://www.romaniajournal.ro/hunedoara-energy-complex-is-officially-insolvent/>

202

<http://www.zf.ro/profesii/vesti-bune-angajatii-complexului-energetic-oltenia-si-complexului-energetic-hunedoara-vor-primi-de-paste-prime-intre-220-si-1-100-de-lei-17115986>

203

<http://actmedia.eu/energy-and-environment/romania-s-coal-production-and-imports-rose-in-2015/62490>

204

<https://www.ceoltenia.ro/job-uri/locurile-noastre-de-munca/>

no opportunities for other types of businesses to emerge.

In 1990 there were 15 active mines in the Jiu Valley, however, by 2018:

- 8 mining units closed have between 1994-2015: Câmpul lui Neag, Valea de Brazi, Bărbăteni, Aninoasa, Iscroni, Dâlja, Petrila Sud, and Lonea Pilier.
- 5 mining units considered to be unprofitable (Uricani, Paroseni, Petrila, Vulcan, Livezeni) have closed by the end of 2017, receiving state aid for closure.<sup>198</sup>
- Only two mining units considered to be profitable (Lupeni and Lonea) are operating within the Hunedoara Energy Complex (CEH). They are expected to cease operation in 2024, however a recent agreement between the mine operator - Hunedoara Energy Complex - the Ministry of Energy and two union confederations extended this deadline to 2027.<sup>199</sup>

The Hunedoara Energy Complex (CEH), which operates two thermal power plants – Paroșeni and Mintia – and the remaining two hard coal mines, registered losses of some 770 million lei [approx. EUR 17 million] in 2017<sup>200</sup> and was declared insolvent in 2016.<sup>201</sup> The company produced little over 1 percent of Romania's electric power in 2017 and employs 4,500 people<sup>202</sup> in both mines and power plants. Expert economists say there is no option except to cut costs and reduce the number of jobs. “Romania can no longer afford to pay millions of euro every year to preserve an industry that is not modernised and efficient,” according to

economic analyst Ilie Serbanescu.<sup>203</sup>

According to European Council Decision 2012/1020 final and EC 2015/8066 final, all underground activity should stop by December 2017, and works towards ecological reconstruction and environmental monitoring should be finalised by 2019. In spite of this, the Romanian Government is negotiating with the European Commission to allow state aid for closure of Lonea and Lupeni underground mines on one hand, and for keeping two power plant units (Mintia 3 and Paroșeni 4) in operation, on the other, making it even clearer that this sector can only be artificially kept alive.

If one lesson is to be learnt from this, it is that mine closures and phasing out of a once secure and well paid sector needs thorough planning and a diversification strategy well in advance.

## Lignite mines are next

Oltenia Energy Complex is today the third largest Romanian company in terms of employees – 13281<sup>204</sup> at the end of 2017, with almost 2000 employees fewer than in 2015, when the figure stood at 15,268 - surpassed only by other state giants, the National Post and the Romanian Railways. Having dropped from 45,000 employees in 1994, however, the company is in further decline. In 2015 alone, OEC recorded a loss of EUR 200 million. In 2016 the company reduced its losses to approximately EUR 31 million, while in 2017, a poor year for hydropower and wind production,

OEC recorded a profit of EUR 41 million.<sup>205</sup>

The Complex was established in 2012 through the merger of Oltenia National Lignite Company and three large Energy Complexes – namely Rovinari, Turcenii and Craiova. 15 open-pit mines and 4 power plants are managed today by the company. Its shareholders are the Romanian State through the Energy Ministry (77.15%), “Fondul Proprietatea” investment fund (21.56%) , Electrocentrale Grup SA (0.84%) and Mine Closure and Conservation (0.44%).

The mining activities started in 1957, while the power plants were built between 1964 and 1987.

The mining activity of the Oltenia Energy Complex employs 7053 miners in 13 open-cast mines as of December 2017 and produced 22.5 million tonnes of coal in 2017,<sup>206</sup> marking a stark decline by 7.2 million tonnes compared to 2012 when the company was established<sup>207</sup> and an even more dramatic fall from the 34 million tonnes of lignite produced in 2008.<sup>208</sup>

Name of lignite mine <sup>209</sup>	2013 Total number of employees	2014 Total number of employees	2015 Total number of employees	2016 (only overall num- ber available)	2017 Total number of employees <sup>210</sup>
UMC Rovinari	548	562	504	N/A	390
Tismana I + II	742	782	791	N/A	695
Pinoasa	572	607	613	N/A	535
USM Rovinari	695	700	590	N/A	N/A
Roşia	1313	1258	1205	N/A	991
Peşteana	1146	1130	1008	N/A	738
Seciuri	1281	1168	339	N/A	N/A
Lupoaia	1038	1032	954	N/A	700
Roşiuta	1235	1226	1177	N/A	977
Husnicioara	661	660	616	N/A	421
Jilt Sud	1784	1421	1228	N/A	859
Jilt Nord	1045	982	896	N/A	747
UMC Motru	311	299	167	N/A	N/A
Executive jobs for the whole mining division	218	149	130	N/A	N/A
<b>TOTAL</b>	<b>12 589</b>	<b>11 976</b>	<b>10 218</b>	<b>8,832<sup>211</sup></b>	<b>7,053</b>

The productivity figure for lignite stands at 3190 tonnes/worker in 2017, a substantial increase from 1778 tonnes/worker in 2013, but nowhere near the productivity levels of other EU members states such as Poland or the Czech Republic, that Romania likes to compare itself with. If it achieved the average EU productivity of 6111 per worker, it would have needed 3671 workers in 2017.

The production cost per tonne of lignite has followed a downward trend, dropping from 61.53 lei/tonne (approx. 14.3 EUR) in 2012 to 52.65 lei/t (11.8 EUR/t) in 2016. In the process of adoption of the 2016-2030 National Energy Strategy, the lignite working group's report points out to the fact that 50 percent of the production cost for one tonne of lignite is represented by personnel costs,<sup>213</sup> and 15

Mine-by-mine production<sup>212</sup> (million tonnes)

	2014	2015	2016
Roşia	3.045	3.617	2.61
Peşteana	1.93	2.016	1.56
UMC Rovinari	0.957	1.119	0.693
Tismana I+II	2.141	2.665	3.482
Pinoasa	1.050	1.500	1.859
Roşiuta	2.945	3.348	3.093
Lupoaia	2.270	2.340	2.250
Husnicioara	1.216	1.098	0.437
Jilt Sud	2.515	2.301	1.354
Jilt Nord	1.696	2.185	2.222
Berbeşti	1.532	0.213	0
<b>Total</b>	<b>21.29</b>	<b>22.40</b>	<b>19.56</b>

205  
<http://www.investenergy.ro/complexul-energetic-oltenia-pe-profit-2017/>

206  
<http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf>, page 16

207  
<http://energie.gov.ro/wp-content/uploads/2016/08/ACTIVITATEA-MINIERA-2016-2030-22072016.pdf> table page 17

208  
Draft Energy Strategy 2015-2035 - <http://energie.gov.ro/files/download/ca40a9f65974c0b>

209  
<http://energie.gov.ro/wp-content/uploads/2016/08/ACTIVITATEA-MINIERA-2016-2030-22072016.pdf>, page 17, table 5

210  
Answer by Oltenia Energy Complex to a request for public information received by Bankwatch Romania on 25 April 2018

211  
<http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2013.03.2017/Anexa%202.docx>, page 13

212  
<http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2013.03.2017/Anexa%201.docx>, page 32

213  
<http://energie.gov.ro/wp-content/uploads/2016/08/ACTIVITATEA-MINIERA-2016-2030-22072016.pdf>, page 20, fig. 9



percent by energy consumption. However, in the framework of the sector's restructuring by 2030, the report only speaks of measures such as reducing mining equipment by 30 percent and energy savings in the mines' own operation by 47 percent until 2030, and not one word about further job cuts, which are inherent the more efficient the equipment is, and whose costs are the highest contribution in the overall lignite price.

The Company's "Restructuring, reorganisation and efficiency plan" for 2017-2018 envisages layoffs of 1740 employees (1000 in 2017 and 740 starting in May 2018),<sup>214</sup> while in 2016, between January and September the Complex had already laid off 802 employees.<sup>215</sup>

The **Seciuri** mine was closed in May 2017 and the next mine on the list expected to close is **Rovinari** starting with 2019 when the coal is expected to run out. This pit currently employs 390 miners. **Peșteana** quarry - employing 738 - is also expected to stop operation in 2023 for the same reason.

**Husnicioara** was already expected to close by the end of 2016, being the "captive" supplier of an only beneficiary power plant - Halânga - which was declared bankrupt in 2016. However, the mine still produced 690 000 tonnes of lignite in 2017, with 421 employees, a significant reduction from 661 in 2016.

The lignite production is expected to follow the electricity production's downward trend by 2020, from 23 million tonnes/year to 19.7 million tonnes/year, but the Energy Strategy lignite working group's document speaks of an increase by 4.5 million tonnes/year from 2021, when a new 600 MW unit is expected to enter operation.

In spite of all evidence pointing at a decline in both electricity consumption and consequently production, as well as in available coal reserves, the Oltenia Energy Complex is pressuring the Romanian Government to issue Governmental Decisions to expropriate land and homes sitting at the edges of the mines to expand them. In December 2016 one such Decision was issued for the Jilt Nord mine, causing protests and lawsuits and an intervention by the Ombudsman over the procedural adoption of the act as well as over the ridiculous price of 1 EUR/m<sup>2</sup> offered to owners, regardless of whether the land contains a forest, an orchard or a house.<sup>216</sup>

Five more such decisions were listed in the working group's report: for Jilt Sud and Roșia pits by the end of 2016, for Pinoasa and Tismana by June 2017 and for Roșiuta by end of 2017. However, only one Government Decision regarding Roșia mine was adopted in June 2018.<sup>217</sup>

All these pits were granted environmental permits for expansion in 2016, following 3 years of court battles and an infringement procedure, because the Complex had previously only applied for deforestation permits, not for mine expansion. Even with the new permitting process, the EIA Directive provisions have not been adhered to in terms of public participation and access to documentation and are being challenged in court for suspension by Bankwatch Romania.

## Power plants

In December 2017, Oltenia Energy Complex had 3945<sup>218</sup> employees in its power plants, for an installed capacity of 3570 MW (1320 MW (4 units) Rovinari, 1320 MW (4 units) Turceni, 630 MW (2 units) Ișalnita, 300 MW Craiova (2 units). In the same year it generated 14,932 GWh of electricity - 3.78 GWh per worker - much less than Šoštanj in Slovenia with 17.5 GWh.

**Ișalnita thermal power plant** has an installed capacity of 630 MW - 2 x 315 MW units - and is the oldest lignite power plant in the country, having entered operation in 1964 and 1968 respectively. Since then, the plant has delivered 203 TWh of electricity and currently employs 650 people. In 2017, it produced 2348 GWh,<sup>219</sup> with a productivity of 3.61 GWh / employee / year. It has undergone refurbishment works, and both units have been equipped with a de-SO<sub>x</sub> installation and dense slurry installations for ash and wastewater removal.<sup>220</sup> According to a 2016 legal analysis of coal power plants' operating compliance commissioned by Greenpeace Romania, Ișalnita's units are two of the very few (10 out of 31) functioning in full compliance with the current legislation.<sup>221</sup>

**Rovinari thermal power plant**, built between 1972 and 1978 with 6 units, has a functional installed capacity of 1320 MW - 4 units x 330 MW. Since the first unit was commissioned, in 1972, Rovinari TPP has produced 182 TWh electricity and currently employs 1386 people. Two of the plant's units (5 and 6) benefited from NO<sub>x</sub> emission level compliance

214  
<http://ceoltenia.ro/documente/AGEA/Sedinta%20AGEA%2013.03.2017/Anexa%202.docx>, page 24

215  
[http://ceoltenia.ro/lista-nominala-personalului-afectat-de-planul-de-disponibilizare/?parent\\_page=142](http://ceoltenia.ro/lista-nominala-personalului-afectat-de-planul-de-disponibilizare/?parent_page=142)

216  
See more: <http://stories.bankwatch.org/a-village-disappearing>

217  
<http://gov.ro/ro/guvernul/sedinte-guvern/informatie-de-presa-privind-proiectele-de-acte-normative-care-ar-putea-fi-incluse-pe-agenda-sedintei-guvernului-romaniei-din-08-iunie-2018>

218  
Answer to a request for public information received by Bankwatch Romania, 25.04.2018

219  
<http://ceoltenia.ro/documente/AGO/Sedinta%20AGO%2015.05.2018/Anexa%201%20la%20AGO.pdf>, page 16

220  
<http://ceoltenia.ro/despre/domenii-de-activitate/producerea-de-energie/>

221  
[http://www.greenpeace.org/romania/Global/romania/energie/publicatii/starea\\_termocentralelor\\_pe\\_carbune\\_din%20Romania\\_in\\_2016.pdf](http://www.greenpeace.org/romania/Global/romania/energie/publicatii/starea_termocentralelor_pe_carbune_din%20Romania_in_2016.pdf), page 17



Mihai Stoica

derogation until 31.12.2017, under Romania's EU accession Treaty. Unit 6 has already undergone refurbishment works to become aligned to current legal NO<sub>x</sub> emission limit values, while unit 5 is still in the process. Units 3 and 4 have a NO<sub>x</sub> derogation until June 2020 according to the Transitional National Plan under the Industrial Emissions Directive. The plant's productivity in 2017 stood at 4.64 GWh/employee/year, the best performing of all four OEC power plants.

**Turceni thermal power plant** was put in operation between 1978 and 1987 with 7 x 330 MW units, but currently, like Rovinari, has 1320 MW of compliant installed capacity in 4 units. Two units (1 and 7) have been opted-out under the Large Combustion Plant Directive's 20,000 operating hours derogation in 2015, while Unit 6 has not recorded any electricity production since 2012, due to severe technical failures. Unit 3 is expected to go offline in 2029 and no other date for closure has been mentioned for the remaining units. The plant employs 1375 people currently, an abrupt fall from the 4500 employees in early 2012.<sup>222</sup> The four units generated 5043 GWh of electricity in 2017, rendering their productivity at 3.66 GWh/employee/year. Turceni power plant has

been subject to a series of legal actions on the national and European levels, as well as to EBRD's compliance mechanism for failure to obtain environmental permits for Units 6<sup>223</sup> and 7<sup>224</sup> which do not meet the Industrial Emissions Directive standards.

**Craiova II thermal power plant** is the newest lignite power plant, commissioned in 1987, which has an installed capacity of 300 MW in two units, supplying both electricity to the national grid, as well as heating to the city of Craiova. The plant employed 592 workers in 2017, and produced 1098.5 GWh, making it the least productive at 1.85 GWh/employee/year, in contrast to its age and expectation of higher efficiency in all aspects. Both units have undergone rehabilitation in 2015 and have been equipped with de-SO<sub>x</sub> installations, however the plant was operating illegally between 2010 and 2016, without an integrated environmental authorisation.

Oltenia Energy Complex's output is expected to drop from 14 TWh in 2016 to 13.4 by 2030, but this figure envisages the construction of a new unit at Rovinari power plant, which seems less and less likely to happen.

<sup>222</sup> [http://adevarul.ro/locale/targu-jiu/230-salariati-complexurile-energetice-turceni-rovinari-vor-disponibilizati-1\\_50ae98d97c42d5a6639e4ab3/index.html](http://adevarul.ro/locale/targu-jiu/230-salariati-complexurile-energetice-turceni-rovinari-vor-disponibilizati-1_50ae98d97c42d5a6639e4ab3/index.html)

<sup>223</sup> <http://bankwatch.org/news-media/for-journalists/press-releases/ebrd-suspends-loan-romanian-coal-plant-turceni>

<sup>224</sup> <http://www.greenpeace.org/romania/ro/campanii/schimbari-climatice-energie/carbunele-energia-trecutului/gnm-suspenda-activitatea-grup-7-Turceni/>



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## Rovinari 600 MW project - planned

Plans to build a new unit at the existing Rovinari TPP have been around for over 5 years, and seemed to gain speed in 2013 when the Romanian and Chinese Governments signed a Memorandum of Understanding which listed this as one of the planned investments.

China Huadian Engineering (CHE) is set to build the 600 MW unit while Chinese banks are to secure the financing. CHE would be the general contractor, but the actual construction would be done by Romanian companies. Since then, there have been numerous trips of Romanian officials to China and several Chinese delegations visited the project site, a pre-feasibility study has been reportedly finalised but was never made public and a Huadian-Oltenia joint venture was established in 2015.

The numbers related to jobs which have been thrown in the public sphere range from 4000 jobs for the “implementation phase” (not specified whether Romanian or Chinese or both), then during the project lifetime, 3000 jobs maintained and 1800 new jobs created in the mining sector, according to Romanian Government’s press release upon the MoU signing in 2013<sup>225</sup> to 500 - presumably for plant operation - which sounds more down to earth, according to OEC’s former director, quoted in the local media.<sup>226</sup>

OEC’s website<sup>227</sup> shows the expected lignite

consumption of the new unit as 4.6 million tonnes. This would come from the Roşia, Tismana and Pinoasa mines. Claims that for this amount of coal 3000 jobs in the mining sector would be maintained are quite fraudulent, as this would translate into a productivity 1533 tonnes/worker/year, below the company’s 2017 level of 3190 and much lower than the EU average of 6111. If the EU average was achieved, 4.6 million tonnes would require only 753 workers at the three mines instead of the current total of 2221.

No environmental impact assessment has been conducted and the project seems at a stand-still. The MoU estimates the project costs at EUR 847,639 million, with a 30 year lifespan and an expected date of operation in 2019.

Although no clear figure has been put forward with regards to planned generation of this new unit, the agreement for setting up the Huadian-Oltenia Company estimates a total of 6750 operating hours/year, with 41.72 percent technical efficiency, which would result in 4050 GWh/year. If we take into account the 500 jobs figure, it would translate to 8.1 GWh/worker, which is not even half that of Šoštanj 6 in Slovenia, making even this 500 figure very incredible. Based on Šoštanj 6, 231 workers would be more realistic.

<sup>225</sup>  
<http://gov.ro/ro/stiri/masuri-pentru-realizarea-unei-investitii-importante-la-sucursala-electrocentrale-rovinari>

<sup>226</sup>  
<http://www.puterea.ro/economie/chinezii-de-la-huadian-vin-la-rovinari-pentru-discutii-despre-grupul-de-500-mw-88911.html>

<sup>227</sup>  
<https://ceoltenia.ro/societate-de-proiect-pentru-termocentrala-de-600-mw-de-la-rovinari/>



# SERBIA

Electricity production in Serbia relies over 70 per cent on coal, while the remaining approximately 30 per cent is produced in large hydropower plants.

Serbia has a large amount of coal reserves, with 4 billion tonnes of proven lignite deposits. The reserves are located in two main coal basins, Kolubara and Kostolac. The coal mines in Serbia are owned and managed by subsidiaries of state-owned EPS.

The Kolubara Mining Basin provides around 75 percent of the lignite used for EPS' thermal generation. It produces over 30 million tonnes of lignite annually, which is supplied to the Nikola Tesla and Morava power plants, together producing more than 50% of Serbian electricity.

25 percent of lignite is produced in the Kostolac basin<sup>228</sup> and supplies the Kostolac A and B thermal power plants.

## Mines:<sup>229</sup>

Year	Drmno (tonnes of lignite mined)	Drmno number of mine workers <sup>230</sup>	Drmno productivity (tonnes lignite/worker)	Kolubara (tonnes of lignite mined)	Kolubara number of mine workers <sup>231</sup>	Kolubara productivity (tonnes lignite/worker)
2006	6,306,125	2258	2792.79	29,198,420	6480	4505.93
2007	6,691,964	2297	2913.35	29,275,954	6678	4383.94
2008	6,826,344	2195	3109.95	30,538,976	6776	4506.93
2009	8,339,474	2036	4096.01	29,141,916	6332	4602.32
2010	7,552,111	1970	3833.56	29,739,634	6190	4804.46
2011	9,229,774	1926	4792.20	31,060,625	6084	5105.30
2012	7,904,296	1904	4151.42	31,060,625	6084	5105.30
2013	8,803,759	1873	4700.35	30,709,715	5984	5131.97
2014	5,849,119	1877	3116.21	23,355,175	6881	3394.15
2015	8,499,000 <sup>232</sup>	2335 (1730) <sup>233</sup>	3640 (4912.7)	28,282,000 <sup>234</sup>	10612 (7509) <sup>235</sup>	2665 (3766)
2016	9,286,000 <sup>236</sup>	2173 (1624) <sup>237</sup>	4273 (5718)	28,855,000 <sup>238</sup>	10253 (6823) <sup>239</sup>	2814 (4229)
2017	9,571,000 <sup>240</sup>	2162 (1601) <sup>241</sup>	4427 (5978)	30,000,000 <sup>242</sup>	10169 (6803) <sup>243</sup>	2950 (4410)

The lignite production in Serbia seems the exception to the rule in the region, not following a clear downward trend. Production has stayed quite level at around 38 million tonnes per year, with small variations from one year to another until 2014, which was marked by the catastrophic floods that affected production for over a year. Once the mines were completely dewatered and production resumed at full capacity in 2016, the amount

of coal mined exceeded the pre-flood levels, nearing 40 million tonnes in 2017.

Oddly enough, both in 2016 and 2017 coal production at the Drmno mine exceeded 9 million tonnes, even though the expansion from 9 to 12 million tonnes/year is only envisaged to cover the additional demand for coal once Kostolac B3 unit is built. But the new unit is not even properly under

228  
<http://www.te-ko.rs/>

229  
Source: EPS answer to information requests from CEKOR, 09.12.2015 and 13.01.2016

230  
Figures until 2014 were provided in a response to an information request to EPS. From EPS' later Sustainability Reports it is clear that they relate only to the employees directly at the Drmno mine and not in the management HQ. For 2015 and after, the larger figure is the total employee number at Drmno mines plus HQ (not Ćirikovac ash landfill, which also falls under the same management), while the smaller number is Drmno direct employees only. We believe the larger number is more relevant.

231  
Figures until 2014 were provided in a response to an information request to EPS. From EPS' later Sustainability Reports it is clear that they relate only to the employees directly at the mines and not in the processing and management. For 2015 and after, the larger figure is the total employee number at Kolubara mines, management, project development and processing (not Kolubara Metal) while the smaller figures are for the direct mine-workers at Kolubara only. We believe the larger number is more relevant.

232  
<http://195.250.121.20/SiteAssets/Lists/Sitemap/EditForm/Izvestaj%20o%20stanju%20zivotne%20sredine%20u%20JP%20EPS%20za%202015.%20godinu.pdf>, page 8, table 1

233  
Ibid. page 53, table 31

234  
Ibid. page 8, table 1

235  
Ibid. page 45, table 23

236  
<http://195.250.121.20/SiteAssets/Lists/Sitemap/EditForm/Izve%C5%A1taj%20o%20stanju%20C5%BEivotne%20sredine%20u%20JP%20EPS%20za%202016.%20godinu.pdf>, page 11, table 1

237  
 Ibid. page 67, table 35

238  
 Ibid. page 11, table 1

239  
 Ibid. page 61, table 29

240  
<http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf>, page 12, table 1

241  
 Ibid. page 65, table 38

242  
 Ibid. page 12, table 1

243  
 Ibid. page 57, table 32

244  
[https://bankwatch.org/press\\_release/serbia-pushes-ahead-with-beleaguered-coal-plant-at-kostolac](https://bankwatch.org/press_release/serbia-pushes-ahead-with-beleaguered-coal-plant-at-kostolac)

245  
<http://www.poslovni.hr/svijet-i-regija/srbija-ulaze-stotine-milijuna-eura-u-rudnik-ugljena-i-novute-336016>

246  
<http://www.rbkolubara.rs/>

247  
<http://www.balkanmagazin.net/struja/cid189-100744/izgradnja-bloka-b3-u-kostolcu-ceka-zeleno-svetlo-iz-kine>

248  
 Data from Annual Environmental Report of EPS. For 2015:  
<http://195.250.121.20/SiteAssets/Lists/Sitemap/EditForm/Izvestaj%20o%20stanju%20zivotne%20sredine%20u%20JP%20EPS%20za%202015.%20godinu.pdf>

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<http://eps.rs/en/poslovanje-ee/Pages/Kapaciteti-ElEn.aspx>

construction,<sup>244</sup> so the question as to why so much coal was produced in Drmno remains.

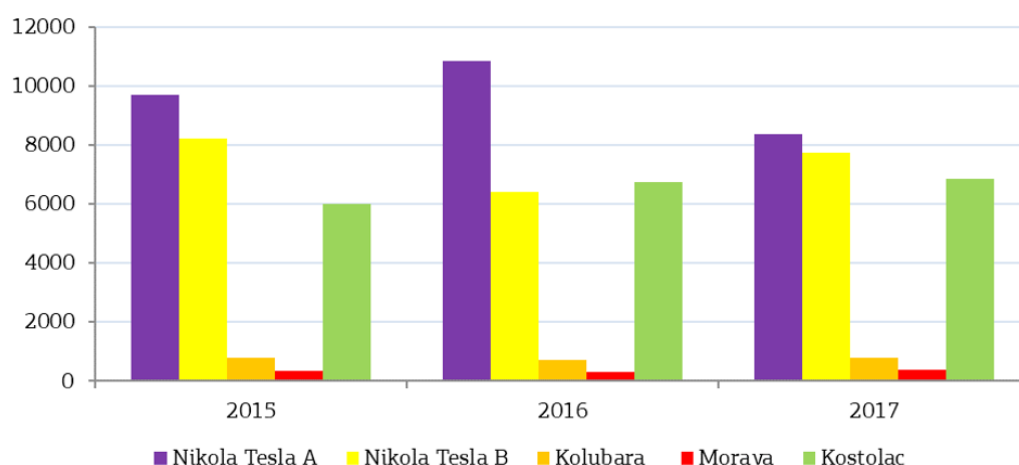
In addition to expanding the Drmno mine's capacity, opening of new mining fields in the Kolubara basin is actively carried out in the area of Zeoke-Medoševac villages where the new Field E is currently being opened. Equally advanced appears to be the Radljevo field, expected to start production in early 2019, for which EPS will spend EUR 100 million on equipment in 2018 alone, according to media reports.<sup>245</sup> In addition, Field G at Kolubara was opened in December 2017, which, together with the Radljevo field, is considered by EPS to ensure production of coal and coal-based electricity for "the next few decades"<sup>246</sup> - a time which other countries in the region (eg. Greece and Romania) are taking to redevelop the mining regions and find long term

solutions for the coal dependent communities.

The productivity level measured in tonnes of lignite produced by worker per year is above the average of the Western Balkan region. In 2017 Drmno productivity reached 4427 tonnes, much more than at the Kolubara mining basin - 2950 tonnes in 2017. Both are below the EU average of 6111 tonnes per worker. If reaching this level, Kolubara would require 4909 workers, while Drmno would require 1566.

In 2014 the level was much lower than in the previous year. This can be explained by the flooding of the mine that occurred in 2014,<sup>247</sup> but also by the fact that one unit in Kostolac B power plant was taken offline for rehabilitation works, so less coal was needed.

## POWER PLANTS



Yearly production of lignite based electricity, in GWh<sup>248</sup>

With an output capacity of 3708 MW in 2017,<sup>249</sup> Elektroprivreda Srbije generated 24.14 TWh from its five lignite fired power plants, a minor decrease from 25 TWh in 2016 and 2015, but a record number for the Western Balkans.

The productivity figures are also quite high in EPS's power plants compared to those in the

rest of the countries of the region, though a slight decrease has been observed between 2016 and 2017. This can be explained by the fact that the number of employees actually increased at Kostolac power plant by 3.6 percent.

In 2015, the Nikola Tesla complex (comprising the Nikola Tesla A and B, Morava and Kolubara power plants) employed 2319 people and produced 19 028 GWh of electricity, putting its productivity at 8.20 GWh/employee/year. The Kostolac complex (comprising the Kostolac A and Kostolac B power plants) performed less well: with 794 employees and annual electricity generation of 5989 GWh, its productivity was 7.54 GWh/employee/year.<sup>250</sup>

In 2016 the Nikola Tesla complex employed 2167 people and produced 18 262 GWh of electricity, putting its productivity at 8.42 GWh/employee/year. The Kostolac power plant, however, performed much better than 2015, with 743 employees it managed to produce 6753 GWh of electricity, upping its productivity figure to 9.09 GWh/employee/year.<sup>251</sup>

2017 was a less productive year for lignite based electricity overall in EPS. The Nikola Tesla complex reduced its employees by only 6 people, leaving 2161 in total, but produced much less electricity than in the previous years - 17 278 GWh. This decrease in generation brought productivity down to 7.99 GWh/employee/year. In contrast, the Kostolac complex hired an additional 27 people compared to 2016, bringing the total to 770, and increased its electricity generation to 6862 GWh, with a productivity level of 8.91 per employee.<sup>252</sup>

If the Nikola Tesla complex raised its productivity per person to the level of Šoštanj 6 in Slovenia - 17.5 GWh per year - it would need only 987 employees, while Kostolac would need only 392.

## Kostolac B3 350 MW unit - planned

In November 2013 a deal was signed with China's National Machinery and Equipment Import and Export Corp (CMEC) to construct the new Kostolac B3 lignite plant in north-east Serbia. No tender procedure has taken place and a contract for a USD 608 million loan was signed with China ExIm Bank in December 2014.

To supply the new unit with lignite, the Drmno mine has to expand from 9 million tonnes/year to 12 million, but the expansion does not yet have an EIA study or environmental permit, so there is no information with regards to expected employment numbers. According to a Decision from 2013 by the Ministry of Environment<sup>253</sup>, no such EIA is planned to even be conducted, leaving this project in a haze of mystery and speculation on all sides.

When it comes to the number of jobs that would be created for this new unit, no official information can be found in either the Investment Plan from 2015, or the Feasibility Study of 2013. Media articles speak about 600 jobs in the construction phase,<sup>254</sup> most likely to be equally divided between Chinese and Serbian workers, as in the case of Stanari in

Bosnia and Herzegovina. Based on Stanari it is to be expected that no more than half of the jobs would be for people from Serbia, so 300 seems more likely.

The anticipated electricity generation per year is at 2765 GWh, almost double that estimated at the Banovici power plant in Bosnia and Herzegovina (1706 GWh) for the same installed capacity, yet, it will be indeed the number of employees that would tip the scale towards higher productivity or political jobs.

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<http://195.250.121.20/SiteAssets/Lists/Sitemap/EditForm/Izvestaj%20o%20stanju%20zivotne%20sredine%20u%20JP%20EPS%20za%202015.%20godinu.pdf>, page 12, table 5

251  
<http://195.250.121.20/SiteAssets/Lists/Sitemap/EditForm/Izve%C5%A1taj%20o%20stanju%20%C5%BEivotne%20sredine%20u%20JP%20EPS%20za%202016.%20godinu.pdf>, page 14, table 4

252  
<http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf>, page 15, table 5

253  
[http://mmediu.ro/app/webroot/uploads/files/2016-08-01\\_raspunsuri\\_chestionar\\_EIA.pdf](http://mmediu.ro/app/webroot/uploads/files/2016-08-01_raspunsuri_chestionar_EIA.pdf) page 5

254  
<http://www.novosti.rs/vesti/naslovna/ekonomija/aktuelno.239.html:540369-Goran-Horvat-Novi-blok-Kostolca-otvara-600-radnih-mesta>







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# EMPLOYMENT IN RENEWABLES AND ENERGY EFFICIENCY

A country's energy sector should not be planned in terms of which energy source provides the most jobs. Nor does a coal-mining area's transformation away from coal need to be based around energy provision, but can rather be based around other kinds of industry or service provision. Nevertheless, within the energy sector itself, it is important to highlight that coal is not the only possibility for employment.

While renewable energies like wind and solar require relatively little employment during

the operational period, manufacturing and installing the equipment can provide significant employment. Few in the southeast European region have yet grasped this opportunity, but a factory manufacturing solar panels is operating in Kosovo, initially with 50 workplaces,<sup>255</sup> the first plant for manufacturing photovoltaic solar and thermal modules was opened in Macedonia<sup>256</sup> in 2018, employing initially 20 people, and a company in northern Croatia started in 2009 with 40 employees and by 2015 had increased to 140.<sup>257</sup>

## Jobs in all renewable energy sectors in the EU, 2016

The adoption of the "Climate and Energy package" in 2009 on the EU level, with targets in both renewable energy production and energy efficiency, was a real boost in the countries' economies, reflected in employment opportunities and energy production, even though the sector's development had begun already earlier. This trend translated in 2016 into 1,427,400 jobs in all types of renewable energy production facilities across the EU and a turnover of over EUR 149 million.<sup>258</sup> This makes up over 280,000 more jobs compared to the 2013 figures in our previous report.

This includes direct employment - RES equipment manufacturing, RES plants construction, engineering and management, operation and maintenance, biomass supply and exploitation - and indirect employment such as transport and other services. As

mentioned above, indirect employment is a slippery concept and we would prefer to cite data that does not include it, however the data provided here is at least generated using a standard methodology across the EU countries, and we did not identify EU wide data only on direct employment.

It should also be noted that these are figures only on renewables jobs per se. It would also be useful to have a balance of jobs lost in the fossil fuel industry versus renewables and energy efficiency jobs created in order to better understand the net gains or losses. However we were not able to locate such data for all EU countries.

A source-by-source comparison for the EU level shows that between 2015 and 2016, the biofuels sector added 26,900 jobs, the heat

<sup>255</sup> <http://renewables.seenews.com/news/kosovo-opens-5-mln-euro-plant-for-solar-panels-527873>

<sup>256</sup> <https://www.mia.mk/en/Inside/RenderSingleNews/61/134281508>

<sup>257</sup> [http://www.fzoeu.hr/hr/novosti/proizvodnjom\\_solarnih\\_modula\\_utrostrucili\\_broj\\_radnih\\_mjesta/](http://www.fzoeu.hr/hr/novosti/proizvodnjom_solarnih_modula_utrostrucili_broj_radnih_mjesta/)

<sup>258</sup> <https://www.eurobserv-er.org/pdf/annual-overview-2017-en/>

pumps sector added 9100 jobs and waste some additional 800. While the rest of the sectors are experiencing smaller employment numbers compared to the previous year, the overall employment trend has decreased by 0.88 percent.<sup>259</sup>

Interestingly, the biomass sector, at 352,500 jobs now exceeds wind energy's 309,000 jobs. Both are far ahead of solar PV (95,900), biogas (76,300) and hydropower (75,900). The solar thermal, waste and geothermal sectors contribute smaller shares to overall employment. The drop in employment figures for PV solar is most likely explained by Chinese "dumping" of PV modules on the European market in the past couple of years, over which the EU and China only reached a settlement in 2017.<sup>260</sup>

With the entering into force of the Renewable Energy Directive in 2014 in the Energy Community countries<sup>261</sup> and a deadline to deliver on the set targets by 2020, it is fair to assume that the countries of the Western Balkans would experience a similar "golden age" of renewable energy if their governments shifted their energy policies towards this sector. The sources of renewable energy which employ the highest number of people in the EU are exactly those which are believed to have the highest potential in the Western Balkan countries - biomass, wind and solar.

Two examples close to home: Slovenia employs 4800 people in the overall renewables sector, with the highest numbers in solid biomass, hydropower and heat pumps, while Croatia has created 20 500 jobs overall, with solid biomass, hydropower and wind in the lead.

Romania employed almost 45 000 people in the renewables sector in 2016, almost four times more than what the entire lignite sector currently employs. It is important to note that while the lignite sector employment figures have been on a constant downward trend, those in the renewables sector have been on the rise in the last 6-7 years.

A table of EU employment in the renewables sector can be found in Annex 4.

For the time being, the access of renewable electricity to the grids in Western Balkan countries faces serious numerous hurdles. For example, the 500 MW quota for feed-in tariffs for wind has been easily filled in Serbia but the legislation has not yet been changed to define the support system after 2018, leaving investors with huge uncertainty. In Albania, the Energy Law has been changed but several elements needed to implement it, such as the calculation of the feed-in premium strike price, have not been completed, again making it hard for investors to know what comes next.

Renewable energy employment growth in the Western Balkans will depend on the political commitment to a strong investment trajectory, in other words a choice between the 40 year long lock-in that a lignite power plant creates or a more flexible renewables-based sector, as well as on continued technological development and cost reductions.

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<https://www.eurobserv-er.org/pdf/annual-overview-2017-en/>

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<https://setis.ec.europa.eu/setis-reports/setis-magazine/solar-power/eu-china-reach-amicable-settlement-pv-trade-dispute>

261  
[https://www.energy-community.org/portal/page/portal/ENC\\_HOME/AREAS\\_OF\\_WORK/Obligations/Renewable\\_Energy](https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Obligations/Renewable_Energy)



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## Approximate potential from energy efficiency retrofits/renewable energy based on EU experience

A 2016 report carried out by the Joint Research Centre<sup>262</sup> for the EU Directorate General for Energy, presents the potential for job creation in energy efficiency retrofits and deep building renovation, as a result of a technical analysis of the long term renovation strategies submitted by the EU Member States under Article 4 of the Energy Efficiency Directive.

As the European building stock consumes approximately 40% of primary energy and it is responsible for 36% of the EU greenhouse emissions,<sup>263</sup> a step-up in the deep building renovation sector not only contributes to meeting Europe's GHG emissions reduction targets, but, as the report shows, in most of the EU member states brings forward encouraging employment numbers.

The national renovation strategies that the Member States have submitted to the European Commission include a chapter on wider-benefits of deep building renovations, such as societal ones which put into perspective job creation in this sector.

This is very relevant for the Western Balkan countries as well, given that the Energy Efficiency and Energy Performance of Buildings Directives are already part of the Energy Community acquis and should have started implementation already in 2012. It shows that with sufficient planning ahead and acknowledgement of benefits, these measures are more beneficial and less costly than the current energy policy in the region, which relies heavily on generation capacities and too little on demand side management.

A few examples:

In the **Czech Republic**, the “fast and deep” renovation scenario would contribute to savings of 18.6 PJ in the residential sector (25.4 PJ including other buildings outside industry). On the basis of a total investment in building renovation reaching CZK 35-40 bn (EUR 125-145 million) per year as a result of implementing the renovation strategy, 35 000 new jobs will be created and GDP increased by 1%.<sup>264</sup>

In **Greece's** renovation strategy, wider benefits have been identified and quantified in detail, e.g. environmental benefits, health benefits, improved comfort, employment impact (i.e. per million Euro investment, created 21.1 jobs created/million EUR invested for basic building insulation), energy security, increase the value of the property.

**Slovenia** too has provided a detailed analysis to quantify the additional benefits of energy savings. Wider benefits have been identified and quantified, eg. economic benefits, energy security, social benefits (7000 new jobs per year), reducing energy poverty, reduction of greenhouse gas and particulate emissions. The number of new jobs per year envisaged dwarfs the employment figure at the newly built unit at Šoštanj, even if 7000 turns out to be too optimistic.

Perhaps the most concrete example comes from **Spain**, whose national renovation strategy provides a clear picture of the main benefits (energy savings and CO2 emission reduction) for the considered renovation scenarios. Moreover, it shows that investing in building renovation is seen as a strategically important action, especially in terms of employment: the report estimates 55 additional jobs created for every million of public spending in the sector.

Yet, this is only part of the wider solution called “energy sector transformation” and only part of the benefits it can bring in terms of employment coupled with environmental improvements. But it is an important part that the governments of the Western Balkan countries should be inspired by and fast track in their national priorities.

<sup>262</sup>  
[http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97754/syntesis%20report%20building%20renovation%20strategies\\_online%20fin.pdf](http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97754/syntesis%20report%20building%20renovation%20strategies_online%20fin.pdf)

<sup>263</sup>  
<https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

<sup>264</sup>  
[http://iet.jrc.ec.europa.eu/energyefficiency/system/tdf/syntesis\\_report\\_building\\_renovation\\_strategies\\_online\\_fin.pdf?file=1&type=node&id=9117,page=59](http://iet.jrc.ec.europa.eu/energyefficiency/system/tdf/syntesis_report_building_renovation_strategies_online_fin.pdf?file=1&type=node&id=9117,page=59)

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# CONCLUSIONS:

## EMPLOYMENT PROMISES FROM LIGNITE ARE OVERBLOWN, EE AND RES OFFER MORE OPPORTUNITIES

This study finds that the promised employment figures in the planned lignite power plants in the Balkans, in all cases where sufficient information is available, are exaggerated.

In fact, it shows that the levels of employment are on a descending trend while the energy companies are faced with economic uncertainties and are having difficulties maintaining the current levels of employment.

**While proponents have overall claimed that 10 030 jobs would be maintained and 17 600 new jobs created, a reduction of workplaces by around 5170 is more likely.**

**Bosnia and Herzegovina** has suffered from a long term lack of capital investments in electricity production and a long history of state subsidies to the lignite mining sector. The country's participation in the Energy Community means that with progressive opening of the electricity market BIH is being exposed to competition from countries like Bulgaria and Romania which are net exporters of electricity, so there will be pressure to keep prices down.

BIH therefore needs to weigh up carefully which investments are worth making and which are in danger of ending up as stranded assets due to their high investment and operational costs.

The only coal power plant built in recent years in the country - the 300 MW Stanari - highlights employment issues likely to be relevant for other plants in the region. For the construction stage 1200 workplaces were promised. In reality, however, the figures cited by the media once construction was underway suggested that there were about 400-450 workers from BiH, along with 350-400 Chinese

workers, so only slightly over one third of the proclaimed workplaces for construction materialized for local workers.

Bosnia-Herzegovina's mines are some of the least productive in Europe regarding tonnes of coal per worker. While Elektroprivreda BIH has to some extent recognised the need to reduce the workforce in its mines and has gradually been doing so, Elektroprivreda Republike Srpske and the Banovići mine have gone in the opposite direction, taking on new workers. This urgently needs to be changed and inclusive plans drawn up on how to deal with the social aspects of the energy transition, particularly for towns like Gacko and Ugljevik that rely heavily on the coal industry.

**Bulgaria's** lignite scene appears quite different at first glance from that in the neighbouring countries, in the sense that the state is no longer the majority shareholder of the power plants and has sold some of its mines to private companies. At the end of the day, though, it is confronted with similar problems regarding the inevitable restructuring of the sector and safeguarding redevelopment of mining regions. Less than a year apart, two underground brown coal mines have shut down in the Bobov Dol mining basin, leaving over one thousand miners unemployed and without a long-term vision for those communities captive to mining for decades.

In contrast, Bulgaria's state-owned mine Mini Maritza Iztok has increased the number of employees in the last 6 years, while coal production has decreased by 16 percent. It is quite unusual that the mine has managed to keep such high levels of employment, when overall trends indicate that this is difficult if companies are to avoid financial losses.

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**Greece** is the regional prize winner for lignite mining productivity per employee, with an average of 9,146.5 tonnes per year per worker. This should put things into perspective for mine operators in the rest of the countries if they are planning to be anywhere near competitive in an open European energy market. One mine in Bosnia-Herzegovina currently has production as low as 282 tonnes per worker per year, and the Drmno mine in Serbia has 4427 tonnes per worker.

The mine operator in Greece had to make lignite production more competitive and keep operational costs at a minimum, given its financial crisis and the fact that renewable energy commitments are pushing lignite down in the country's energy mix, so the number of employees in mining dropped from 4108 in 2011, to 3433 in 2016.

**Kosovo** has been planning a new lignite unit for over ten years. The Government and concessionaire ContourGlobal, may be the regional prize winners for the most outrageous claims regarding coal plant employment, with promises of 10 000 workplaces during construction and 500 once the plant comes online. There is no reason why a plant which would have a smaller capacity than Šoštanj 6 in Slovenia would require two and a half times more employees, nor why construction would need over ten times more than the recently built Stanari power plant in Bosnia-Herzegovina.

On the positive side, Kosovo has opened a solar PV factory employing 50 people, but the country's installation of solar power facilities is lagging far behind its potential.

In **Macedonia**, reviews of existing studies about the availability of lignite on the eastern fringe of the Pelagonia basin, which hosts the three Bitola power plant units, lead to the overall conclusion is that even if two new lignite mines were to be opened in the region, Macedonia would still need to start importing coal from 2025 onwards. The state-owned utility which operates both the lignite power plants and the lignite mines, has plans to develop an underground mine at Suvodol, but there is no information available with regards to the number of jobs this mine expansion would bring, nor for what period of time.

All we know is that Macedonia has no experience in underground mining, which may mean the jobs in this planned mine would be

imported. Such a struggle for domestic fuel resources may win Macedonia the regional prize for the most unrealistic coal development pathways and signals an urgent need for a well thought through transition plan for the population reliant on coal jobs.

The planned new unit in Pljevlja in **Montenegro** is promoted as tackling the small town's two biggest problems: air pollution and unemployment. It is just wishful thinking. The project does not include the construction of a district heating system, so smoke from individual stoves will persist. Jobs are likely to further decrease rather than increase.

The feasibility study for the new plant estimates that 147 workers will be employed. Generation would be around 1700 GWh annually. This would make 11.5 GWh per worker - much less than Šoštanj 6 in Slovenia with 17.5 GWh per worker, in a situation where Šoštanj 6 has huge financial problems. This may lead to further decreasing the number of workers at Pljevlja.

As for the mine, in order to reduce the coal production cost to a potentially feasible level, Fichtner has calculated that the number of employees in the mine would need to be reduced to 544 or 520, depending on the scenario, by around 2025, compared to 872 in 2016. The number of employees at the mine is already steadily decreasing and Pljevlja is seen as a dying town, due to its air pollution and limited other economic activities.

Even though the coal industry's lifetime is being temporarily extended by the modernisation of the existing unit, the direction of travel is still clear: new economic activities need to be generated for the laid off workers from the mine and an inclusive overall development plan for a post-coal Pljevlja needs to be drawn up.

**Serbia** also qualifies for a regional prize, one for the least transparent access to information related to employment in planned lignite power plants. Even though the Government has signed a financing agreement with China Eximbank for the construction of a new 350 MW unit at Kostolac B power plant and for the expansion of nearby Drmno mine, there is no Environmental Impact Assessment study for the mine expansion, nor does the government plan such a process, according to a decision from 2013.

Related to the new lignite unit, only a few media articles speak about 600 jobs in the



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construction phase, most likely to be equally divided between Chinese and Serbian workers, as in the case of Stanari in Bosnia-Herzegovina, but not a word about long-term jobs in the plant's operation or in other alternative sectors.

As part of its ongoing restructuring programme, Elektroprivreda Srbije needs to reduce the number of workers overall but there is very little information about this publicly available. It is very unlikely that there will be an overall increase in jobs if Kostolac B3 is built as this will merely offset some of the jobs lost in the wider company.

**Romania** is the only country in the region which has gone through a socially failed process of hard coal mines closure in the early 2000s and also the only country in the region which currently employs more people in the renewable energy sector than in the lignite one. Production of coal-based electricity has shrunk from 37 percent in 2011 to 25 percent in 2015, as renewables grew from 2 percent to 15 percent.

Plans to build a new 600 MW unit at the existing Rovinari power plant have been

around for over 5 years, but it is unlikely it will materialise given lignite production's steep downward trend.

Romania is perhaps the country where the government must most urgently recognise that a transition to a cleaner energy system is necessary, while making sure that the transition is a just one, with adequate planning, financing and inclusion of workers in decision-making.

Romania, as well as other countries such as the UK which have undergone poorly planned closures of the coal mining sector, serve as a lesson that thorough participatory and transparent planning needs to take place for moving coal mining communities beyond coal to a more diverse and sustainable economy. In short, a just transition needs to be planned and implemented urgently.

# RECOMMENDATIONS

1. Governments and companies need to stop making exaggerated claims about employment in the coal sector and examine the numerous other ways to stimulate jobs, especially in the household energy efficiency renovation sector.
2. Social and employment vulnerability assessments need to be undertaken for existing coal mines and plants.
3. Decommissioning and rehabilitation plans for coal mines, ash dumps and power plants planned for closure need to be drawn up and their labour requirements calculated.
4. Coal-affected communities need to start inclusive processes for envisioning and planning a future beyond coal. These need to be integrated, taking into account economic development but also infrastructure, education, participation and social and public policies. Bottom-up policies are likely to be more successful than top-down ones as local people know their needs best.
5. Provisions for a just transition away from coal need to be included in state level energy and climate policies and local development plans. These need to be widely consulted at a stage where all options are still open.
6. Workers' education and training on climate friendly and climate-resilient technologies needs to be promoted by governments as part of capacity building strategies.
7. The move to an auction-based renewable support scheme needs to be carried out as soon and efficiently as possible in the Western Balkan countries in order to ensure a clear perspective for renewable energy investors until at least 2030.
8. Public participation needs to be ensured from the beginning for all energy projects, including renewables, in order to ensure public acceptance of the energy transition.
9. Community-based renewable energy systems need to be enabled by law and incentivised by governments, to stimulate local communities and ensure public acceptance of renewable energy.
10. States and regions need to consider how to use EU funds to the best effect for transforming mining communities, and the EU needs to ensure that such funds are available also in pre-accession countries.
11. Funds need to be directed at helping communities, not keeping the coal industry on a life support machine.

# ANNEX 1

## Overview of mine productivity per employee (country average and mine-by-mine)

Mine productivity

Country	Year	Number of employees	Lignite production in tonnes	Lignite production per employee in tonnes per year	Number of employees needed to reach the EU average efficiency	Source
Bosnia and Herzegovina (EPBIH)	2017	8,283	5,575,066	673.1	912	<a href="http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark9">http://www.elektroprivreda.ba/stranica/koncern-epbih#bookmark9</a>
Bosnia and Herzegovina (Banovići)	2017/2018	2,780	1,434,651	516.1	235	<a href="http://www.rmub.ba/proizvodni-rezultati-2017-godine">http://www.rmub.ba/proizvodni-rezultati-2017-godine</a> , <a href="https://avaz.ba/vijesti/teme/358546/otvoreno-pismo-rmu-banovici-mi-poslujemo-pozitivno-a-rudnici-u-koncernu-su-gubitasi">https://avaz.ba/vijesti/teme/358546/otvoreno-pismo-rmu-banovici-mi-poslujemo-pozitivno-a-rudnici-u-koncernu-su-gubitasi</a>
Bosnia and Herzegovina (Federation average)	2017/2018	11,063	7,009,717	633.6	1,147	ibid
Bosnia and Herzegovina - Republika Srpska (Gacko only)	N/A	Data issues	7,197,614	Data issues	1,178	See below under individual mines
Bulgaria	2015	11,765	36,000,000	3,059.9	5,891	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
Czech Republic	2015	7,869	38,100,000	4,841.8	6,235	<a href="http://euracoal.eu/info/country-profiles/czech-republic/">http://euracoal.eu/info/country-profiles/czech-republic/</a>
Germany	2015	15,428	178,100,000	11,543.9	N/A	<a href="http://euracoal.eu/info/country-profiles/germany/">http://euracoal.eu/info/country-profiles/germany/</a>
Greece	2016	3433	31400000	9146.51907952228	N/A	<a href="https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2015/Annual_Report_2015_EN_WEB.pdf">https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2015/Annual_Report_2015_EN_WEB.pdf</a> PPC 2015 Annual Report, page 10
Kosovo (Sibovc)	2016/2015	3,249	8,200,000	2,523.9	1,342	Information request to KEK, Sept. 2016, Auditors' Report for the year ended 31 December 2015. <a href="http://kek-energy.com/kek/en/financial-audit-reports/">http://kek-energy.com/kek/en/financial-audit-reports/</a>
Macedonia (Suvodol only)	2015	No data available	5,900,000	No data available	965	<a href="https://www.braunkohle.de/files/euracoal-coal-industry-across-europe-6th.pdf">https://www.braunkohle.de/files/euracoal-coal-industry-across-europe-6th.pdf</a>
Montenegro (Pljevlja)	2017	750	1,420,022	1,893.4	232	<a href="http://www.scmn.me/fajlovi/RUPV201712.pdf">http://www.scmn.me/fajlovi/RUPV201712.pdf</a>
Poland	2016	6,001	59,576,100	9,927.7	9,749	<a href="http://www.wug.gov.pl/english/supervised_plants">http://www.wug.gov.pl/english/supervised_plants</a>
Romania	2017	7,053	22,500,000	3,190.1	3,682	<a href="http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf">http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf</a>
Serbia (Drmno and Kolubara only)	2017	12,331	39,571,000	3,209.1	6,475	<a href="http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf">http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf</a>
Slovenia (Velenje only)	2016	1,243	3,348,889	2,694.2	548	<a href="http://www.rlv.si/si/files/default/Letna%20porocila/LETNO%20POROCILO%20PV%202016.pdf">http://www.rlv.si/si/files/default/Letna%20porocila/LETNO%20POROCILO%20PV%202016.pdf</a>



Mine	Year	Number of employees	Lignite production in tonnes	Lignite production per employee in tonnes per year	Number of employees needed to reach the EU average efficiency	Source
Stanari, RS, BIH	2017	590	2,454,253	4,159.8	402	<a href="http://www.eft-stanari.net/index.php/about-us/rezultati">http://www.eft-stanari.net/index.php/about-us/rezultati</a> , Mine employees estimate based on Republika Srpska Energy Strategy 2018
Ugljevik, RS, BIH	2016	Data issues	2,027,457	Data issues	332	<a href="http://ers.ba/ers/planovi-i-izvjestaji/finansijski-izvjestaji/">http://ers.ba/ers/planovi-i-izvjestaji/finansijski-izvjestaji/</a>
Gacko, RS, BIH	2017	Data issues	2,715,904	Data issues	444	<a href="http://ritegacko.com/ostvareni-rezultati-r/">http://ritegacko.com/ostvareni-rezultati-r/</a>
Kreka, FBIH	2017	2,462	2,215,748	900.0	363	<a href="http://www.elektroprivreda.ba/stranica/koncern-epbih">http://www.elektroprivreda.ba/stranica/koncern-epbih</a>
Đurdevik, FBIH	2017	834	495,938	594.6	81	
Kakanj, FBIH	2017	1,694	1,300,000	767.4	213	
Zenica, FBIH	2017	1,472	415,989	282.6	68	
Breza, FBIH	2017	1,220	676,545	554.5	111	
Bila, FBIH	2017	412	138,923	337.2	23	
Gračanica, FBIH	2017	189	331,923	1,756.2	54	
Banovići, FBIH	2017/2018	2,780	1,434,651	516.1	235	<a href="http://www.rmub.ba/proizvodni-rezultati-2017-godine">http://www.rmub.ba/proizvodni-rezultati-2017-godine</a> , <a href="https://avaz.ba/vijesti/teme/358546/otvoreno-pismo-rmu-banovici-mi-poslujemo-pozitivno-a-rudnici-u-koncernu-su-gubitasi">https://avaz.ba/vijesti/teme/358546/otvoreno-pismo-rmu-banovici-mi-poslujemo-pozitivno-a-rudnici-u-koncernu-su-gubitasi</a>
Mini Maritza Iztok (BG)	2016	7,308	27,760,000	3,798.6	4,543	<a href="https://www.bgenh.com/OTCHETI/MMI/MMI%202016/GFO_MMI_2016_EN.PDF">https://www.bgenh.com/OTCHETI/MMI/MMI%202016/GFO_MMI_2016_EN.PDF</a>
Bobov Dol mines	2015	No data available	1,000,000	No data available	Not relevant – largest mine closing 2018	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
Pernik	2015	No data available	1,000,000	No data available	164	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
Oranovo	Average	No data available	700,000	No data available	115	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
Vitren (Katrishte)	Average	No data available	100,000	No data available	16	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
Cherno More	Average	No data available	250,000	No data available	41	<a href="https://euracoal.eu/info/country-profiles/bulgaria/">https://euracoal.eu/info/country-profiles/bulgaria/</a>
LEAG Lusatia operations, DE	2017	8,000	61,200,000	7,650.0	10,015	<a href="https://www.leag.de/fileadmin/user_upload/pdf-en/LEAG_facts_figures_2017.pdf">https://www.leag.de/fileadmin/user_upload/pdf-en/LEAG_facts_figures_2017.pdf</a>
Kosovo (Sibovc)	2016/2015	3,249	8,200,000	2,523.9	1,342	Information request to KEK, Sept. 2016, Auditors' Report for the year ended 31 December 2015. <a href="http://kek-energy.com/kek/en/financial-audit-reports/">http://kek-energy.com/kek/en/financial-audit-reports/</a>
Macedonia (Suvodol only)	2015	No data available	5,900,000	No data available	965	<a href="https://www.braunkohle.de/files/euracoal-coal-in-dustry-across-europe-6th.pdf">https://www.braunkohle.de/files/euracoal-coal-in-dustry-across-europe-6th.pdf</a>
Pljevlja, ME	2017	750	1,420,022	1,893.4	232	<a href="http://www.scmn.me/fajlovi/RUPV201712.pdf">http://www.scmn.me/fajlovi/RUPV201712.pdf</a>
Roşia, RO	2016/2017	991	2,610,000	2,633.7	427	Answer by Oltenia Energy Complex to a request for public information received by Bankwatch Romania on 25
Peşteana, RO	2016/2017	738	1,560,000	2,113.8	255	
UMC Rovinari, RO	2016/2017	390	693,000	1,776.9	113	
Tismana, RO	2016/2017	695	3,482,000	5,010.1	570	
Pinoasa, RO	2016/2017	535	1,859,000	3,474.8	304	
Roşiu de Jos, RO	2016/2017	977	3,093,000	3,165.8	506	
Lupoaia, RO	2016/2017	700	2,250,000	3,214.3	368	
Husnicioara, RO	2016/2017	421	437,000	1,038.0	72	
Jiū Sud, RO	2016/2017	859	1,354,000	1,576.3	222	
Jiū Nord, RO	2016/2017	747	2,222,000	2,974.6	364	
Drmno, SRB	2017	2,162	9,571,000	4,426.9	1,566	<a href="http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf">http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf</a>
Kolubara mining complex, SRB	2017	10,169	30,000,000	2,950.1	4,909	<a href="http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf">http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf</a>
Velenje (Šoštanj), SLO	2016	1,243	3,348,889	2,694.2	548	<a href="http://www.rlv.si/si/files/default/Letna%20porocila/LETNO%20POROCILO%20PV%202016.pdf">http://www.rlv.si/si/files/default/Letna%20porocila/LETNO%20POROCILO%20PV%202016.pdf</a>

# ANNEX 2

## Power plant labour productivity - existing plants

Country/ power plant	Year	Number of employees	Generation in GWh	GWh per employee	Source
Germany - country average	2017	5,000	147,500	29.5	<a href="http://corporate.vattenfall.com/press-and-media/news/2014/lignite-in-numbers/">http://corporate.vattenfall.com/press-and-media/news/2014/lignite-in-numbers/</a>
Greece – country average	2016	4,671	14,937	3.2	<a href="https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf">https://www.dei.gr/Documents2/ANNUAL%20REPORT/AR-2016/Annual_Report_2016_EN_WEB.pdf</a>
Šoštanj 6, SLO	Average	200	3,500	17.5	<a href="http://www.te-sostanj.si/nip5/index.html">http://www.te-sostanj.si/nip5/index.html</a>
Stanari, BIH	2017	190	2,000	10.5	<a href="http://www.eft-group.net/index.php/news/single/81/Press-Releaseand%20estimated%20employees%20based%20on%20RS%20Energy%20Strategy%202018">http://www.eft-group.net/index.php/news/single/81/Press-Releaseand estimated employees based on RS Energy Strategy 2018.</a>
Ugljevik I, BIH	2016	Data issues	1,750	Data issues	<a href="http://www.ers.ba/images/stories/izvjestaji/mh2014osn.pdf">http://www.ers.ba/images/stories/izvjestaji/mh2014osn.pdf</a>
Gacko, BIH	2017	Data issues	1,586	Data issues	<a href="http://ritegacko.com/proizvodnja/">http://ritegacko.com/proizvodnja/</a>
Tuzla units 3-6, BIH	2016	665	3,100	4.7	<a href="http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf">http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf</a>
Kakanj 5-7, BIH	2016	614	2,300	3.7	<a href="http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf">http://www.elektroprivreda.ba/upload/documents/2016%20GI%20_%2015_8%20final.pdf</a>
Maritsa East 2, BG	2016	2,433	8,271	3.4	<a href="https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202016/GFO_TPP_2016%20consol_EN.PDF">https://www.bgenh.com/OTCHETI/TPP%20Maritsa%20East%202/TPP%202016/GFO_TPP_2016%20consol_EN.PDF</a>
Maritsa Iztok 3	No data available	No data available	No data available	No data available	
AES Galabovo, BG	Unclear	300	No data available	No data available	<a href="http://aes.bg/our-business/tpp/?lang=en">http://aes.bg/our-business/tpp/?lang=en</a>
Brikell	Unclear	No data available	No data available	No data available	
Maritsa 3	Unclear	No data available	No data available	No data available	
Bobov Dol	Unclear	No data available	No data available	No data available	
Pernik	Unclear	No data available	No data available	No data available	
Kosova A, KOS	2017	No data available	2,084	No data available	<a href="http://kek-energy.com/kek/raportet-auditura-financiare/">http://kek-energy.com/kek/raportet-auditura-financiare/</a>
Kosova B, KOS	2017	No data available	3,641	No data available	<a href="http://kek-energy.com/kek/raportet-auditura-financiare/">http://kek-energy.com/kek/raportet-auditura-financiare/</a>
Bitola 1-3, MK	Average	Data issues	4,200	Data issues	<a href="http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html">http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html</a>
Oslomej	Average	Data issues	500	Data issues	<a href="http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html">http://www.elem.com.mk/wp-content/uploads/2015/struktura_na_ad_elem_en.html</a>
Pljevlja I, ME	2017	171	1,265	7.4	<a href="http://www.cdm.me/ekonomija/te-pljevlja-nakon-33-godine-rada-uspjesan-rezultat">http://www.cdm.me/ekonomija/te-pljevlja-nakon-33-godine-rada-uspjesan-rezultat</a> , <a href="https://www.epcg.com/sites/epcg.com/files/multimedia/gallery/files/2014/04/378_online.pdf">https://www.epcg.com/sites/epcg.com/files/multimedia/gallery/files/2014/04/378_online.pdf</a>
Turcenii 1-5, 7, RO	2017	1,375	5,043	3.7	<a href="http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf">http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf</a>
Rovinari 2-6, RO	2017	1,386	Unclear	4.6	<a href="http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf">http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf</a>
Craiova 1-2, RO	2017	592	1,099	1.9	<a href="http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf">http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf</a>
Işalniia 1-2, RO	2017	650	2,348	3.6	<a href="http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf">http://ceoltenia.ro/documente/AGOA/Sedinta%20AGOA%2015.05.2018/Anexa%201%20la%20AGOA.pdf</a>
Nikola Tesla complex (Nikola Tesla A and B, Kolubara and Morava) SRB	2017	2,161	17,278	8.0	<a href="http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf">http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf</a>
Kostolac A + B	2017	770	6,862	8.9	<a href="http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf">http://eps.rs/En/Documents/energyEfficiency/The%20PE%20EPS%20Environmental%20Report%20for%202017.pdf</a>

# ANNEX 3

## Power plant labour productivity - planned plants

Planned power plant	Number of employees planned	Average planned generation in GWh	GWh per employee	Number of employees needed to reach Šoštanj 6's productivity	Source
Ugljevik III, BIH	303	3,371	11	192.6	<a href="http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/IPRP%202017-2026%20-%20Prijedlog.pdf">http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/IPRP%202017-2026%20-%20Prijedlog.pdf</a>
Gacko II, BIH	180	2,556	14	146.1	Studija ekonomske opravdanosti "Termoelektrane Gacko II" (Feasibility study), 2016
Tuzla 7, BIH	Data issues	2,632	Data issues	150.4	<a href="http://www.elektroprivreda.ba/upload/documents/materijali286MB.pdf">http://www.elektroprivreda.ba/upload/documents/materijali286MB.pdf</a>
Banovići, BIH	200	2,200	11	125.7	Rudarski institut d.d. Tuzla: IZMJENE I DOPUNE STUDIJE O UTICAJU NA OKOLIŠ ZA TE „BANOVIĆI“, Tuzla, May 2015, p. 31, <a href="http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/Juli%202016/IPRP%202017-2026%20-%20Final.pdf">http://www.nosbih.ba/files/dokumenti/Indikativan%20plan%20razvoja/2016/Juli%202016/IPRP%202017-2026%20-%20Final.pdf</a>
Kamengrad, BIH	Data issues	No data available	No data available	No data available	
Kakanj 8, BIH	No data available	1,755	No data available	100.3	<a href="http://www.elektroprivreda.ba/stranica/blok-8-te-kakanj">http://www.elektroprivreda.ba/stranica/blok-8-te-kakanj</a>
Ptolemaida V, GR	250	4,620	18	264.0	<a href="http://tdm.tee.gr/wp-content/uploads/2015/04/paremvasi-tee-tdm-anaforika-me-tin-kataskeyi-tis-monadas-ptolemaida-v.pdf">http://tdm.tee.gr/wp-content/uploads/2015/04/paremvasi-tee-tdm-anaforika-me-tin-kataskeyi-tis-monadas-ptolemaida-v.pdf</a>
Meliti II, GR	No data available	3,500	No data available	200.0	<a href="http://www.wwf.gr/images/pdfs/Roadmap_PostLignite_EN.pdf">http://www.wwf.gr/images/pdfs/Roadmap_PostLignite_EN.pdf</a> <a href="http://www.wwf.gr/images/pdfs/Lignite_Study_WWFGreece.pdf">http://www.wwf.gr/images/pdfs/Lignite_Study_WWFGreece.pdf</a>
Kosova e Re, KOS	500	3,370	7	192.6	<a href="http://mzhe-ks.net/repository/docs/DSEKRS_VERSIONI_FINAL_3_GUSHT_2016_Anglisht.pdf">http://mzhe-ks.net/repository/docs/DSEKRS_VERSIONI_FINAL_3_GUSHT_2016_Anglisht.pdf</a> , <a href="http://mzhe-ks.net/repository/docs/Kosova_e_Re_Brochure_ENG.pdf">http://mzhe-ks.net/repository/docs/Kosova_e_Re_Brochure_ENG.pdf</a>
Pljevlja II, ME	147	1,700	12	97.1	<a href="http://www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&amp;rType=2">www.gov.me/ResourceManager/FileDownload.aspx?rId=244860&amp;rType=2</a>
Rovinari 7, RO	500	4,050	8	231.4	<a href="http://www.puterea.ro/economie/chinezii-de-la-huadian-vin-larovinari-pentru-discutii-despre-grupul-de-500-mw-88911.html">http://www.puterea.ro/economie/chinezii-de-la-huadian-vin-larovinari-pentru-discutii-despre-grupul-de-500-mw-88911.html</a>
Kostolac B3	No data available	2,765	No data available	158.0	<a href="http://www.novosti.rs/vesti/naslovna/ekonomija/aktuelno.239.html:540369-Goran-Horvat-Novi-blok-Kostolca-otvara-600-radnih-mesta">http://www.novosti.rs/vesti/naslovna/ekonomija/aktuelno.239.html:540369-Goran-Horvat-Novi-blok-Kostolca-otvara-600-radnih-mesta</a> , Investment plan, revision December 2015



# ANNEX 4

## Jobs in the renewable energy sector across the EU-28, 2016 figures<sup>265</sup>

	Country total	Biomass	Wind power	Heat pumps	Biofuels	PV	Biogas	Hydro	Solar thermal	Waste	Geothermal energy
Germany	<b>283100</b>	42500	121700	14500	21800	27100	35700	5200	6400	7000	1200
Italy	<b>179000</b>	32600	6300	94000	6500	10700	8000	13400	1400	3800	2300
France	<b>143100</b>	35400	18800	32800	33200	5200	1800	10200	1100	4000	600
Spain	<b>141000</b>	18400	23500	60800	15100	2200	1300	10900	8000	700	<100
UK	<b>107400</b>	12600	42900	1800	4500	29000	11800	2200	200	2300	<100
Poland	<b>81800</b>	26100	11400	2200	34800	1500	3100	1300	1100	<100	200
Sweden	<b>47900</b>	18700	4900	10400	7600	300	<100	4800	<100	900	<100
Romania	<b>44900</b>	11400	2500	300	23800	1800	200	4400	200	<100	200
Denmark	<b>43000</b>	8500	26600	2100	200	1200	300	<100	3200	500	300
Finland	<b>39200</b>	25400	2500	4500	2900	400	400	1200	<100	700	<100
Netherlands	<b>37600</b>	3900	21500	3600	400	4700	800	<100	100	2000	500
Hungary	<b>35200</b>	12000	800	500	15700	2000	1500	<100	400	1000	1200
Czech Republic	<b>30500</b>	11400	900	1800	8000	1700	4300	1700	400	200	<100
Latvia	<b>27400</b>	21800	<100	<100	3100	<100	800	1100	<100	<100	<100
Portugal	<b>26800</b>	6500	6400	7400	400	700	800	3800	200	500	<100
Austria	<b>24000</b>	8600	1700	1900	2900	1300	500	4800	2000	200	<100
Bulgaria	<b>23200</b>	9600	600	3900	3000	800	800	2900	1300	<100	200
Croatia	<b>20500</b>	15000	900	<100	1900	<100	600	1600	100	<100	<100
Greece	<b>18300</b>	3400	3700	1400	4500	1100	800	1700	1500	<100	<100
Lithuania	<b>18300</b>	4700	1600	400	9200	300	800	800	<100	300	<100
Slovakia	<b>15500</b>	8700	<100	100	4000	400	600	1300	<100	<100	100
Estonia	<b>14600</b>	10000	1600	2100	200	200	200	<100	<100	<100	<100
Belgium	<b>9500</b>	1000	2300	1500	900	2400	400	400	200	300	<100
Ireland	<b>7300</b>	1700	4200	400	<100	<100	300	200	100	<100	<100
Slovenia	<b>4800</b>	2300	<100	500	<100	300	200	900	200	<100	100
Luxembourg	<b>1500</b>	<100	200	<100	<100	<100	<100	500	<100	<100	<100
Cyprus	<b>1000</b>	<100	<100	<100	<100	<100	<100	<100	100	<100	<100
Malta	<b>1000</b>	<100	<100	<100	<100	100	<100	<100	<100	<100	<100
Total EU-28	<b>1427400</b>	352500	309000	249400	205100	95900	76300	75900	29000	25700	8600

Source: EurObserv'ER

Note: the inclusion of sectors such as waste and biofuels should not be taken as an indication that these sectors are environmentally sustainable. Close attention also needs to be paid to the impacts of renewable energy as with any other energy source.

<sup>265</sup> <https://www.eurobserv-er.org/17th-annual-overview-barometer/>, page 144

“ In several southeast European countries, new coal-fired power plants are planned. This is in contrast to most of the EU, where no new coal plants are planned, due to their climate and health impacts, and their poor economics. These plans for southeast Europe are accompanied by promises of creating new workplaces or saving current ones. This study examines these claims and finds that in almost all cases, they are exaggerated. In fact, even the current levels of employment cannot be maintained in most cases, so a fair and inclusive plan is needed to transform coal-dependent communities. “