

Study Committee C3

Power system environmental performance

Paper 10710_2022

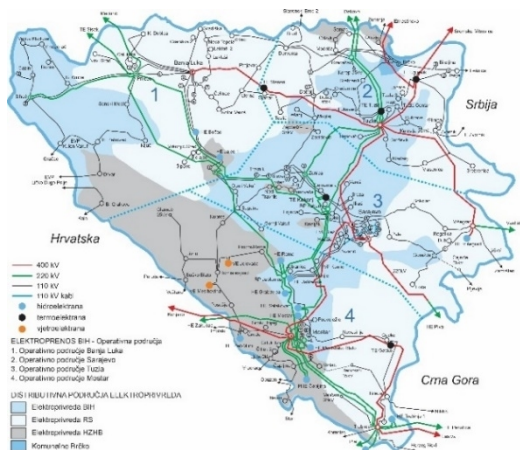
Photovoltaic Power Plants on degraded Mining, Slag and Ash dump Areas – a Contribution to Coal Region Transition Processes

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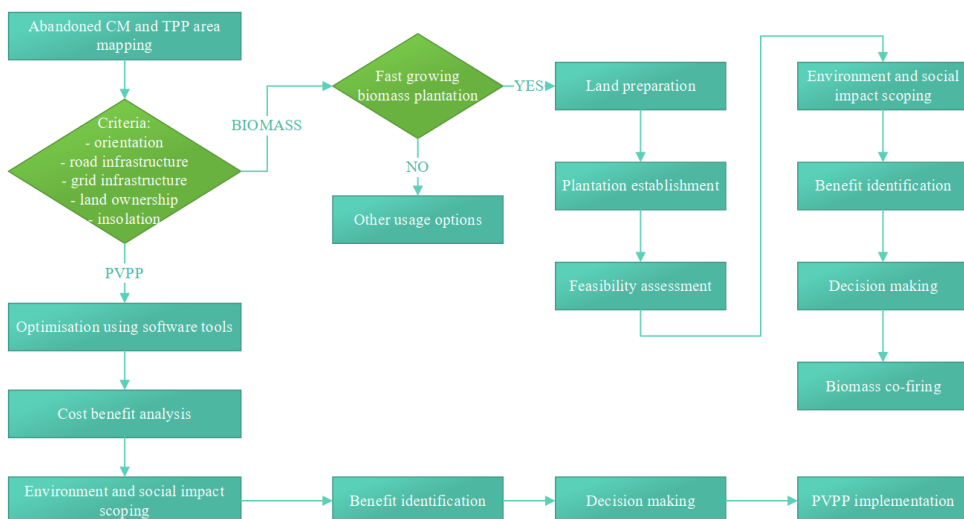
Motivation

- EPBiH's generation portfolio is based on fossil fuels (coal).
- RES share generally ranges up to 23%
- Activities that lead to decarbonization, job diversification, mining land and ash landfills conversion/reuse and implementation of RES based projects can contribute to a sustainable and just transition process.



Method/Approach

- In order to maintain the basic mission of electricity generation, with the aim of increasing RES share in EPBiH's generation portfolio, available degraded mining and slag and ash dump areas suitable for further energy purposes have been identified.
- The first step was exploring possibilities for implementing PVPP there. In case a location was not suitable for PVPP construction, it was further considered for fast growing biomass plantation (energy crops and SRC) establishment.



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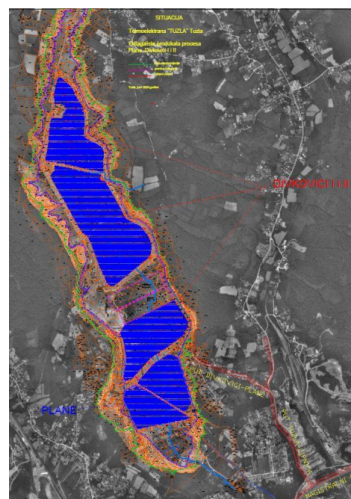
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Analysis

- In total, 1009.8 ha of available land belonging to EPBiH's Concern coal mines (CM) and TPP was mapped.
- 359.6 ha were identified as suitable for large-scale PVPP implementation
- 114.0 ha were identified as suitable for short rotation coppice plantations
- Performed PV panel sizing and optimization by using PV*SOL software tool, conducted analyses and calculations resulted in a conceptual design on 163.5 hectares of useful land (total available land area was 265.1 ha) for three PVPP.
- In order to assess environmental implications of such projects, CO₂, SO₂, NO_x and particle matter (PM) savings have been estimated.
- For all three selected locations, projects are feasible and the estimated payback period is within the first half of their life expectancy.



Indicator / Location	PVPP Divkovići	PVPP Gračanica	PVPP Kreka-Šićki brod
Installed capacity [MW]	56	42	46
Average annual electricity generation [MWh]	76.548	57.761	64.914
Average annual CO ₂ savings [t]	70.676	53.445	59.942
SO ₂ savings during lifetime [t]	8.652,98	6.512	7.351,384
NO _x savings during lifetime [t]	1.971,56	1.574	1.672,8
PM particle emission reduction during lifetime [t]	123,18	93.18	104,53
Estimated number of coal mine worker jobs retained	7		



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Benefits

- Reduction of greenhouse gas emissions and pollutants respecting the concept of replacing electricity generated from coal-fired thermal power plants with electricity generated from future large scale PVPP.
- Utilization of mining areas and landfill surfaces that currently have no other utilization purpose and also have regulated property and are tangible asset of a company,
- Creation of new jobs and employment opportunities along with need for retraining of the employees,
- Contribution to energy transition and the transition of coal regions in accordance with strategic documents at state level
- Local economy enhancement in terms of potential for engagement of local companies and workforce in the PVPP sector which is currently not developed

Conclusion

- Implementation of PVPP at former CM and TPP sites as described within this work, maintains the basic mission of electricity generation, with the aim of reducing CO₂ emissions, as one of the transition approaches within the energy sector towards decarbonized systems.
- Even though the transition process will bring many of the new green jobs which will require skills different than previous energy jobs and will be even in new locations, the approach proposed in this article dealt partially with coal mine industry related employment, facilitating training of workers so they can be re-employed in those new opportunities.
- Implementation of these 3 PVPP would generate approx. 200 GWh RES based electricity yearly, save more than 184.000 tonnes of CO₂ and maintain several jobs of workers currently employed in the coal mining industry.