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Evaluation of Alternative Energy Exploitation Using the TOPSIS Method

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Abstract

Alternative Energy Exploitation Development and utilization of natural Energy resources. Air pollution, climate change, water pollution, heat pollution and solid waste disposal and directly with consumption Energy production and directly with consumption Related environmental issues. Alternative Energy Exploitation is Developing and Growing using natural energy resources to the greatest possible advantage, usually for profit. TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) analysis using the Alternative Energy Exploitation 1, Alternative Energy Exploitation 2, Alternative Energy Exploitation 3, Alternative Energy Exploitation 4, Alternative Energy Exploitation 5, Alternative Energy Exploitation 6 Alternative value and Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk Index Evaluation Parameters in value. Alternative Energy Exploitation 5 is got the first rank whereas is the Alternative Energy Exploitation 6 is having the Lowest rank..

Keywords: MCDM, Alternative Energy Exploitation, NPV (106 GDR), Jobs, Energy use (1012 cal/year and Risk index).

1. Introduction

Exploitation of Alternative Energy – Development and utilization of natural energy resources. Energy is available. Renewable energy sector includes power generation production and consumption depending on natural resources that can be controlled by man. Air pollutants, climate exchange, Water pollution, thermal pollution and Disposal of solid waste. All strength Resources also have some effect on our environment causing Fossil fuels coal, oil and natural gas are notably greater dangerous than renewable energy resources by maximum measures, along with. Basic energy of industrial civilization; Without power, contemporary life might give power will have an effect on the environment in some way. The big hike in gas fees due to the strength crisis is hitting the tourism enterprise very badly. Tourism charges also are growing because of growing fuel charges. Thus, there are many folks that cannot afford it. TOPSIS (Technique for Order Performance (like an ideal solution) Real-world multi-attributes or Multi-Dimensional Selection-Making (MADM/MCDM) To deal with is an effective method issue.

2. Alternative Energy Exploitation

Alternative strength exploitation projects of low temperature geothermal area. It has been proven that this technique is greater sensible and produces more reliable ratings for troubles together with the assessment of opportunity power exploitation scenarios where the input information is not nicely described [1]. An alternative to energy production and now many more Popular in countries arena together with USA, Strength is changed to declared Because the 5th in the power supply Gasoline is a mixture. Renewable energy is focused as an extensive contributor to the U.S.A.'s general strength distributor. With this aim in mind Biomass, biogas, solar, wind and Renewable including mini-hydro More resources to sell Efforts are being made. strength production [2]. Alternative renewable strength resources. The European Union currently debts for most of the useful resource enter between international locations and there are numerous varieties of renewable power (RE) aid utilization. Solar electricity may be very dominant the various renewable energy sources and appears to be very attractive for power production because it does no longer growth carbon dioxide emissions, does not damage the environment and is environmentally pleasant. Energy in specific styles of buildings has attracted global attention [3]. The technique of externalization is the implementation of an internal round financial system in more than one linkages inclusive of oil exploration, exploitation, Transportation, oil Manufacturing, oil intake, and so forth. Also, this process ought to extend the scope and oil Engineering Services Size. Through this procedure, we can multiply the oil and fuel useful resource industry to build a garage enterprise Chain, the ability to extract resources Upgrade, review prices of the era of reductionist, untouched exploration Selling growth, lessen the environmental impact Study Areas, and Active R&D sales. The method of increasing value brought products. Exploitation and Refinement our oil and fuel Research career should be completer upon technological know-how and era to unfastened itself from quantitative enlargement at a low technological degree, increase the utilization efficiency of mineral resources, and decrease the level of intake as a result of monetary boom. Exploitation: growing an industry chain approach for mining oil and gasoline resources; Strengthening aid era development and innovation strategy, developing method for strength performance development and finishing help system of round economic system [4]. Alternative sources of power are constantly converting. In fact, the application and RES and other environment Energy friendly development technology in the nation, alternate technical information with KACST scientists on ideas of sun Radiation measurements, instruments, social Activities,

information is excellent Assessment and Control, Solar Radiation modeling. [5] to expand a solar radiation atlas for the kingdom. Alternative electricity sources. We have determined to ignore the numerous benefits, benefits and herbal and this kind of environmentally friendly Energy houses and damaging, environmentally friendly energy Exploit, transform and exploit have chosen to engage ring [6]. Alternative and renewable strength assets have visible a big increase in the previous few years because of each their demand and higher costs, so they are now available now not simplest for industrial use but also for small families and standard purchasers [7]. The at moment, renewable strength technologies aren't considered completely mature and the diverse machine components are nevertheless pricey. Exploitation capacity per unit of time. Furthermore, the geographical distribution of RES electricity does no longer continually correspond to water pressure depth at the nearby stage. Exploitation, high fee and troubles related to using membranes in desalination packages have hindered the development of business merchandise [8]. Subsea exploitation capability. Furthermore, fracture length has an extensive effect, while fracture width has no obvious effect on NGH stress extraction overall performance. The quantity of fractures also significantly affects NGH extraction efficiency. With the increase in the number of fractures, the NGH depressurization exploitation performance can be progressed and the gasoline manufacturing fee also can be elevated in reducing amplitude. In addition, fracture spacing significantly affects NGH uptake capacity [9]. In the aforementioned cavitation processes, acoustics cavitation and hydrodynamic cavitation They have great potential for commercial exploitation in general, acoustic cavitation is used to carry out organic reactions is used. Since liquids are inelastic A continuum of abstract and rarefied activity Cycles are the equilibrium of individual molecules within the solution Translation does not lead to motion, which Increases the rate of transport processes. [10]. For energy-assisted desalination plants Proper exploitation of alternative energy on a larger scale Unexplored, thus in less studied cases One is steam for exploitation Regarding the use of rotation, to be properly connected to a desalination plant in electricity or shaft work [11]. Exploitation of Alternative Energy – Development and utilization of natural energy resources. Energy is available. Renewable energy sector includes power generation, directly related to energy production and consumption depending on natural resources that can be controlled by man. NPV (106 GDR) of different sizes or of different periods Compared to investments, the NPV is lower Important because NPV is a dollar amount Revealed, and the more you Investing or more time The more you invest, the higher the NPV. If you find that you're not fully qualified for the jobs you're applying for, whether it's skills or education — or both — that could be a reason you're not getting the job. Employers often won't hire someone who doesn't have most of the skills, education, or work experience needed for the job. Energy use (1012 cal/year) Annual global energy consumption is 580 million Rated interajoules. It is 580 million trillion joules or approx. 13865 million tonnes of oil equivalent. (mtoe). A risk index is a cumulative risk assessment will end. All indicators and symbols in the calculation of risk index can be used. This is probability and is a combination of influence index. Probability: Probability index shows the probability of a risk event.

3. TOPSIS

TOPSIS method of ranking evaluated based on enhanced ambiguity comparison with weighted average. One of the typical approaches Multiple response in the process used in TOPSIS to improve problems, reduce uncertainty determining the weight of each response and manageable at the same time A global approach continuously [12]. The TOPSIS process is an advanced and simple ranking engine used. The state-of-the-art TOPSIS technique tries to simultaneously choose alternatives with very short of the best-correct solution far and far from the worst-case-scenario solution. A better superior response increases the benefit criteria and lowers the price criterion, while a worse superior response raises the price Criterion and Advantage Reduces criteria TOPSIS makes full use of the attribute records [13]. TOPSIS method, two fuzzy Member Respectively Activities and a census sheet. of this title Basic attributes of FMCDM Motivations for use, open challenges and constraints to its use, and recommendations for researchers to increase FMCDM acceptance and use [14]. Topsis is another mead because of its characteristics More effective than heuristics Fewer parameters, more stability multiple response values when the value changes contain The TOPSIS algorithm was developed [15]. TOPSIS rankings are given by five distance measurements, different Random problems of sizes are created are calculated in the numerical example. We conduct a comprehensive comparative study of preference ranking orders, including consistency ratio, odds ratio of best alternatives, and mean Spearman correlation coefficients. Finally, the Spearman Correlation The number of alternatives over the mean of the coefficients Number and distance of attributes The second is to realize the influence of measurements Row regression will be implemented. "Proximity to ideal" is developed by compromise programming system. It is the "majority" and the minimum Provides maximum "group utility" for the individual grievance to "opponent". TOPSIS method for ideal solution Short range and negative-optimal Determines the solution with these distances Not considered significant [16]. The Topsis (of the optimal solution Order by unity technique for option) technique offered to indicate TOPSIS, a multi-criteria technique for identifying selected opportunity need to most from the grand perfect solution Shorter distances worse at best Stay away from the solution [17]. TOPSIS may also seem reasonable however it's far undoubtedly now not. One complaint is that the relative significance of the 2 separations is not considered, the hassle taken into consideration, and they amplify TOPSIS to solve the multi-goal selection-making (MODM) hassle. PIS Short distance from and NIS longest distance), then a "satisfiability condition" for each criteria is delivered, followed through max-min operator for those criteria Eliminate conflict between uses Ultimately "harmony is solution where the satisfaction [18]. TOPSIS (A Technique for Optimal Solution-like Regulatory Performance) is an effective. Perform analysis, comparisons and rating of options. Accordingly, appropriate Therefore, this take a look at will amplify TOPSIS to actual assignment-oriented group decision-making surroundings. A whole and efficient selection-making procedure is then supplied [19]. TOPSIS has been carried out. First, based on a big range of statistics and theoretical evaluation, the consequences of EW at the system of attribution in decision-making or assessment are analyzed. Then from the perspective of specific and bilateral stage selection-making or assessment effects, the consequences of EW on TOPSIS are similarly analyzed. E-TOPSIS is used to regulate the function of EW in selection-making or assessment [20].

4. Analysis and Discussion

Table 1 - Alternative Energy Exploitation

	NPV (106 GDR)	Jobs	Energy use (1012 cal/year)	Risk index
Alternative Energy Exploitation 1	31.08	139.53	29.15	22.05
Alternative Energy Exploitation 2	29.12	142.97	33.69	27.30
Alternative Energy Exploitation 3	24.08	122.58	29.18	23.10
Alternative Energy Exploitation 4	25.37	128.28	24.60	17.59
Alternative Energy Exploitation 5	33.33	186.41	27.96	18.89
Alternative Energy Exploitation 6	10	24	15	10

Table 1 shows the Alternative Energy Exploitation for Analysis using the TOPSIS Method. Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk index. Alternative Energy Exploitation 1, Alternative Energy Exploitation 2, Alternative Energy Exploitation 3, Alternative Energy Exploitation 4, Alternative Energy Exploitation 5, Alternative Energy Exploitation 6

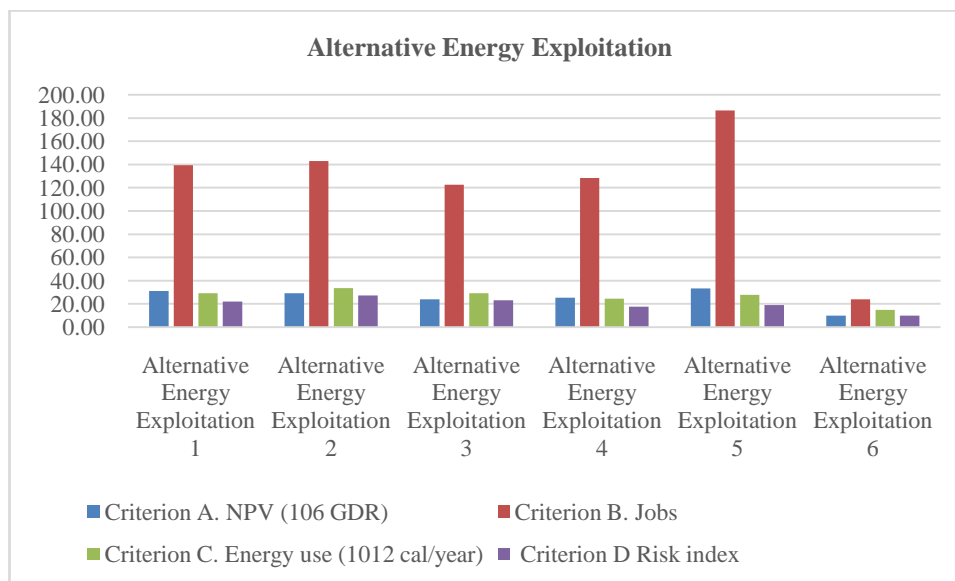


Figure 1 - Alternative Energy Exploitation

Figure 1. Shows Operating System like Alternative Energy Exploitation 1, Alternative Energy Exploitation 2, Alternative Energy Exploitation 3, Alternative Energy Exploitation 4, Alternative Energy Exploitation 5, Alternative Energy Exploitation 6. From the figure 1 and table 1 it is seen that Alternative Energy Exploitation 5 is showing the Highest Value for Criterion A. NPV (106 GDR) and Alternative Energy Exploitation 6 is showing the lowest value. Alternative Energy Exploitation 5 is showing the Highest Value for Criterion B. Jobs and Alternative Energy Exploitation 6 is showing the Lower value. Alternative Energy Exploitation 2 is showing the Highest Value for Criterion C. Energy use (1012 cal/year) and Alternative Energy Exploitation 6 is showing the lowest value. Alternative Energy Exploitation 2 is showing the Highest Value for Criterion D Risk index and Alternative Energy Exploitation 6 is showing the lowest value.

$$X_{n1} = \frac{X1}{\sqrt{((X1)^2 + (X2)^2 + (X3)^2 \dots)}} \quad (1).$$

Table 2. Normalized Data

NPV (106 GDR)	Jobs	Energy use (1012 cal/year)	Risk index
0.4768	0.4271	0.4371	0.4383
0.4468	0.4377	0.5051	0.5426
0.3694	0.3752	0.4375	0.4591
0.3892	0.3927	0.3688	0.3496
0.5114	0.5706	0.4192	0.3755
0.1534	0.0735	0.2249	0.1988

Table 2 shows the various Normalized Data for Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk index. Normalized value is obtained by using the formula (1). Table 3 shows Weightages used for the analysis. We taken same weights for all the parameters for the analysis.

Table 3 - Weightages

Weightages			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

$$X_{wnormal1} = X_{n1} \times w_1 \tag{2.}$$

Table 4 -Weighted normalized decision matrix

	Weighted normalized decision matrix			
Alternative Energy Exploitation 1	0.1192	0.1068	0.1093	0.1096
Alternative Energy Exploitation 2	0.1117	0.1094	0.1263	0.1357
Alternative Energy Exploitation 3	0.0924	0.0938	0.1094	0.1148
Alternative Energy Exploitation 4	0.0973	0.0982	0.0922	0.0874
Alternative Energy Exploitation 5	0.1278	0.1427	0.1048	0.0939
Alternative Energy Exploitation 6	0.0384	0.0184	0.0562	0.0497

Table 4 shows weighted normalized decision matrix for Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk index. To figure out the weighted normalized decision matrix, we used the formula (2).

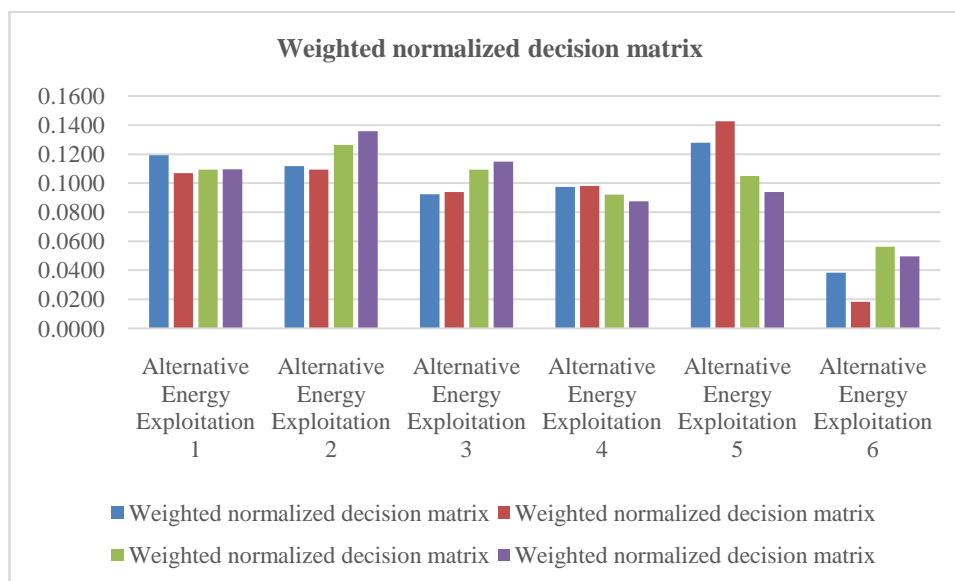


Figure 2 - Weighted Normalized Decision Matrix

Figure 2 shows weighted normalized decision matrix for Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk index. To figure out the weighted normalized decision matrix, we used the formula (2).

Table 5 - Positive and Negative Matrix

Positive Matrix				Negative matrix			
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357
0.1278	0.1427	0.0562	0.0497	0.0384	0.0184	0.1263	0.1357

Table 5 shows Positive and Negative Matrix for Alternative Energy Exploitation 1, Alternative Energy Exploitation 2, Alternative Energy Exploitation 3, Alternative Energy Exploitation 4, Alternative Energy Exploitation 5, Alternative Energy Exploitation 6. In various Positive Matrix in Maximum value 0.1278, 0.1427, 0.1506, Minimum value 0.0562, 0.0497 is taken and for Negative matrix the Minimum value 0.0384, 0.0184, 0.0664 and Maximum value 0.1263, 0.1357 is taken.

Table 6 - Final Result of Alternative Energy Exploitation

	SI Plus	Si Negative	Ci	Rank
Alternative Energy Exploitation 1	0.0881	0.1238	0.5842	3
Alternative Energy Exploitation 2	0.1169	0.1169	0.5000	4
Alternative Energy Exploitation 3	0.1035	0.0966	0.4828	5
Alternative Energy Exploitation 4	0.0750	0.1155	0.6062	2
Alternative Energy Exploitation 5	0.0657	0.1602	0.7093	1
Alternative Energy Exploitation 6	0.1532	0.1109	0.4200	6

Table 6 shows the final result of TOPSIS for Alternative Energy Exploitation. Figure 3 shows the TOPSIS Analysis Result of Alternative Energy Exploitation. In Table 6, Si positive is calculated using the formula (3). From figure 3, In Si positive, Alternative Energy Exploitation 6 is having is Higher Value and Alternative Energy Exploitation 5 is having Lower value. Si Negative is calculated using the formula (4). In Si Negative, Alternative Energy Exploitation 5 is having is Higher Value and Alternative Energy Exploitation 3 is having Lower value. Ci is calculated using the formula (5). In Ci, Alternative Energy Exploitation 5 is having is Higher Value and Alternative Energy Exploitation 6 is having Lower value.

$$X_{si+1} = \sqrt{((X_{wn1} - X_{p1})^2 + (Y_{wn1} - Y_{p1})^2 + (Z_{wn1} - Z_{p1})^2)} \tag{3}$$

$$X_{si-1} = \sqrt{((X_{wn1} - X_{n1})^2 + (Y_{wn1} - Y_{n1})^2 + (Z_{wn1} - Z_{n1})^2)} \tag{4}$$

$$X_{ci1} = \frac{X_{si-1}}{(X_{si+1}) + (X_{s(i-1)})} \tag{5}$$

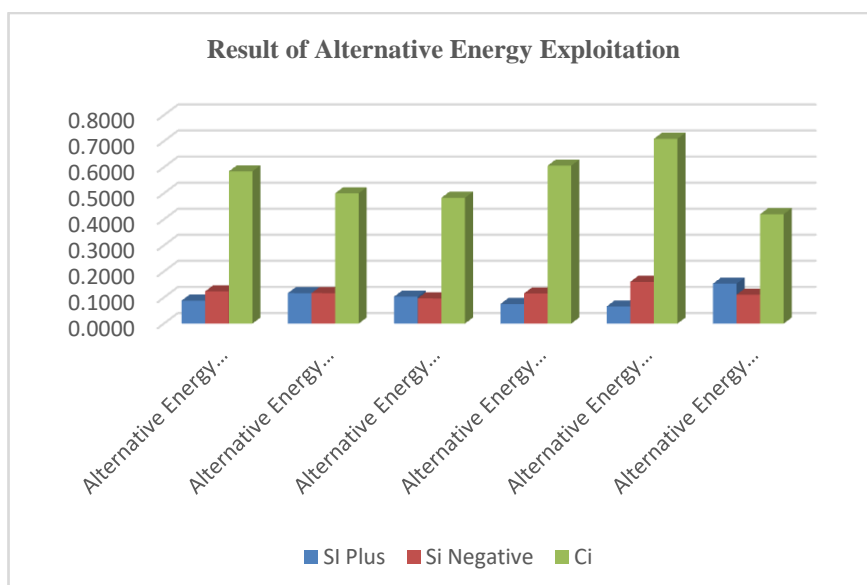


Figure 3 - Result of Alternative Energy Exploitation

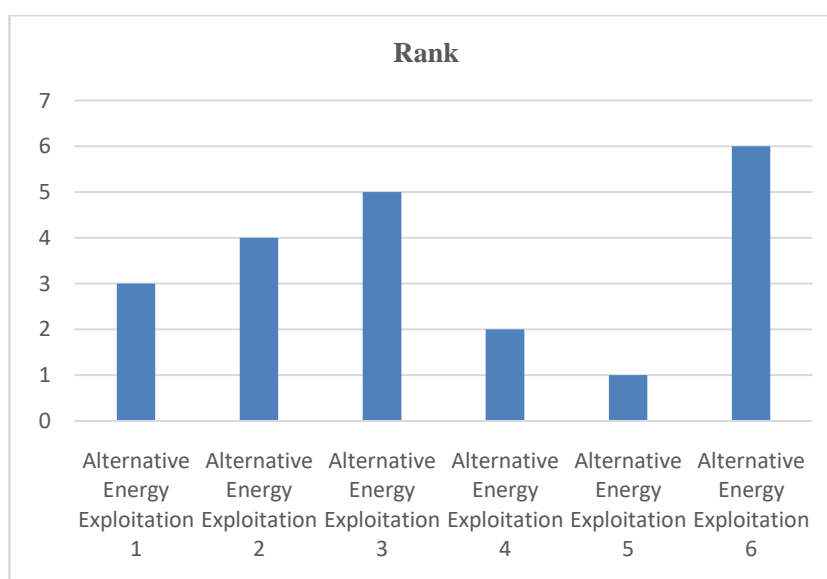


Figure 4 – Shown the Rank

Figure 4 Shows the Ranking of Alternative Energy Exploitation. Alternative Energy Exploitation 5 is got the first rank whereas is the Alternative Energy Exploitation 6 is having the Lowest rank.

5. Conclusion

Alternative energy exploitation projects of low temperature geothermal field. It has been demonstrated that this approach is more realistic and produces more reliable rankings for problems such as the evaluation of alternative energy exploitation scenarios where the input data are not well defined. TOPSIS method of ranking evaluated based on enhanced ambiguity comparison with weighted average. One of the typical approaches Multiple response in the process used in TOPSIS to improve problems, reduce uncertainty determining the weight of each response and manageable at the same time A global approach continuously the TOPSIS process is an advanced and simple ranking engine used. The state-of-the-art TOPSIS technique tries to simultaneously choose alternatives with very short of the best-correct solution far and in the worst case scenario A solution is far from over. Topsis (Technique for Order of Preference by Similarity to Ideal Solution) analysis using the Alternative Energy Exploitation 1, Alternative Energy Exploitation 2, Alternative Energy Exploitation 3, Alternative Energy Exploitation 4, Alternative Energy Exploitation 5, Alternative Energy Exploitation 6 Alternative value and Criterion A. NPV (106 GDR), Criterion B. Jobs, Criterion C. Energy use (1012 cal/year), Criterion D Risk Index Evaluation Parameters in value. Alternative Energy Exploitation 5 is got the first rank whereas is the Alternative Energy Exploitation 6 is having the Lowest rank

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