

An Assessment on Renewable Power Sources Using the VIKOR Method

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Abstract: Renewable energy is Obtained from natural sources is energy, more than they consume are filled in proportion. For example, Like sunlight and wind Resources are constantly being replenished. Renewable energy sources There are plenty around us. Renewable energy, Within a relatively short period of time Generated by replenishable sources. Sunlight, Air, water, biomass and all Geothermal renewable energy proofs. Green energy, energy Just as renewable, more Having environmental benefits is a subset of sources. The VIKOR method is multi-criteria Decision Making (MCDM) or Multiple criteria The result is the analytical method. Contradictory and harmonious (different units) with scales To solve decision-making problems First by Seraphim Obrykovic Created, conciliation to resolve conflict Assuming it is acceptable The decision maker is highly idealistic Wants a closer solution, too All installed According to criteria Evaluation of alternatives are done As a result, public recognition obtained first rank, At the same time employment generation Low grade. From the result it is seen that Public acceptance has got the first rank whereas is the Employment creation has the lowest rank.

Keywords: Hydropower, Solar thermal power, Wind power, Biomass power and MCDM.

1. INTRODUCTION

Renewable energy is Obtained from natural sources is energy, more than they consume are filled in proportion. For example, Like sunlight and wind Resources are constantly being replenished. Renewable energy sources Abundant around us There are Fossil fuels coal, Oil and gas On the other hand, non-renewable Resources, they are in billions develop It takes years. fossil fuels, To produce energy When burned, carbon dioxide Harm such as oxides The resulting greenhouse gas causes emission. Generating renewable energy Burning of fossil fuels Much lower emissions than creates. Currently in emissions A lion's share of fossils Renewable from fossil fuels Energy transitions address the climate crisis Important in judging. Most Renewables in countries now Cheaper, more fossilized Three times that of fuels Create more jobs. Renewable energy is reliable Electricity and fuel It provides diversification Improves energy conservation and imported while reducing the need for fuels Reduces the risk of fuel spillage. Renewable energy is the nature of the country. It also helps conserve resources.

2. RENEWABLE POWER

Renewable power generation, Exchange and Distribution, Storage and security are with stable environment Build a smart grid. The main purpose of the book, the big one of scale renewable power generation Appropriately, this is growing The technology sector is stable Able to transform the world It means showing the role. Big Scaled distributed renewables Protection of Power Systems Problems, one-way electricity Current protection for flow Differently compared to the system Because there will be, renewable This book is new to generators Provides security technology [1]. Electric-gas process By renewable energy becomes more economical. renewable An efficient level of energy With electricity-gas facility Binding hybrid energy From an investor's perspective Find this alternative here Let's explore. will occur Increase in electricity prices and Low and medium Renewable Power Generation Capacity get through Update in real time [2]. In the previous section, various A reviews of forecasting techniques is provided. In those jobs For the most part, renewable energy and accuracy of resource forecasts Based on error codes Only evaluated. predictive power For management strategies, renewables The importance of energy projections is a As described in the review, the same Accuracy of RE resources in time Economic dispatch with forecast To become more efficient can Renewable energy Forecasting is due to uncertain information Can have a significant impact In aspects of power system planning He is reviewed from [3]. Greater renewable energy capacity Of all countries, China in 2009 Recorded.

226 GW of that is in the US 144 MW and Japan's 56 GW surpassed. In fact, 1230 GW of the world in total renewable energy capacity China contributes approximately 20% Just consider, China Non-hydro renewables GW) for Germany 39 GW and USA 49 GW. It is in third place behind. It is expected that in 2020 1600 GW A third of the total power capacity of will be a share (Official for 2020 Development Goals In 2007 The total installed capacity is 362 GW Renewable energy efficiency [4]. Renewable power generation Opportunities for Diffusion of Technologies. Average wholesale of electricity and input fuel through stochastic processes for prices Price uncertainty is introduced. Overall efficiency As investment costs increase In order to reduce, renewable electricity Learning for manufacturing technologies We integrate curve information [5]. P2X technology and products Acceptance of fossil fuels Effective displacement of demand Doing so, to the global economy Transport, Agriculture and Manufacturing etc. will contribute a lot In other energy consuming sectors To integrate renewable energy Also helps. Renewable energy Hydrogen and its economics Important in their possibilities will play a role. The following In sections, different P2X technologies Overview and challenges Present and cost We discuss ways of reduction [6]. With renewable power generation Common power supply with Structure of the organization. It is Different types of electricity manufacturing units and Different types of loads contains wind and sunlight Renewable sources like Residential users and small To generate electricity for industries is used For voltage conversion AC/AC and DC/AC standard PWM converters and for long-term energy savings Battery banks are of two types Also uses the products of These converters are wind and sunlight From the maximum power point Monitoring to extract maximum potential [7]. On-grid of renewable energy When the ratio 0.1, the planned installed capacity can be fully implemented. We will use this in the version when the on-grid charge of renewable energy is zero.15 above. Potential to use wind power; In 2020, the wind power generation capacity increases from one lakh MW to 169000 MW. However, the on-grid rate of renewable energy is also zero. 2 If better, not only wind power capacity but also solar and biomass power capacity should be added. utilized. 2009 to 2020 of the three sources of renewable energy Cost of optimal growth paths To analyze in a minimal way Renewable Energy Optimization Model (ROOM) [8]. Rising emissions and Increasingly volatile Due to Oil costs, both large-scale and small-scale renewable energy technology, may be key components of the electric-powered rule. Electricity markets have been in a liberalizing fashion over the past decade, which has created exchanges for spot buying and selling and financing markets. Electricity market liberalization and for small scale electrical appliances Driven by cost improvements, the future The power system is among the end users Involves significant production. This change is for electricity customers A market for productivity Based assessment and conclusion Increases demand for support tools. With uncertain future electricity prices Decentralized renewable energy Optimum investment strategies in manufacturing The following presents a method for detection [9]. Solar photovoltaic, focused Solar strength, wind power, biomass and Five renewables are geothermal To verify strength generation sources of the analytic hierarchy procedure Basically multi-criteria We approach selection-making We endorse Criteria used Technological, socio-political, monetary and as environmental criteria Can be categorized. For Saudi Arabia A case look at is a massive oil Manufacturer and Global Offered as a supplier [10]. Intermittent renewable energy and presence of load heterogeneity. First, the ambient temperature constant while varying For uncontrolled set point temperature We simulate the system, then For simulations, lognormal Executing. of this section Restore system parameters from package By sampling, 1000 TCL units' Inclusive diversity We construct a Monte Carlo model with [11]. Renewable energy is CO2 To reduce emissions and therefore Earth A to reduce overheating It is promising technology. Next few Within decades, mainly coherent Current supplied by generators Power systems step by step A structure in generation portfolios See the change and eventually 100% For renewable energy system (RPS) may change. Large asynchronous For RPS with renewable generation, Massive transmission improvements and Demand side management is also important However, the most basic and A challenging problem is the power supply [12]. Development of renewable energy By relative technological maturity Controlled, technological diffusion Effect of renewable energy Development for national economy To meet the requirement of the project want The above factors Consider, renewable energy Optimum of three main resources To examine developmental pathways, Renewable Energy Optimization We develop the model (RPOM). Using HOMER software Fuel cell power generation System Electrolyzer Hydrogen Tank fuel cell renewable energy Hybrid power systems with Non-renewable energy sources Emissions due to use significantly reduced [13]. Special focus on Malaysia first Unique in the paying world Application HRES for applications A comprehensive overview of the Second, the former in Malaysia to HRES by researchers According to the recommended composition, a hybrid Renewable energy system in Malaysia To a village in Malaysia Designed and delivered [14].

3. VIKOR

The VIKOR method is weight stability of determining intervals Analysis and trading Along with trade-off analysis is extended. Extended VIKOR method Three-dimensional decision-making Compared with methods: TOPSIS, PROMETHEE AND ELECTRE. A numerical example Application of VIKOR method explains, and four more are considered explains, and four more are considered The results of the methods are compared. VIKOR Methodology for MCDM problems Contrast and compare different units Created to solve with criteria, Conciliation is about conflict

resolution deeming it acceptable, The decision maker is highly idealistic prefers a closer solution, Further alternatives are being evaluated. All established criteria [1]. New version of VIKOR method, All kinds of criteria It insists on a compromise solution, which is this is proposed in the paper. VIKOR's Proposed comprehensive version, traditional VIKOR's main flaw is simple Coping with attitude. recommended The method has a variety of applications Accuracy of material selection results Can be improved, especially biomedical Implants in use are human properties similar to those of tissues to have recommended To explain and justify the method Five examples are included [2]. The VIKOR method is presented in the next section. In Section 3, the extended VIKOR method introduced and of the decision maker's confidence level Basically for interval ranking A new method is proposed. In section 4, extended VIKOR A to show the application of the method. An illustrative example is provided. VIKOR The method is an implementation within the MCDM problem Introduced as a matching technique, And its different units that don't match A unique decision-making problem Multi-attribute decision making to solve duly formed [3]. Type of decision problem and Depending on the need of the decision maker, Apart from the VIKOR method, comprehensive VIKOR, modified VIKOR and Various such as interval VIKOR methods Genres have also been developed later. In this paper, the original VIKOR method ranking performance and its Five categories are two demonstration examples are basically analyzed. Interval VIKOR method satisfactorily Failure to act will result in a decision Even when the information at issue is imprecise, Fuzzy VIKOR method is preferred want But for any decision problem, The original VIKOR is relational mathematics without unnecessarily complicating the calculations The best method of solution [4]. Municipal solid waste in ambiguous environment VIKOR for Selection of Placement in Management method. City Logistics Concept Fuzzy DEMATEL, fuzzy ANP for selection and combining fuzzy VIKOR A novel hybrid MCDM Created the model. Ambiguous VIKOR and uses AHP methods Customer satisfaction skills Basically Dincer and Hacioglu Performance of banks in Turkey evaluated. Vinod et al. The changing needs of customers Ambiguous VIKOR to complement Appropriate using the method Concept in context deals with design choice [5]. Until now, VIKOR is legit Post-earthquake stable reconstruction, mountain target selection, Choice of alternative bus fuel systems, Alternative hydropower system evaluation, Financial performance evaluation and Widespread in various fields like many others is used. Classical VIKOR, whose formality is unclear interval value VIKOR, Intuitive Ambiguous VIKOR, Interval VIKOR is a value intuition ambiguous and hesitantly vague In various forms like VIKOR is extended. with conflicting criteria, the VIKOR method for dealing with MCDM problems That is very powerful As observed, in this thesis is used. Classical VIKOR Covering the basic concept of Reluctant Ambiguous Linguistics VIKOR's extended within circumstances We are motivated to explore form [6]. Deciding with interval number VIKOR method for problems. Ranking of the extended VIKOR method By comparing interval no's is obtained and for intervals For intercomparisons, of the decision maker in this paper We introduce v as the confidence level. Sanaye et al. Distribution A supplier in a chain structure Ambiguity to deal with selection problems Synthesis theory and VIKOR A hierarchy based on method proposed the MCDM model. unclear Selection criteria using VIKOR method Best alternative under each and Rationale for developing a compromise solution And the formal process Sen and presented by Wang. of the study Multiple criteria for finding ambiguity For solving decision problems Gives an important hint [7]. The VIKOR method is conflicting or Many with mismatched criteria Criterion Decision Making (MCDM) Created to solve problems. That compromise is acceptable for conflict resolution. This method assumes that. VIKOR method In multi-criteria analysis (MCA). A popular method used However, MCDM problems There are some problems with solving. This study In traditional VIKOR mode Discussed the problems. of this study The objective is to solve problems by the traditional VIKOR method Solving numerical problems A modified VIKOR method to avoid is to create. Modified in MCA Improvement of Solvency of VIKOR Method Many artificial experiments to verify were designed and evaluated [8]. The proposed VIKOR method, The extreme of a set of criterion weights The exact or the conversion of points Multiply by spacing effects Integral of alternatives calculated by Alternatives using marks sorting. Also, VIKOR and under uncertainty (DMUU) methods We provide insights on In particular, some of the VIKOR method As a DMUU approach under conditions As you can see, it will make other decisions Adapt to circumstances [9].

4. ANALYSIS AND DISCUSSION

Hydropower is seen that Reliability is showing the highest value for Social benefits is showing the lowest value. Solar thermal power it is seen that Efficiency is showing the highest value for Maturity is showing the lowest value. Wind power it is seen that Efficiency is showing the highest value for Market maturity is showing the lowest value. Biomass power it is seen that Efficiency is showing the highest value for Market maturity is showing the lowest value.

TABLE 1. Determination of best and worst value

	Hydropower	Solar thermal power	Wind power	Biomass power
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Electricity Cost	0.24	0.95	0.75	0.23
Market maturity	0.32	0.81	0.67	0.11
Capital Cost	0.19	0.79	0.93	0.27
Employment creation	0.25	0.93	0.72	0.14
Public acceptance	0.37	0.66	0.86	0.26
Social benefits	0.16	0.72	0.81	0.31
Maturity	0.21	0.65	0.72	0.24
Reliability	0.41	0.81	0.86	0.16
Efficiency	0.36	0.99	0.95	0.36
Best	0.16	0.99	0.95	0.11
worst	0.41	0.65	0.67	0.36

Table 1 shows the Determination of best and worst value Hydropower, Solar thermal power, wind power, Biomass power. Electricity Cost, market maturity, Capital cost, Employment creation, Public acceptance, social benefits, Maturity, Reliability, Efficiency.

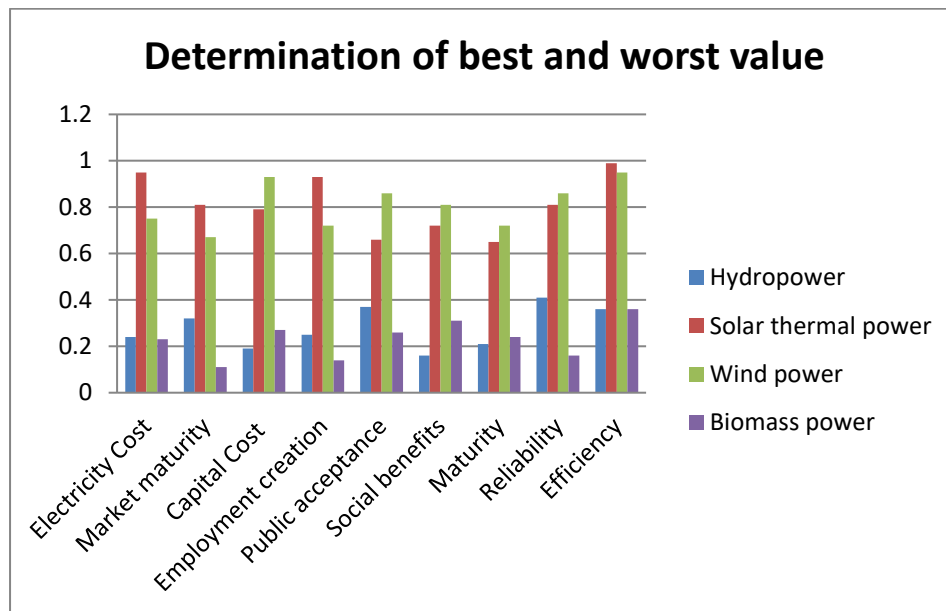


FIGURE 1 Determination of best and worst value

Figure 1 shows the graphical representation Determination of best and worst value Hydropower, Solar thermal power, wind power, Biomass power. Electricity Cost, market maturity, Capital cost, Employment creation, Public acceptance, social benefits, Maturity, Reliability, Efficiency. Efficiency is showing the highest value is showing the Market maturity is showing the lowest value.

TABLE 2. Normalization S_j and R_j

Calculation S _j and R _j					
				S _j	R _j
0.08	0.029412	0.178571	0.12	0.407983	0.178571
0.16	0.132353	0.25	0	0.542353	0.25
0.03	0.147059	0.017857	0.16	0.354916	0.16
0.09	0.044118	0.205357	0.03	0.369475	0.205357
0.21	0.242647	0.080357	0.15	0.683004	0.242647
0	0.198529	0.125	0.2	0.523529	0.2
0.05	0.25	0.205357	0.13	0.635357	0.25
0.25	0.132353	0.080357	0.05	0.51271	0.25
0.2	0	0	0.25	0.45	0.25

Table 2 shows the calculation S_j and R_j is the sum of Normalization of the tabulation 1 which is calculated from The Determination of best and worst value.

$$S_j = \sum_{i=1}^m \frac{f_i^+ - f_{ij}}{f_i^+ - f_i^-} * W_i$$

$$R_j = \text{Max}[w_i * (\frac{f_i^+ - f_{ij}}{f_i^+ - f_i^-})]$$

TABLE 3. Calculation Qj

Calculation Qj			
	Sj	Rj	Qj
	0.706555	0.407983	0.188901
	0.792353	0.542353	0.484794
	0.674916	0.354916	0.074428
	0.604832	0.369475	0.022187
	1.075651	0.683004	1
	0.923529	0.523529	0.595413
	1.015357	0.635357	0.863356
	0.81271	0.51271	0.461237
	0.95	0.45	0.511467
S+ R+	0.604832	0.354916	
S- R-	1.075651	0.683004	

Table 3 shows the Calculation Qj calculated from the sum of the calculation from the Sj and Rj from the Qj value.

$$Q_j = v * \frac{(S_j - S^+)}{(S^- - S^+)} + (1 - v) * \frac{(R_j - R^+)}{(R^- - R^+)}$$

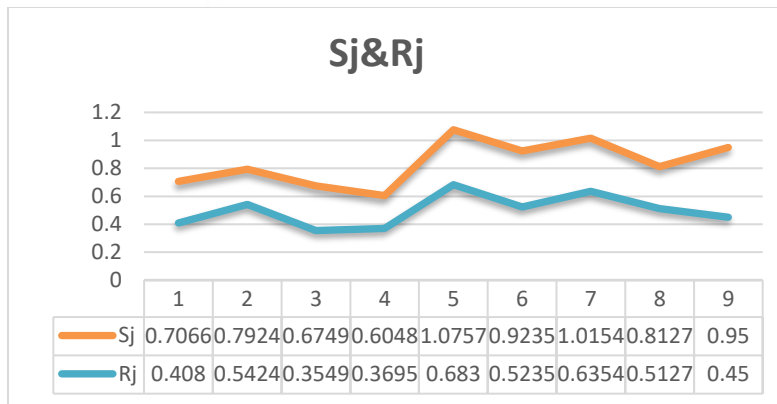


FIGURE 2. Sj & Rj

Figure 2 shows the graphical representation Sj & Rj value.

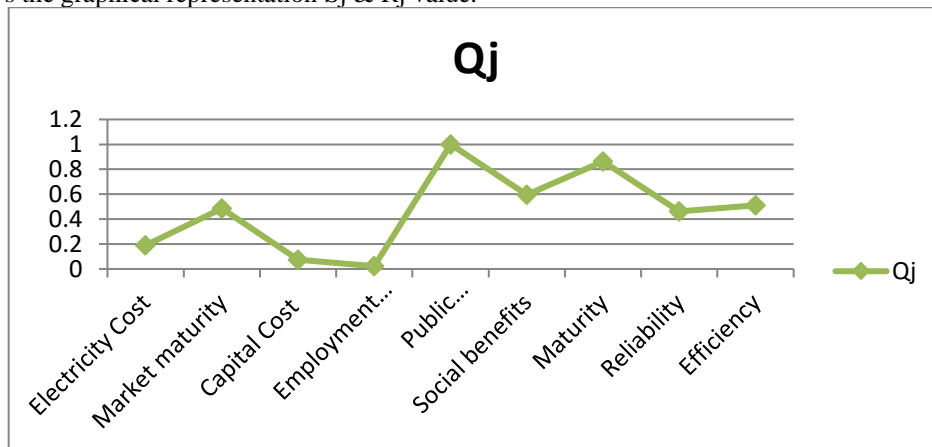


FIGURE 3. Qj

Figure 3 shows the graphical representation Qj value it is seen that Public acceptance is showing the highest value for Employment creation is showing the lowest value.

TABLE 4. Rank

	Rank
Electricity Cost	7
Market maturity	5
Capital Cost	8
Employment creation	9
Public acceptance	1
Social benefits	3
Maturity	2
Reliability	6
Efficiency	4

Table 4 shows the Rank the Electricity Cost is in 7th rank, the Market maturity is in 5th rank, the Capital Cost 4 is in 8th rank, the Employment creation is in 9th rank and the Public acceptance is in 1st rank, Social benefits is in 3rd rank, Maturity is in 2nd rank, Reliability is in 6th rank, Efficiency is in 4th rank. The final result is done by using the VIKOR method.

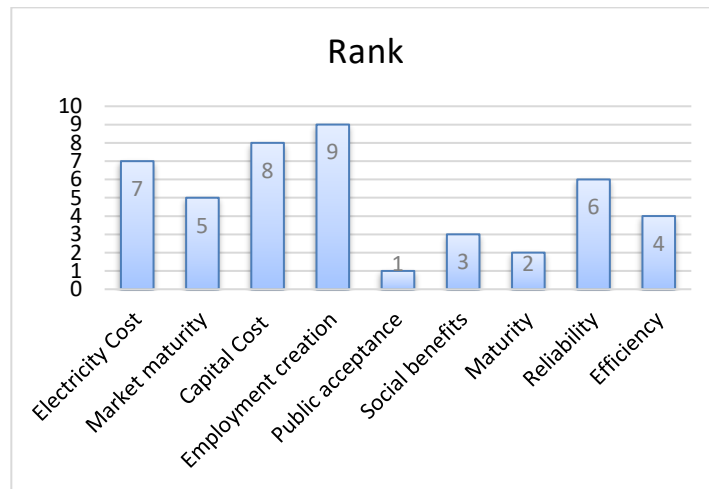


FIGURE 3. Rank

Figure 3 shows the graphical view of the final result of this paper the Electricity Cost is in 7th rank, the Market maturity is in 5th rank, the Capital Cost 4 is in 8th rank, the Employment creation is in 9th rank and the Public acceptance is in 1st rank, Social benefits is in 3rd rank, Maturity is in 2nd rank, Reliability is in 6th rank, Efficiency is in 4th rank. The final result is done by using the VIKOR method.

5. CONCLUSION

Renewable power generation, Exchange and Distribution, Storage and security are with stable environment Build a smart grid. Renewable energy, Within a relatively short period of time Generated by replenishable sources. Sunlight, Air, water, biomass and all Geothermal renewable energy proofs. Green energy, energy Just as renewable, more Having environmental benefits is a subset of sources. The VIKOR method is multi-criteria Decision Making (MCDM) or Multiple criteria The result is the analytical method. Contradictory and harmonious (different units) with scales To solve decision-making problems First by Seraphim Obrykovic Created, conciliation to resolve conflict Assuming it is acceptable The decision maker is highly idealistic Wants a closer solution, too All installed According to criteria Evaluation of alternatives are done. From the result it is seen that Public acceptance is got the first rank whereas is the Employment creation is having the lowest rank.

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