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Wind Powered Hydrogen Refueling Station for Some Selected Cities of South Africa Using VIKOR method

***Chinnasami Sivaji, M. Ramachandran, Vimala Saravanan, Chandrasekar Raja**

REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.

*Corresponding Author Email: chinnasami@restlabs.in

Abstract: *air-generated electricity to produce hydrogen power from water electrolysis can, this can make vehicles that can be used as fuel, or saved and then used in fuel cells, they are fewer air resources at the times of the day that generates electricity. Hydrogen as energy storage media offers an alternative path, this is a renewable power product not only helps to integrate, transport, and nature decarbonization of gas sectors activates. Water hydrogen and oxygen electricity can be used to separate. This technology is well developed and available commercially, and effectively renewable power useable systems, air, geothermal, or solar are created. Renewable and grid hydrogen from electricity electrolysis to produce learn more about using. Air-generated electricity water to produce hydrogen power supply of electrolysis can, this can make vehicles can be used as fuel, or saved and then fuel used in cells, they are less air resources at the times of the day generates electricity. Hydrogen from the air electrolysis to produce learn more about using. mechanical power or electricity in the air is used to create wind power in the process or describe wind energy. Wind turbines in the air operate energy as a mechanical force change. For motorists, the final distribution of hydrogen refueling stations occurs. Hydrogen fuel cell vehicles (FCVS) gas use hydrogen in form, usually 350 or 700 bar provided in pressures. Like diesel or gasoline-distributing vehicle fuels regular station pumps fill in ways similar to tubes consumers from stimulation back their vehicles offer. Hydrogen in the form of gas or liquid saved, pipelines or through truck trailers gh2 and road tankers lh2 has been provided via. On-site at large stations production facilities can also be fitted. In refueling stations, acceptance of h2 distributions or saving liquid hydrogen additional capital and operating does costs because f.c.hydrogen for vs for sale to customers the gas must be converted into shape. The transport sector is high carbon in the fields of producing emissions considered together. Fossils because of the use of fuels globally. Hydrogen is a toxic non-energy carrier; this is for fossil fuels may act as a good alternative. The use of hydrogen vehicles reduces carbon emissions help, thereby greenhouse gases and the environment reducing pollution. From renewable energy sources, hydrogen is made, and hydrogen from refueling stations easily through a wide network is accessible and often can be achieved. In this study of south africa wind-powered in seven cities hydrogen refueling technology to the station economic evaluation was made.: VIKOR method is a multi-criteria decision (mcdm) or multiple criteria results analysis method. Contradical and incomparable (different units) with criteria this is to address decision issues first seraphim obrikovic created by, compromise for conflict resolution assuming acceptable, the decision maker is very much for ideal he wants a solution close, all that is installed alternative ways according to criteria are evaluated. Vikor sorting alternatives and the solution of compromise determines, this is for ideal very close. Alternative taken as Wind Turbine (Nos), Battery (Nos), Electrolyser (kW), Hydrogen tank (kg), Converter (kW), Renewable energy fraction (%), Annual Hydrogen production (ton/yr). Evaluation preference taken as Johannesburg, Pretoria, Cape Town, Bloemfontein, Durban, Port Elizabeth, Rhodes. From the result it is seen that Dams is got the first rank where as is the building is having the lowest rank. Dams is ranked first and industrial Building is ranked lowest.*

Keywords: *construction materials, building, Bridges, Dams.*

1. INTRODUCTION

Fossil fuels due to the user's worldwide production of high carbon emissions transportation in the performing sectors department are considered one. Hydrogen is non-toxic is the energy carrier, which is the energy carrier for fossil fuels and may act as a good alternative. Hydrogen vehicles use carbon emissions to help reduce, greenhouse gases and reduce environmental pollution. From renewable energy sources, hydrogen is produced, and hydrogen refueling a widespread network of stations when easily accessible by the way this can often be achieved. In this study, south africa wind-powered in seven cities hydrogen refueling technology to the station economic evaluation

was made [1]. Windmill for every city powered by energy resources hydrogen refueling the optimal configuration of the station determining, their economic viability and carbon emissions reduction determining is the purpose of this. Stations 25 every day fill hydrogen vehicles designed to do; each is 5 kg tank capacity contains. 6.34 $ / kg to 8.97 $ / kg hydrogen production up to in south africa at cost wind-powered hydrogen refueling station results are possible to show. Around the world other hydrogen production compared to costs these costs are competitive are class. South africa located on the coastal cities on the mainland compared to the cities located in air-powered-hydrogen fuel in sitting the filling station very promising. Hydrogen refueling stations' co2 and co emissions, respectively reduce 73.95 tons and 0.133 tons per year [2]. Increasing population and the quality of life desired globally lead to energy consumption two main factors. However, easily accessible that most of the energy sources fossil fuels are they assist greenhouse gas (ghg) emissions. These emissions are the whole world today the biggest environment facing is the environment challenging (climate change) because of this, it is the cause of mankind threatening existence. Transport fossil fuel the sector world uses a significant portion of gasoline, diesel harm sustaining gases leads to exhaust into the atmosphere [3]. Road traffic worldwide liquid fossil fuel consumption is half, and by 2050 that would be tripled as expected, so sustainability in this field needs alternatives. Emissions in ways to reduce one, the current high from carbonated fuels safe, efficient and as an environmentally friendly alternative used in transportation the type of fuel is to change. Hydrogen great alternative energy seems to be the carrier because the body of hydrogen and the chemical properties of fossil well fuels applies, by this close performance and flexibility provides size for fossil fuels [4]. Increasing oil prices, climate change, and energy global, such as security challenges that are renewable to promote energies have attracted a global opinion. In such circumstances, internally produced renewable hydrogen and electricity oil reduce imports and the transportation of a country the department can also be used as disarray and alternatives. Cheap and polluted in the position, renewable hydrogen fuel world the whole has attracted attention. Transporting fuel renewable hydrogen import to use country in made gasoline can reduce credibility, and more climate and energy-related sustainability help achieve goals [5]. Using wind energy renewable hydrogen many studies in production have been done. However, some of those studies are off-grid focused on applications, and some phases are connected they are leaning to applications. Used in those studies most methods are electric for a renewable homer model hybrid optimization model-based. Homer off-grid and grid-connected energy systems can be modeled. In addition, this is technical, economic, environmental, and related to sensitivity analysis provides detailed results [6]. In most studies, electricity and transport air for applications running hydrogen production homer to analyze facilities a wide range of results supplied was found. Windmill energy is a free and low-carbon source of energy, but it is some level fluctuations contain. Storage facility renewable hydrogen the option of air for production the fluctuation of wind energy possible to reduce can be considered alternatives. Also, renewable hydrogen electricity of stored form and to the transportation sectors can be used as fuel, and suitable air speed when not available. Accordingly, sweden's fossil in the transportation industry using fuel eliminated by 2030 [7]. Fuel with hydrogen begins with, its production, transportation, related to storage, and distribution many issues need to be resolved. Future hydrogen distribution planning of the chain and models for design and classification of approaches has been done, and has been done in this mathematical optimization methods include gis and evaluation programs decision support system. Great for hydrogen production to use scale installation, location of production sites several decisions will be made should be accepted and accepted technologies need to choose [8]. Installation from other sites site selection is many criteria m with. C.d.m issue. In the geographic information system, multiple criteria integration is its analysis energy that enhances strength contains. Solar energy wind energy or sites for hybrid systems to identify the fit there are many studies on this topic. This article is geographical information systems and many other criteria decision methods discussing the mix, this is a decision support model end support for creation creating a model of algeria in the future of attar province wind-powered hydrogen to the refueling station appropriate for restructuring to determine stations' regional size and filtration the technique is used [9]. For the production of hydrogen for existing fuel stations next up are the wind turbines to establish technical capability should. Fuel cell vehicle refueling and the existing local hydrogen for gas phases used. Buffer-using zones appropriate through gis evaluation fuel stations selected and structured areas, important infrastructures and for environmental networks next is the wind turbine risks associated with installation taken into account. In existing fuel stations 4.6% were found to be relevant. Also, weather station datasets, land card data hydrogen production using capacity evaluated, and future fuel cell electric as a vehicle demand protection revealed. 30% fcev for the drive train display, this is this station 2.3% of this requirement% it was found that i could be created. Finally, existing gas in the distribution phases and the proximity of the station case were examined [10]. Many countries are green hydrogen paths towards change reports that provide has been released. Australia first japan and california from europe to europe. Renewable energy resources air and solar green coming from power for the production of hydrogen, climate goals hydrogen for attainment refueling stations traffic through for use and that common to all paths there is vision. Estimated in ref several studies of governments and projects. [11]. Between 2030 and 2050 fuel cell electric vehicles (fcevs) in many circumstances would be cheaper one of them is refueling the size of the stations increased it is also pointed out that it is coming. In the netherlands, a hydrogen cabinet vision was recently announced, where hydrogen from refueling stations 50 stations by 2025 addressing the view. Green as a major

ingredient of carbon with hydrogen by 2050 the emission-free economy a path map with is published. The netherlands most of the northern part using industrial facilities, and the entire sector with hydrogen due to the massive increase this statement view is great cost reductions are in cost reductions. In addition, gas and electricity reports of transfer operators' e-gase capacity of the netherlands problems and hydrogen gas networks are more save the quantity the flexibility that can be provided by the way identifies energy [12]. For generating hydrogen one of the many modes, windmill electricity from turbines uses, “green” for the production of hydrogen feeding the electrode. Refueling within the administrative boundaries of the station contributes to hydrogen production because all systems exist, proximity and expansion potential due to elimination an interesting with cost reduction presents the case all wind turbine electricity because hydrogen is converted into fuel, with the existing power grid interconnection and interconnection refuel cars when the tanks are packed refueling uncertainty reduction of character and phase electricity will be used [13]. From a technical point of view, a large wind turbine “green” hydrogen production the large size that does connect to an inverter with an electrode and with a low-pressure compressor together with this system manufactured hydrogen pumping 200 bar storage buffer tanks. Hydrogen fueling the operating vehicle there is a possibility of filling ensure at all times a high pressure do compressor with local electric grid existing interconnected attached. This parallel structure hydrogen distribution of 900 wires attracts the buffer. Low saved in pressure tanks near excess hydrogen for urban or rural areas with pipe trailer traffic or if different types will be sold for requirements considered hydrogen gas to need the pipe will be network [14].

2. MATERIALS & METHODS

Alternative: Wind Turbine (Nos), Battery (Nos), Electrolyser (kW), Hydrogen tank (kg), Converter (kW), Renewable energy fraction (%), Annual Hydrogen production (ton/yr)

Wind turbine (nos): wind turbines are working on a simple policy. Like fan wind turbines to use electricity for air instead of creating electricity using the air. A turbine around the rotor blades like a propeller the air turns, which inspires the generator, it generates electricity. Airflow methods and speeds across the unitedstates are different, and they are water, plants, and landfill modified by the differences. Humans are this airflow or many of the operating energy they are used for purposes. Sailing, flying a kite and generating electricity. "air energy" and "air power" both the words are both mechanical to create power or electricity and describe the process in which the air is used. This machine is for tasks specific to power grinding grains or pumping water or a generator you can use specific tasks such as.

Battery (nos): the battery is an electrical device external to operate one with links or more e chemical cells the source of electric power. When the battery supplies electricity, its positive terminal cathode, and its negative terminal is the anode. The terminal is marked negatively as the source of electrons, it is the source of electrons via the outer electric circuit flowing to the positive terminal. With an external electric load when the battery is connected, a redox reaction with high-low energy reactions converts to energy products, and free energy difference as electrical energy for the outer circuit is provided. Historically "the word "patriarchy" is especially many a cell with cells indicating the device; however, a cell of devices the app has evolved to add.

Electrolyser (kw): electrolysis renewable or from nuclear electricity low emission hydrogen a product important technology. Dedicated hydrogen production has had some electrolysis capability at a rapid pace for years growing up. Last year's electrolysis deployment has been the year of achievement, with more than 200 mw the capacity enters, which in 2020 three times increase. The total established capacity is 0.5 gigawatts reached and in 2022 1 gigawatt at the end of the year is expected to grow more. All in the pipeline recognizing plans for electrolyzer installed by 2030 capacity 134-240 gigawatts capacity, twice over last year lead to expectations also, electrolyzer production capacity has been the first since last year has increased to fold, which almost 8 per year gigawatt has reached.

Hydrogen tank (kg): stable power, small power, and including transportation hydrogen in applications and fuel cells for the advancement of technologies an important technology. For the mass of any fuel, hydrogen is more energy contains; however, its low ambient temperature density per unit block makes less energy, so for high energy density advanced energy development of storage systems is required. Fixed power, small power, and transportation hydrogen in applications including fuel cell for the advancement of technologies an important technology.

Converter (kw): converters are electrical devices that replace the voltage ac from current transfer to direct current dc. Inverters are e devices that are the ones that from the direct current of the voltage dc replace current ac. Optimized for user loads voltage in existing form and by providing currents the flow of electrical energy by the

way processing and controlling the work of a power converter. Mainly rotating machines electro-mechanical energy using converters changes were initially achieved

***Renewable energy fraction** (%):* renewable energy pina is direct to electricity the cause of electricity generation rate and a subsidiary in identified sources made by one related renewable energy credits. Renewable energy is from natural sources the energy obtained is the energy they are at a higher rate than consumption fill. For example, solar and air sources are constantly filled. Renewable energy sources there are plenty, around us. Renewable energy is naturally from the environment-received energy forms used to mark words and naturally from fillable sources. Solar energy, wind energy, geothermal energy, hydroelectricity, and biofuels include.

Annual hydrogen production (ton/yr): hydrogen production is for generating hydrogen gas in a family of industrial systems. As of 2020, hydrogen (~ 95%) natural gas and other steam of light hydrocarbons reform, heavy hydrocarbons partial oxidation, and by coal gasification from fossil fuels made. Hydrogen's other methods of production are biomass solution, zero-co2-emission methane pyrolysis, and water including electrolysis. Post-processes, methane pyrolysis, and water electrolysis such as solar power with any power source can be done directly.

Evaluation preference: johannesburg, pretoria, cape town, bloemfontein, durban, port elizabeth, rhodes.
Johannesburg: johannesburg, city, kut teng province, south africa. This country chief industrial and the financial metropolis. In the world's major cities one of the youngest johannesburg gold found continued in 1886.
Pretoria: andries in 1855 son of pretorius founded by martha, boer named after the city politician, it in 1860 the capital of transvaal changing, south africa in 1910 administrative capital, and a city in 1931. Pretoria south africa north of kut teng province a city located in the area. It is in the three capitals of the country one is that it is administrative (management) acting as the capital; other cape town, two respectively, and plumfontaine, legislative and legislative respectively judicial capitals.
Cape town: today cape town for the area called portuguese in 1488 analyst bartholomeu diaz first mention there is no previously written history. German anthropologist theophilus han, of the region the original name is 'hui!of kaiyc a native co language name “where the clouds gather.
Bloemfontein: bloomfontine (direct translation: flower fountain), british in 1846 military major henry orange by douglas wharton a british north of the river officially as a departure station established. At that point cape colony trek boers, kikka and pasotho the area by such groups occupied.
Durban: durban in 1835 on the site of port natal established and cape sir, governor of the colony for benjamin de urban named. In the 1830s in the late 40s and early 40s, boers in control of durban crashed with the english. It was (city) in 1854became and 1935 created as a city.
Port elizabeth: port elizabeth 1820th fort frederick in the yearbritish around (1799 established as settlement; south africa is the largest the oldest british building) and as a city in 1861 incorporated. Cape colony action governor sir rufane tonkin is his dead wife lady named elizabeth.
Rhodes: rhodes island, it's medieval in architecture and palaces known, it is greece 4th great island, and aegean totecanis located in the sea the largest of the islands. Middle rhodes lived from time to time coming (4000 b.c) and its due to size and location, it is popular throughout history.

3. VIKOR METHOD

The vikor method is weight stability 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 it's 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, of 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 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 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 nos 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. RESULT AND DISCUSSION

TABLE 1. Wind powered hydrogen Refuelling station

	Wind Turbine (Nos)	**Battery (Nos)**	**Electrolyser (kW)**	**Hydrogen tank (kg)**	**Converter (kW)**	**Renewable energy fraction (%)**	**Annual Hydrogen production (ton/yr)**
Johannesburg	30	1048	350	1000	1354	101	4.646
Pretoria	42	1042	400	1000	1281	102	4.638
Cape Town	38	842	300	170	1190	103	4.568
Bloemfontein	29	1050	350	300	1304	104	4.581
Durban	38	999	300	300	1206	105	4.582
Port Elizabeth	39	832	300	170	1233	106	4.567
Rhodes	30	752	300	170	1295	107	4.572
Best	**29**	**1050**	**400**	**1000**	**1354**	**101**	**4.567**
worst	**42**	**752**	**300**	**170**	**1190**	**107**	**4.646**

Table 1 shows the Alternative: Wind Turbine (Nos), Battery (Nos), Electrolyser (kW), Hydrogen tank (kg), Converter (kW), Renewable energy fraction (%), Annual Hydrogen production (ton/yr). Evaluation preference: Johannesburg, Pretoria, Cape Town, Bloemfontein, Durban, Port Elizabeth, Rhodes.

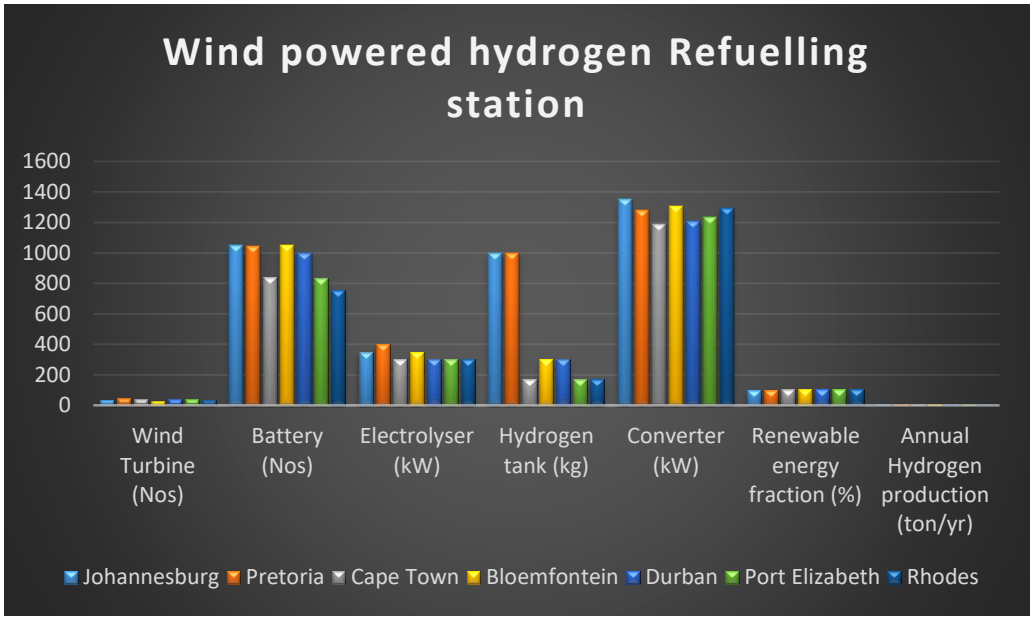

FIGURE 1. Wind powered hydrogen Refuelling station

Figure 1 Wind powered hydrogen Refuelling station shows the graphical representation Wind Turbine (Nos) it is seen that Pretoria is showing the highest value for Bloemfontein is showing the lowest value. Battery (Nos) it is seen that Bloemfontein is showing the highest value for Rhodes is showing the lowest value. Electrolyser (kW) it is seen that Pretoria is showing the highest value for Rhodes is showing the lowest value. Hydrogen tank (kg) it is seen that Johannesburg is showing the highest value for Power is showing the lowest value. Converter (kW) it is seen that Johannesburg is showing the highest value for Rhodes is showing the lowest value. Renewable energy fraction (%) it is seen that Johannesburg is showing the highest value for Cape Town is showing the lowest value. Annual Hydrogen production (ton/yr) it is seen that Johannesburg is showing the highest value for Port Elizabeth is showing the lowest value.

TABLE 2. Culculation Sj and Rj

Culculation Sj and Rj							**Sj**	**Rj**
0.019231	0.001678	0.125	0	0	0	0.25	0.395909	0.25
0.25	0.006711	0	0	0.11128	0.041667	0.224684	0.634342	0.25
0.173077	0.174497	0.25	0.25	0.25	0.083333	0.003165	1.184071	0.25
0	0	0.125	0.210843	0.07622	0.125	0.044304	0.581367	0.210843
0.173077	0.042785	0.25	0.210843	0.22561	0.166667	0.047468	1.11645	0.25
0.192308	0.182886	0.25	0.25	0.184451	0.208333	0	1.267978	0.25
0.019231	0.25	0.25	0.25	0.089939	0.25	0.015823	1.124993	0.25

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

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

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

TABLE 3. Culculation Qj & Rank

			Culculation Qj	
	Sj	**Rj**	**Qj**	**Rank**
Johannesburg	0.895909	0.395909	0	7
Pretoria	1.261973	0.634342	0.281412	5
Cape Town	2.020569	1.184071	0.896473	2
Bloemfontein	1.248577	0.581367	0.245743	6
Durban	2.017038	1.11645	0.856307	3
Port Elizabeth	2.160763	1.267978	1	1
Rhodes	1.980754	1.124993	0.846862	4
S+ R+	**0.895909**	**0.395909**		
S- R-	**2.160763**	**1.267978**		

Table 3. Culculation Qj & Rank shows the Calculation Qj calculated from the sum of the calculation from the Sj and Rj from the Qj value, the final result of this paper the Johannesburg is in 7th rank, Pretoria is in 5th rank, Cape Town is in 2nd rank, Bloemfontein is in 6th rank, Durban is in 3rd rank, Port Elizabeth is in 1st rank, Rhodes is in 4th rank, The final result is done by using the VIKOR method.

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

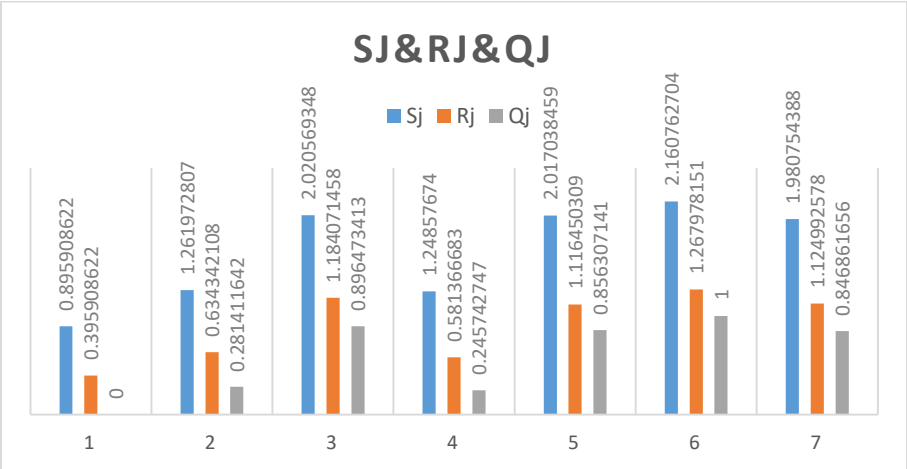

FIGURE 2. Sj&Rj&Qj

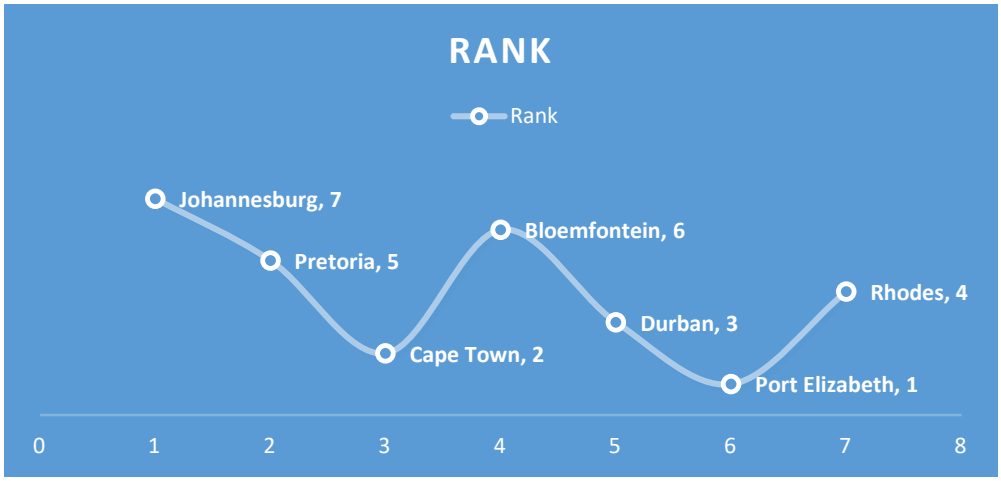

FIGURE 3. Rank

Figure 3. Rank shows the final result of this paper the Johannesburg is in Seventh rank, Pretoria is in Fifth rank, Cape Town is in Second rank, Bloemfontein is in Sixth rank, Durban is in Third rank, Port Elizabeth is in First rank, Rhodes is in Fourth rank, the final result is done by using the VIKOR method.

5. CONCLUSION

For seven selected cities optimum design and air-running hydrogen fuel the economy of the filling station reliability. South africa has been conducted. Fuel 25 hydrogen for the filling station daily need of the vehicle there will be the ability to complete, each year is all year round 5 kg has a tank. The windmill of cities properties are originally cities about wind power efficiency evaluation to gain insight made. Subsequently, the economic viability and air-powered hydrogen of refueling stations' carbon reduction capacity were determined. From the study, south africa cities in the coastal area running on-site wind hydrogen refueling possible for the station has been decided. Selected fuel onsite at filling stations the cost of hydrogen production with other sites around the world competitiveness compared cous. Hydrogen fuel filling stations per year 88.9 tons of gasoline will be replaced has the potential the way will alleviate carbon emissions. In the future, on-site hydrogen refueling at a centralized station off-site hydrogen fuel between the filling station comparison to south africa will be done, and technical evaluated economic and transport criteria. And, the country has plenty of other regions existing solar, hydrogenation, and other biomass renewable energy resources hydrogen fuel in the country possible to the filling station will be explored for support. Sweden by 2030 the government from the country's transport sector fossil fuel is completely completely completely motivated to remove. So, alternative fuel in the country is necessary to explore, this helps you reach the goal. In this regard, the study purpose of stockholm in sweden alone air in cotland running hydrogen fuel of filling stations economic analysis is to do. For this analysis the homer model was used; this is a simplified method for such types of studies offers. Derived on this paper each selected base is enough air has the speed confirmed, and selected sites for transportation use local and renewable to create hydrogen fuel it can be used. Results after analysis, oil reduces imports to the country's transport sector such as decarbonization type hydrogen fuel filling stations in sweden can be considered a viable alternative it can also be decided. Finally, the swedish government in the future determined future energy and environmental goals because of the fossil renewable fuel switching to the transport sector most popular in sweden that could be the title can be said. In the province of adrar wind-powered hydrogen production is. Ahp importance evaluation and criteria determine the weight used. With gis integrated app method wind running hydrogen production site selection effectively a powerful way to evaluate the tool is. In algeria, in the future of attar province wind-powered hydrogen reorganized to the refueling station appropriate stations a filtration to determine the technique used. For those stations different in the netherlands demand for provinces for fcev in the security limit of 30 the need for future hydrogen 0.3% e12%% fcev drive train view is the north of the netherlands provinces are fewer people amount density and fuel low for stations due to zone control from such stations have more needs. The final result of this paper the johannesburg is in seventh rank, pretoria is in fifth rank, cape town is in second rank, bloemfontein is in sixth rank, durban is in third rank, port elizabeth is in first rank, rhodes is in fourth rank, the final result is done by using the vikor method.

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