Optimal Utilization of Renewable Energy Sources in Micro Grids Using Improved Algorithms, Fireflies

Mehdi Veisi[1] and Mohammad Reza Soltanpour[2]

1. Department of Electrical Engineering, college of Electrical, kurdistan Science and Research Branch, Islamic Azad University, Sanandaj, Iran.
2. Department of Electrical Engineering, Shahid Sattari University of Aeronautical Science and Technology, Tehran, Iran.

Abstract

The main purpose of this paper, Provide an appropriate framework for optimal management of distributed energy in a micro grid is based on renewable energy to comply with all constraints, to determine the optimal working point function a variety of new energy sources like wind turbines, Fuel cells and solar cells pay. Since the above problem,is a combinatorial optimization problem requires efficient algorithm is necessary. Here we will use of an evolutionary Firefly Algorithm(FA) as new and powerful algorithm.Also, here's a an appropriate correctio on the fireflies algorithms proposed up to Power of the algorithm search improved and simultaneously rate of convergence is further. According to behave differently some sources such as wind turbines and photovoltaic during the day(from the standpoint of production) a certain time frame for the analysis like a day will be considered were analyzed Up to well network and the answer to each one of sources distinct be determined separate. Also, battry impact in network will be study. With the introduction of the mathematical model used equipment, search space, algorithm fireflies and an innovative method improved algorithm firefly, optimization was performed. Optimization is performed using MATLAB software. The results are compared with some other methods in this field, finally as well as the performance of each of the sources in the specified network and Power Management The optimized structure presented Based on fireflies algorithm improved is determined.

Keywords: Micro-grid, Optimal operation, Renewable resources

1-Introduction:

Today, according to the opposite end of fossil fuels And efforts to reduce the use of these resources, Countries due to the use of renewable resources has shifted [1]. Solar and wind as renewable energy sources can Suitable alternative For fossil fuels The addition of non-renewable In terms of environmental Also very harmful, are. Progress in Development technology Utilization of wind energy, Solar and fuel cells, and the growing importance of renewable energy And environmental issues, Using these sources for electricity has increased [2]. The increased presence of renewable energy sources in Distributed systems A new structure is created microgrid. Prior to this Because distribution systems, transmission systems exist side by side would find Systems depend. With the advent of distributed generation (DG) and microgrid in Distribution systems Found that both consumption and production. The system microgrid can be connected to the main power grid Or the island can be exploited. Each microgrid of several small electric power generation source is made in the name of DG Their mission is providing power to local loads[3]. Independent Power Systems Power Grid by many countries and regions all over the world who are far from home network Have no access to the national grid is used. The use of renewable energy systems because the

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

independent network Rising and volatile prices of fossil fuels and the problems of global warming and environmental pollution Fossil resources are growing. Production based on solar and wind power generation, renewable technologies are commonly Due to climate variability and uncertainties caused by wind and solar energy Other technologies such as fuel cells and batteries are needed to avoid power cuts This issue is caused Hybrid Energy Systems[4]. Nowadays, with the advancement of science and technology and limited resources,

Application of optimization techniques have been given special status. Optimization means finding the best solution in the presence of limitations governing an. Optimization can also be used as a mathematical tool for finding the optimal strategy is to choose from among the several methods for choosing a particular method may be defined. There are two ways to solve optimization problems. One traditional method of solving optimization problems And other modern methods of randomization. Evolutionary algorithms (artificial intelligence) are stochastic optimization techniques The main idea is based on Darwin's theory About evolutionary process in nature. Evolutionary algorithms are a kind of optimization algorithm without derivation. The most striking feature of this method is its randomness. In this paper, a new algorithm for solving forward with Firefly, were utilized. The main feature of this algorithmis Simply run, The small number of adjustable parameters, Balance between global and local search. An innovative and appropriate correction on Algorithms, Fireflies've done And problems such as Reliability of convergence, Speed of convergence, Premature Convergence, Inertia and The computational cost Firefly algorithms have been resolved With This will improve the ability to search algorithm, we have And simultaneously increase the speed of convergence have. The purpose of this research is to provide an appropriate context for Energy efficient management in micrigrid presence of renewable energy sources Firefly algorithm is used. In Part 2 of this paper Firefly algorithm was evaluated And an appropriate correction was performed on. In part 3 of this paper Formulation of optimal energy management problem in a microgrid given Then, in part 4 Simulations are given Finally, the conclusion of the argument being made is presented in section 5.

2 - Firefly algorithm [5]

Algorithms, Fireflies is one of the new methods to solve Optimization problems.

For simplicity in describing the Firefly Algorithm (FA) are ideal three rules to consider:

1) All fireflies are single sex, So a Firefly regardless of gender, Will attract other fireflies;
2) the attraction is proportional to the light, Thus, for any two flashing fireflies, Fireflies lighting up brighter than looking fireflies will move. Attractiveness is proportional to the light , Fireflies when the distance increases, Both will reduce.if Than a particular firefly, there isnot a brighter fireflies, Will move randomly.
3) lighting fireflies by the prospect of the objective function is affected or determined. For a maximization problem, Lighting can simply be proportional to the objective function value. other forms of lighting may function similarly to match the genetic algorithm, is defined [6]. Based on these three rules, the basic steps Firefly Algorithm (FA) can be coded pseudo (fake ID) are summarized below [7].

Objective function $f(\mathrm{x})$, $\mathrm{x} = (x_1, ..., x_d)^T$
Generate initial population of fireflies x_i $(i = 1, 2, ..., n)$
Light intensity Ii at x_i *is determined by* $f(\mathrm{x}_i)$
Define light absorption coefficient
while *(t <MaxGeneration)*
for*i = 1 : n all n fireflies*
for*j = 1 : i all n fireflies*
if $(I_j > I_i)$, *Move firefly i towards j in d-dimension;* end if
Attractiveness varies with distance r via $\exp[-\gamma r]$
Evaluate new solutions and update light intensity
end for*j*
end for*i*
Rank the fireflies and find the current best
end while

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

Postprocess results and visualization

The proposed correction for Firefly algorithm: The purpose of this section is to provide an appropriate correction on Firefly algorithm. To do this, Must first identify problems in Similar evolutionary algorithms. In fact, on the whole, this algorithms ,Global and local search procedures that In terms of performance are identified and exploited Do it on the whole space so that , Approached potential areas Give the intensity of their search around the sites. Most versions of the algorithms provided by looking Establishing an appropriate balance between identification and exploitation are. Compared with classical optimization methods, Modern optimization algorithms, Greater ability to escape from local Optimum are going. But it still has some defects, such as Low reliability, low convergence rate, premature convergence, stagnation And high computing costs In this algorithms is observed that must Harvest steps to solve them.

In this section, A new correction to improve the ability to effectively search for fireflies is proposed. The method proposed change Consists of three phases To increase the accuracy and speed of convergence algorithm Firefly The first part of the method to accelerate move glow worms to move towards best

Firefly. To do this First Average population of fireflies Is calculated and then the size of its difference of best Firefly to Position ALL of fireflies Be added:

$$X_i^{New} = X_i^{Old} + \rho_1 (X_{best} - round(1+rand) \times M_T)$$

(1)

That here X_{best} The Best fireflies, M_T Average population and ρ_1 A random number between 0 and 1.

Second part of the Improved methods relates to Changes to enhance the diversity of population Firefly Through the use of mutation and crossover operators is. To this end, For any Firefly (Xi), Tues. Firefly random (m1, m2, m3) have been chosen so that (m1 ≠ m2 ≠ m3 ≠ i). Had one experimental solution is generated as follows:

$$X_{Test1} = X_{m1} + \rho_1 \times (X_{m2} - X_{m3})$$
$$X_{Test1} = [x_{Test1,1}, x_{Test1,2}, \dots, x_{Test1,d}]$$

(2)

σ is a random value in the range [0, 1]. However, using Xi, Xtest and best Firefly (Xbest) Two fireflies are produced as follows:

(3)

$$x_{Test2,j} = \begin{cases} x_{best,i}, & \text{if } \rho_2 \le \rho_3 \\ x_i, & \text{otherwise} \end{cases}$$

(4)

$$x_{Test3,j} = \begin{cases} x_{best,i}, & \text{if } \rho_3 \le \rho_4 \\ x_{Test1,i}, & \text{otherwise} \end{cases}$$

that $\rho_1, \dots, \rho_4$ are Random values in the range [0, 1] . The Best fireflies among XTest1 and XTest2 is selected and With the i th Firefly (Xi) are compared. If the Firefly was better than Xi, Xi is replaced And otherwise Xi will remain in his position.

The third step in the proposed method, relates to use of a new and powerful operator called Slow motion That could be a local search around each of Fireflies available in population Well done . With the help of this method, the position of each Fireflies is updated as follows:

$$X_i^{t+1} = X_i^t + \alpha \oplus Le'vy(\theta)$$
$$Le'vy(\theta) \sim u = t^{-\theta} \quad ; \quad (1 < \theta \le 3)$$

(5)

Here $\oplus$ inner product, and t is the number of repeat procedures.

3 - The formulation optimal energy management problem in a sample Microgrid. The problem of optimizing the utilization management Like any other optimization problem As a set of objectives and Limitations are defined. in optimization problems, the goal is Minimize or maximize one

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

or more specific objective function In the case that all constraints problem are satisfied. in The formulation optimal energy management problem in microgrid, The objective is to minimize the total cost of power generation in microgrid. minimizing the cost of operation of microgrid Include the cost of producing units and energy storage and numerous other factors the following models is:

$$Min \quad f_1(\mathbf{X}) = \sum_{t=1}^{NT} Cost^t = \sum_{t=1}^{NT} \{ \sum_{i=1}^{N_g} [u_i^t \, p_{Gi}{}^t B_{Gi}{}^t + Start_{Gi} \times \max(0, u_i^t - u_i^{t-1}) + Shut_{Gi} \times \max(0, u_i^{t-1} - u_i^t)]$$
$$+ \sum_{j=1}^{N_s} [u_j{}^t p_{sj}{}^t B_{sj}{}^t + Start_{sj} \times \max(0, u_j{}^t - u_j{}^{t-1}) + Shut_{sj} \times \max(0, u_j{}^{t-1} - u_j{}^t)] + p_{Grid}{}^t B_{Grid}{}^t \}$$

(6)

Here is $\mathbf{X} = [X^1 \, X^2 ... X^t ... \, X^{NT}]$ Vector of design variables included The power output production and storage units And On status (value 1) or off (value 0) units. X^t Is defined as follows:

$$X^t = [p_{G1}^t, p_{G2}^t, ..., p_{GNg}^t, p_{s1}^t, p_{s2}^t, ..., p_{sNs}^t, u_1^t, u_2^t, ..., u_{Ns+Ng}^t] \qquad (7)$$

Similar each other problem in the electricity, There are always limits a of sight technical and security.

The following these cases for a Microgrid introduced and formulated.

load balance – Production

balance between load and Whole position power production of microgrid, The most important limitation is problem of utilization management. This constraint is formulated as the following equation:

$$\sum_{i=1}^{Ng} p_{Gi}{}^t + \sum_{j=1}^{Ns} p_{sj}{}^t + p_{Grid}{}^t = \sum_{D=1}^{N_D} P_{L_D}{}^t \qquad (8)$$

Here is $P_{L_D}{}^t$ The amount of load d th in microgrid At the time of N_D and t The total number of loads in a network.

Limitation of active power

All manufacturing units and storage Technical and functional for reasons, Are bound to respect certain power range. This ranges are defined as follows:

$$p_{Gi,\min}{}^t \le p_{Gi}{}^t \le p_{Gi,\max}{}^t \qquad (9)$$

$$p_{sj,\min}{}^t \le p_{sj}{}^t \le p_{sj,\max}{}^t \qquad (10)$$

$$p_{grid,\min}{}^t \le p_{Grid}{}^t \le p_{grid,\max}{}^t \qquad (11)$$

$p_{G,\min}{}^t$, $p_{s,\min}{}^t$, $p_{grid,\min}{}^t$ Respectively are marker least permissible active power of distributed generation, The energy Saver and upstream network. Similarly, $p_{G,\max}{}^t$ ، $p_{s,\max}{}^t$ و $p_{grid,\max}{}^t$ Maximum allowable power of units At the time of the show.

spinning reserve

To enhance reliability microgrid, Supply constraints spinning reserve Be considered in the modeling.

Relation (12) shows limitation:

$$\sum_{i=1}^{Ng} u_i^t p_{Gi,\max}{}^t + \sum_{j=1}^{Ns} u_j{}^t p_{sj,\max}{}^t + p_{grid,\max}{}^t \ge \sum_{D=1}^{N_D} P_{L_D}{}^t + Res^t \qquad (12)$$

In the above relationship Res^t represents Square spinning reserve microgrid necessary at the time t.

Step to solve the problem by Firefly algorithm

In order to solve the optimal energy management problem in microgrid by modified Fireflies algorithms

The following steps should be taken:

1) Enter the necessary information for solving problems such as:

Network information, algorithms information, information the objective function and

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

constraints, The amount of load consumed in different times, Adjustment coefficients of algorithms ,Initial population size of fireflies, Criterion End, initial brightness Firefly, Framework of choice for computing the distance between two fireflies (Cartesian or polar).

2)produce Fireflies initial population randomly,each Fireflies randomly in authorized space as follows generated :

$$X_i = X_{i,\min} + \rho_1 (X_{i,\max} - X_{i,\min}) \quad (13)$$

In above relation, $X_{i,\max} / X_{i,\min}$ Vectors minimum / maximum for each particle is For each system According to the power production it is determined also ρ_1 is a random value between 0 and 1.

3)satisfy the problem constraints for Fireflies produce Here are all the fireflies will be correct. Importantly, is Satisfy the constraints load balancing and production that Is an equality constraint Which should be checked at each iteration and for each new member.

4) Calculate the objective function value for the initial population Fireflies .Here ,the Best fireflies with the lowest cost is selected as the best member.

5)Improved fireflies population by original method in the basic algorithm, As explained earlier. to do this, you must calculate the Euclidean distance between any two fireflies And then calculating the luster of the fireflies, will move it to the best Firefly Again, the provisions of the new fireflies and calculated And the objective function is defined.

6) Improvement of the population's fireflies detection method proposed improvements. The same again here, as well as the constraints and objective function value for the new fireflies are determined.

7)the termination criterion of algorithm . if the termination criterion satisfied Print the result Otherwise, go to step 5 and repeat the process again.

4 - Results of Simulations

In this part of the study, a sample microgrid shown in Figure 2 as the test system is considered. Chosen because it microgrid this microgrid different distributed generation resources like Fuel cells, solar cells, wind turbines and micro turbines composed. Information of the reference system [8] have been used. It is assumed that all production units, active power and power factor are produced And no reactive power generate or Do not use. In addition, a line for the exchange of power between the upper network and microgrid there. The central control system microgrid based microgrid materials can be purchased through these line the upper network or to sell.

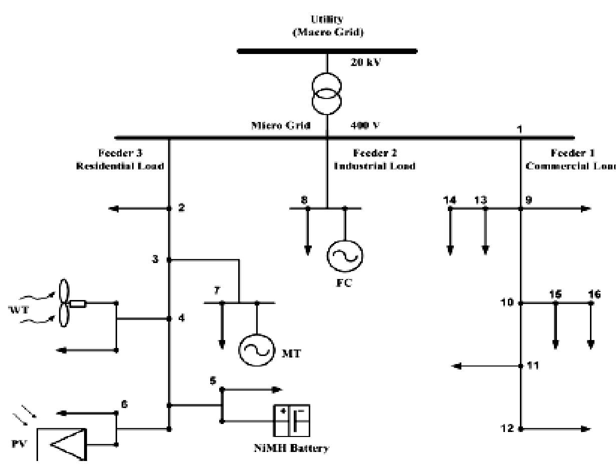

Figure 2: microgrid tested

Table 1: Minimum and maximum limits productivity DG And minimum and maximum charge and discharge the battery shows In the same table, the price of euros in terms of kWh of distributed generation units, as well as the cost of the units is given off.

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

Table 1-limits and tariffs distributed

	Type	Min Power(KW)	Max Power(KW)	Bid(€ct/kwh)	Start-up/shut-down (€ct)
1	MT	6	30	0.457	0.96
2	FC	3	30	0.294	1.65
3	PV	0	25	2.584	0
4	WT	0	15	1.073	0
5	Bat	-30	30	0.38	0
6	Utility	-30	30	-	-

As seen in this table, although solar cells and wind turbine units do not use any fuel, But the prices are higher than other units. These price differences due to the initial cost of the investment unit. The unit price of productivity due to faster return on investment will be higher than traditional units. Another reason for the high cost of power production units, encouraging people to invest in this field. Figures 3 to 6, respectively, the predicted market price forecasts, local time, the normalized output power is predicted to Wind and solar modules for 24 hours, the samples show. Solar and wind power units have been normalized to the maximum capacity of the units. As can be seen in Figure 3 the market price is low in the early hours of day and night While peak load requirement of the day, the price will reach its maximum. Microgrid can use the difference between the market price of its profits The peak load is low, so the hours can be bought cheaply from the upstream network and storage units to store And at peak hours when prices are high in the market, to market, sell and profit will benefit many. The total load on the local microgrid studied for 24 h, 1695 kW .As shown in Figure 2, this time involving a residential area, a commercial and a consumer of industrial feeders to supply the required power for a small workshop.

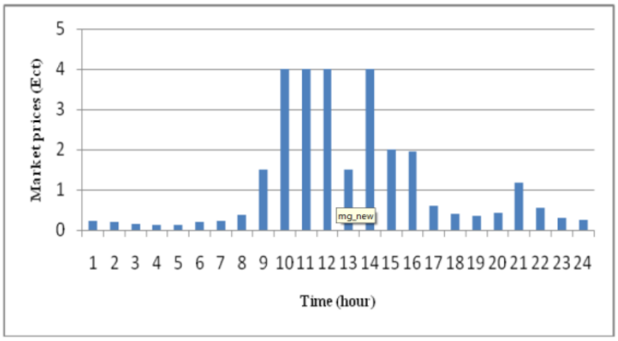

Figure 3 - The expected price in the market

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

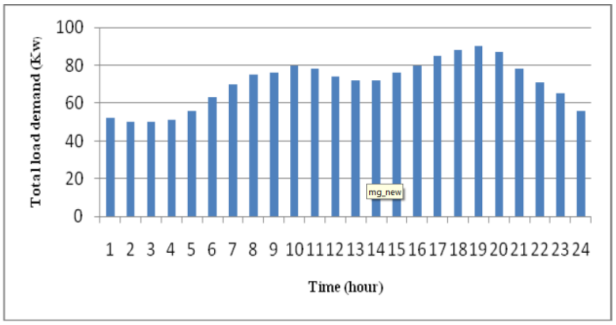

Figure 4 - Predicted local time

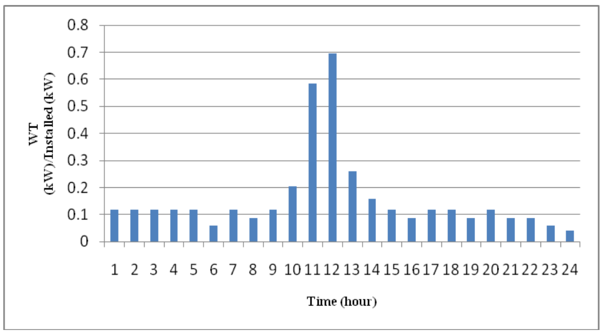

Figure 5 - The normalized output units forecasted wind

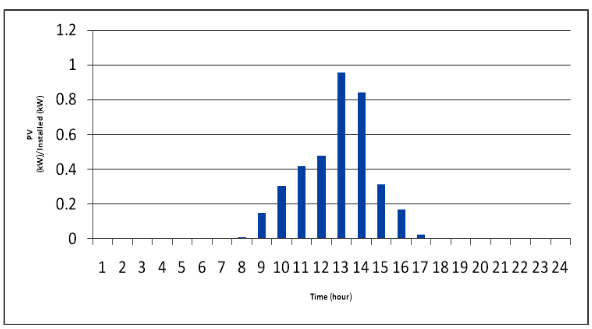

Figure 6 - The amount of power output normalized to the predicted solar units.

It is assumed that the central controller microgrid, at any time, all power units are produced by solar and wind buys. Moreover, for simplicity, in this part of the study, once the heat has not been studied microgrid. The DG is assumed that all work units have power factor so that only the active power is produced. Battery Type NiMH used in the network also has a positive impact on the network to be examined .Philosophy of NiMH-Battery energy storage during low load (low energy) to generate power in peak hours (high energy) is. The deeper issue, this part of the simulation study based on three different scenarios have been performed as follows:

• First scenario: Assume that all units are turned on all day. In addition to the initial charge of the battery set is infinite.

• Scenario Second: a flexible microgrid performance in this scenario, each unit can be turned on or off. However, in this case on or off the unit cost to be considered. Battery performance in this scenario is similar to the first scenario.

• Scenario Third: In this scenario, like the second scenario, the units can be turned on or off, but the battery is different from the previous two scenarios. In this scenario, the initial charge is zero and each time the battery charge and discharge limits are given in Table 1, To limit the amount of energy stored in the battery discharge early hours there.

For all three scenarios, the simulation of glow worms equal to 30 is considered. Results of simulations carried out in the proposed structure, the tables are given below. As can be seen from Tables 2 and 3, the proposed method could reduce the amount of acceptable total cost of the micro-grid. The results in Table 2 is the first scenario. For better comparison, some of the most popular methods in this field are shown in the table at the same time. The optimal operating point consistent with the results in Table 3 for each of the power sources.

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

Table 2 - Values of the objective function for 20 repetitions in the first scenario

way	Best Answer (€ct)	Worst reply (€ct)	Average (€ct)	standard deviation (€ct)	Average simulation time (Sec)
GA [8]	277.7444	304.5889	290.4321	13.4421	-
PSO [8]	277.3237	303.3791	288.8761	10.1821	-
FSAPSO [8]	276.7867	291.7562	280.6844	8.3301	-
CPSO-T [8]	275.0455	286.5409	277.4045	6.2341	-
CPSO-L [8]	274.7438	281.1187	276.3327	5.9697	-
AMPSO-T [8]	274.5507	275.0905	274.9821	0.3210	-
AMPSO-L [8]	274.4317	274.7318	274.5643	0.0921	-
FA	275.9852	281.9008	277.2435	2.8434	12.379
MFA	264.7600	264.7600	264.7600	0	8.7743

Table 3 - values the operating point of each of the units in the first scenario

Time	DG Sources (kWh)					
(Hour)	PV	WT	FC	MT	Battery	Utility
1	0	1.7850	30	6	-15.7850	30
2	0	1.7850	30	6	-17.7850	30
3	0	1.7850	30	6	-17.7850	30
4	0	1.7850	30	6	-16.7850	30
5	0	1.7850	30	6	-11.7850	30
6	0	0.9150	30	6	-3.9150	30
7	0	1.7850	30	6	2.2150	30
8	0.2000	1.3050	30	6	7.4950	30
9	3.7500	1.7850	30	30	30	-19.5350
10	7.5250	3.0900	30	30	30	-21.1150
11	10.4500	8.7750	30	28.7750	30	-30

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

12	11.9500	10.4100	30	21.6400	30	-30
13	23.9000	3.9150	30	14.1850	30	-30
14	21.0500	2.3700	30	18.5800	30	-30
15	7.8750	1.7850	30	30	30	-23.6600
16	4.2250	1.3050	30	30	30	-15.5300
17	0.5500	1.7850	30	30	30	-7.3350
18	0	1.7850	30	6	30	20.2150
19	0	1.3020	30	6	22.6980	30
20	0	1.7850	30	6	30	19.2151
21	0	1.3005	30	30	30	-13.3005
22	0	1.3005	30	30	30	-20.3005
23	0	0.9150	30	6	-1.9150	30
24	0	0.6150	30	6	-10.6150	30

Simulation results for the second scenario is shown in Tables 4 and 5. Here also this proposed method has achieved good results. As can be seen, due to the greater flexibility this scenario, the amount of the total cost of the fine grid is reduced compared to the first scenario.

Table 4 - Values of the objective function for 20 reps in the second scenario

way	Best Answer (€ct)	Worst reply (€ct)	Average (€ct)	standard deviation (€ct)	Average simulation time (Sec)
GA	277.7444	304.5889	290.4321	13.4421	-
PSO	277.3237	303.3791	288.8761	10.1821	-
FSAPSO	276.7867	291.7562	280.6844	8.3301	-
FA	274.5634	282.7854	277.8744	2.9643	13.239
MFA	261.8472	262.7746	261.6578	0.4347	8.499

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

Table 5 - Values for each operating point of units in the second scenario

Time	DG Sources (KWh)					
(Hour)	PV	WT	FC	MT	Battery	Utility
1	0	1.7850	30	0	-9.7850	30
2	0	1.7850	30	0	-11.7850	30
3	0	1.7850	30	0	-11.7850	30
4	0	1.7850	30	0	-10.7850	30
5	0	1.7850	30	0	-5.7850	30
6	0	0.9150	30	0	2.0850	30
7	0	1.7850	30	0	8.2150	30
8	0.2000	1.3050	30	0	13.4950	30
9	3.7500	1.7850	30	30	30	-19.5350
10	7.5250	3.0900	30	30	30	-20.6150
11	10.4500	8.7750	30	28.7750	30	30-
12	11.9500	10.4100	30	21.6400	30	30-
13	23.9000	3.9150	30	14.1850	30	30-
14	21.0500	2.3700	30	18.5800	30	30-
15	7.8750	1.7850	30	30	30	-23.6600
16	4.2250	1.3050	30	30	30	-15.5300
17	0.5500	1.7850	30	30	30	-7.3350
18	0	1.7850	30	0	30	26.2150
19	0	1.3020	30	0	28.6980	30
20	0	1.7850	30	0	30	25.2150
21	0	1.3005	30	30	30	-13.3005
22	0	1.3005	30	30	30	-20.3005
23	0	0.9150	30	0	4.0850	30
24	0	0.6150	30	0	-4.6150	30

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

Finally, the simulation results for the third scenario are given in Tables 6 and 7. As we said earlier, this scenario is limited to the batteries on the net. As a result, we can already guess that the net cost should increase., As we see this happen also been. In fact, from the point of view of optimal utilization of energy required in the early hours of battery will charge to the peak load can be discharged.

Table 6 - values the operating point of each of the units in the third scenario

way	Best Answer (€ct)	Worst reply (€ct)	Average (€ct)	standard deviation (€ct)	Average simulation time (Sec)
GA[8]	334.8694	345.0211	336.2912	17.6310	14.291
PSO[8]	327.7211	340.3123	331.2102	13.1244	14.283
FSAPSO[8]	326.4291	335.4931	331.4301	10.6621	13.281
FA	31905743	333.4548	320.3567	5.0065	13.428
MFA	299.4124	302.9483	301.8842	2.5738	8.839

Table 7 - values the operating point of each of the units in the third scenario

Time	DG Sources (kWh)					
(Hour)	PV	WT	FC	MT	Battery	Utility
1	0	1.7850	30	20.2150	-30	30
2	0	1.7850	30	18.2150	-30	30
3	0	1.7850	30	18.2150	-30	30
4	0	1.7850	30	19.2150	-30	30
5	0	1.7850	30	24.2150	-30	30
6	0	0.9150	30	30	-27.9150	30
7	0	1.7850	30	30	-21.7850	30
8	0.2000	1.3050	30	30	-16.5050	30
9	3.7500	1.7850	30	30	30	-19.5350
10	7.5250	3.0900	30	30	30	-20.6150
11	10.4500	8.7750	30	30	28.7850	-30
12	11.9500	10.4100	30	30	21.6400	-30

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

13	23.9000	3.9150	30	30	14.1850	-30
14	21.0500	2.3700	30	30	18.5800	-30
15	7.8750	1.7850	30	30	30	-23.6600
16	4.2250	1.3050	30	30	30	-15.5300
17	0.5500	1.7850	30	30	-7.1030	29.7680
18	0	1.7850	30	30	-3.7850	30
19	0	1.3020	30	30	-1.3020	30
20	0	1.7850	30	30	-4.7850	30
21	0	1.3005	30	30	30	-13.3005
22	0	1.3005	30	30	0	9.6995
23	0	0.9150	30	6	-1.9150	30
24	0	0.6150	30	0	-4.6150	30

5 – Conclusion

Economic and environmental concerns and technological developments, because changing the way generated and Transfer electricity. Economic losses caused by large centralized generators that are gradually replaced by smaller and more dispersed manufacturers. They also have great potential in reducing costs. According to this argument, the main subject of this paper, Review and analysis of the optimal management of microgrid operation with respect to the types of ew energy power generation and energy storage such as batteries are. Here, the full sample includes a microgrid fuel sources, wind, solar, micro and batteries (as stored energy) was used to study 24 hours, we have discussed and planned. The microgrid is connected to the power network upstream, and therefore it is possible to buy or sell electricity to the grid. Good results, the suitability of the proposed framework for solving upcoming shows. From a technical viewpoint, there can reduce the cost of grid energy storage can help. It also necessitates the use of high power, low hours, full time hours as well as time and sales network is shown. From the perspective of optimization, firefly algorithm is superior to other known approaches in this area have been fixed.

6-References

1- H.Sajad,A.R.TavakoliGhinani,M.Dehghani," Application of differential evolution algorithm in optimal operation of the microgrid considering the economic objectives",Fresh ideas in Electrical Engineering

2.B.NamvarBehraghani,M.Aghashafiee,M.Morad iDalvand,M.Ahmadian(1391)," Determine the optimal size of a Micro Grid interactive resources with electricity market electrical and thermal load to supply the micro grid aims to reduce dependence on fossil fuels"

3.A.HesamiNaghshbandi,SH.Shokuhi,H.Bivorani ," Application of fuzzy controllers - the nerve in voltage and frequency stability of micro-grids island", Journal of Electrical Engineering, University of Tabriz

4- R.ShaikhZakaria,S.Esmaili(1391),” Optimization of the system parameters on the

(DOI: dx.doi.org/14.9831/1444-8939.2014/2-SI/MAGNT.17)

micro-grid frequency control using PSO algorithm” First National Conference on New Ideas in Electrical Engineering

5- Xin-She Yang, "Firefly Algorithms for Multimodal Optimization," arXiv:1003.1466v1 [math.OC] 7 Mar 2010.

6- Previento wind power prediction, Energy&meteo, 2010

7- M. Eusuff, and K. Lansey.Optimization of water distribution network design using the shuffled frog leaping algorithm. Journal of Water Resources Planning and Management. 2003 129(2):10-25.

8- Moghaddam A, Seifi A, Niknam T. Multi-operation management of a typical micro-grids using Particle Swarm Optimization: A comparative study. J Renew Sust Energy Rev 2012;1621268-1281.