Therefore, each kWp PV in proposed system of this work will produce 41.47 kWh/day, which is close to above published value, with a relative error of 2.9 % only.

7. CONCLUSIONS

It was found that a HyRES microgrid consisting of PV/WT/DG/batteries bank is a reasonable and proven solution that can be applied in Jordan under the current tariff of electricity $0.37/kWh, which is significantly higher than the optimal configuration of this study, which is $0.237/kWh.

The microgrid consisting of PV/WT/DG/batteries bank (first option) has the lowest net present cost as well as cost of electricity for all nine different scenarios of data of solar radiation (GHI) and wind speed with or without excess electricity.

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NOMENCLATURE

f_{pv}	The PV derating factor
Y_{pv}	Rated capacity of the PV array
I_T	The solar radiation incident on the PV array in the current time step
I_S	The incident radiation at standard test conditions
F_0	Fuel curve intercept coefficient
F_1	Fuel curve slope
Y_{gen}	Rated capacity of a diesel generator
P_{gen}	Electrical output of a diesel generator
$c_{om,\,gen}$	Operating and maintenance cost of a diesel generator
$C_{rep,\,gen}$	Replacement cost of a diesel generator
R_{gen}	Generator lifetime.
$C_{fuel,\,eff}$	Effective price of fuel
R_{batt}	Expected battery life
$Q_{lifetime}$	Lifetime throughput of single battery
Q_{thrpt}	Total energy that cycles through the battery bank in one year
$R_{batt,\,f}$	Float life of the battery
$C_{rep,\,batt}$	Replacement cost of the battery
N_{batt}	Number of batteries
η_{rt}	Round-trip efficiency
$C_{be,\,n}$	Storage energy cost in time step n
$C_{cc,\,i}$	Cost of cycle charging the storage in time step i
$E_{bc,\,i}$	Amount of energy that went into the storage bank in time step i
$C_{ann,\,tot}$	Total annual cost
C_{RF}	Function returning the capital recovery factor.
i	Interest rate
R_{proj}	Project lifetime
N	Number of years
E_{served}	Total electrical load served