Contents list available at IJRED website
Int. Journal of Renewable Energy Development (IJRED)
Journal homepage: http://ejournal.undip.ac.id/index.php/ijred

Potential of Wind Energy in Albania and Kosovo: Equity Payback and GHG Reduction of Wind Turbine Installation

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ABSTRACT: The energy generation in Albania is completely from the hydropower plants. In terms of GHG emissions this is 100% green. In Kosovo 97% of energy is generated from lignite fired power plants. Apart the energy generation, the combustion process emits around 8000 ktCO_2/yr and 1.5 Mt of ash in the form of fly and bottom ash. In both countries there is no MWh power generated from wind energy, i.e. this energy source is not utilized. Here, a proposed project for five locations in Albania and Kosovo has been analyzed in detail with the aim of installing a 1kW wind turbine off-grid. The method of study is based on the application of RETScreen International program software. This proposed model is intended to replace a base case- a diesel generator with installed capacity 7kW. The locations are selected three in Albania: Vlora, Korça and Elbasan, and two in Kosovo: Prishtina and Prizren. All are in different altitudes. By the calculation of RETScreen program, it has been analyzed the feasibility of the proposed projects by installing a wind turbine at hub's height 20m. The climate data for each location were retrieved by the RETScreen program from NASA. Generally, the calculation of financial parameters for the investments came out to be positive, the impact of GHG reduction very significant. A 5500 USD investment for the implementation of proposed case showed an equity payback time of 2-3 yrs and GHG reduction of 2.2 tCO_2/yr. The electricity delivery to load only from this 1 KW wind turbine resulted to be between 1.6-1.7 MWh/yr.

Keywords: Albania, Kosovo, wind energy, financial viability, equity payback, GHG reduction

***Article History:** Received November 19,2014; Received in revised form January 12,2015; Accepted February 1, 2015; Available online

How to Cite This Article: Qafleshi, M., Kryeziu, R.D., Aliko, L., (2015). Potential of Wind Energy in Albania and Kosovo: Equity Payback and GHG Reduction of Wind Turbine Installation. *Int. Journal of Renewable Energy Development*, 4(1), 11-19.
http://dx.doi.org/10.14710/ijred.4.1.11-19

1. Introduction

Energy generation in Albania is chiefly based on hydro-power. Albania is situated in the south-western part of the Balkan Peninsula. There is only one TPP oil-gas combined-cycle TPP in Vlora, but the high cost of fuels made it nonoperational (Xhitoni 2013). In 2012, 2013 there were produced 4.745 GWh, 6.987 GWh respectively (Instituti i Statistikave, Republika e Shqipërisë 2014). This electricity was generated 100% from hydropower plants. In terms of GHG this is green, but considering the land, riverbeds and canyons degradation this can be an issue to be revised. The electrical energy generation from wind energy is an option. The geographical position and relief of Albania could enhance the policies toward green energy by wind turbines. Up to now, there is no single wind turbine installed. As the wind speed is the main key factor for energy generation from a wind turbine, the geographical position along the cost line and the mountainous reliefs are favourable conditions to pay more attention to this energy production sector.

As Albania is near the sea and it is a mountainous land, the expectations are that in some locations the wind turbines should show a better favourable time of return of investment. According to The Institute of

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Hydro-Meteorology (IHM), Albania, the annual average wind speed can vary fro 4-6 m/s (Albania Energy Association 2014). The data for wind speed favour some regions, but the lack of insufficient information for reasoning the investments in various successful projects of wind energy. The wind speed of 4-6 m/s at height 10m is not so satisfactory, but at other heights this can be higher resulting with e greater energy generation (Rajeevan et al. 2013). In this regard the aim of this study is assess the wind potential and possibilities of investments. As the planning of energy production from wind turbines till 2025 to be 4% from overall energy production, that is around 400 GWh annually.

In Kosovo, a country in the Balkan Peninsula, 97% of total energy generation is from lignite fired power plants and only 3% is from hydropower plants. In terms of environment pollution, either as gaseous or particulate pollutants, the combustions process of lignite is a source of GHG emission and particulate matter in the form of ash residue (Qafleshi et al. 2013a). In 2013 the energy production of 5864 GWh (Transmission, system and market operator, J.S.C., 2014) was also a source of 7896.0 KtCO_2 (Gjurgjeala2007) and 1.5008 Mt of ash (Qafleshi et al. 2013b). 1.2006 Mt is captured by ESP in the form of Fly ash and 0.30016 Mt as bottom ash (Transmission, system and market operator, J.S.C. 2014 & Kosovo Energy Corporation 2013).

As Kosovo aims to join the EU it should fulfil, until 2020, the energy and environment targets set by EU: 20% reduction CO_2 emissions, 20% increase of production of renewable energy, and 20% of energy efficiency improvement (Ministry of European Integration, Republic of Kosovo 2012). Although a study regarding the wind energy utilization showed that only at height 38m the wind speed was 6.9m/s (Kosovo Civil Society Consortium for Sustainable Development 2014), the results of these proposed projects analyzed in this paper proved that the wind energy is a feasible solution in achieving 20-20-20 EU targets even at lower heights, e.g. as in our cases at 20m. In Kosovo only three wind turbines with total installed capacity of 1.36 MW were put in operation in 2010. Unfortunately, due to a dispute on feed-in tariff by Energy Regulatory Office that wind plant was shut down (Deutsche Gesellschaft für Internationale Zusammenarbeit 2012). Thus, this situation must be resolved in regard of achieving 20% targets. Referring to 5864 GWh of electricity generation in 2013, the energy generation from wind turbines could be around 1000 GWh being enough to make Kosovo energy greener. The proposed projects for Prishtina and Prizren showed to be feasible in this regard.

2. Materials and methods

2.1 Site selection

There are selected five locations: Vlora, Elbasan, Korça in Albania and Prishtina and Prizren in R. of Kosovo. These are two neighbouring countries in the Balkans Peninsula as in the Fig. 1. The aim of this study is to replace a 7KW diesel generator that operates to supply load directly or charge the batteries with a wind turbine. The generator is activated only 1 hour a day and supplies directly the load and mostly to charge the batteries. The intended project is a scenario of replacing this generator with a wind turbine off-grid with installed capacity of 1KW. The study covers five locations, three in Albania and two in Kosovo. The selection of locations was done based one the two criteria: altitude and the geographical position, e.g. near the sea or situated in mountains (Oliveria et al. 2012).

The proposed case is indented to be implemented completely same in all five locations. Then the local weather conditions and cost of fuel used for generator could be factors that make the difference in the financial viability and environmental benefits of certain case in a given location (Bickert 2014). The Table 1 shows the selected locations (see Fig. 1) included in the study and all are at different altitudes. Vlora region, with low altitude is situated along the seacoast, whilst the others are in higher altitudes and deep inland. Elbasan is the highest in altitude. The data of selected locations have been taken from NASA through the RETScreen program, RETScreen Climate Database and Retscreen Product Database (Natural Recourses Canada, Retscreen International 2014). The geographical positions, altitude as presented in the Table 1 affects the wind speed which for a wind turbine is the "fuel" of operation. The wind speed as shown in the table is higher in Vlora region that is 3.2 m/s and the lowest out of five selected locations is in Prizren and Prishtina 1.5 m/s at height of 10 m. The accuracy of wind speed is very deterministic parameter for a wind turbine and it is a sensitive factor. If the wind speed is not 16 km/h, but 14 km/h, the generated power will be 27% smaller, in 13 km/h the generation will be decreased for 41% of predicted value (Electropedia 2014). There are other factors that influence the power generation from a wind turbine such as hill effect, terrain roughness, effect of tunnels, wind speed change in time, wind obstacles, wind shear (Charmor et al. 2014). All these factors affect the potential of wind power, and the formula for calculating the potential of wind energy converted in power in turbine in a certain location is given as:

$$P = 0.5\ \rho\ V^3 \pi r^2 W \qquad (1)$$

Were, ρ is air density, r- blade length, W -power coefficient (Sathiyanarayanan et al. 2013). Thus, it has been found out that same turbine with same installed capacity gives different outcome.

Fig. 1. Locations' map in Albania & Kosovo: Vlora, Elbasan, Korça, Prishtina, Prizren

Table 1
Elevation (m) of project locations & Wind speed at 10 m height

Location	Vlora	Prizren	Pishtina	Korça	Elbasan
Elevation(m)	173	403	576	977	1101
Wind speed (m/s) at 10 m	3.2	1.5	1.5	3.0	2.9

2.2 Scenario methodology

2.2.1 Base case

The analysis of project was done using the software RETScreen 4 downloaded from the web page www.restcreen.net. As the method of our study is method two of the RETScreen model; this program has five excel worksheets: project information, energy model, cost analysis, emission analysis, financial analysis and financial analysis. The later steps for specific location for the same wind turbine case have been analyzed following the aforementioned procedure. The climate data for each location have been retrieved by the software form NASA source. This includes the wind speed at 10m height, altitude, longitude, latitude, etc. Mostly the interest of the study is the wind speed. The program showed almost all locations have different annual average wind speeds (Xydis 2012). This will affect the annual electricity delivery to load (see Table 1).

The installation of 1kW Wind turbine off-grid intends to replace a diesel generator with 7kW capacity. This is referred as base case. This generator supplies with electricity the load directly or, mostly to charge the batteries then through an inverter the load. The price of one diesel in Albanian locations is 1.9 $/L, in Kosovo 1.5 $/L. The annual cost of operations and maintenance is 300 $. The average daily load of user is 4kWh AC and 1kWh DC. The electricity rate of base case in Albanian locations is 1.107 $/kWh, for Kosovo locations 0.909/kWh. The maximum load during the entire year does not exceed 7kW.

2.2.2. Proposed project

In all five locations, this diesel generator will be replaced with 1 kW wind turbine off-grid. The diesel generator will be still available in case of insufficient electricity supply from wind turbine. The turbine has a rotor diameter of 3m, whilst the swept area of blades is 6 m2. The height of turbine's hub is 20m and the wind speed in that height, from the climate data location for all location showed to be 5.2 m/s (Table 2). The wind shear exponent, which is a factor that shows how much wind speed increases with the height in m, is 0.15. The purchase price of wind turbine is 3500$, whilst the in situ building classified as engineering cost in height 20 m is 1000$ and the development cost is 1000$. The total is 5500$ that is the total initial cost of the wind turbine installation as the proposed case.

Table 2
Wind speed and Electricity delivery in proposed locations, based on formula P= 0.5 ρ $V^3\pi r^2 C_p$ (The Royal Academy of Engineering 2014)

Location	Annual Wind speed m/s at height		Electricity delivered to load MWh annually
	10 m	20 m	
Vlora	3.2	5.2	1.68
Prizren	1.5	5.2	1.66
Prishtina	1.5	5.2	1.67
Korça	3.0	5.2	1.67
Elbasan	2.9	5.2	1.67

3 Result and discussion

3.1 Energy model

The energy model of this case selected in RETScreen program is power. The power will be generated by the wind turbine with a nominal capacity 1kW and aims to replace the diesel generator with data given above. As taken, the turbine's installed capacity is 1kW, i.e. if working for 1h, the electricity generation of turbine would be 1kWh. As the power generation depends on the wind speed in cube, the optimal cases should not have speed lower than 4 m/s [Caduff et al. 2012). In our cases for Vlora the average wind at height 10 m is 3,2 m/s, Prizren 1.5 m/s, Prishtina 1.5 m/s, Korça 3.0 m/s and in Elbasan town average speed of 2.9 m/s, not so satisfactory. In the height of our proposed project, i.e. 20 m, we have got the speeds 5.2 m/s in all locations. The calculated annual electricity delivered to laod for certain location is: Vlora 1.68 MWh, Prizren 1.66 MWh, Prishtina 1.67 MWh, Korça 1.67 MWh and Elbasan 1.67 MWh. The percentage of power supplied from wind turbine and diesel generator for the proposed case is: Vlora 92% from wind turbine and 8% from diesel generator, Prizren 90.9% wind and 9.1 % diesel generator, Prishtina 191.4% wind and 8.6% diesel generator, Korça 91.6% wind and 8.4 % diesel generator, and Elbasan 91.5% wind and 8.5% diesel generator. The better ratio wind/generator has Vlora with 92 % of power supplied by wind turbine and the lowest is for Prizren 90.9 % from wind. The rest of power supply is from the generator.

3.2 Financial and viability of proposed project model

The total initial cost of the project is 5500 USD$, including the purchasing and building and operational costs. The total annual saving and income for proposed cases in Albanian side, i.e. Vlora, Elbasan and Korça is 2020 $, whilst in Kosovo location, i.e. Prizren and Prishtina is 1658 $. This is affected by the price of 77 L of diesel needed for the proposed case that is different in two countries. This causes the difference in the total annual costs in locations as given by this calculation: Vlora 685$, Korça 692$, Elbasan 694$, Prishtina 664$ and Prizren 670$. To cover the total initial cost, for the proposed cases, a bank loan of 2750$ has been taken. The debt should be returned in 10 years, debt interest rate is 10%, that comes 448$ to be paid annually. Financial viability starts from year 0 as year of initial investment. From the results of financial viability worksheets, it can be seen that the ratio Benefit-Cost (B-C) for Vlora is 5.44 and debt service coverage (DSC) 4.6; Prizren (B-C) 4.18, (DSC) 3.27; Prishtina (B-C) 4.21, (DSC) 3.29; Korça (B-C) 5.41, (DSC) 4.05; for Elbasan as shown in the Table 3 (B-C) 5.41, and the coverage of debt service (DSC) is 4.04. The simple payback calculated from the model for Vlora is 3.1 yrs, Prizren 3.8 yrs, Prishtina 3.8 yrs, Korça 3.1 Yrs and Elbasan 3.1 yrs.

The simple payback (SP), as defined in (RETScreen International 2005), is the number of years it takes for cash flow (excluding debt payments) to equal investment (which is equal to the sum of debt and equity). The SP is calculated by the equation:

$$SP = \frac{C-IG}{(C_{ener}+C_{capa}+C_{RE}+C_{GHG})-(C_{O\&M}+C_{fuel})} \quad (2)$$

where, C_{ener}-the annual energy savings or incomes, C_{capa}-annual savings or income, C_{RE}-annual renewable energy production credit income, C_{GHG}-GHG reduction income, $C_{O\&M}$-yearly operation and maintenance costs incurred by the clean energy project, C_{fuel}-annual cost of fuel.

It can be seen that project is more suitable financially in Albanian locations Vlora, Korça and Elbasan with 3.1yrs, in Kosovo 3.8 yrs. The net present value NPV is calculated to be for Vlora 12208 $, Prizren 8755 $, Prishtina 8819 $, Korça 12135 $, Ebasan 12117 $. The NPV represents the difference between actual of income and values as outcome. The annual life cycle savings of for Vlora is 1434 $/yr, Prizren 1028 $/yr, Prishtina 1036 $/yr, Korça 1425 $/yr and for Elbasan is to be 1423 $/yr. a key financial parameter for the implementation of the project is the equity payback, that is as previously referred to RETScreen as "Year-to-positive cash flow." This in fact is time-year(s) that it takes for the owner of a project to recoup its own initial investment (equity) out of the project cash flows generated."

The year to positive cash flow N_{PCF}, as in (RETScreen International 2005), is the first year that the cumulative cash flows for the project are positive. It is calculated by solving the equation:

$$0 = \sum_{n=0}^{N_{PCF}} \check{C}_n \quad (3)$$

where, $\check{C}_n$ is the after-tax flow in year n.

From the calculation of the model(s) it comes that equity payback for Vlora is 2.0 yrs, Prizren 2.6 yrs , Prishtina 2.6 yrs (Fig. 3), Korça 2.0 yrs and Elbasan 2.0 yrs (Fig. 2). Regarding this, the Albanian locations are more advantageous than those in Kosovo. The model

Table 3
Financial viability, Elbasan case

Financial viability		
Pre-tax IRR - equity	%	52.3%
Pre-tax IRR - assets	%	27.6%
After-tax IRR - equity	%	52.3%
After-tax IRR - assets	%	27.6%
Simple payback	yr	3.1
Equity payback	yr	2.0
Net Present Value (NPV)	$	12,117
Annual life cycle savings	$/yr	1,423
Benefit-Cost (B-C) ratio		5.41
Debt service coverage		4.04
GHG reduction cost	$/tCO2	(640)

Table 4
Financial parameters for five proposed locations

	Vlora	Prizren	Prishtina	Korçë	Elbasan
Simple payback (yr)	3.1	3.8	3.8	3.1	3.1
Equity payback (yr)	2.0	2.6	2.6	2.0	2.0
Net present value $	12200	8755	8819	12135	12117
Annual life cycle savings $/yr	1434	1028	1036	1425	1423
GHG reductions cost $/$CO_2$	641	465	466	640	640

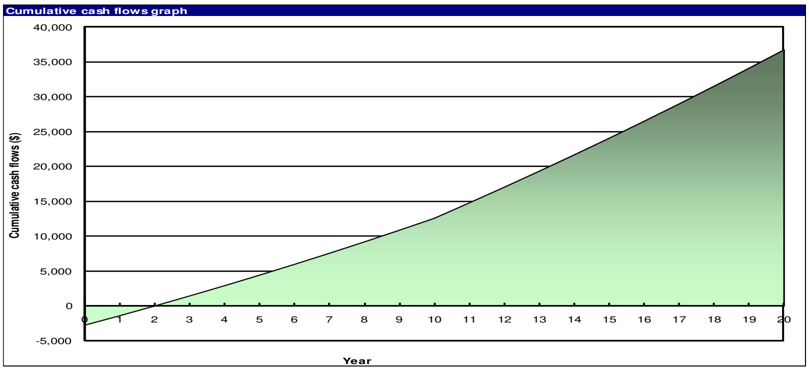

Fig. 2 Cumulative cash flow and equity payback, Elbasan case
Source: RETScreen Financial Analysis-Power project.

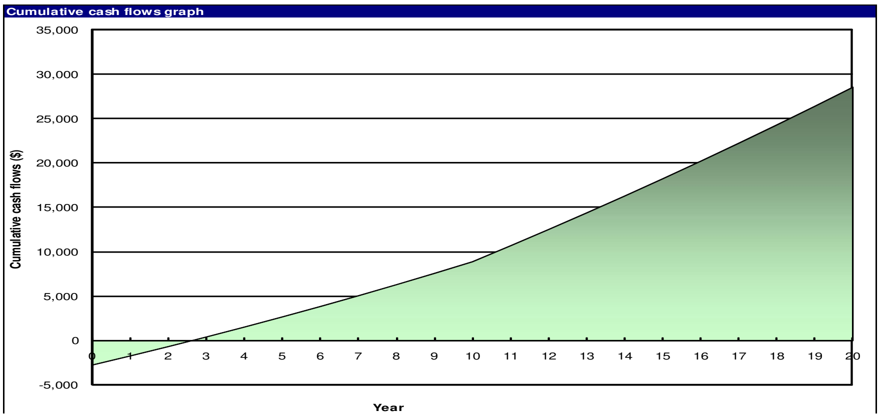

Fig. 3 Cash Flow and equity payback, Prishtina case

Source: RETScreen Financial Analysis-Power project.

calculates the cumulative cash flows, which represent the net pre-tax flows accumulated from year 0 (Natural Recourses Canada, Retscreen International 2014). It uses the net flows to calculate the cumulative cash flows. All five proposed cases have a project life of 20 years. As shown in the Table 4, the equity payback for three locations starts in the second year, i.e. equity pay back is 2 years, for other two 2.6 yrs.

3.3 The Impact in the reduction of greenhouse gases (GHG)

The change of energy "fuel" diesel with wind implies that we consequently have the changes in the GHG emissions emitted from the power production. The combustion of carbon from diesel emits CO_2 that is a greenhouse gas. As the aim of this proposed case aims to replace the diesel generator with a wind turbine with air as "fuel", then this benefits with lowering the quantity emissions of CO_2 in the atmosphere, i.e. that power generated from the wind turbine is "greener". The RETScreen model calculates the quantity of reduction of GHG. The data are calculated as equivalent tons of CO_2 avoided every year. In our base case we have Diesel (#2oil) which has the emission factor of CO_2 equal 0.266 tCO_2/MWh of produced energy (Natural Recourses Canada, Retscreen International 2014).

3.3.1 Base case

In bas case we have the diesel generator with installed capacity 7kW which works one hour a day. From the Table 5 it can be seen that from the data of base case we have got 2.4 tCO_2.

Table 5
Base case system GHG summary (Baseline)
(RETScreen International 2005)

Fuel type	Fuel mix %	Fuel cons. MWh	GHG emission factor tCO2/MWh	GHG tCO_2
Diesel (#2 oil)	100%	9	0.266	2.4

3.3.2 Proposed case with wind turbine

From the calculations of the system it is observed that percentage of fuel mix varies from one location to the other. The higher percentage of diesel replaced by wind is in Vlora where energy generated by diesel is 30.30% and wind 69.7%. In Prizren it is 33.2% diesel and 66.8% wind energy, Prishtina31.9 % diesel and 68.1% from wind, Korça31.5 % diesel and 68.5% wind energy. So in regard of GHG emission the wind turbine installed in Vlora has a greater positive impact in reduction of GHG (Ramos 2013). As it is shown in the RETSCreen model from the combustion of diesel 0.2 tCO_2 are emitted, from wind zero tons. This verifies that in the proposed case in total there are 0.2 tCO_2 emitted. GHG emission tCO_2 is the same 0.2 for all cases of wind turbines, because the % of fuel mix is almost same, and the approximation by system rounds that to 0.2 tCO_2.

3.4 Green house gases reduction (CO_2)

According to the data as presented in Table 7, Table 8 it can be seen the comparison, respectively the difference in reduction of emission of CO_2 in base case and proposed project cases (Olanson et al. 2014). The annual emission from the base case is 2.4tCO_2, whilst the proposed case only 0.2 tCO_2. Thus the net annual reduction of emissions of CO_2 reaches a value of 2.2 tCO_2 that is the same in all five locations. The project life is 20 years and the savings/reductions in emissions would be 44 tCO_2 as presented in Table 6. And we must be aware of only one wind turbine with capacity 1 kW.

The GHG reduction cost GRC, as defined in (RETScreen International 2005), repsrensts the levelised nominal cost to be incurred for each tonne of GHG avoided. It is calculated by:

$$GRC = -\frac{ALCS}{\Delta_{GHG}} \quad (4)$$

Where, ALCS is the annual life cycle savings, Δ_{GHG} is the annual GHG emisssion reduction in the GHG Analyses worksheet. The Δ_{GHG} si calculated by the equation:

$$\Delta_{GHG}=(e_{base}-e_{prop})\, E_{prop}(1-\lambda_{prop})(1-e_{cr}) \quad (5)$$

e_{base}-base case GHG emission factor, e_{prop}-proposed case GHG emission factor, E_{prop}-propsoed case annual electricity production, λ_{prop}-fractiuon of electricity lost in the transmission and dristribution for the proposed case, e_{cr} – the GHG emission reduction credit transaction fee.
The GHG reduction cost for the 20 years project life cycle (PLC) can be calcualted by the equation:

$$GRC=AGHGR\ (tCO2/yr) \times PLC\ (20yrs) \quad (6)$$

which for our project cases is 44 tCO2, except for Vlora an Korça that is 45tCO2 (see Table 6).

Table 6
The net GHG reduction income

	Vlora	Prizren	Prishtina	Korçë	Elbasan
Net GHG reduction tCO_2/yr	2	2	2	2	2
Net GHG reduction-20 yrs	45	44	44	45	44

Table 7
Proposed case system GHG summary (power project)

	Fuel type	Fuel mix %	Fuel consumption MWh	GHG emission factor tCO_2/MWh	GHG emission tCO_2
Vlora	Diesel (#2 oil)	30.3%	1	0.266	0.2
	Wind	60.7%	2	0.000	0.0
	Total	100%	2	0.081	0.2
Prizren	Diesel (#2 oil)	33.2%	1	0.266	0.2
	Wind	66.8%	2	0.000	0.0
	Total	100%	2	0.089	0.2
Prishtina	Diesel (#2 oil)	31.9%	1	0.266	0.2
	Wind	68.1%	2	0.000	0.0
	Total	100%	2	0.085	0.2
Korça	Diesel (#2 oil)	31.5%	1	0.266	0.2
	Wind	68.5%	2	0.000	0.0
	Total	100%	2	0.084	0.2
Elbasan	Diesel (#2 oil)	31.8%	1	0.266	0.2
	Wind	68.2%	2	0.000	0.0
	Total	100%	2	0.085	0.2

Table 8
GHG emission summary

	Base case GHG emission tCO_2	Proposed case GHG emission tCO_2	Gross annual GHG emission reduction tCO_2	GHG credits Transaction fees %	Net annual GHG emission reduction tCO_2
Power project	2.4	0.2	2.2		2.2
Net annual GHG emission reduction	2.2	tCO_2 is equivalent to	0.4	cars and trucks not used	

4. Project sensitivity and level of project risk

Part of the program RETScreen Clean energy Project Analysis, is also a worksheet Risk assessment which helps in calculation of the sensitivity in regard to more sensitive financial factors. Here, there are two categorizations: sensitivity assessment and risk analysis.

4.1 Sensitivity analysis and assessment

The analysis in the proposed case is done for After-Tax IRR-equity. The model after-tax internal rate of return (IRR) on the capital (equity) (%), that represents the actual interests given assured from the equity (capital) of the project during its durability (life) after income tax. The sensitivity in the proposed case is analyzed in relation of the changes of initial cost, fuel price and rate of interest of the debt, i.e. the impact on standard deviation. It is noticed that the greater impact is from the change of initial cost, then debt's rate and so on as shown in the Fig. 4. This graphical presentation is done with the Monte Carlo simulation method called Tornado Chart. The level of risk was taken 15%, thus the project has interval of credibility 85%.

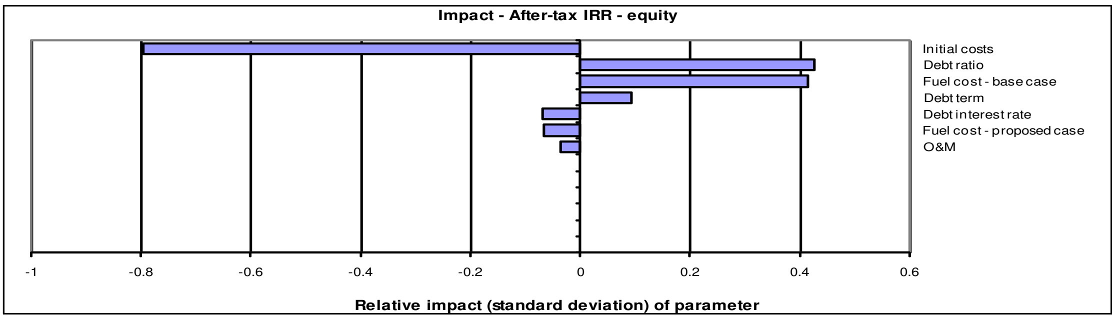

Fig. 4 Relative impact of parameters in the proposed project, Vlora case
Source: RETScreen Sensitivity and Risk Analysis-Power project.

4.2 Risk assessment

Risk Assessment in the phase of preliminary analyses of feasibility there is an uncertainty regarding that how the input of parameters will deviate from the given levels. Thus, it was insert the range that how it could deviate from assessments. To evaluate this, the model program uses the Monte Carlo simulation, it does analyze 500 times and median is the average (mean) of values of order 250-251. Distribution of After –Tax –equity is given with the Fig. 5.

The level of risk taken is 15%, i.e. 15% of financial indicator falls out of specified interval. The minimum of confidence is 46.1%, while the maximum of the level of confidence is 61.4%.

5. Acknowledgment

The authors are grateful to Prof. Dr. Pellumb Berberi for his valuable instructions on using RETScreen International software and scientific support on renewable energy. The authors would like to express their gratitude to reviewers for their useful comments.

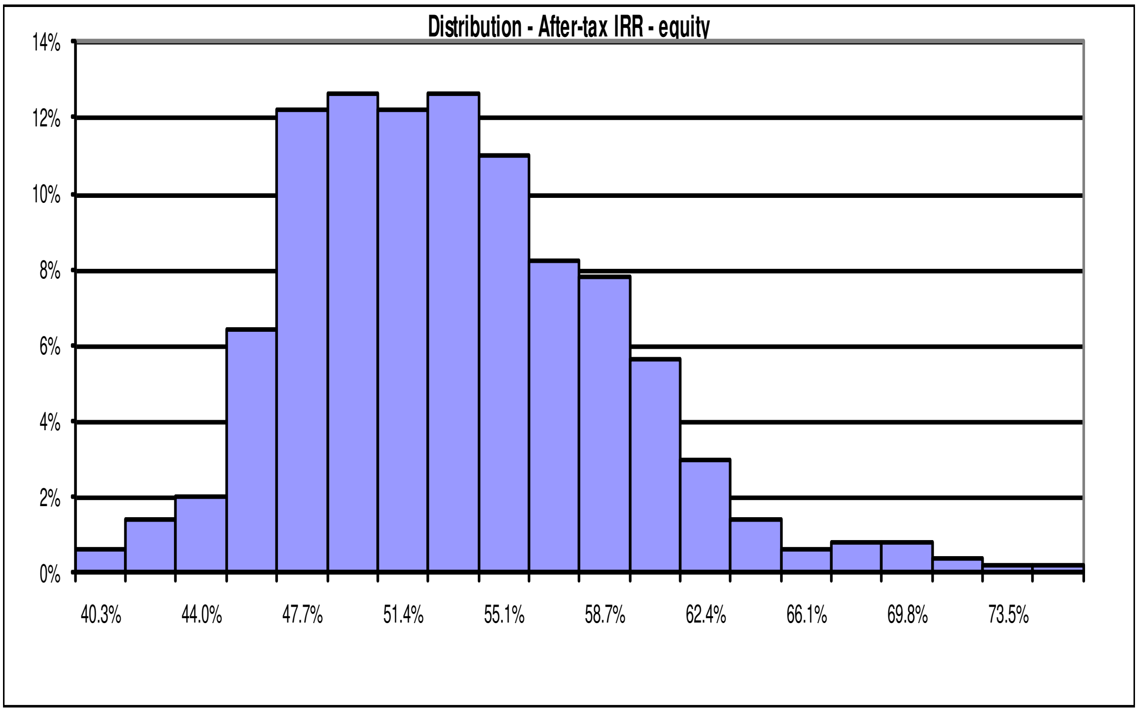

Fig. 5 Distribution After-Tax IRR-equity, Elbasan case
Source: RETScreen Sensitivity and Risk Analysis-Power project

6. Conclusions

Five locations for installing a Wind turbine 1kW off-grid were studied by the use of RETScreen application. As the power generated from wind turbine mainly depends from wind speed, the results at height 20 m of turbine's hub in regard to the electricity delivery to load in MWh/yr for locations Vlora, Prizren, Prishtina, Korça and Elbasan were 1.68, 1.66, 1.67, 1.67 , 1.67 respectively. There has been a slight higher electricity delivery in proposed case in Vlora compared to other project locations. This showed to be due to favorable position near the seashore. As the initial cost for all proposed projects was 5500 USD$, the different location of the same 1KW wind turbine showed different time of annual saving, in Albania is 2020 USD$, in Kosovo is 1658 USD$. This subsequently affected the total annual cost that in those locations Vlora, Prizren, Prishtina, Korca and Elbasan was 685$, 670$, 664 $, 692$, 694$ respectively. The time of equity pay back for proposed projects in VLora, Prizren, Prishtina, Korca and Elbasan resulted to be 2.0 yrs, 2.6 yrs, 2.6 yrs, 2.0 yrs, 2.0 yrs respectively, and the simple payback 3.1 yrs, 3.8 yrs, 3.8 yrs, 3.1 yrs, 3.1 yrs and 3,1 yrs respectively. According to the above financial results the project of wind turbine in Vlora showed more affective. The GHG reduction cost expressed in $\$/CO_2$ were in Vlora 641, Prizren 465, Prishtina 466, Korça 640 and Elbasan 640. The Net GHG reduction income tCO_2/yr for Vlora, Prizren, Prishtina, Korça and Elbasan is 2 for all five locations for proposed cases. The impact of installation of Wind Turbine in reduction of GHG showed to be significant. As the resource method data for the proposed projects were same, i.e. wind speed at height 20m is 5.2 m/s and knowing the emission factor of CO_2 for diesel fuel for the base case is 0.266 tCO_2/MWh, the net annual GHG emission reduction calculated was 2.2 tCO_2/yr. for a proposed case with a project life of 20yrs the Net GHG reduction in 20 yrs was around 44-45 for respective locations. One must be aware that this GHG reduction results only from a wind turbine with installed capacity 1 kW. Having in regard that Albania has a power installed operational capacity of 1515 MW, Kosovo around 975 MW, at first sight, in Albania this makes no difference in reduction of GHG, but as many MWh are imported from neighboring countries due to shortcomings of waters in different seasons, this indirectly reduces the GHG emissions in those countries from where the electricity is imported. In Kosovo taking the 20% EU target for reduction of GHG from the energy generation, the reduction of GHG is 1579 Kt CO_2 less emissions in atmosphere. Taking into consideration all the financial and environmental benefits, the fact that there are no MWh generated from wind, this project study results proved to be of great importance commercially and environmentally.

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