

A REVIEW ABOUT IRAN WIND FARMS AND PROGRAMS

Neda Lazemi¹, Mahmood Baghban Taraghdari², Heidar Abdollahian³, Nafiseh Ghorbani³, Mohammad Reza Asadi⁴

1- Department of Environmental Engineering, Payam Noor University, Shahre Rey, Iran

2- Department of Agricultural, Varamin-Pishva Branch, Islamic Azad University, Varamin, Iran

3- Department of Technical Drawing, Shahr-e-rey Branch, Islamic Azad University, Shahr-e-rey, Tehran, Iran

4- Department of Mechanical Engineering, Buinzahra Branch, Islamic Azad University, Buinzahra, Iran

ABSTRACT: Iran from the point of different energy resources is considered one of the richest countries of the world, because, on the one hand it has various and extensive resources of fossil and non-renewable fuels, such as gas and oil, and on the other hand it has much potential of renewable energies such as wind Iran, because of having susceptible windy locations and being on the pathway of main wind, at present, has a suitable bed for developing exploiting wind turbines for producing electricity and delivering it to electrical network. So this paper reviews the situation of wind energy in Iran.

KEYWORDS: Renewable energy, Wind Energy, Iran

INTRODUCTION

Today, in all of the countries, with attention to limitation of resources and finishable fossil resources, difficulties and environmental problems coming from exploiting and burning of these resources and soon replaceable energies are used which are renewable, clean, easy to called and economical (Reid, 2001; Charter, 1997). So this paper reviews the situation of wind energy in Iran.

1.1. Projects in Iran

Power ministry is conducting some designs and projects for developing, programming, supervising and managing new energies. At present, one of the diplomacies of power ministry is to develop wind power stations with the help of private section and forming suitable bed. One of the most susceptible sites in Iran for using wind energy is Mangile site (Abbaspour and Atabi, 1994). In Gilan province which is bordered among Gilan, Ghazvin and Zanjan provinces. Being permanent wind along the year because of high height difference of this site with Caspian Sea and being natural canal of Sefidrood river has caused this area to have wind speed of about 8 to 12 meters per second to 40 meters per second. About %65.2 of the capacity of erected wind power stations are in Manjile site. Wind turbines of this area are erected in Manjile, Roodbar, Harzvil and Siahpoosh site. Erecting turbines in different sites is because of this problem that Manjile city, Lake Sefidrood and mountains surrounding there have limited the

space for erecting all of the turbines in one place (AEOL, 2002). After this area Binalood wind power station with the capacity of %30.5 has had the most capacity in Neishaboor, in Khorasan province that by paying attention to suitable conditions of this site for erecting wind turbines some designs are being studied for developing more turbines in this area. The other %4.3 capacity of wind turbines are erected in the provinces such as eastern Azarbayjan, Sistan and Balouchistan, Fars and Khoozestan. Table 1 depicts situation of wind power projects for each province separately to the end of 2010, and table 2 depicts specifications of the sites of wind power stations in the country to the end of that year (SUNA, 2010). Table 3 depicts the power of erected wind turbines during 1994 to 2010 and table 4 depicts the process of producing electricity from wind power stations during 2004 to 2010. As this observed in 2010, wind power stations in provinces such as Gilan, Khorasan, eastern Azarbayjan, Sistan and Balouchistan, Fars and Khoozestan totally with 160 turbines and with nominal capacity of 92930 Kilowatt, have had non-specific production about 162.2 Giga watt per hour (SUNA, 2010). In 2010, the capacity of wind power stations has increased to 2640 Kilowatt and this increase has been because of starting two wind turbines with 1320 Kilowatt in Ovn-Ebne-Ali power station in Tabriz and one turbines with the capacity of 660 Kilowatt in Babakoohy site in Shiraz and one turbines with the capacity of 660 Kilowatt in Mahshahr, in

Khozestan province. The aim of erecting wind power stations in Babakoohy site in Shiraz is: using renewable energies preventing from environment pollution and increasing the production of network electricity in that mountainous site (SUNA, 2010). Of course suitable conditions of windy site in Mahshahr for mounting wind power stations and high efficiency of mounted turbines in this site has created situations for studying the conditions of mounting more wind turbines in that site. Table 5 depicts the specifications of power stations that are working and ones that are being studying as this observed, except completing Manjile wind power station with final capacity of 100 Megawatt and Binalood wind power station with final capacity of 28380 Kilowatt, erecting and completing Ghazvin wind power station with final capacity of 60 Megawatt is being studying and conducting (SUNA, 2010). All of the information and statistics which have been noted in the present research are activities which are being conducting with governmental investing and under direct supervision of the government.

But extended developing of renewable power stations without investing of the private section is impossible. Encouraging private capitalists to invest capital in the field of new energies can play a main role in developing renewable power stations. In this direction the organization of new energies of Iran has done effective activities to invite private section and develop using renewable energies all over the country that among them we can point to the matter of buying electricity from renewable resources. With prosecutions of new energies organization and with the help of government in 2005, some laws were approved that according to them power ministry was obliged to buy the electricity produced by wind power stations with approved price. After approving mentioned laws, some companies required to build power station and sell their produced electricity to power ministry. Table 6 depicts the specifications of non-governmental projects for producing electricity to the end of 2010 (SUNA, 2010).

Table 1: Situation of wind power projects for each province separately in 2010

Province	being exploiting		Conducting and studying	Total	
	Number of turbines	Nominal capacity (Kilowatt)		Number of turbines	Nominal capacity (Kilowatt)
Gilan ⁽¹⁾	110	60580 ⁽²⁾	38820 ⁽³⁾	110	99400
Ghazvin ⁽¹⁾	-	-	60000	-	60000
Khorasan	43	28380	-	43	28380
Eastern azarbayjan	4	1990	-	4	1990
Sistan & Balochistan	1	660	-	1	660
Fars	1	660	-	1	660
Khozestan	1	660	-	1	660
Total	160	92930	98820	160	191750

(1) The capacity of mentioned designs is in the direction of erecting 100 megawatt wind power turbine in Gilan and Ghazvin site.

(2) In Babaiean site in Manjile power station, there is one turbine with the capacity of 600 kilowatt that because of basic repairment it has been closed and it isn't noted in the present study.

(3) In 2010 there hasn't been conducting any project, but on the basic of a program they have decided to exploit from 32 turbines with the capacity of 660 kilowatt in Ghazvin site during the next years.

Table 2: Specifications of wind turbine sites erected in the country

Windy power station	Site	Province	City	Erected turbines	
				#	Capacity (Kilowatt)
Manjile	paskolan	Gilan	Roodbar	22	14520
	Roodbar	Gilan	Roodbar	4	2150
	Siahposh	Gilan	Roodbar	26	17160
	Manjile	Gilan	Roodbar	31	13250
	Harzvil	Gilan	Roodbar	27	13500
Binalood		Khorasan	Neyshaboor	43	28380
Sahand	Sahand university of Tabriz	eastern Azarbayjan	Tabriz	1	10
	Tabriz	eastern Azarbayjan	Tabriz	3	1980
Lotak	Zabol	Sistan & Balochistan	Zabol	1	660
Babakoohy	Fars	Shiraz	1	660	
Mahshahr	Mahshahr	Khozestan	Mahshahr	1	660
Total		-	-	160	92930

Table 3: the power of wind turbines erected during 1993 – 89

Number of turbines	time of erecting and starting	power of turbine (kilowatt)	the place of erecting
Manjile 1	1993	1×500=500	Manjile
Manjile 6	1997	1×550=550	Manjile
Manjile 13	1997	1×300=300	Manjile
Mnajile 11,12,14	1997	3×300=900	Manjile
Mnajile 7 to 10	1997	4×300=1200	Manjile
Mnajile 2 to 15	1998	4×550=2200	Manjile
Mnajile 15 to 21	1998	7×300=2100	Manjile
Mnajile 22,23	2003	2×550=1100	Manjile
Mnajile 26 to 28	2003	3×550=1650	Manjile
Manjile 29,30	2004	2×550=1100	Manjile
Manjile 25	2004	1×550=550	Manjile
Mnajile 24,31	2004	2×550=1100	Manjile
Babeian 1 ⁽¹⁾	1381	1×600=600	Manjile
Paskolan 9 to 11	2004	3×660=1980	paskolan
Paskolan 12,15,13,2,1,3,4,14,5,7,8	2005	11×660=7260	paskolan
Paskolan 6,21,14,16,17,20,18,19	2005	8×660=5280	paskolan
Roodbar 2	1993	1×500=500	Roodbar
Roodbar 1,3,4	1998	3×550=1650	Roodbar
Harzvil 8,9,10	1999	3×300=900	Harzvil
Harzvil 1	2003	1×300=300	Harzvil
Harzvil 3 to 7,11,12	2003	7×300=2100	Harzvil
Harzvil 2	2003	1×300=300	Harzvil
Harzvil 13 to 27	2008	15×660=9900	Harzvil
Siahposh	2006	17×660=11220	Siahposh
	2008	9×660=5940	Siahposh
Binalood	2004	20×660=13200	Khorasan
	2007	23×660=15180	Binalood
Vantis (dizabad) ⁽²⁾	2005	2×130=260	Khorasan
Sahand	2006	1×10=10	Sahand university of Tabriz
Ovn-ebne-Ali	2009	3×660=1980	Tabriz
Lotak	2009	1×660=660	Zabol
Babakoohy	2010	1×660=660	Shiraz
Mahshahr	2010	1×660=660	Mahshahr

(1) In Babaeian site of Manjile power station there is one turbine with the capacity of 600 kilowatt that because of basic repairmen it is closed and therefore its statistic hasn't been mentioned.

(2) It has been a research project and because of low production it hasn't been connected to the power network. On the other hand because of malfunction of some turbines they have been stopped. So they haven't been mentioned in the list of turbines.

Table 4: producing electricity from windy power stations during 2004-89

Year	site	total of nominal capacity	number of turbines	unspecific power production
2004	Gilan ,Khorasan	24880	56	46.5
2005	Gilan ,Khorasan	47580	92	70.9
2006	Gilan, Khorasan & Tabriz	58810	110	125.3
2007	Gilan, Manjile	45340	87	118.7
2007	Khorasan, Binalood	28380	43	24.6
2007	Khorasan, Vantis	260	2	(1)
2007	Sahand Tabriz	10	1	*
2007	total	73990	133	143.4
2008	Gilan, Manjile	61180	111	139.8
2008	Khorasan, Binalood	28380	43	56.5
2008	Khorasan, Vantis	260	2	(1)
2008	Sahand Tabriz	10	1	*
2008	total	89830	157	196.3
2009	Gilan, Manjile	60580 ⁽²⁾	110	170.2
2009	Khorasan, Binalood	28380	43	53.8
2009	Sahand Tabriz	10	1	*
2009	Ovn-Ebne-Ali	660	1	0.1
2009	Lotak, Zabol	660	1	0.5 ⁽³⁾
2009	total	90290	156	224.6
2010	Gilan, Manjile	60580 ⁽²⁾	110	109.7
2010	Khorasan, Binalood	28380	43	50.6
2010	Sahand Tabriz	10	1	*
2010	Ovn-Ebne-Ali	1980	3	1.2
2010	Lotak, Zabol	660	1	1.1
2010	Babakoohy, Shiraz	660	1	0.1
2010	Mahshahr, Khzestan	660	1	0.04
2010	total	92930	160	162.6

Consideration: self-consuming with regard to the kind of turbine is between 0.5 to 1% of yearly production

- (1) It has been a research project and because of low production it hasn't been connected to the power network. On the other hand because of malfunction of some parts the project has been stopped. So it hasn't been included in the list of turbines and projects.
- (2) In Babaeian site in Manjile power station there is one turbine with the capacity of 600 kilowatt that because of basic repairment, it has been stopped.
- (3) This amount of production is related to 6 months in 2009 and relates to low wind months.
* Amount is not too much

Table 5: specification of conducting and studying projects related to wind energy

Name of the project	geographic situation	starting year	exploiting year	percent of progress to the end of 2010	capacity of the project (kilowatt)	useful life	capability of yearly energy production (giga watt/H)
??	all country	2003	2009	100	-	-	-
??	Ghazvin	2005	1016	20 ⁽¹⁾	60000	20	190
Wind power station developing design							
??	Gilan	1999	2012	74.6	100000 ⁽²⁾	20	200-330
Binalood wind power station	Khorasan	2001	2012	94.5 ⁽²⁾	28380	20	124

(1) Percent of progress is related to the section of possibility measuring

(2) From 100 megawatt of wind turbine in Gilan %38.82 of its capacity is being studying and conducting and from the rest of it (%61.18), 32 units with the capacity of 660 kilowatt will be exploited in future in Siahposh site.

(3) Erecting of the mentioned turbines has been completed and the remaining %5.5 is because of not being power post in that area.

Table 6: specification of non-governmental renewable power station projects in 2010

In the process of constructing power station			
Name applicant company	proposed capacity (maga watt)	place of constructing power station ⁽¹⁾	province
Windy power stations			
Ghaem power-phase 1	100	Jarandagh	Ghazvin
Ghaem power-phase 2	100	Binalood	Khorasan razavi
Royan	100	Binalood	.
Tizbad power	100	Khauf	.
Power investing Co	10	Dashly castle	northern Khorasan
Nehbandan fajr'e sadid	10	Nehbandan	southern Khorasan
Shahd'e jonoob. Free site of Chabahar-phase 1	10	Chabahar	Sistan&Balochistan
Arge jam windy power station	9	Tunekabon-Roodbar	Gilan
Matin tam developing energy Co	100	Manjile	Gilan
Aryan Mahbad Gostar (Mahtab Gostar)	123	Siahposh	Ghazvin
Developing permanent power company-phase 1	20	Siahposh bam	Ghazvin
Aban windy turbine Co	30	Khorhasht Takestan	Ghazvin
Total of windy power stations	712	-	-
Biomass power stations			
Pak asia energy fanavaran	12	Sari	Mazandaran
Total of biomass power stations	12	-	-
Sunny power stations			
Semnan electronics makers industries	10	Semnan	Semnan
Total of sunny power stations	10	-	-
Total	734	-	-

(1) It is possible that power stations be erected in different site

REFERENCES

- Abbaspour M, Atabi F. A mathematical model to evaluate wind energy potential in Iran. In: World renewable energy congress; 1994.
- AEOI. Renewable energies: their present and future forecasts. A report prepared by CRERA, Tehran, Iran; 2002.
- Charter WWS. The current status of renewable energy technologies. In: The Australian academy of technological science and engineering. Academy symposium; 1997.
- Reid F. The future for renewable energy. In: Women leaders on the uptake of renewable energy seminar; 2001.
- WWW.SUNA.ir (Wind office-Renewable Energies

Office-Ministry of Energy-Islamic Republic of Iran).