Impediments in the Execution of Wind Power Projects: A Case Study of Gharo Wind Projects in Sindh

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Abstract

This paper analyses the current status of the wind power projects in Gharo Wind Corridor in Sindh. Recently the Government of Sindh has given lands to different investors to establish wind farms in the area. However since 2006 when the short term renewable energy policy was introduced only one project has been executed producing currently 6 MW of energy. The objective of this study is to find out what has been the problems associated with the implementation of the policy to promote renewable energy in Pakistan especially with reference to wind energy. The study has found out that the government agencies regulating the renewable energy sector were in-experienced in dealing with the renewable energy sector therefore they took lots of time in deciding about the important issues like tariff rate etc. The investors left the renewable energy sector due to slow processes on their work. However with the success of initial project and the acquirement of substantial experience in documentation the expectations are high that in couple of years at least 200 MW of wind energy projects would be added. The power firms also mentioned that lack of financing options, supply crunch from wind turbine manufacturers before financial crises of 2008 and volatile law and order situation in Pakistan have led to the non implementation of their power projects. It is recommended that a specialized financial institution for the promotion of renewable energy be established in Pakistan. The government should establish model wind power project so that more private investors are willing to take risk in the wind energy market.

Keywords: *Renewable Energy, policy, wind power, Gharo Corridor.*

1. Introduction

Facing the dual challenges of fulfilling the ever growing energy demand on the one hand and protecting the environment on the other, the energy policy makers in the world are promoting renewable energy resources. In Pakistan severe energy crisis has badly damaged the socio-economic fabric of Pakistan. In a desperate attempt to ease the demand supply gap in energy sector Pakistan too is looking towards exploiting renewable energy resources.

1.1 Background of the Study

In November 2006, the Government of Pakistan introduced its first policy to promote renewable energy. The focus of the policy was on giving incentives in the form of

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subsidies, tax reduction, preferential tariff rates to power producers who use renewable energy especially wind. (GOP: 2006) in this regard, AEDB set a target of 700 MW to be produced through renewable energy resources by 2010.

Despite favorable policies to encourage investment in wind power projects only 6 MW of electricity is being produced through wind energy in Gharo Corridor till April 2010.

1.2 Problem Statement

There is a need to investigate why on-grid wind energy projects have not taken off successfully in Gharo Wind Corridor despite favorable wind conditions, government policies and demand for energy. Is it due to factors outside policy framework or within policy framework?

1.3 Objectives of the Study

a) To understand the problems related with wind turbine projects in Gharo Wind Corridor from investors' point of view.

b) To know the point of view of AEDB about the causes of the lack of progress on wind power projects in Gharo Wind Corridor.

1.4 Research Design

This study is descriptive and qualitative in nature. The primary data will be collected through semi structured interviews from private investors and officials of AEDB. The sample size of investors is 6 out of total 18 WIPP companies who have been acquired land in the Gharo Wind Corridor. All the 6 companies are actively involved in the establishment of wind farms in Gharo Wind Corridor. For this study top AEDB officials in Islamabad are also interviewed. At the same time literature on the renewable energy policies is explored through books, magazines, newspapers, internet and research journals.

1.5 Limitations of the Study

This is a relatively new area of research in Pakistan and as the problems associated with wind power projects are analyzed the government officials may not be willing to share the right information. The WIPP companies whose head offices are in Karachi are part of the research. The Lahore and Islamabad based WIPP companies are not part of the research.

1.6 Significance of the Study

The study is a seminal work on on-grid wind power projects in Pakistan. The study helps policy makers to understand the practical problems faced by IWPPs in the execution of their projects.

1.7 Scope of the Study

The results of the study could be applied to other renewable energy technology projects based on solar or bio mass.

1.8 Areas of the Future Research

There is a need to study the micro wind power projects (off-grid) initiated by government to provide electricity to far flung and remote areas of the country. The future research on off-grid micro wind power projects will give a complete picture of wind power projects in Pakistan.

2. Literature Review

2.1 Global Scenario in Renewable Energy

Renewable energy technologies have to fight a long battle to establish themselves as an alternative means of energy among the well established forms of energy based on fossil fuels. Renewable energy technologies are not creating a new service they have to compete with existing fossil fuel based technologies and in free market system price is the mechanism that decides the allocation of resources and currently fossil fuels are cheaper and more flexible than renewable energy technologies. (Mallon: 2006)

The growth of renewable energy in different countries has been influenced by two main policy mechanisms: Renewable Energy Feed in Tariff (REFIT) and the Renewable Energy Portfolio Standards (Lipp, 2007). REFIT mechanism requires energy companies to purchase electricity from renewable energy producers at a favorable price per unit guaranteed over a certain time period. Feed in Tariff (FIT) rates are set separately for each renewable energy technology, (wind, solar, geothermal etc) depending upon its cost of production. FITs if properly implemented can bring great benefits to electricity consumers, electric utilities and society as a whole. FITs help in the development of renewable energy technologies and their rapid deployment. Thus bringing the cost of renewable energy technologies down and making them competitive with fossil fuel based technologies (Mendonca et al, 2010).

The "Renewable Portfolio Standard" (RPS) requires that power companies should produce a certain percentage of their power generation from renewable energy sources by a given date (PCGCC, 2009 and Lauber, 2006). Australia, UK, Japan and several states in the USA have applied the RPS approach (Swisher and Porter, 2008).

The countries that adopted REFIT have been successful in achieving best results in capacity deployment, developing renewable energy power industry and brining the costs and prices down. Germany leads in renewable energy technologies and credit goes to its policy that led to the expansion and growth of this sector (Lipp, 2007).

Several countries have adopted Renewable Portfolio Standards. The success of RPS is mixed depending upon the design mechanism used. In several US states and

European countries, RPS schemes have been a failure due to unclear regulatory rules, insufficient enforcement, strict eligibility guidelines and weak government support. In the state of Texas (USA), RPS has proven to be an effective and low cost support mechanism for renewable energy. The success was due to the proactive and aggressive approach of the state where it set an ambitious target of producing 2000 MW of electricity by renewable energy by the year 2009 (Langniss and Wiser, 2008). The countries that have adopted RPS showed little concern for adopting renewable power equipment industry (Lauber, 2006).

In Japan, the policy towards wind energy development has been indifferent. Japan has set three strategic energy objectives. Japan has placed nuclear power at the centre of its strategic energy policy. Increasing the feed in mandates for renewable energy and by liberalizing the power generation industry, Japan can successfully transform its energy sector towards renewable energy sources (Valentine, 2009).

In UK, the renewable energy policy is designed with the philosophy of not interfering in the markets. The government does not support the stimulation of new national industry through public funds. UK gives no consideration to the return on national investment in the development of renewable energy technologies. Therefore, the UK companies in renewable energy sector find it hard to compete internationally against those companies that gain support from their governments (Connor, 2008). The case in point is of Denmark where the government's investment subsidies supported the market of renewable energy technologies and develop the alignment among policy makers, manufacturers, investors and researchers to establish techno-economic organization and innovation base (Nielsen, 2008).

Government of China acknowledges the importance of renewable energy and has set ambitious targets for energy production through renewable energy. However in wind China lacks a clear cut purchase policy and the prices differ from provinces to provinces (Saidur et al., 2010). In India renewable energy policy encourages local private investment and foreign direct investment. India will be an exciting place for global and national renewable energy industry in the near future (Bakhshi, 2006).

2.2 Renewable Energy Scenario in Pakistan

Pakistan's current power generation capacity is 19,460 MW with thermal sources (fossil fuels) accounting for 64% of total energy supply. The share of renewable energy is negligible. (MOWP: 2009). Currently Pakistan is facing a severe energy crises with the gap between demand and supply reaching 5000 MW (Sana News, 2010). Pakistan is looking for different solutions ranging from coal, nuclear, thermal and renewable energy projects to mitigate the power crisis. Pakistan's efforts to include renewable energy resources in its power mix were institutionalized with the establishment of Alternative Energy Development Board in 2003. AEDB has the mandate to implement policies, programs and projects through private sector in the field of alternative energy and facilitate the development and generation of alternative energy to achieve sustainable economic growth (AEDB, 2009).

In its short term renewable energy policy released in November 2006 for the period till June 30' 2008, Government of Pakistan (GOP, 2006) offered liberal risk cover and attractive purchase tariffs to enable investors to install a reasonable generation capacity. Private sector was targeted to invest in large power projects while public sector was to undertake the projects in far flung areas of the country where financial returns on the projects were not profitable. Several incentives were given to IWPP companies. The major incentives offered:

1. Guaranteed market: It was made mandatory for the power distribution utilities to buy all the electricity offered to them by the RE project.
2. Wheeling: RE power producers were allowed to enter into direct sales contracts with end-customers.
3. RE Resource Variability Risk: Revenues will be guaranteed according to the benchmark production levels for each project even if production falls due to variability of wind speed.
4. Carbon Credits: All qualifying RE projects shall be encouraged to register for Carbon Credits with Clean Development Mechanism Executive Board.
5. Exemption from Custom duty or Sales tax of any equipment imported for running the project.

The short term renewable energy policy, however, failed to deliver the results and in March 2010, AEDB involved various stakeholders in Renewable Energy for the consultation to develop medium term policy. The draft available of AEDB medium term policy has shown similar incentives to wind power projects as were given in short term policy some changes. The significant changes include the accelerated depreciation of 90% for eligible depreciable assets and 100% carbon credit benefits to IPPs. Furthermore premium rate of return is offered (17% as compared to 15%) and further bonuses on early completion of projects. (AEDB: 2010a)

The area identified for large wind projects is Gharo Wind Corridor stretching from the Indus delta to Hyderabad covering an area of 9700 sq. km in Sindh and has a gross wind power potential of 43000 MW. The exploitable power potential for the area is 11000 MW. (PMD, 2008)

AEDB has so far allocated land to eighteen (18) IWPP companies for wind power generation projects of 50 MW each. Thirteen (13) IWPPS have submitted the feasibility studies of 50 MW wind power projects to AEDB. NEPRA has so far issued Generation License to six (6) IWPPs and announced tariff determinations for three (3) IWPPs. (AEDB: 2010)

3. Analyses of the Data

To find out the reasons why the power projects in Gharo wind corridor failed to take off despite having lucrative incentives in short term policies, interviews were conducted with AEDB officials and IWPP companies' project heads. Some of the interviews were conducted during the consultative workshops of renewable energy stakeholders organized by AEDB for developing the medium term renewable energy policy in Karachi and Islamabad held on 1 March 2010 and 8 March 2010 respectively.

3.1 Independent Wind Power Producers' Response

In the data analysis our focus was on the response of the project heads of IWPPs. During the interviews the questions related to nine problem areas were asked. These problems were identified based on different phases of wind power project. The question related to security issues was asked in the context of volatile law and order situation in Pakistan. The identity of companies and officlas has been kept confidential due to the sensitive nature of their responses.

a. Wind Data

Did you collect your own wind data for the feasibility of project or you relied on the AEDB provided wind data?

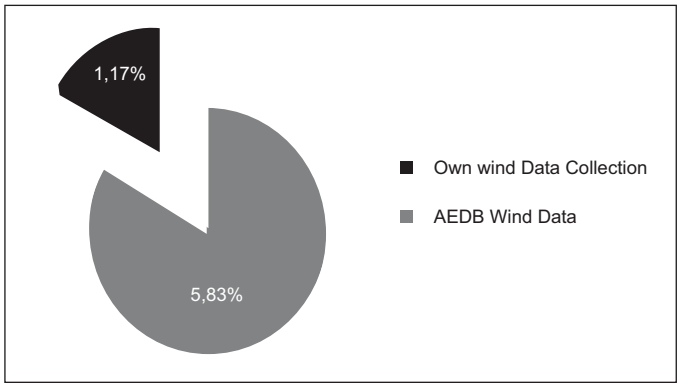


Figure: No. I

Analyses: Only 17% of the IWPP based their feasibility on the wind data provided by AEDB. 83% of IWPPs erected their own wind masts to collect the data. The result shows that IWPPs were not confident about the authenticity of wind data collected by AEDB and to get the reliable data on which all the calculations for electricity production are based they erected their won wind masts.

b. Land Acquisition

Did you find any problem in the acquisition of land and for wind power project in Gharo Wind Corridor through AEDB?

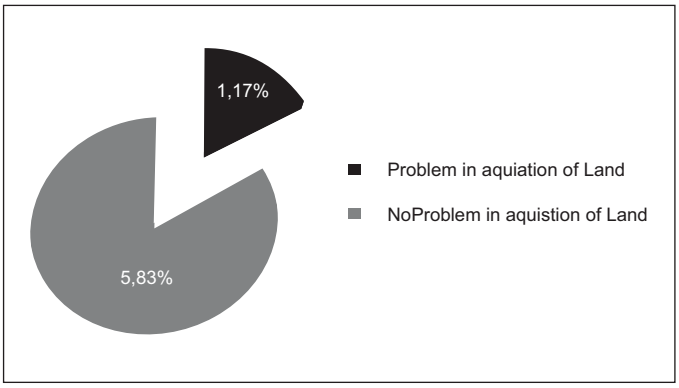


Figure: No.2

AEDB has facilitated the acquiring of land in Gharo Wind Corridor on lease. 83 % of the IWPP companies had no issue with acquisition of land in the area. 17% IWPPs had faced problems in getting land in the area. The late comers in the Gharo Wind Corridor are now facing difficulty in getting land.

c. Time period for Documentation

Did you find any problem in the preparation of documentation for submission to NEPRA for getting tariff rate?

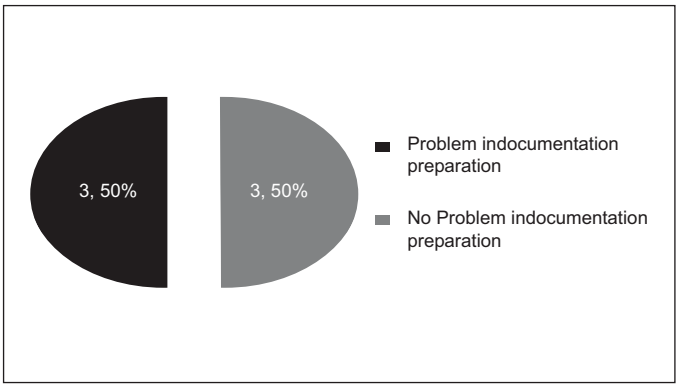


Figure No. 3

Analysis: Initially there were issues with the documentation process for technical and financial feasibility as there were no standardized documents available. 50% of the IWPP companies mentioned that long time for the development of feasibility was an issue in the delay of starting of projects. However, the late comers do not have to go

through the same problem as the standardized documents have been prepared by initial phase IWPPs.

d. Time period taken for Tariff determination by NEPRA

Are you satisfied with the time period taken by NEPRA to decide the tariff rate for wind power projects?

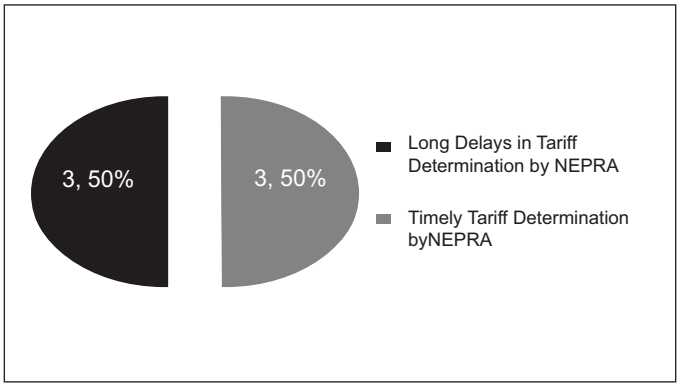


Figure No. 4

The tariff determination by NEPRA also took time between 6 months to 1 year in the initial phase of the project. Many firms as mentioned by 50% of IWPP companies abandoned their projects due to delays in tariff determination by NEPRA. The reason for the delay at NEPRA was that the officials there were new in the renewable energy field and they themselves had no experience in the determination of tariff. They were reluctant to commit themselves with a rate that might turn out be very high. However, with the accumulated experience regarding tariff determination it is expected to be timely as mentioned by 50% of the IWPPs.

e. Financial Impediments

Did you face any problem to arrange finances for your wind power projects? If yes, what were those problems?

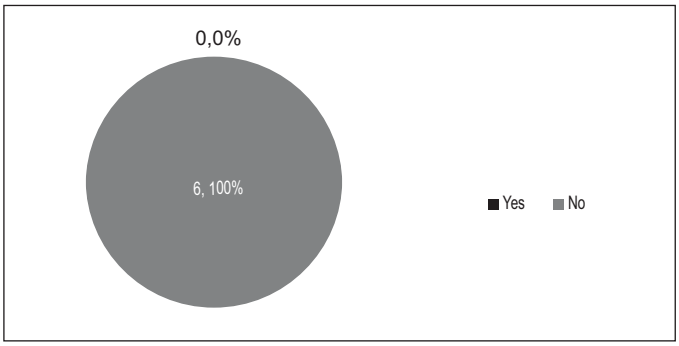
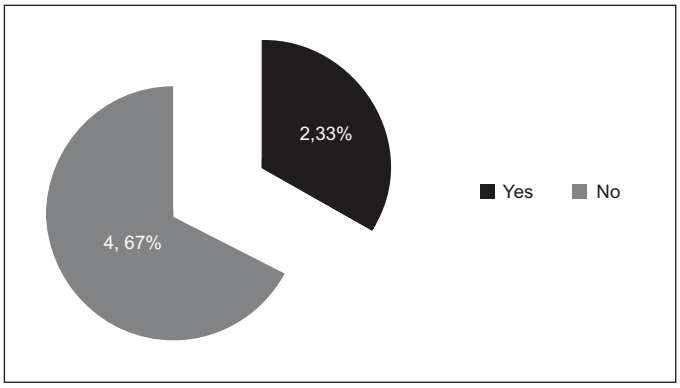


Figure No. 5

The greatest impediment for the wind power projects comes from non availability of financial resources. Due to high risk environment in Pakistan, foreign banks are not willing to take risk in investing in Pakistan. Local financial institutions are not well equipped with financial requirements of the large wind farm projects. State Bank of Pakistan is also offering loan only to small projects. With the Asian Development Bank and International Financial Corporation funding available for renewable energy projects the financial crunch has eased down. However the Pakistani projects have to pay high rate of interest due to high risk conditions in Pakistan.

f. Wind Turbine Availability

Is there any problem in the procurement of wind turbines from wind turbine manufacturing companies? If yes, what were those problems?



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The IWPPs that started work between 2007-2008 just after the announcement of the short term renewable energy policy found the procurement of wind turbines difficult. This was the time period when oil prices reached the peak that created a huge demand for wind turbines in the international markets. There were hike in the prices of wind turbines due to price increase and many firms in the initial stage had to revise their cost due to increased pricing that caused further delay in the determination of tariff by NEPRA. The shortage of wind turbines during 2007-2008 time period caused delays in the start of the projects. However the situation has much improved as far as supply of wind turbines is concerned due to the global financial crisis of 2008. Many wind turbine manufacturers are willing to work with Pakistan on priority bases.

g. Grid Code

Are you satisfied with the existing "Grid Code"?

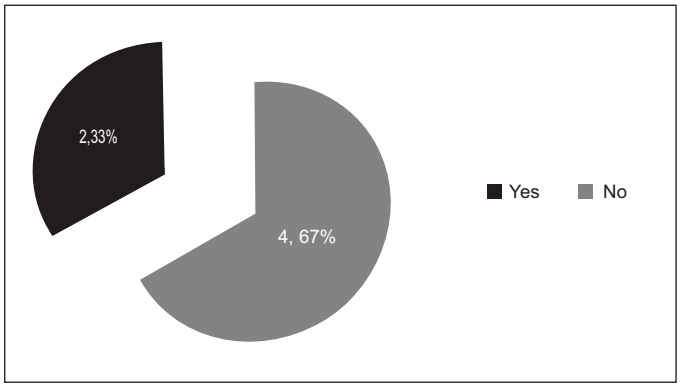


Figure No. 7

Two IWPP companies also demand the change in grid code as the wind is not predictable as compared to fossil fuel. Hence the conditions on which the power would be purchased from power producers needs to be changed in the grid code.

h. Ambiguity Regarding Carbon Credits

Does your project qualify for getting Carbon Credits through Clean Development Mechanism program of United Nations Framework of Climate Change?

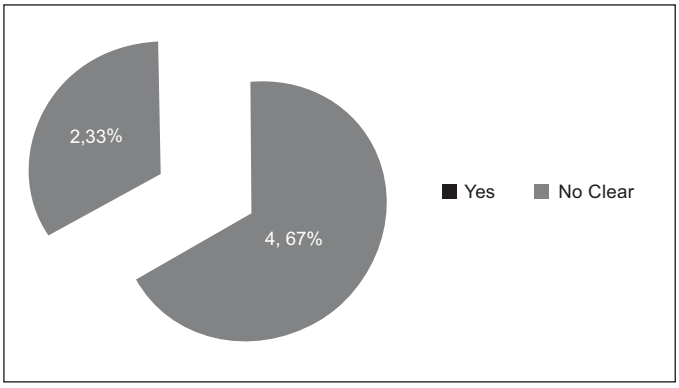


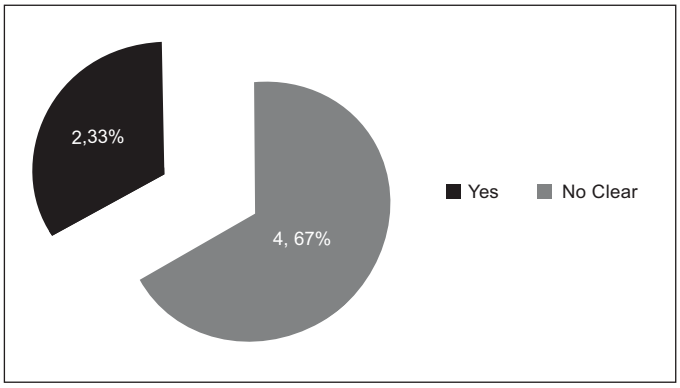
Figure no. 8

There is also an ambiguity among the private investors regarding the eligibility of their projects for Carbon credits. As one of the projects' official described that according to the United Nations Framework Convention on Climate Change only those project will qualify for carbon credits that are not otherwise financially viable. Since wind power projects are guaranteed a high rate of return therefore they do not qualify for carbon

credits. Other officials were of the view that wind power projects do qualify regardless of the rate of return. The ambiguity still persists. 33% of the IWPP companies mentioned about the ambiguity of getting carbon credits for their projects. Other IWPPs had no issue.

i. Security Issues

Has the prevailing law and order situation in Pakistan affected the wind power projects? If yes then in what ways?



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All the companies' representatives mentioned that worsening law and order situation in Pakistan has affected the wind power projects. The qualified foreign consultants are un-willing to come to Pakistan due to the security problems. Foreign direct investment has dwindled and the political risk in Pakistan has resulted in high rate of interest for projects.

3.2 AEDB Official Response

The officials of AEDB conceded that 2006 RE policy was good but not good enough for the promotion of renewable energy. There was a need for standardized commercial documents, renewable energy friendly grid codes and promulgation of the law to support renewable energy. However they blame the external factors for the failure of achieving the short term targets. According to them the dramatic increase in the oil prices in between 2007 and 2008 led to the greater demand for wind turbines. The other countries like China and India that were advanced in the deployment of wind energy and having better Renewable Energy policies and incentives rapidly deployed wind turbines. The greater demand created the shortage of wind turbines in international market and that resulted in non availability of wind turbines for Pakistani investors. The 2008 global economic crises also led to the general deterioration of investment climate. Pakistan was also affected as the investment declines in Pakistan due the global financial crises.

4. Conclusion

The Renewable Energy policy of the Government of Pakistan is well received by the private investors for wind power projects. However, the investors found that the law and order situation in the country has resulted in lack of foreign direct investment, shortage of foreign qualified wind project consultants and high risk premiums. The government agencies like NEPRA were not experienced to deal with renewable energy projects and they took long time to decide about tariff rates that drove many investors away. However with the easing of global financial crisis there are wind turbine companies and international funding agencies like IFC and ADB that are very much interested in wind power projects in Pakistan. The tariff offered to these projects is satisfactory and the culmination of new projects would be at a much faster rate now and if political and security situation is improved we see large number of projects executed in Gharo Wind Corridor.

5. Recommendations

It is recommended that to expedite the production of electricity through wind power in Pakistan reliable and detailed wind data need to be collected. The government should set up an exclusive financial institution for the promotion of renewable energy projects. The government should also establish model wind farms so that more private investors are willing to take risk in the newly developed market.

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