Federal Ministry
for Economic Affairs
and Energy

Wind Energy in Iran; Feed in Tariffs, Wind Energy Potential,

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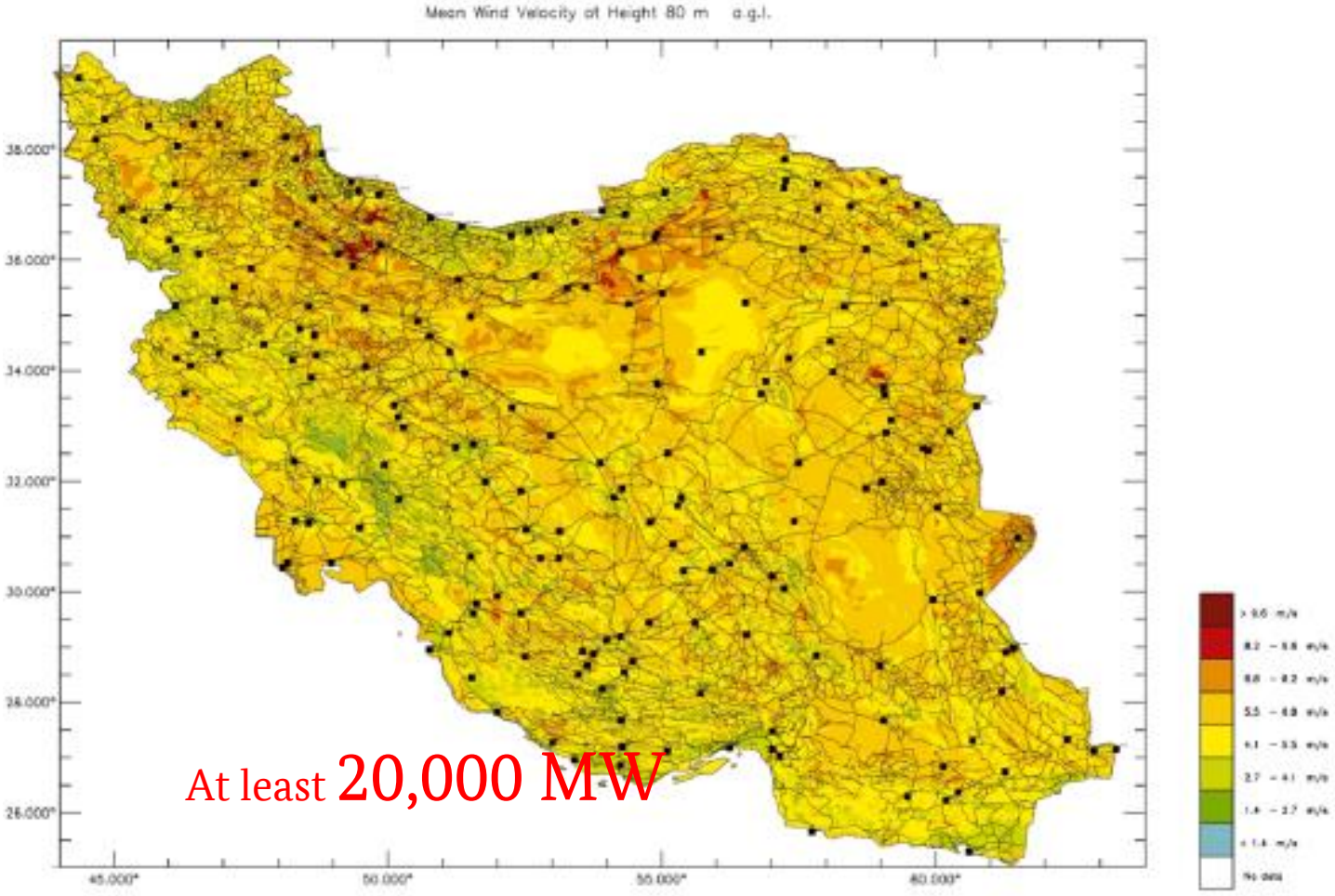
Content

2- Wind Energy Potential in Iran



1- Wind Energy Potential in Iran

- **Use of wind energy in Iran**
- According to the advantages of wind power, Iran's potential for wind power generation is 20.000 MW.

- There are four regions in Iran to install wind turbines.
  - It is from north west of Iran in west Azarbayjan to Sarakhs & Damghan.
  - It is from Zagros mountain to Sistan & Baloochestan.
  - It is from Khoozestan to Ilam & Kordestan.
  - It is a huge area from Khorasan to Zabol.

1- Wind Energy Potential in Iran

- **Benefits and necessity of using wind farms in Iran**

- All wind farms in Iran are capable of handling 3MW turbines
- Quick and simultaneous installation of turbines
- Macro sitting conducted by SUNA
- Majority of wind farms in Iran have been located in plain areas thus minimizing the cost of erection and execution.
- Infrastructures necessary for the implementation of projects such as access roads and power grid exist for most of wind farms
- Availability of the choice of off-grid and on-grid installation of wind turbines.
- Iran's border line with the Persian Gulf and Sea of Oman is over 2000 kilometers. These areas together with the Persian Gulf islands are generally not connected to the power grid and therefore, lower cost on-shore turbines installed in these areas can offer the advantages of offshore turbines at no additional costs.

1- Wind Energy Potential in Iran

- **Benefits and necessity of using wind farms in Iran**

- On the implementation of the legal obligations of Ministry of Energy, the guaranteed electricity purchase tariff for types of renewable and clean energy for 20 years.
- Provision of financial sources out of excessive tax levied on overconsumption (rural consumers are exempt).
- Whereas, south of Iran is one the world's dry regions, desalination of sea water can be a priority in this region. Wind turbines can provide sources of energy required for desalination units.
- According to Falcon Mark and the UN indices, Iran is experiencing water tension; therefore, provision of water is a high cost process.

1- Wind Energy Potential in Iran

- **Benefits and necessity of using wind farms in Iran**

no water
for Power generation

- Wind turbines need no water for Power generation.
- The average water consumption in the Iranian power plants is 1.05 m3/mWh.

Power Plant	million kwh	%	m^3/mwh	m^3/mwh
Conventional	89664	34.2	1.25	0.43
Opnen Cycle	66039	25.2	0.7	0.18
Combine Cycle	87135	33.2	1.15	0.38
Hydro	14470	5.5	0.3	0.02
Deisel	284	0.1	0.7	0.00
Nuclear	4600	1.8	2.7	0.05
	262192	**100**		**1.05**

source: Tavanir power production 2013

1- Wind Energy Potential in Iran

- **Benefits and necessity of using wind farms in Iran**

no water
for Power generation

- Whereas, Iran power plants generate 262 thousand GWh/year of electricity, they require 275 million m3 of water annually.
- If wind power generation constitutes only 1% of this figure, 2.75 million m3 of water is saved each year.

1- Wind Energy Potential in Iran

OPPORTUNITIES OF IRAN'S WIND POWER PLANTS

- Iran is located on the seasonal wind belt. (at least 45 wind farm)
- Expansion of small scale wind turbines has served to be effective in giving way to the culture of developing wind farms.
- Government, it plans to generate 5000 MW from renewable energies (exception of hydro power) in 2013 that by 2015, which will meet 7% of Iran's power requirements.
- Engagement of large Iranian companies in the area of manufacture of main wind turbine parts such as blade, tower, control systems, etc. will
- allow the industry to compete in the world market of wind turbines in the near future.

1- Wind Energy Potential in Iran

OPPORTUNITIES OF IRAN'S WIND POWER PLANTS

- Kyoto protocol: CDM (clean development mechanism):
- Iranian companies that generate emission free electricity can receive CER (Certified Emission Reduction) from the UN.
- Such countries as Pakistan, Azerbaijan and Georgia that are host to rich wind farms form rewarding overseas markets for the Iranian players of the industry.
- Iran's expert company has undertaken to manufacture and construct the Middle East's largest wind farms relying on the following advantages:

1- Wind Energy Potential in Iran

OPPORTUNITIES OF IRAN'S WIND POWER PLANTS

- Large companies engaged in the power generation industry have built confidence in the suppliers of technology, consumers, contractors and government bodies. Such a confidence is on the building in the wind farm market as well.
- Integrated management of production and execution of all components of wind farms within a manufacturing unit can significantly impact pace of production and end user price.
- The potential that resides within large groups to finance wind farm projects is a unique opportunity for the financing and development of wind farms.

3- Wind Farms under operation and in the pipeline

3- Wind Farms under operation and in the pipeline

Wind Power Plant in Regional Electricity co.						
Regional Electricity co.	Installed Capacity (MW)			Production (GWH)		
	2014	2013	% Growth	2014	2013	% Growth
Azarbaijan	4	3	33.3	2	3	
Esfahan	1	7		0	1	
Bakhtar						
Tehran	16	43				
Khorasan	4	5	-20.0	7	7	0.0
Khoozestan	1	1				
Zanjan						
Semnan						
Sistan & Baloochestan	1	1		1		
Gharb						
Fars						
Kerman						
Gilan	92	72	27.8	129	133	-3.0
Mazandaran						
Hormozgan						
Yazd						
Kish						

Source: Electricity Industry Statistics 1393(2014)

3- Wind Farms under operation and in the pipeline

Sites	Location	Nominal Capacity (MW)	Capacity factor
Khvaf	Khorasan province	50	51.6%
Nashtifan	Khorasan province	50	52.6%
Siahpoosh	Ghazvin province	70	46.2%
Sarab	East Azarbaijan province	80	45.57%
Jarandagh	Ghazvin province	100	42.9%
Binalood	Khorasan province	50	42.7%
Koohin	Ghazvin province	50	42.5%
Kahak	Ghazvin province	50	39.6%
Fariman	Khorasan province	100	34.1%

3- Wind Farms under operation and in the pipeline

- Manjil Wind Farm

3- Wind Farms under operation and in the pipeline

- Binaloud Wind Farm

3- Wind Farms under operation and in the pipeline

- Kahak Wind Farm

4- Financing Wind Farms in Iran, the challenges and barriers

PROCEDURE FOR THE FINANCING OF WIND FARMS:

1. Low interest rate facilities
2. Receipt of facility from the National Development Bank
3. Overseas Financing
4. Facilities granted by the Ministry of Energy out of collection of Consumer Tax
5. KYOTO international pact
6. Procedure for securing the special fund's capital
7. Procedure for providing capital for lease Sokuk bonds

4- Financing Wind Farms in Iran, the challenges and barriers

1. LOW INTEREST RATE FACILITIES

Whereas, bank interests in Iran are very high and return of loan is short term and the interest rates of such loans exceed the project's rate of return, investors are not attracted by bank loans.

4- Financing Wind Farms in Iran, the challenges and barriers

2. **RECEIPT OF FACILITY FROM THE NATIONAL DEVELOPMENT BANK**

The National Development Fund's interest rate is reasonable and majority of investors do their best to use this fund for financing of a project, however, the fund allocates little financing to renewable energies and for that matter, receiving loan from this fund is time consuming and projects rarely have the chance to receive a loan from this fund.
Even if the loan is granted, it covers less than 75% of the project cost.

4- Financing Wind Farms in Iran, the challenges and barriers

3. **OVERSEAS FINANCING**

Financing of projects utilizing overseas financial sources is attractive for local and foreign investors due to low rate of interest compared with local banks.
In recent years, however, due to sanctions and impediments in the way of transfer of money to Iranian banks and high risk of investment in Iran, overseas financial sources refuse to grant loans to wind farm investors.

4- Financing Wind Farms in Iran, the challenges

4.FACILITIES GRANTED BY THE MINISTRY OF ENERGY OUT OF COLLECTION OF CONSUMER TAX

Guaranteed renewable electricity purchase tariffs for 20 years.

Paragraph 69 of Iran's 2013 budget law: The government levies a scant IRR30 /kwh (IRR50/kwh) in tax on consumers of electricity for the development of renewable energies and development of rural grid. (rural household consumers are exempt).

4- Financing Wind Farms in Iran, the challenges

5. KYOTO INTERNATIONAL PACT

The UNFCCC of which majority of wind farm projects have been approved.
This amount is currently ¢€15 per ton CO2 has been reduced significantly compared with the previous years.

4- Financing Wind Farms in Iran

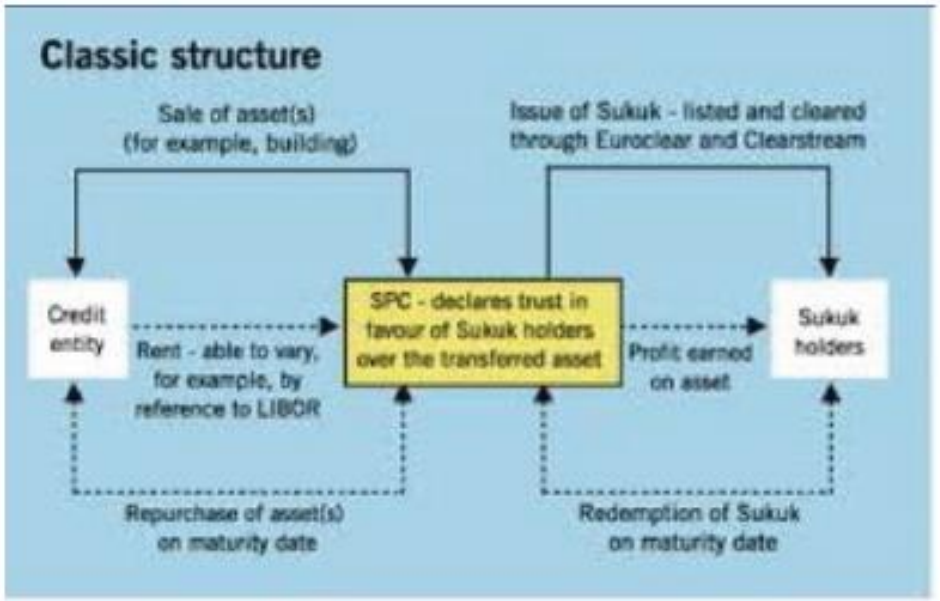
6. PROCEDURE FOR SECURING THE SPECIAL FUND'S CAPITAL

Another attractive method is allowing the investors to have a share of the profit as a result of the progress of projects. In this manner, concerns about inflation rate are subsided, for growth of the company's asset value can notably cover inflation.

4- Financing Wind Farms in Iran, the challenges and barriers

7. PROCEDURE FOR PROVIDING CAPITAL FOR LEASE SUKUK BONDS

Sukuk generally implies Islamic financial tools.
In this mechanism, physical-asset-based bonds are issued.
The owners of bonds are in fact considered owners of the asset.
The owners of these bonds own a portion of the asset that has been assigned in compliance with the lease contract.



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5- Case Study
Nashtifan Wind Power Plant

5- Case Study: Nashtifan Wind Power Plant

- **Case Study (Nashtifan Wind Power Plant)**
- **Nashtifan** is a city in the Central District, Khvaf County, Razavi Khorasan Province, Iran.
- **Khvaf County** is a county in Razavi Khorasan Province in Iran. The capital of the county is Khvaf. It is a small border town about 350 km from Mashhad.
- The county contains five cities: Khvaf, Nashtifan, Qasemabad, Salami, and Sangan.

5- Case Study: Nashtifan Wind Power Plant

Index	Point of views
Site area	2830 Hectare
Site capacity	52.6%
Average wind speed measured at the site conditions	6.07 m/s – at the height of 10 m - Class 5
transmission lines	Ghaenat – Torbate Jam 400 kv transmission line passes through the site.
Access ways to the site	Khvaf – Taibad road
Security	Good
Site vegetation	Bush

5- Case Study: Nashtifan Wind Power Plant

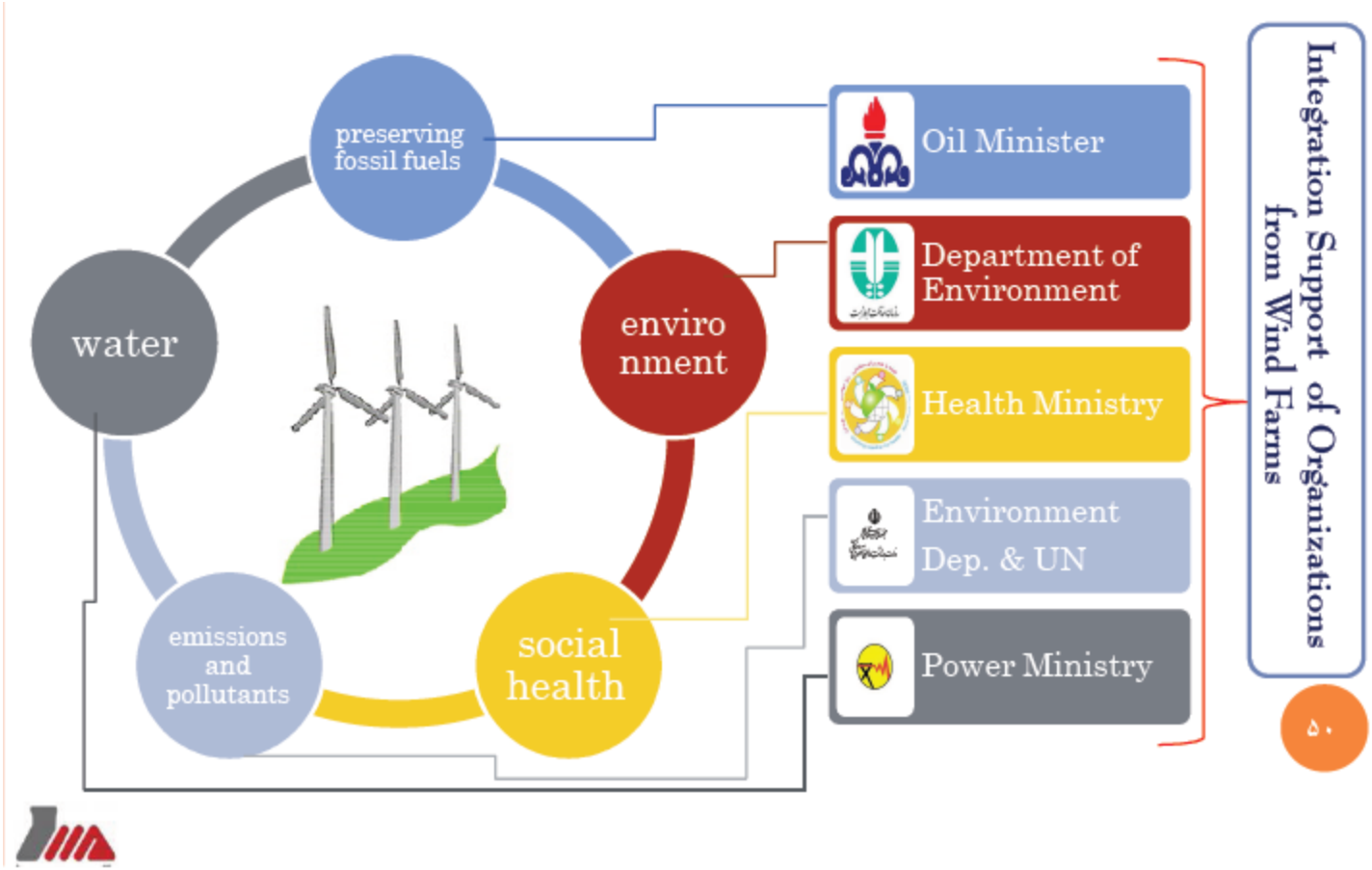
Financial & Economic Analysis

Technical data

The summaries of technical data used in the financial model of power plant are as follows:

Technical data	
Nominal capacity of wind generator	2.5 MW
Number of wind turbine	20
Nominated output of wind generator	50 MW
Capacity factor	Max: 52.6% Min: 42.6%*
Actual capacity of wind generator	Max:1.32 MW Min:1.07 MW
Actual net generator output	Max:21.30 MW Min:26.30 MW
Total operating hours	8760 Hours / year
Total potential energy production	Max: 230.4 Gwh / year Min: 186.6 Gwh / year

*Because of uncertainty


preserving fossil fuels
water
enviro nment
emissions and pollutants
social health
Oil Minister
Department of Environment
Health Ministry
Environment Dep. & UN
Power Ministry
Integration Support of Organizations from Wind Farms
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Thanks you for your kind attention