The Potentials of Wind Energy Investment in Iran

Houman Liaghati
Iran National Environmental Fund
2015
The amount of renewable power capacity

| TECHNOLOGY                                      | World | EU-28 | BRICS | China | United States | Germany | Italy | Spain | Japan | India |
|------------------------------------------------|-------|-------|-------|-------|---------------|---------|-------|-------|-------|-------|-------|
| Bio-power                                       | 93    | 36    | 29    | 10    | 16.1          | 8.8     | 4     | 1     | 4.7   | 5     |
| Geothermal power                                | 12.8  | 1     | 0.1   | ~0    | 3.5           | ~0      | 0.9   | 0     | 0.5   | 0     |
| Hydropower                                      | 1,055 | 124   | 463   | 280   | 79            | 5.6     | 18    | 17.3  | 22    | 45    |
| Ocean power                                     | 0.5   | 0.2   | ~0    | ~0    | ~0            | 0       | 0     | ~0    | 0     | 0     |
| Solar PV                                        | 177   | 87    | 32    | 28    | 18            | 38      | 18.5  | 5.4   | 23    | 3.2   |
| Concentrating solar thermal power (CSP)         | 4.4   | 2.3   | 0.2   | ~0    | 1.6           | 0       | ~0    | 2.3   | 0     | 0.2   |
| Wind power                                      | 370   | 129   | 144   | 115   | 66            | 39      | 8.7   | 23    | 2.8   | 22    |
| Total renewable power capacity (including hydropower) | 1,712 | 380   | 668   | 433   | 185           | 92      | 50    | 49    | 54    | 76    |
| Total renewable power capacity (not including hydropower) | 657   | 255   | 206   | 153   | 105           | 86      | 32    | 32    | 31    | 31    |
| Per capita capacity (Watts / inhabitant, not including hydropower) | 90    | 500   | 70    | 110   | 330           | 1,070   | 530   | 680   | 250   | 20    |
The Trend in Renewable Energy Investment
Wind Power Global Capacity – 2004 -2014

Figure 22. Wind Power Global Capacity, 2004–2014

Source: See Endnote 1 for this section.

51 Gigawatts added in 2014
Wind Power Capacity in Top 10 Countries

Wind generated more than 20% of electricity in several countries, including: Denmark, Nicaragua, Portugal and Spain.

Figure 23. Wind Power Capacity and Additions, Top 10 Countries, 2014

- China: +23.2
- United States: +4.9
- Germany: +5.3
- Spain: ~0
- India: +2.3
- United Kingdom: +1.7
- Canada: +1.9
- France: +1.0
- Italy: +0.1
- Brazil: +2.5

Source: See Endnote 8 for this section.
The Potential of each Sector in Job Creation

Figure 5. Jobs in Renewable Energy

- **Bioenergy** (Biomass, Biofuels, Biogas)
- **Geothermal**
- **Hydropower** (Small-scale)
- **Solar Energy** (Solar PV, CSP, Solar Heating/Cooling)
- **Wind Power**

Source: IRENA

World Total: **7.7 Million Jobs**

i - Employment information for large-scale hydropower not included.
Estimating the Wind Energy Share in Global Final Energy
FIGURE 4. GLOBAL NEW INVESTMENT IN RENEWABLE ENERGY: DEVELOPED V DEVELOPING COUNTRIES, 2004-2014, $BN

Trend in Investment in Developed and Developing Countries
The total investment on Wind Energy in 2013.
Country Vision in Energy Sector

It is planned for 5% of the national generation of electricity to be from renewable sources.
Iran Energy Supply (2014)

Total Energy Mix in Iran

- Oil: 44%
- Natural Gas: 53%
- Hydroelectric Power: 2%
- Coal: 1%
Iran capacity for wind power
Applying wind energy has priorities over other power resources, including:

- Reducing costs
- Job opportunities
- Lack of environmental pollution

In Iran, wind energy is the second source of electricity production from renewable sources.

Iran potential capacity for wind power generation has estimated as 100 G watt.

At 2012, the active capacity of country for wind power generation was 106 M watt.
## Capacity of Iran wind power plants (2012)

<table>
<thead>
<tr>
<th>Turbine (KW)</th>
<th>Number and capacity (KW)</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27 (8100)</td>
<td>Manjil</td>
</tr>
<tr>
<td>2</td>
<td>2 (1000)</td>
<td>Manjil</td>
</tr>
<tr>
<td>3</td>
<td>18 (9900)</td>
<td>Manjil</td>
</tr>
<tr>
<td>4</td>
<td>1 (600)</td>
<td>Manjil</td>
</tr>
<tr>
<td>5</td>
<td>70 (46200)</td>
<td>Manjil</td>
</tr>
<tr>
<td>6</td>
<td>9 (5940)</td>
<td>Manjil</td>
</tr>
<tr>
<td>7</td>
<td>43 (28380)</td>
<td>Binalood</td>
</tr>
<tr>
<td>8</td>
<td>1 (660)</td>
<td>Zabol</td>
</tr>
<tr>
<td>9</td>
<td>1 (660)</td>
<td>Babakooohi (Shiraz)</td>
</tr>
<tr>
<td>10</td>
<td>3 (1980)</td>
<td>Tabriz</td>
</tr>
<tr>
<td>11</td>
<td>1 (660)</td>
<td>Ardabil</td>
</tr>
<tr>
<td>12</td>
<td>1 (660)</td>
<td>Isfahan</td>
</tr>
<tr>
<td>13</td>
<td>1 (660)</td>
<td>Mahshahr</td>
</tr>
<tr>
<td>14</td>
<td>1 (1500)</td>
<td>Khaaf</td>
</tr>
<tr>
<td>15</td>
<td>1 (2500)</td>
<td>Khaaf</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109,400</strong></td>
<td></td>
</tr>
</tbody>
</table>
Wind Energy in Iran

As Iran located in a low-pressure region surrounded by high-pressure areas of north and north-west, the country is located in a corridor of following winds in summer and winter:

✓ Winter winds from Atlantic ocean, Mediterranean and Central Asia region
✓ Summer winds from India ocean and north-west winds

A study in 1999 showed that there are huge capacities for wind power in country in north-west, north, north-east and east which can be utilized to generate 19900 GWh electricity (Kianifar, 1999).
INEF and its role in development of renewable energies in Iran
Part II, article 68, 5th National program for development:
The government is permitted to, considering article 72 and 85 of Iran Constitution, establish Iran National Environmental Fund (INEF) to reduce environmental pollutants and degradations.

Part II, article 187, 5th National program for development for Edits on INEF establishment

INEF articles of association (2005)

Edits on INEF articles of association (2008 and 2014)

Formal establishment of INEF, 2014
Dignitaries of INEF

✓ General assembly
✓ Board of directors
✓ Executive director
✓ Inspector
✓ Masoumeh Ebtekar, Vice President & Head of Department of Environment
✓ MohammadReza Nematzadeh, Minister of Industry, Mine and Commerce
✓ Ali Tayyebnia, Minister of Economy and wealth
✓ Mohammad Javad Zarif, Minister of foreign affairs
✓ MohammadBagher Nobakht, Head of management and planning organization
Board of directors

- **Safdar Hosseini**, Chairman
- **Ali Mojabi**, Vice chairman
- **Ali Mojtahed Shabestari**, Member of board
- **Farhad Dabiri**, Member of board
- **Houman Liaghati**, Executive director, Member of board
INEF fields of activity

- Supply and equip legally-provided financial sources
- Granting to factories, industries, firms etc, to reduce environmental pollutants
- Granting for prevention of environmental damage through conservation, reclamation and management of biodiversity (ecosystem, habitat, species and gene)
- Financial support and participation for environmental and ecotourism projects
- Financial support and participation for education to improve environmental condition
- Granting for innovators and researchers to develop and mass production of facilities for control and reduction of air pollution
INEF sources of credit

- Governmental financial aids according to regulations and law
- Non-governmental, domestic, true- and legal person presents and financial aids
- International presents and financial aids
- Income from INEF financial turnover and activities and its branches
- Other income and financial sources according to regulations and law
INEF and development of renewable energy in Iran

✓ Making loan and financial support for new-established industries
✓ Making Transparent subsidies and reducing obligatory facilities to Banks
✓ Facilitation of absorbing international projects, including CDM and absorbing GEF financial support
✓ Empowerment for renewable energy consumption in the country
✓ Integration of financial sources from pollution and environmental tax to develop investment in renewable energy sources
✓ Applying supportive policies in high-capacity regions in the country for renewable energy
✓ Providing financial sources to guaranteed purchase of electricity from renewable energy power plants
**Concluding remarks**

INEF is ready to commence and develop its cooperation with German partners in the following fields for renewable energy section:

✓ Abstracting investors,
✓ Participation in direct investment,
✓ Marketing, and
✓ Developing market.
The potentials of Wind Energy Investment in Iran

Houman Liaghati
Iran National Environmental Fund

2015