Eni Energy Solutions in Kazakhstan
Badamsha project
Republic of Kazakhstan

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Eni Energy Solutions in Kazakhstan

1. The Context: Energy Transition

2. Eni Business Model and Plans

3. Badamsha 50 MW Wind Project
Actual shares of worldwide renewable energy

Which future for renewables in energy mix?

Eni elaborations on IEA, IRENA, BP, IHS, Greenpeace, Exxon data
Eni Energy Solutions Business Model

AN INTEGRATED MODEL

- Synergies with Eni assets and activities
- International expansion in Eni Countries
- Solar, Wind and Hybrid Technologies
- R&D Deployment
Eni renewable strategic plan

RENEWABLES: INTEREST AREAS OF THE 2018-2021 STRATEGIC PLAN

1 GW
INSTALLED CAPACITY
FROM RENEWABLES BY 2021

€1.2 BILLION
OF INVESTMENTS
BY 2021

INVESTMENTS BY GEOGRAPHIC AREA

INVESTMENTS BY TYPE

Italy  Asia  Rest of the world

PV  Wind onshore  Other*

* Mainly referred to innovative solutions in R&D
Eni activities in Kazakhstan

Eni is in Kazakhstan since 1992

- Co-operator of the Karachaganak field
- Partner in the North Caspian Sea PSA, in charge of Kashagan operations
- Holder of 50% interest for exploration and production of the Isatay block, located in the Kazakh sector of the Caspian Sea.
Eni approach to renewable energies in Kazakhstan

Eni signed on 21st June 2017 a MoU with General Electric (GE) and the Minister of Energy of Kazakhstan, to promote the development of renewable energy projects in the country.

Eni and GE will co-operate to evaluate the construction of a wind power plant with approximately 50 MW capacity and further future initiatives.

Badamsha 50 MW wind project
Badamsha 50 MW wind project: project selection and location
Badamsha 50 MW wind project: exploiting high wind potential in harsh and remote environment

### WIND RESOURCE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average wind speed @ 85 m</td>
<td>&gt;8.0 m/s</td>
</tr>
<tr>
<td>Temperature (annual average)</td>
<td>+2.8°C</td>
</tr>
<tr>
<td>Average Energy</td>
<td>&gt; 190 GWh/y</td>
</tr>
<tr>
<td>Capacity factor</td>
<td>45 %</td>
</tr>
</tbody>
</table>

### TECHNOLOGY

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTG GE 3.8 – 130 HH 85m</td>
<td>13</td>
</tr>
<tr>
<td>Rotor diameter</td>
<td>130 m</td>
</tr>
<tr>
<td>Number of blades</td>
<td>3</td>
</tr>
<tr>
<td>Hub height</td>
<td>85 m</td>
</tr>
</tbody>
</table>

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![Wind resource diagram](image)
Badamsha 50 MW wind project: logistics and construction challenges

**LOGISTICS**
- Logistics assessment
- Roads modifications
- Transportation challenges

**CONSTRUCTION**
- Electrical connection
- Foundations concrete
- Lifting operations
Badamsha 50 MW wind project: strategic partnerships to deliver energy by the shortest time to market

- Global wind energy expertise
- Complex projects management
- KZ market leader in construction sector

Time to Market
1.5 year from Kick Off

Commercial Operation Date
December 2019