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# Wind Energy

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## Executive Summary

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Somalia's and Somaliland's difficult histories have hampered the development of infrastructure that could support growth and improve lives. The energy sector has been particularly hard hit. In the continuing series of market analyses of potential opportunities, the prospects of wind power generation in Somaliland are reviewed. The need for review is given even more urgency by official Somaliland data indicating that more than 90% of the total energy consumed there has its origins in biomass. These biomass sources are derived primarily from fast-diminishing plant cover.

Using an augmented version of Michael Porter's "five forces model," this market analysis considers the effects of competition, new entrants, substitute products, suppliers, buyers, and complements on the proposed market. The market analysis determines that while Somaliland faces a large number of technical, economic, institutional, financial, and regulatory hurdles, several attractive features exist that should be the basis for further due diligence:

- No direct competition exists for the proposed wind farm.
- Most available electricity in Somaliland is currently supplied by a plethora of private sector players who mostly use diesel generators.
- Electricity deficits in Somaliland cannot be met by any one vendor.
- Somaliland has several areas with wind speeds in excess of the industry benchmark.
- If environmental externalities are appropriately accounted for in calculating true social costs, the local renewable energy options are, in terms of average cost per unit, comparable to those of a wind energy source.
- No new entrant is currently foreseen in the jurisdiction.
- Vendors from at least 12 different countries, with long track records in nameplate capacity, could easily handle the projected installed capacity for the Somaliland project.
- The jurisdiction's land is held in trust by the state, leaving room for favorable leasing terms.
- Somaliland's foreign direct investment laws pledge to grant a three-year tax holiday to foreign investors in lieu of capital subsidies.
- The project's vendors would also be subject to tradable energy certificates, feed-in tariffs, and grid and access guarantees.
- Significant funding from the diaspora continues to drive local development.
- The earth's wind energy supply potential significantly exceeds global demand.
- Establishing wind power facilities is actively encouraged by policies and climate change initiatives arising from the Kyoto Protocol.

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## The Market

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Somalia's difficult history has not allowed for significant development of infrastructure that could support growth and improve lives. The energy sector is particularly underdeveloped. In the continuing series of market opportunity analyses, a critical source of renewable energy—energy derived from wind—is reviewed within the context of Somaliland.

According to Somaliland's five-year development plan, more than 90% of the total energy consumed in the region has its origin in biomass. Biomass sources in Somaliland come primarily from combustion of the fast-diminishing protective vegetation cover. The rate of depletion is

not sustainable, and this state of affairs is made worse by the burgeoning energy deficit. Strategies for addressing this deficit are still largely in the discussion stage. Through the prism of the “six forces” model (an extension of Michael Porter’s “five forces model” first attributed to Adam Brandenburger and Barry Nalebuff in the mid-1990s), this market analysis extends these discussions and seeks to establish the attractiveness of wind energy farms. The market analysis will therefore consider the effects of competition, the threat of new entrants, the threat of substitutes, the bargaining power of suppliers and of buyers, and the support, if any, of complements.

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## Competition

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Charcoal is the primary form of non-biomass fuel used in the country. Charcoal is used mainly for cooking. Lighting is still in many instances provided by fossil-fueled wicker lamps, with kerosene being the most common fuel. In the rare instances that electricity is generated, diesel-fueled power plants provide all of the available lighting. This is mainly the case in some parts of the larger urban centers and for the more resource-rich individuals.

According to World Bank reports, most of this electricity is currently supplied by local businesses operating generators, who divide Somaliland’s urban centers into specific quarters. Customers are then given menu options for electricity in terms of service times and the number of bulbs used. Possible alternatives such as importing energy from Ethiopia are rendered impossible due to high cost.

There are no commercial wind farms in Somaliland or even in the rest of Somalia. Currently, no direct competition to a proposed wind farm exists. There are rare instances in which wind is used for energy generation, but it is only on a small scale, primarily to drive mechanical devices such as water pumps.

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## New Entrants

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Wind turbines, located on land (onshore) as part of a wind farm, or offshore in the sea or freshwater, harness the energy of moving air, primarily to generate electricity. According to World Bank reports, in order to qualify as a good (low cost) region for wind power, wind speeds must be greater than seven meters per second (approximately 15.86 miles per hour). As Somaliland’s five-year development plan shows, the region has excellent opportunities for onshore turbines, with particularly good wind speeds in Awdal, Togdheer, Woqooyi Galbeed, and Sanaag. Similar United Nations Development Program-commissioned reports on the vast potential of wind energy within the rest of the African continent also support the evidence in favor of Somaliland. This opportunity has not been exploited and remains unlikely to be a target for new entrants as long as investors view the lack of a legal and regulatory framework as an insurmountable obstacle.

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## Threat of Substitutes

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Besides onshore and offshore wind farms, Somaliland has identified a range of other possible sources of renewable energy for electricity, heat, and transportation fuels. These include solar heating and photovoltaics; geothermal aquifers; tidal or wave energy; coal; commercially produced biofuels such as bioethanol and biodiesel; and other sources of biomass that do not use crop cover, including municipal wastes such as sewage, landfill gas, and sludge digestion. All of these options, each with vast potential, remain unexploited at this time.

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## Bargaining Power of Suppliers

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Onshore wind is one of the most technologically mature renewable energy sources, and as such it plays a leading role in the generation of electricity in many parts of the world; there are many large onshore wind farms either in operation or under construction. The most recent energy generation data of the Global Wind Energy Council estimates the nameplate capacity of this renewable energy form at 238,351 megawatts (238GW) as of the end of 2011. This figure is nearly the total electricity consumption of the state of California for 2010, according to U.S. Department of Energy estimates.

Global wind energy penetration is still very low at less than 4% of total electricity generated. While the United States pioneered the wind farm concept and remains a leader in installed capacity, many other countries have significant wind power penetration, which is greatly helped in part by the ability to manufacture wind turbines locally. China, Spain, Germany, Denmark, India, the United Kingdom, France, Portugal, Italy, Canada, South Korea, and Brazil are among the top wind-power producing countries.

Evident in this list, with the exception of Brazil, India and China, is that the leading countries in production of wind energy are from the developed world. According to the Global Wind Energy Council, these nations control more than 85% of the market. Somaliland would not, therefore, be limited to any one supplier for installed capacity. Wind power also has low operation costs, but substantial (yet still moderate) start-up costs. The model of how a supplier's investments would be recouped could include the direct sale and connection to the Somaliland grid, or some variant of the concessionary forms (Build, Operate, and Toll; Design, Build, Operate; etc.).

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## Bargaining Power of Buyers

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The demand for electricity in Somaliland varies by day, week, and season. As electricity is hard to store, supply must also meet this fluctuating demand. In theory this can be achieved by turning wind power stations on and off, or by operating them below full load. This is a particular challenge for wind power because the supply is intermittent. This implies that Somaliland's wind energy output could be high at times of low demand, like late at night. For customers in the cities of Hargeysa, Berbera, Las Anod, Erigavo, Baki, Burao, and Las Khorey, a deficit could be a source of significant distress. This problem could be partly addressed for energy-challenged Somaliland by having wind farms in different areas around the cities to reduce the variability in average wind output. Wind power would, even in those circumstances, remain limited in its ability to meet the full demand of Somalia's energy needs, and would at best complement other sources of electricity.

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## The Support of Complements

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In many countries where wind energy has significant penetration, plant owners receive significant subsidies in order to encourage production of this renewable energy source. Somaliland is unlikely to offer subsidies beyond tax rebates. Somaliland, in its effort to encourage foreign direct investment, offers a three-year tax holiday to foreign investors. Apart from subsidies, the costs of generating wind power depend to a large extent on wind speed at hub height, the cost of turbines and related equipment, and accessibility of the plant, including proximity to a sufficiently strong grid. Other factors that influence wind power generating costs are the system load profiles and operating procedures, the prevailing generating mix, electricity markets, and land costs.

In the absence of subsidies, the 2008 average global generation cost of onshore wind farm output was estimated by the British Wind Energy Association and the World Bank at approximately US \$0.089 per kilowatt-hour (\$89.10 per megawatt hour). This figure was deemed comparable to the cost of new generating capacity for the higher-startup-cost options of coal and natural gas, which the Somaliland five-year development plan and the CIA World Factbook state exist but which remain unexploited.

The equivalent figures per kilowatt-hour for the other options are:

- Supercritical Coal - \$0.106
- Biogas - \$0.086
- Solar Thermal - \$0.127
- Geothermal - \$0.102
- Biomass - \$0.165

The land tenure structure in Somaliland is also particularly favorable to investors, as the state owns most of the land. To many, the inability of citizens to contest decisions made by the government to redevelop the land seems problematic. However, lessons learned from India's experience with land disputes arising from the establishment of Special Economic Zones may provide direction in dealing with this problem.

Establishment of a wind farm in Somaliland may prove feasible if certain obstacles are overcome. While Somaliland's authorities recognize the importance of access to affordable energy, as is evident in the current five-year development plan, the lack of formal recognition of the government remains a challenge. Any likely model for the set-up of a wind farm directly feeding into the main grid would, therefore, need a syndicated loan or guarantees, and the government of Somaliland would struggle to play a part in that. Inclusion of credible private sector players, including members of the diaspora and international development agencies, may be an option. It is also important that ongoing efforts to implement a national energy policy be fast-tracked and that measures be taken to upgrade existing power stations and distribution grids.

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