



**European Bank**  
for Reconstruction and Development

U.S. DEPARTMENT OF THE TREASURY

# Development Impact Honors Mongolia: Salkhit Wind Farm

## Project summary

Mongolia's newly discovered wealth of natural resources, in particular minerals such as coal, copper and iron ore, has attracted the attention of many investors.

But the EBRD is supporting another rich resource in this Asian democracy: wind. The Bank was the first international investor to support Mongolia's first wind energy project and its first privately-owned generator, the Salkhit wind farm.

Now, as of 20 June 2013, Salkhit is connected to the grid and has started producing electricity.

"Salkhit" means "windy mountain" in Mongolian, and windy it is, according to EBRD bankers who say: "It is a great place to build a wind farm, and overall a very exciting project".

Mongolia has adopted a progressive Renewable Energy Law which will give producers preferential rights to sell their output. However, while the National Renewable Energy programme mandates one-quarter of energy coming

“ The EBRD was the first international investor to support Mongolia's first wind energy project.”

from renewable sources by 2020, the Salkhit wind farm is the first significant renewable energy generator in the country, producing about 5 per cent of its electricity needs.

Salkhit wind farm was built with debt and equity financing of US \$47.5 million from the EBRD and the same amount from FMO, the Dutch development bank. The funds were provided to Clean Energy LLC, a company now 51 per cent owned by Newcom, 14 per cent owned by each the EBRD and FMO, and 21 per cent by General Electric. Newcom is a Mongolian technology holding company, which founded the first mobile operator in the country and owns the largest domestic airline.

The Salkhit wind farm is a flagship project for Mongolia's renewable energy sector and the country's energy sector

## SALKHIT ON VIDEO



► Bloomberg

Harnessing wind to bring warmth, light to Mongolia.  
[www.newcom.mn/en/media/video/17](http://www.newcom.mn/en/media/video/17)

► Newcom

Introducing Salkhit Wind Farm  
[www.newcom.mn/en/media/video/18](http://www.newcom.mn/en/media/video/18)

► UNEP

Salkhit Windfarm Project in Mongolia  
[www.youtube.com/watch?v=eC-lzV5GXJo](http://www.youtube.com/watch?v=eC-lzV5GXJo)



as a whole. The project has introduced new and advanced technology and know-how to the industry. As Clean Energy and Newcom themselves say, it marks the dawn for Mongolia's aspiration to becoming Asia's renewable energy champion.

The 50 MW Salkhit wind farm was built about 70 km away from the capital Ulaanbaatar, one of the most polluted cities on earth. The wind farm is expected to reduce CO<sub>2</sub> emissions in the country by approximately 178,000 tonnes annually, enabling the company to be the first to sell carbon credits in the country.

Support for the project was also provided by the US Millennium Challenge Corporation, through the Millennium Challenge Account Mongolia, who facilitated the project through the reconstruction of the Nalaikh substation and associated fiber optic cables, which directly benefit the project.

EBRD has facilitated technical assistance to the Mongolian government, funded by the government of Japan to develop the regulatory framework for renewable energy. In addition, the EBRD received funding from the government of Luxembourg for the environmental and social impact assessment for the Salkhit wind farm.

## Project history

In December 2009, the EBRD approved a US\$ 700,000 early development equity stake in the company. This investment was disbursed across several subscriptions in 2010 and 2011.



**Salkhit wind farm, 70 km from Ulaanbaatar, the first renewable energy project in the country, the first energy generator in general built in the last 30 years, and the first privately owned energy generator in Mongolia.**

The US\$ 700,000 represented a 25 per cent equity stake in the company based on its share of total development costs. The development equity stake allowed the EBRD to leverage its policy dialogue efforts, which focused on refining the regulatory framework for renewable energy, as well as bringing the Power Purchase Agreement (PPA) into a bankable form. These developments were critical to bring the project into a financeable state.

The construction of Salkhit wind farm was completed in 2013 with debt and equity financing (provided in 2012 and 2013) of US \$47.5 million from the EBRD and the same amount from FMO, the

Dutch development bank. The funds were provided to Clean Energy LLC, a company now 51 per cent owned by Newcom, 14 per cent owned by each the EBRD and FMO, and 21 per cent by General Electric. Newcom is a Mongolian technology holding company, which founded the first mobile operator in the country and owns the largest domestic airline.

Bringing this project to full completion has been a landmark achievement in the Mongolian power sector. Not only is this the first renewable energy project in the country but it is also the first private generator in an otherwise state-dominated sector. It has also been a

“ The wind farm is expected to reduce CO<sub>2</sub> emissions in the country by approximately 178,000 tonnes annually.”

significant step forward in establishing the viability of renewable energy in the Mongolian economy. Lastly, it was the first project to utilise a limited recourse project financing structure, which will set the template for future projects in energy and infrastructure.

The Salkhit wind farm project has demonstrated the strong capabilities the EBRD can bring to a project and the wider sector, specifically through mobilisation of technical cooperation funds, policy dialogue, early stage equity, and finally provision of the remaining funds required for full implementation of the project.

### 1. Development problem

The Mongolian economy is growing rapidly, and its electrical infrastructure requires urgent expansion and upgrading to accommodate this growth. Currently, about 1.2 million people reside in Ulaanbaatar, which is experiencing annual population growth rates of about 3-4 percent. This fact, combined with a rapidly growing economy, is putting enormous strain on the city region's ageing power network. Power demand cannot be currently met by domestic capacity (the country relies on Russian import) and is expected to increase by

150 per cent to 2030 according to the Mongolian Energy Regulator, ERA. The consequences of being unable to meet this demand are severe for the economy.

Up until the Salkhit wind farm, investment in the sector was solely driven by coal-fired power plants financed by sovereign lending or concessional grants. The total installed generation capacity in Mongolia is approximately 1,000MW, though only about 75 per cent is available.

Virtually all existing generation is through coal-fired power plants, which contribute to what is the most polluted capital in the world (based on particulate matter), according to the World Bank. The concentration of dust particles in the air is 35 times higher than the standard recommended by the World Health Organization (WHO). The consequent health impacts of the poor air quality in Ulaanbaatar is severe, particularly aggravating cardiovascular and pulmonary illnesses among the city's residents.

### 2. Program Logic(\*)

Mongolia has enormous potential for renewable energy. The theoretical potential for annual wind capacity is estimated at over 4,313 GW. This theoretical figure vastly exceeds the practical potential because of limitations on transmitting and integrating such volumes, but it gives an indication of the scale of Mongolia's resource, arising from its large, sparsely inhabited and windy landmass. Significant potential also exists in small hydropower and solar energy.

read more...  
**ON EBRD.COM**

- ▶ Salkhit, Mongolia's first wind farm, starts producing electricity [www.ebrd.com/pages/news/features/mongolia-windfarm.shtml](http://www.ebrd.com/pages/news/features/mongolia-windfarm.shtml)
- ▶ Mongolia country page [www.ebrd.com/pages/country/mongolia.shtml](http://www.ebrd.com/pages/country/mongolia.shtml)
- ▶ Country assessment on Mongolia, from EBRD's *Transition Report 2013* <http://tr.ebrd.com/tr13/en/country-assessments/2/mongolia>
- ▶ The EBRD's energy strategy [www.ebrd.com/pages/sector/powerenergy/energy-strategy.shtmlpowerenergy.pdf](http://www.ebrd.com/pages/sector/powerenergy/energy-strategy.shtmlpowerenergy.pdf)

Reflecting this divergence between current reality and opportunity, the Mongolian parliament approved a National Renewable Energy Programme in 2005. This mandates an increase in the share of renewable energy to 20-25 percent by 2020.

A Renewable Energy Law was passed in 2007 with the key ingredients for support for renewable energy: a preferential right for producers to sell all their output, and a feed-in tariff guaranteeing them a fixed, long-term price.

The 50MW Salkhit wind farm is the first project under this law. The EBRD is now considering investing another US\$ 50 million into two more wind farms in Mongolia.

## SALKHIT IN THE NEWS

### NEW YORK TIMES

Severely Polluted Mongolia Tries a Cleaner Power Source

[www.nytimes.com/2012/12/04/business/energy-environment/severely-polluted-mongolia-tries-a-cleaner-power-source.html?\\_r=0&adxnnl=1&adxnnlx=1387207885-gEHM7F0eLcLxG3JUfzfqSQ](http://www.nytimes.com/2012/12/04/business/energy-environment/severely-polluted-mongolia-tries-a-cleaner-power-source.html?_r=0&adxnnl=1&adxnnlx=1387207885-gEHM7F0eLcLxG3JUfzfqSQ)

### BLOOMBERG

EBRD agrees \$85 million loan for Mongolia's First Wind Farm

<http://www.bloomberg.com/news/2012-07-19/ebrd-agrees-85-million-loan-for-mongolia-s-first-wind-farm.html>

### FINANCIAL TIMES - FT BEYONDBRICS.

EBRD Director for Power and Energy Nandita Parshad writes about Salkhit

<http://blogs.ft.com/beyond-brics/2012/06/28/guest-post-mongolias-bid-to-dodge-the-resource-curse-through-green-power/#axzz2my1ddE9o>

### SEENEWS RENEWABLES

Mongolia ties to grid EBRD-backed 50-MW wind farm

<http://renewables.seenews.com/news/mongolia-ties-to-grid-ebrd-backed-50-mw-wind-farm-361074>

### EBRD

Salkhit wind farm. Meeting the Copenhagen challenge: EBRD's first investment in renewable energy in Mongolia (2009)

<http://www.ebrd.com/english/pages/news/press/2009/091217a.shtml>

Salkhit wind farm in Mongolia starts production; EBRD ready to double funding for wind. First Mongolian wind farm received US\$ 47 million from EBRD. Bank is ready to invest US\$ 50 million in

new wind projects (2013)

<http://www.ebrd.com/pages/news/press/2013/130620.shtml>

### CLEAN ENERGY

EBRD supports Mongolia's landmark wind farm

[www.cleanenergy.mn/en/13/article](http://www.cleanenergy.mn/en/13/article)

### CLEAN ENERGY / NEWCOM

Mongolia's first wind farm opens

[www.newcom.mn/en/media/news/224](http://www.newcom.mn/en/media/news/224)

### CLIMATE ACTION PROGRAMME

EBRD to pioneer investment in Mongolia's other natural resource - wind

[www.climateactionprogramme.org/news/ebrd\\_to\\_pioneer\\_investment\\_in\\_mongolias\\_other\\_natural\\_resource\\_wind/](http://www.climateactionprogramme.org/news/ebrd_to_pioneer_investment_in_mongolias_other_natural_resource_wind/)



### DEMONSTRATION EFFECT

Salkhit is the first renewable energy project to be implemented in Mongolia and thus has set an important precedent for further development, unlocking the exploitation of the renewable energy potential in Mongolia.

The project was structured as a long-term, non-recourse project financing, which has never been done in the Mongolian power sector, where most loans are concessional loans to state-owned companies.

### CORPORATE GOVERNANCE AND BUSINESS CONDUCT

The project has the potential to positively influence business conduct in Mongolia through the application of international best practices including, but not limited to, environmental and social matters.

### PRIVATE OWNERSHIP

Power sector assets in Mongolia are almost entirely state-owned, with no plans for privatisation. Salkhit wind farm is the first generating capacity to belong to a private owner. It sets a model for further involvement of private investors in the power sector.



### TECHNOLOGICAL INNOVATION

Salkhit uses modern wind turbines supplied by General Electric (GE). Newcom ran an open, competitive tender for the supply of turbines. Newcom received bids from GE, Siemens, Sinovel, Hyundai, and Mitsubishi Heavy Industries. Based on criteria such as overall cost, technical details and appropriateness to the site, GE won the contract to supply 31 GE 1.6xle turbines in November 2011.

The 1.6xle turbine is an upgraded model of the 1.5xle turbine, which has a strong track record and has been implemented in wind farms in China under similar climatic conditions. These turbines are estimated to produce annually 149.2, 160.1, and 171.9 GWh under P90, P75 and P50 scenarios.

“ This is the first project to utilise a limited recourse project financing structure. It will set the template for future projects in energy and infrastructure.”

### 3. Analysis, Appraisal, and Previous Approaches(\*):

Being the largest renewable energy financier in its region of operations, the EBRD has extensive experience in financing projects in very varying environments. In financing this project, the Bank used lessons learned in Russia, Kazakhstan, Azerbaijan and other countries.

Salkhit wind farm is the first significant renewable project in Mongolia. As such, it faced a number of challenges which were addressed. New regulations and a revised project document structure were implemented with technical cooperation and policy dialogue support from the EBRD. The Bank produced a project financial model, supported by information provided by Newcom and the various lender advisers.

The EBRD was the first financier to support the project back in 2009 with an early-stage equity investment. This was also the first project to rely on an otherwise untried mechanism to support renewable energy. Commercial funding had not been available in Mongolia for projects of this nature or with this risk profile.

In 2012, the EBRD became one of several financiers to invest into the



construction of the project. Since the wind farm became operational, interest in similar projects has increased among international investors, and the EBRD is currently considering financing two other wind farms up to US\$ 50 million.

### 4. Rate of Return

#### ELECTRICITY OUTPUT

The planned installed generation capacity of the project is 49.6 MW. The Debt Base Case assumes that the wind farm produces electricity under the P90 wind scenario. The P90 wind forecast results in electricity generation of 149.2 GWh and implies a load factor of 34.3 per cent.

#### ELECTRICITY OFF-TAKE

The power purchase agreement (PPA) provides a guaranteed off-take for 100 per cent of the electrical output of the wind farm at a tariff fixed in US\$ at US\$ cents 9.5/kWh for 20 years. The project is assumed to sell carbon credits under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC). The carbon price forecasts were taken from various investment bank forecasts.



### INVESTMENTS

The total project cost is expected to be US\$ 123.2 million, including development costs. The total project cost/MW is approx. €1.7 million. This figure is in line with other wind farm comparables.

### REVENUE

Salkhit wind farm's revenues are projected to reach US\$ 13.7 million p.a. The revenues from the PPA are projected to amount to US\$ 14.8 million p.a..

In addition, the wind farm is projected to benefit from the sale of carbon credits, in particular through an emissions reduction purchase agreement signed with the Swedish Energy Agency.

### 5. Beneficiaries(\*)

Mongolia is a sparsely populated country with less than 3 million people, but one half of the population lives in the capital, Ulaanbaatar. It is known as the coldest capital on earth, with temperatures reaching -40 Celsius in the winter. But Ulaanbaatar - which relies on inefficient coal plants for energy and heat - is not only the coldest, but also the most polluted capital in the winter. Salkhit wind farm is helping the city cut down



on harmful emissions, while maintaining electricity output for the country's rapidly growing and power-hungry economy.

The total installed generation capacity in Mongolia is approximately 1,000MW, though about 25 per cent is currently unavailable. About 67 per cent of houses have access to grid electricity. There is a shortfall in power supply of about 70 MW during evening periods, and this demand is currently met by importing from Russia. The energy produced by Salkhit helps reduce import requirements.

Power and heat generation in Mongolia is dominated by coal. Typically this is burnt in old, dirty CHP plants located very close to urban centres. This, together with the widespread use of poor quality domestic fuels to heat semi-permanent homes in Ulaanbaatar, contributes to the capital's very poor air quality. According to the World Health Organization (WHO), air pollution kills 1,600 persons in Ulaanbaatar every year. The concentration of dust particles in the air is 35 times higher than the standard recommended by the WHO.

The EBRD's Country Strategy for Mongolia envisages supporting projects which reduce Mongolia's existing high levels of carbon intensity and promote environmentally sustainable

“ EBRD provided debt and equity financing of US\$ 47 million.”



development. With the Salkhit wind farm, and potentially other similar projects, the EBRD is supporting the renewal of Mongolia's energy infrastructure, in particular where this exploits Mongolia's ample renewable energy reserves.

## 6. Monitoring and Evaluation(\*)

The project has benefited from reputable experts who will continue to be involved during the operational period. In particular, technical assistance for the project is provided by several leading firms, including Mott MacDonald (Lender's Engineer) and Sgurr Energy (Owner's Engineer). In addition, legal advice was provided by Norton Rose and DLA Piper. Lastly, the project benefits from an Operations and Maintenance Agreement signed with General Electric.

Apart from external advisers, the EBRD receives extensive regular implementation and operational reporting from the client on technical, operational, financial, legal, and environmental matters.

The Bank, with a sizeable presence in Ulaanbaatar, remains closely involved with the Mongolian authorities in relation to the wind farm and energy sector in general. It is also able to closely monitor the project through an EBRD representative on the company's Board of Directors.

## 7. Operational and Environmental/Social Risk Mitigation (\*)

Given that Salkhit is the first large windfarm development in Mongolia, a full Environmental and Social Impact Assessment ("ESIA") was undertaken in accordance with EBRD and IFC requirements in 2008.

The assessment included site visits, extensive scoping with key stakeholders (local and national authorities and potentially affected people), preparation of an ESIA and associated documents and surveys of potential effects on migrating and resident birds.

The ESIA showed that environmental and social impacts of the project will be limited and determined that primary concerns were potential impacts on resident and migrating birds, including protected raptor species.

“ The Salkhit wind farm is a flagship project for Mongolia's renewable energy. It marks the dawn for Mongolia's aspiration to becoming Asia's renewable energy champion.”

Field surveys were conducted as part of the ESIA and subsequently an independent ornithological assessment was undertaken, which included consultations with local representatives of Bird Life International. These studies and ongoing monitoring have confirmed that it should be possible to avoid or adequately control any potential adverse impacts.

The state-owned land leased for the project is occupied seasonally by a few nomadic herders; however, the amount of land is inconsequential compared to the land otherwise available. The environmental and social impact assessment was disclosed to the public by the company, and a public meeting

was held in the community nearest to the project site.

No major issues were raised by stakeholders during the public consultation process.

## 8. Lessons Learned and Applied (\*)

Salkhit wind farm has awakened interest in wind power in Mongolia from other investors, both local and international. The EBRD is now assessing several follow-on wind farm projects, and expects to invest about US\$ 50 million in renewable energy generators in Mongolia in the coming years. The demonstration effect from Salkhit, in

terms of both project implementation and financing, has been significant.

## 9. Sustainability(\*)

Helping countries move towards sustainable energy markets is the EBRD's goal throughout its region of operations, and especially in Mongolia.

Mongolia, despite sitting on one of the world's largest reserves of coal, knows first-hand the effect that climate change has on their pasture land and harsh winters. The country has announced a significant renewables agenda.

Mongolia's President has stated that the country aims to become a regional renewables hub, producing one-quarter of its energy from renewable sources by 2020, and potentially exporting both wind- and solar-generated electricity.

Salkhit will allow Mongolia to diversify energy sources (which means more security), adopt the newest technology,

and of course tackle climate change. The country is also determined to make its coal – on which it depends for heat during its harsh winters – cleaner, and the EBRD will cooperate to achieve that goal.

The Salkhit wind farm is a major step towards the development of a sustainable energy market in Mongolia.

Newcom will monitor the project and provide regular updates to stakeholders on all relevant issues.

## 10. Partnerships

Salkhit wind farm has been widely supported by all stakeholders. Financing to this landmark project was provided by two development institutions - the EBRD and FMO, the Dutch development bank – as well as private sector investors, such as General Electric which owns 21 per cent equity in Clean Energy LLC and also supplied the cutting-edge turbines, and the domestic technology holding company Newcom.

Support for the project was also provided by the US Millennium Challenge Corporation, through the Millennium Challenge Account Mongolia, who facilitated the project through the reconstruction of the Nalaikh substation and associated fiber optic cables, which directly benefit the project.

## 11. Dissemination

The web site ebrd.com has featured several press releases and feature stories about Salkhit at different stages of the project's development. (See 'Read more on ebrd.com').

In addition, the international media, including in the USA, have reported widely on this unique project (see 'Salkhit in the News').

A documentary is currently being produced and the project is consistently discussed at energy conferences in the region.



“ Salkhit wind farm produces about 5 per cent of the country's electricity needs.”

## AT A GLANCE

**Project:** Salkhit wind farm, 70 km from Ulaanbaatar, the first renewable energy project in the country, the first energy generator in general built in the last 30 years, and the first privately owned energy generator in Mongolia.

**Sponsor:** Clean Energy LLC (majority-owned by a leading Mongolian technology holding Newcom). Clean Energy LLC is a company incorporated in Mongolia. The Company's sole purpose is the development, construction and operation of the 50MW Salkhit wind farm.

**Total cost:** US\$ 123 million

**The company:** Clean Energy LLC, a company 51 per cent owned by Newcom, 14 per cent owned by the EBRD, 14 per cent by FMO, and 21 per cent by General Electric. Newcom is a Mongolian technology holding company, which founded the first mobile operator in the country and owns the largest domestic airline.

**EBRD financing:** In 2009, a US\$ 700,000 development equity investment into Clean Energy LLC, a special-purpose company created jointly with Newcom. In 2012, a US\$ 47.5 mln debt and further equity stake in Clean Energy LLC.

**EBRD technical cooperation:** study and policy dialogue to support the renewable energy sector in Mongolia, with donor funding from the governments of Japan and Luxembourg. Support from the the United States' MCA Mongolia was also critical for the implementaiton of the project.



The new EBRD energy strategy, adopted in December 2013, presents Salkhit as a landmark project. [www.ebrd.com/pages/sector/powerenergy/policy.shtml](http://www.ebrd.com/pages/sector/powerenergy/policy.shtml)



## A sustainable energy future



### Total EBRD investments since 2006

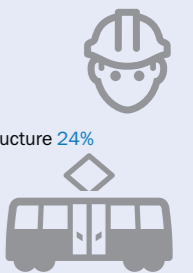
Financial Institutions 24%



Industry, commerce and agribusiness 31%

€52 billion

Infrastructure 24%



More than 37 million tonnes of CO<sub>2</sub> saved

Since 2006 the EBRD's investments in the energy and natural resources sector have saved over 37 million tonnes of CO<sub>2</sub> per year. This is equivalent to an industrialised country of around 5 million people.

Energy and natural resources 21%



### Power and energy utilities investments

Safety upgrades 5%

Transmission and distribution 25%  
Investments in smart grids can halve losses in distribution networks



Thermal generation 38%

€6.3 billion

Renewables 33%

Combined heat and power (CHP) 26%  
Using 'waste' heat from power generation increases efficiency and warms homes during the winter



The Bank has made 65 direct investments in renewables, for a total value of over €2 billion

€2.0 billion

€2.4 billion

Privatisation and restructuring 15%

Rehabilitation at existing plants 10%

Coal generation (new) 6%

Combined cycle and high efficiency gas generation 42%  
Modern gas turbine plants can be twice as efficient as the old plants they replace



22 wind

7 biomass

3 solar

2 mixed

31 hydro

### Natural resources investments

Environmental improvements and clean-up 13%

Transportation, storage and distribution 20%  
Better transportation and storage infrastructure means greater energy security



Gas flaring reduction and energy efficiency investments 27%  
The EBRD is at the forefront of efforts to reduce gas flaring



€2.5 billion

Downstream/retail 18%  
Modernisation of service stations for a cleaner environment

Coal mining 2%

Support activities 6%

Oil and gas extraction 14%

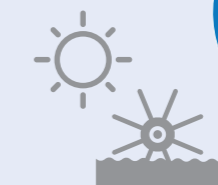
### Across the whole of the EBRD Sustainable Energy Initiative has saved 57 million tonnes of CO<sub>2</sub>



Supply side energy efficiency 31%  
Improving efficiency in the energy and natural resources sector

€12.1 billion

Demand side energy efficiency 46%  
Improving municipal, business and residential use of energy



Renewables 23%