

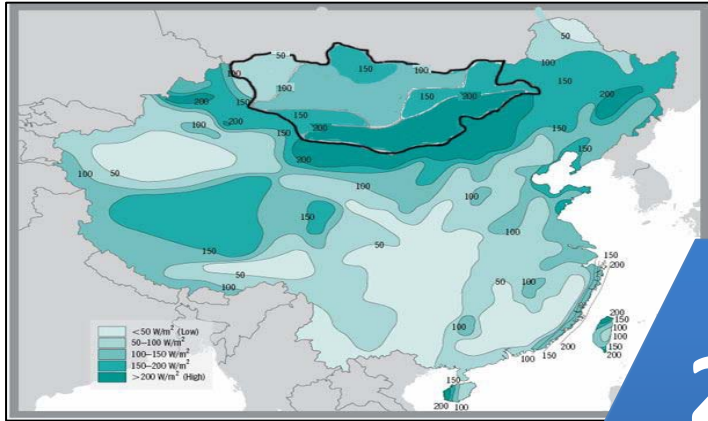


# Mongolia: Powerhouse to a Clean Energy Future

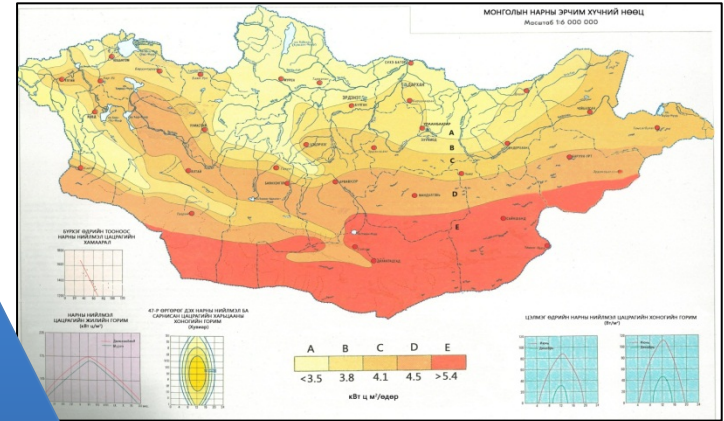
**YOUR PARTNER OF CHOICE**

# MONGOLIA'S HUGE RENEWABLE POTENTIAL

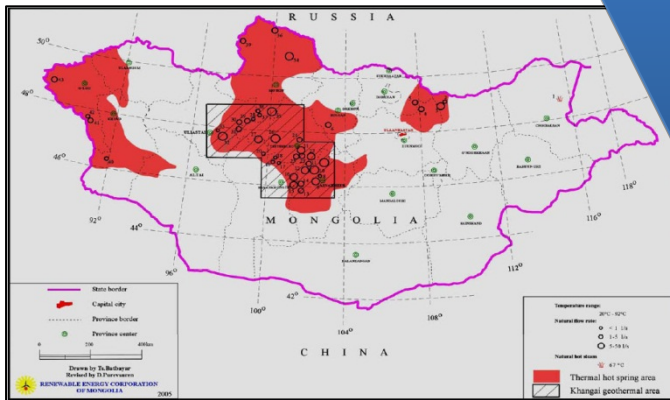
**WIND**  
7 MW/km<sup>2</sup>



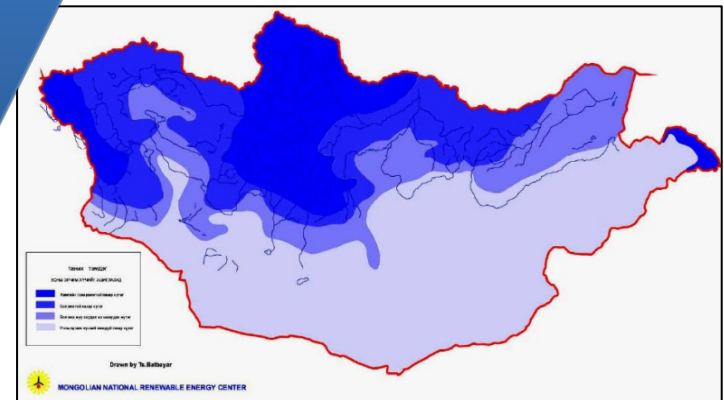
**SOLAR**  
66 MW/km<sup>2</sup>



**GEO THERMAL**

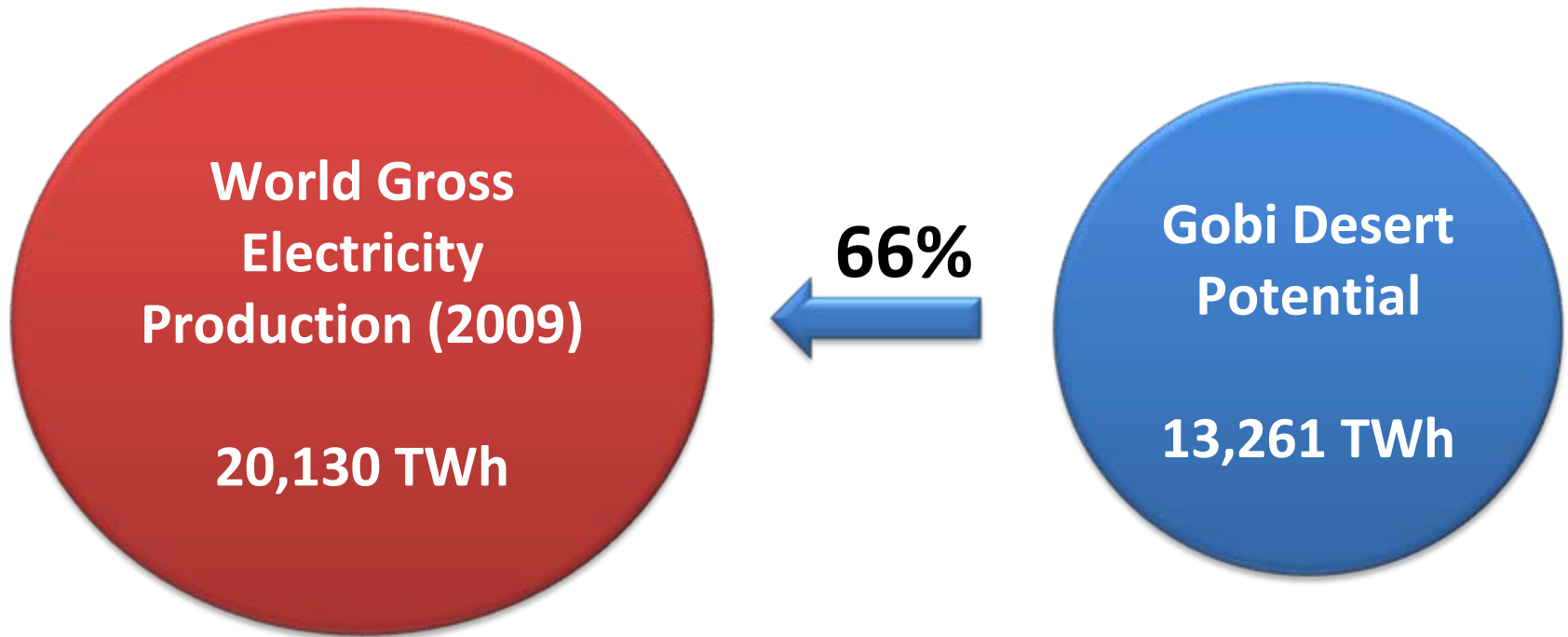


**HYDROPOWER**



**2.6TW**  
generation  
capacity

Sources: US National Renewable Energy Laboratory, Mongolian National Renewable Energy Center



If the Gobi Desert's 1.3 million km<sup>2</sup> were covered in PV solar cells, generation could equal 66% of the world's gross electricity production in 2009

The Gobi Desert has the 3<sup>rd</sup> highest annual solar electricity generation potential among the world's deserts

Source: International Energy Agency (2011), Kurokawa et al. (2006), US National Renewable Energy Laboratory

# MONGOLIAN SOLAR POTENTIAL

- Mongolia in total is estimated to have more than **4,774 terawatt hours per annum** in solar resources
- The Gobi Desert region of Mongolia alone has an estimated average solar electricity generation potential of 5.4kWh / m<sup>2</sup> / day, spread across a useable land area of 5542km<sup>2</sup>

## Mongolia Solar Resource Estimates

kWh/m <sup>2</sup> /day	Estimated kWh/m <sup>2</sup> /day	Applicable land (km <sup>2</sup> )	Total Power T Wh/yr
3.5	3.4	5,269.53	654
3.8	3.8	3,924.65	544
4.1	4.1	4,210.61	630
4.5	4.5	4,514.84	742
5.4	5.4	5,541.89	1092
<b>Total</b>		<b>23,461.52</b>	<b>4774</b>

Source: US National Renewable Energy Laboratory, Mongolian National Renewable Energy Center

## Good-to-Excellent Wind Resource at 30m (Utility Scale)

Wind Class	Wind Power at 30m W/m <sup>2</sup>	Wind Speed at 30m m/s*	Total Area km <sup>2</sup>	Percent Windy Land	Total Capacity Installed MW	Total Power TWh/yr
3	300-400	6.4-7.1	130,665	81.3	905,500	1,975.5
4	400-600	7.1-8.1	27,165	16.9	188,300	511.0
5	600-800	8.1-8.9	2,669	1.7	18,500	60.2
6	800-1000	8.9-9.6	142	0.1	1,000	3.4
<b>Total</b>			<b>160,641</b>	<b>100</b>	<b>1,113,300</b>	<b>2,550.1</b>

## Moderate-to-Excellent Wind Resource at 30m (Utility Scale)

Wind Class	Wind Power at 30m W/m <sup>2</sup>	Wind Speed at 30m m/s*	Total Area km <sup>2</sup>	Percent Windy Land	Total Capacity Installed MW	Total Power TWh/yr
2	200-300	5.6-6.4	461,791	74.2	3,200,200	5,572.9
3	300-400	6.4-7.1	130,665	21	905,500	1,975.5
4	400-600	7.1-8.1	27,165	4.4	188,300	511.0
5	600-800	8.1-8.9	2,669	0.4	18,500	60.2
6	800-1000	8.9-9.6	142	0.0	1,000	3.4
<b>Total</b>			<b>622,432</b>	<b>100</b>	<b>4,313,500</b>	<b>8,123.0</b>

\* Wind speeds are based on a Weibull k value of 1.8 and an elevation of 1400m

Source: US National Renewable Energy Laboratory

### Assumptions:

Turbine Size – 500kW

Hub Height – 40m

Rotor Diameter – 38m

Turbine Spacing – 10D by 5D

Capacity km<sup>2</sup> – 6.9MW

## Recent advances paving the way for rapid development

### Milestones:

#### Favorable legal background:

- National Renewable Energy Program 2005
- Renewable Energy Law 2007
- Copenhagen - Mongolia's commitment to drastic utilization of renewable energy

#### Newcom's Salkhit 50MW Wind Project:

- Renewable energy standard
- First IPP in Mongolia
- First PPA
- First new power generation since 1985



Current events are driving political will and processes



“Mongolian Prime Minister Sukhbaatar Batbold outlined plans to ramp up the country’s investments in alternative energy and to export wind power to China — enough to equal 40 million tons of coal”  
- Wall Street Journal (2010)

Mongolian President Elbegdorj said  
“Mongolia is paying attention to energy saving, effective usage of energy and supporting renewable energy use. Mongolian Gobi experiences more than 300 sunny days annually and there are ample opportunities to use solar energy in the Gobi.”

- Office of the President, Mongolia



# THE FUTURE OF JAPAN – MONGOLIAN RELATIONS

Politically, Japan and Mongolia enjoy a stable, friendly  
Economically, there is great potential for a mutually beneficial partnership



Advanced, world-leading economy

High technology powerhouse,  
specialized skills and know-how

Leading global innovator

Expanding demand for safe, reliable  
energy

Looking for reliable access to natural  
resources and clean energy

A primary supporter of Mongolia since  
its transition

Partnership  
for the  
Future

Rapidly growing economy

True democracy and market economy

Young, friendly and ambitious society

Huge landmass, low population density  
and an abundance of resources

Looking to diversify away from mining  
and into advanced technology

Looking for access to capital and  
technology transfers

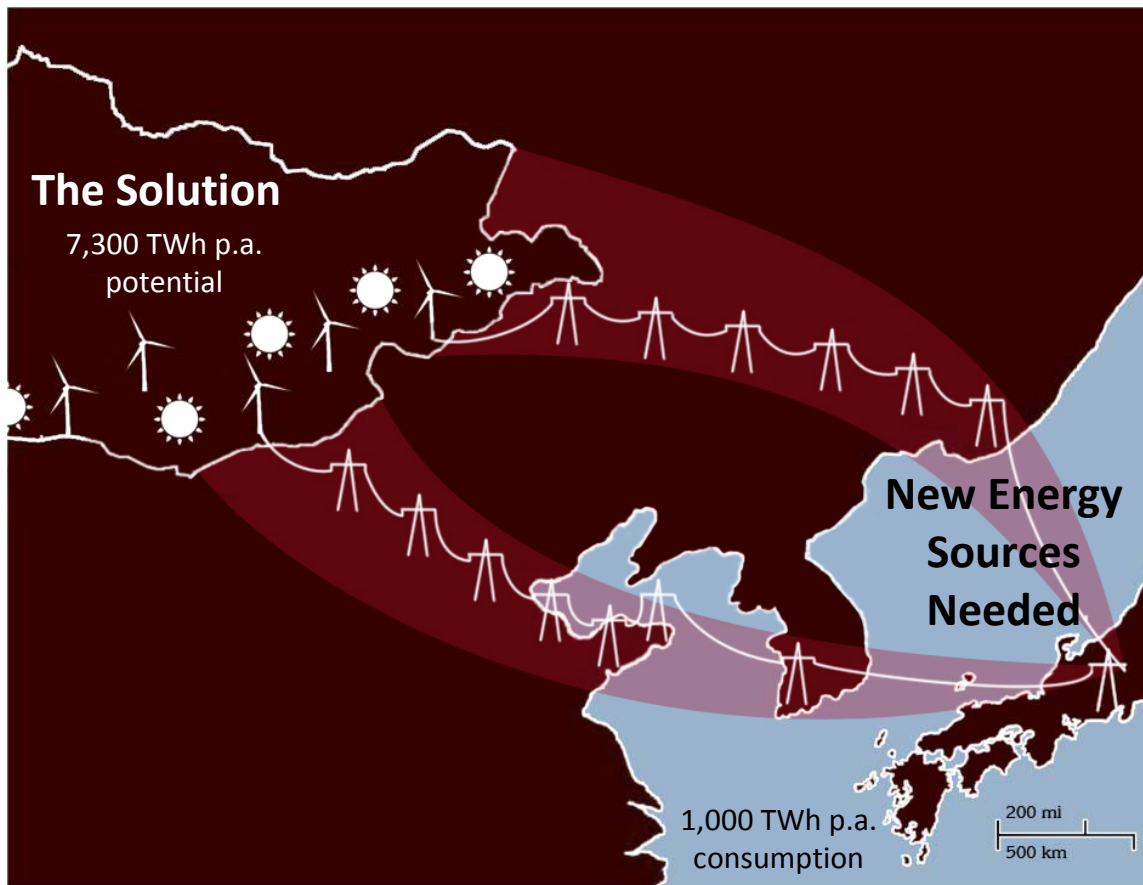


# THE OPPORTUNITY

## Linking renewable generation across borders

Advances in renewable energy and grid technologies, along with regional political will, are turning the dream of regional renewable energy market into a reality

### The Mongolia Solution



Connect Mongolia's vast renewable generation to Japan's energy-thirsty economy

Japan able to supply the advanced knowledge and technology

Both benefit by taking advantage of the cheapest, cleanest and safest energy opportunities

Sources: US National Renewable Energy Laboratory, US Department of Agriculture, International Energy Agency, US Environmental Protection Agency



**THANK YOU FOR YOUR ATTENTION**

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