



Small is Beautiful

The Potential for Wind Micro-generation in China

Presented to: *Clean Energy Expo Asia 2010*

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Research

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China need for Wind power

Energy Usage

- China overtook the USA to become largest consumer of Energy (IEA) requiring 1,310GW in 2010 (est.)
- Current production cannot keep pace with usage
- China still overwhelmingly dependent on coal generated power

Renewables

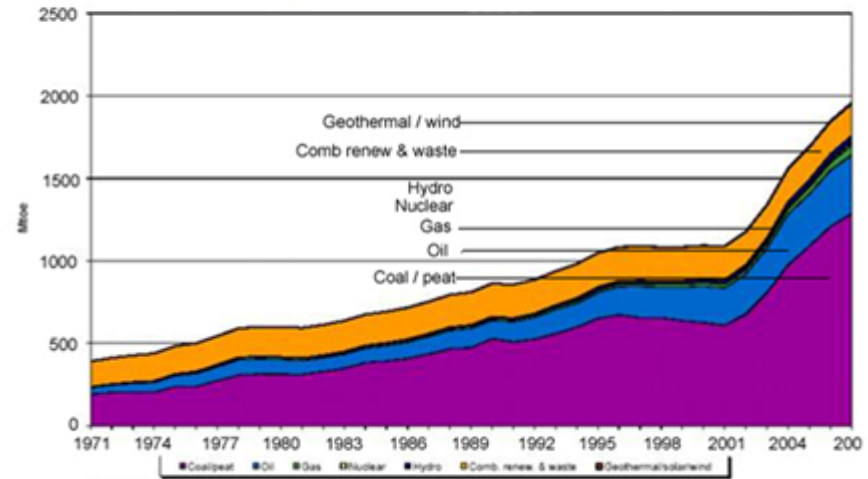
- China has committed to generating 15% of its energy from renewable sources by 2020.
- Planned investment 2011-2020: USD 747.8 billion

Wind Power

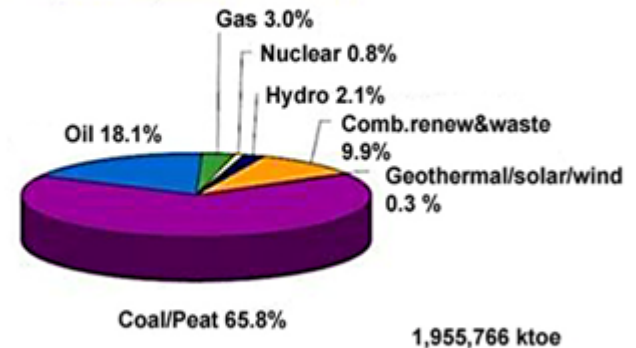
- Central Government is focused on large scale wind farms: installations 50MW and larger under the purview of the National Development & Reform Commission (NDRC)
- Target for installed capacity in 2020 is 40 – 120 GW
- 2-6% of total energy to be supplied by wind in 2020

Peoples Republic of China

Total primary energy supply*

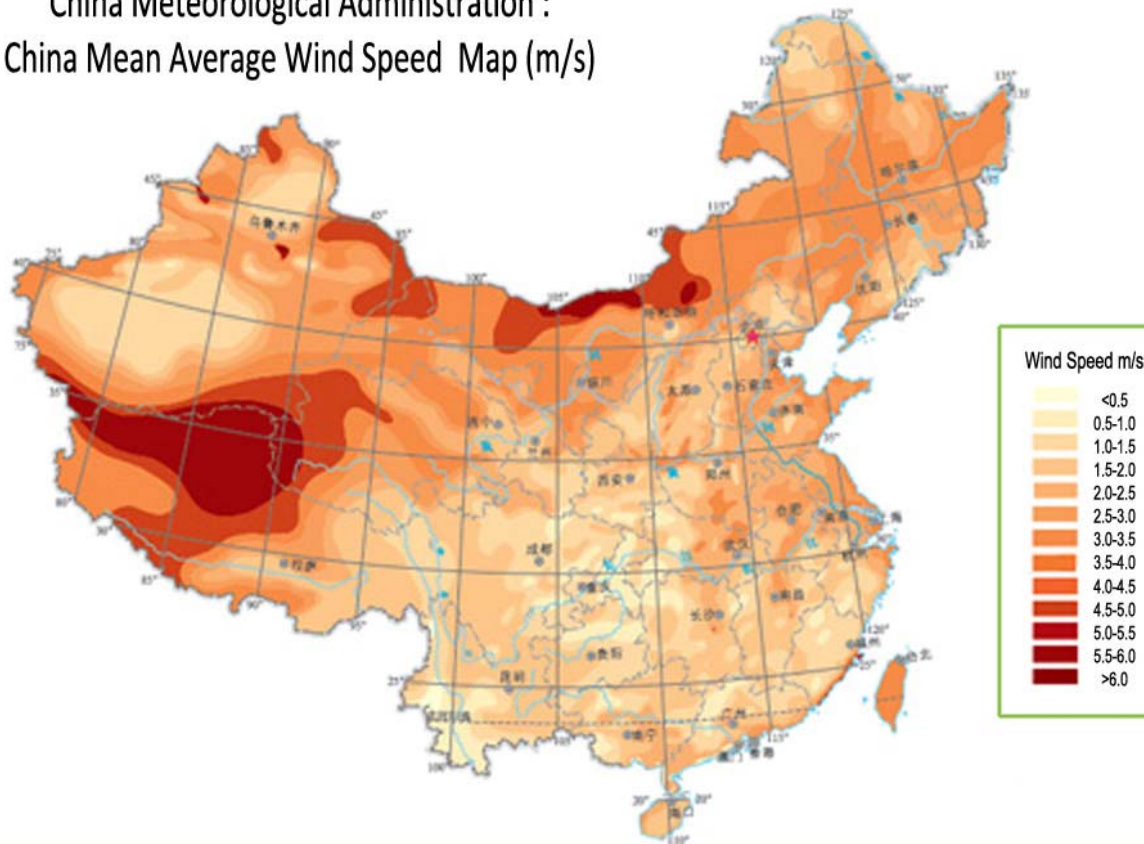


Share of total primary energy supply* 2007



Abundant Wind potential

China Meteorological Administration :
China Mean Average Wind Speed Map (m/s)



- Largest wind market as of 2009
- CAGR of 134% since 2004
- Most subsidies focus on big wind projects for East coast development

Rural Market Opportunities for Wind Power

	Prosperous China (Tier 1 and 2 cities)	Emerging China (Tier 3 to 5 cities)	Rural China (Tier 6 and Rural)
Number of cities ¹	25 (Tier 1:4 Tier 2:21)	305 (Tier 3:19, Tier 4:77 Tier 5: 209)	324 (Tier 6:324 Rural: N/A)
Percentage of China's total population (2004)	9% (119 milion)	18%(234 milion)	73% (947 milion)
Percentage of China's GDP (2004)	34%	43%	23%
Average annual GDP growth rate of cities ²	16%	16%	N/A
Average population range of cities (thousands) ³	220 - 10,000	300 - 1400	250 - 1420 (Tier 6 only)
Average salary range of cities (RMB thousands) ³	16 - 30	11 - 21	8 - 15 (Tier 6 only)
Broadband internet penetration rate	24 %	12 %	4%
Mobile phone ownership rate	78%	56%	27%

Note:

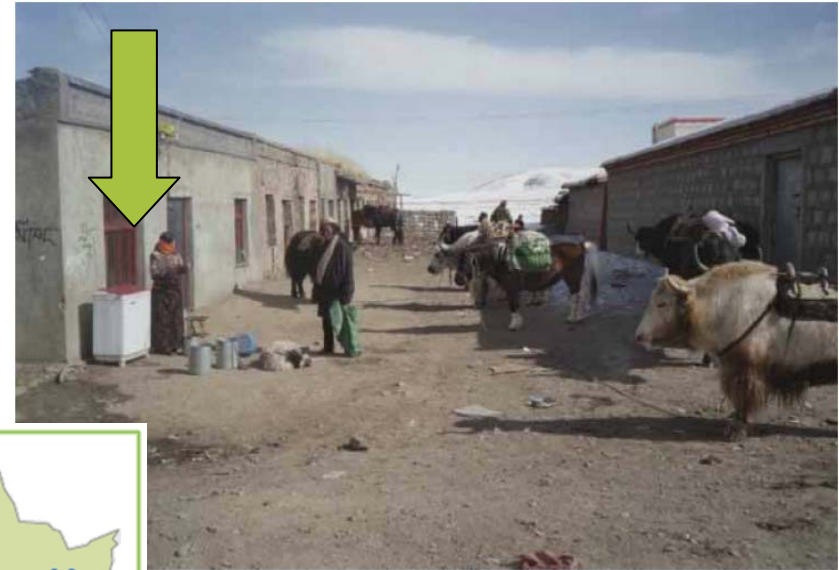
1. China's National Statistics Bureau classifies 654 cities that in aggregate account for 92% of GDP. Hong Kong and Taiwan excludede from analysis
2. 2003-4 figures. 149 county level cities and rural areas were excluded due to data limitations
3. Population and salary ranges exclude the top 10% and bottom 10% of values to minimize impact of cities with outlying values:
population figures are generally for cities only, not for their metropolitan areas

Source: IBM Institute for Business Value

- Additional Rural power capacity need by 2020 of nearly 300GW
- Urban to rural power consumption 2:1 split
- Each Tier 6 level city would require 13.5 MW of micro generated power to support local electricity demands

Microgeneration Wind Market potential

- Rural Villages
 - 10kW – 50kW Wind Turbines
 - USD 10,000-18,000
- Larger Towns
 - 100KW Wind Turbines
 - USD 100,000 – 150,000



Source: IBM Institute for Business Value



Market Potential
As high as USD \$5.8 Billion

Benefits

- Projects under 50MW have the following advantages for Manufacturers & Investors:
 - Fall under the purview of provincial governments
 - Available for grants & subsidies per the Renewable Energy Law
 - Avoid Entanglements with State Owned Enterprises

Drivers

- Bulk of preferential policies aimed at developing large scale wind farms to power urbanized East Coast leaving many rural areas with insufficient power.
- Interior development will mean increased need for local generation in lower tier cities and rural areas.
- Projected growth in tier 1 & 2 cities means lower tier cities and rural areas will still find themselves in need of consistent electricity supply as the larger cities consume more

Challenges

Market

- Diverse and expansive geographical area means many local markets, not one unified market

Government

- Implementation oversight is delegated to Provincial-level Development & Reform commission, rules and implementation process could vary from province to province

Local Capabilities

Technical and institutional capacity may be lacking . Suppliers must closely work with all stakeholders on implementation and maintenance increasing cost of sale.

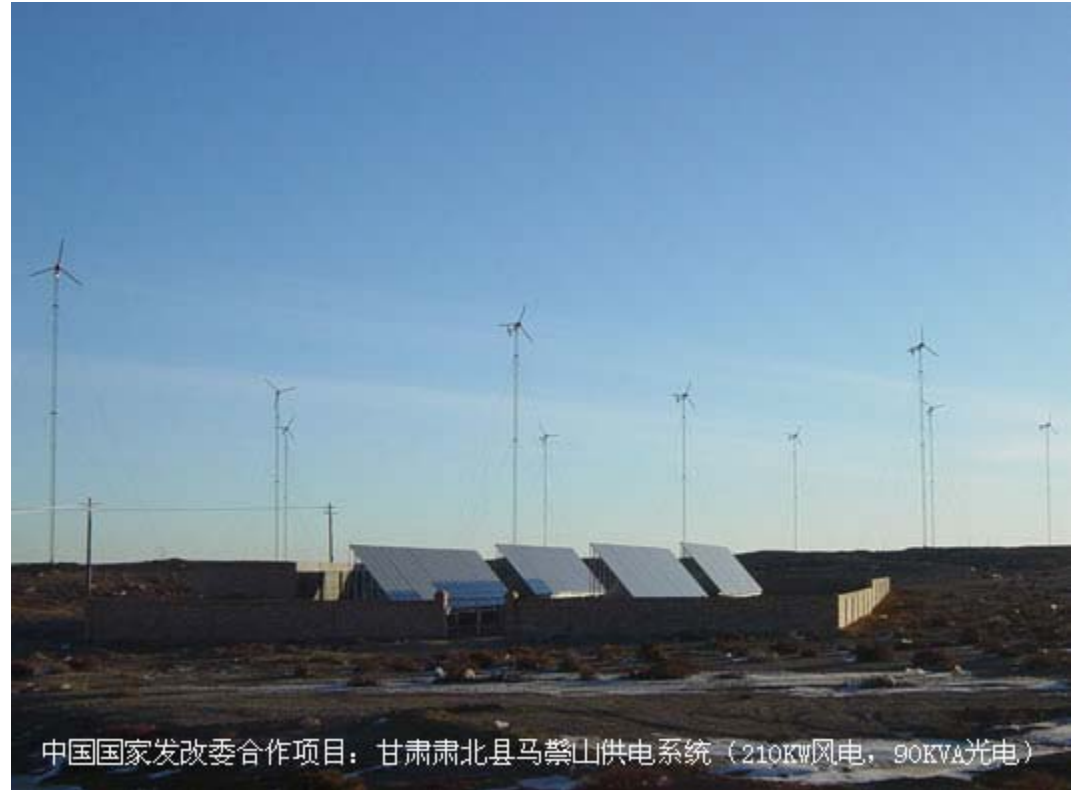
Pricing

Implementation of off grid renewable energy generation is dependent on tariffs which could change in the future



Case Study: Mazongshan, Gansu

- Rural electrification of village 2003
- 124 homes & government offices
- Twenty-one 10kW wind turbines and a 90kW photovoltaic solar array
- Largest standalone wind /PV/diesel hybrid system for a single village in the world.



Credit: Beijing Bergey Windpower Company



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