



## Small is Beautiful

The Potential for Wind Micro-generation in China

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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

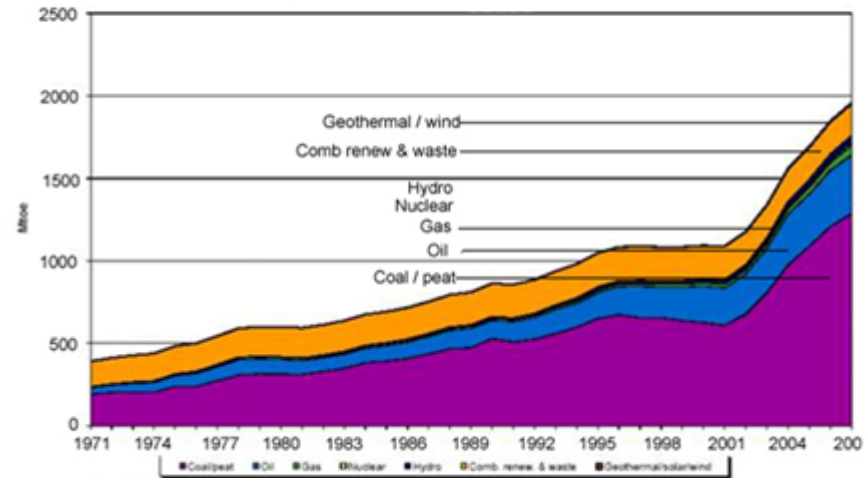
- China has committed to generating 15% of its energy from renewable sources by 2020.
- Planned investment 2011-2020: USD 747.8 billion

## Wind Power

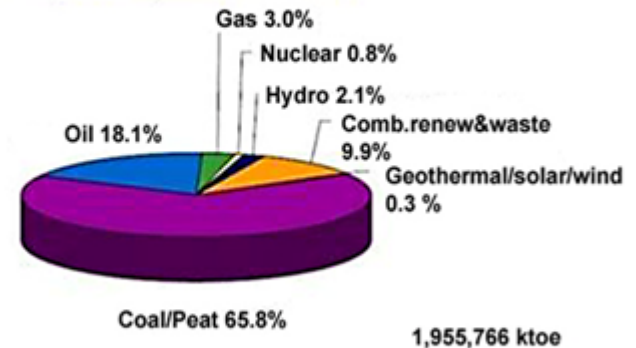
- Central Government is focused on large scale wind farms: installations 50MW and larger under the purview of the National Development & Reform Commission (NDRC)
- Target for installed capacity in 2020 is 40 – 120 GW
- 2-6% of total energy to be supplied by wind in 2020

## Peoples Republic of China

Total primary energy supply\*

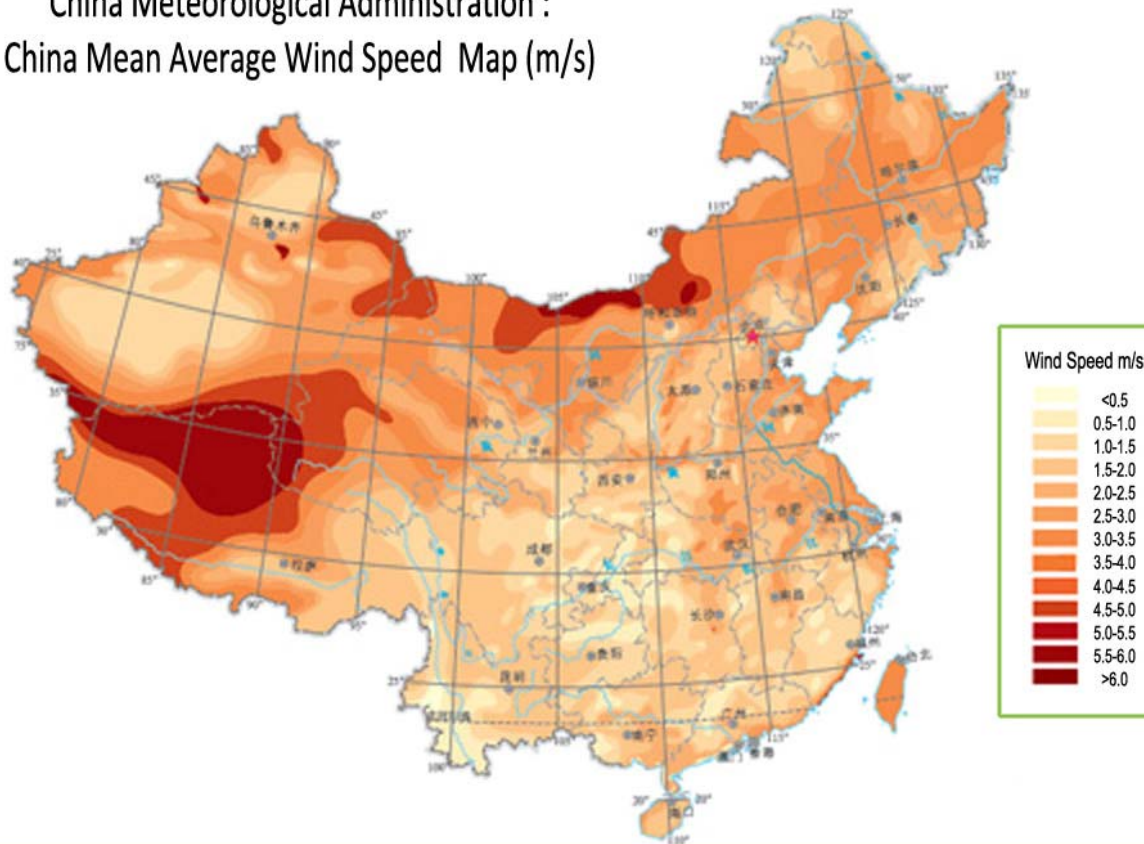


Share of total primary energy supply\* 2007



# 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 <sup>1</sup>	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 <sup>2</sup>	16%	16%	N/A
Average population range of cities (thousands) <sup>3</sup>	220 - 10,000	300 - 1400	250 - 1420 (Tier 6 only)
Average salary range of cities (RMB thousands) <sup>3</sup>	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

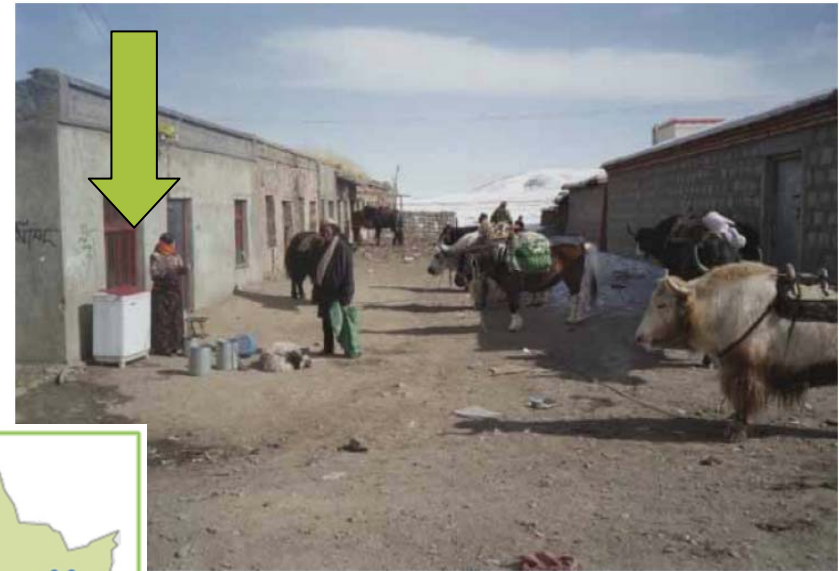
Source: IBM Institute for Business Value

- 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





## China Energy Sector

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