

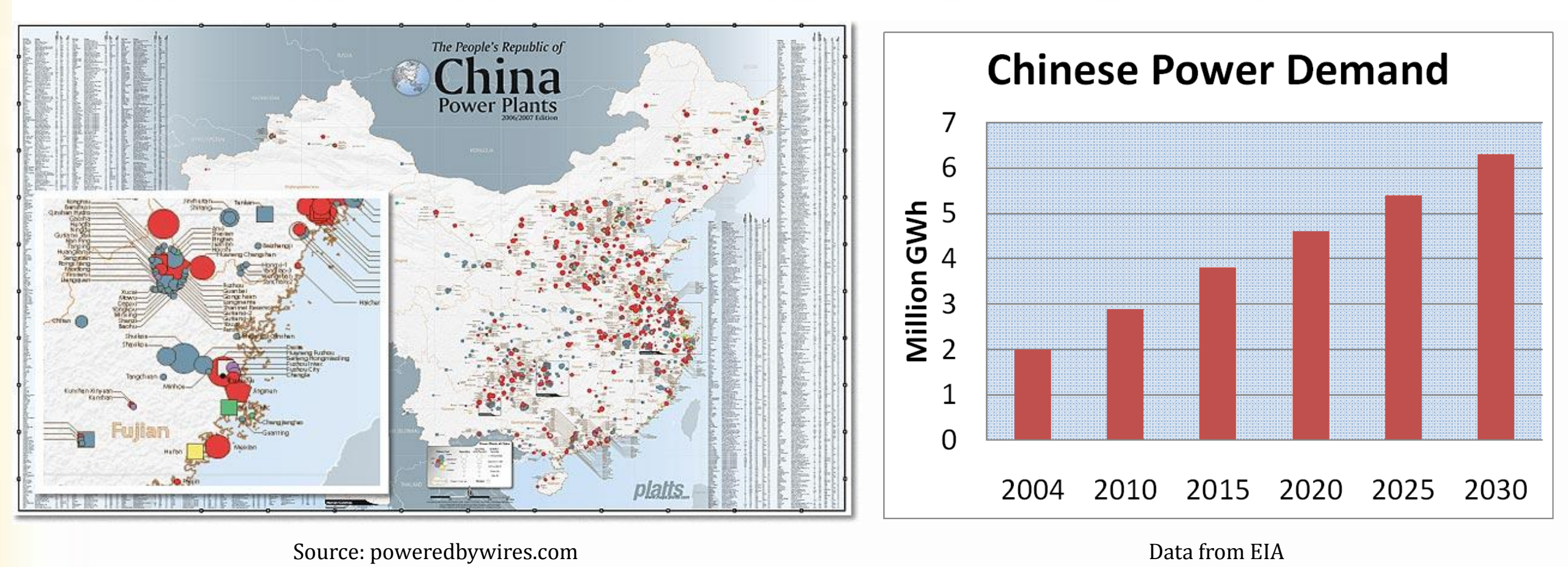
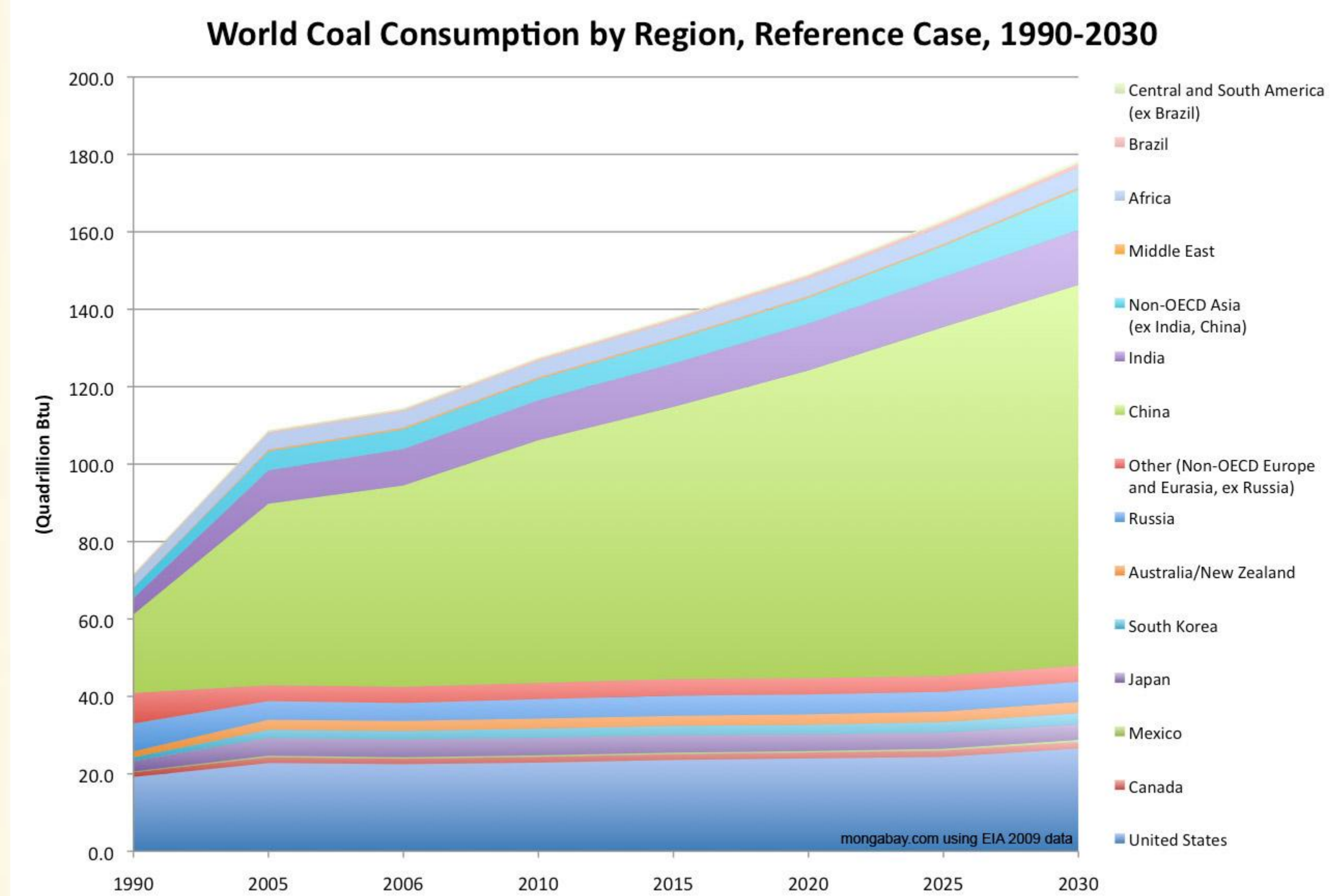
Distributed Power Plant Options in Urban China

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Abstract

China relies on electricity generated from large, centralized power plants to meet the demands of its unprecedented economic development; these plants exhaust the country's resources and pollute its environment. Distributed power plants provide another option. Based on technical research on the potential reliability and carbon emissions of various plant designs as well as surveys of Chinese students' attitudes toward the alternative infrastructure, we created a series of recommendations for supplying power to China's capital, Beijing. The most feasible power option involves constructing a collection of combined cooling, heating, and power (CCHP) distributed generation systems.

Background



In order to preserve a healthy air quality level at the Beijing Olympics, the provinces of northern China reduced the amount of emissions from their coal power plants, and Beijing city officials limited non-emergency vehicles from using the city's main roads based on their license plate numbers.



Photo: AFP/GETTY, Source: telegraph.co.uk

Goals/Methodology

- Determine the most reliable and environmentally friendly types of distributed power plants for the Beijing area by analyzing the emissions and electricity supply that current power plants create when serving this municipality.
- Measure Chinese citizens' willingness to use these distributed power plants by creating a questionnaire for Chinese citizens and interviewing WPI students from China.
- Create a set of plant construction guidelines for the Chinese government.

Results

Statement 1 – I have experienced more than one blackout in my home within the last five years.

Statement 2 – I find that blackouts are inconvenient and negatively affect my daily lifestyle.

Statement 5 – If I only receive electricity from one large power plant, my power supply will sometimes be unreliable.

Statement 6 – If I receive electricity from several clean, small power plants, my power supply will sometimes be unreliable.

These maps depict the results of the questionnaire. The red regions on each map indicate the areas where the students agreed the most with each statement.

Name	Type	Monthly Supply to Grid (GWh)	Emission Factor (tons CO ₂ /GWh)	Percent CO ₂ Reduction
Traditional centralized power plant that serves NCPN	Coal	1425	1101	0
Jingfeng	CCGT	194.8	388.4	8.859
Sulige	CCGT	99.67	496.6	3.824
Beijing Taiyanggong	CCHP	272.2	462.5	11.09
Hebei Shangyi Manjing East	Wind	16.67	0	1.147

Gas-based distributed power plants would provide urban Chinese citizens with a reliable electricity supply and would produce less carbon dioxide than coal plants.

Recommendations

- Install at least three distributed CCHP power plants in place of centralized coal power plants within the North China Power Network annually.
- Continue increasing the electricity supply capacity of distributed power plants, especially those that use renewable resources.
- Develop an educational program informing Chinese citizens about the benefits of using electricity from distributed power plants.



Source: <http://www.beinet.net.cn>

Acknowledgments

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Key References

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