RESEARCH BRIEF

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China Can Supply About 250 Million Metric Tons of Crop Residues for Bioenergy Production Every Year

Bioenergy Derived from Agricultural Biomass Has Great Potential to Reduce Coal Consumption and Greenhouse Gas Emissions in China

BY XIAOGUANG CHEN, EFD CHINA, DRB 15-06, NOVEMBER 2015

We use county-level data on crop yields and cropland to estimate the potential biomass supply from crop residues in China. We find that China can potentially produce about 250 million dry metric tons of crop residues per year when biomass prices are greater than $100 per metric ton. We also find that rice straw is expected to account for about 47% of total residue production, while corn stover (residue) can contribute 28% to total biomass production in China and wheat straw can contribute 25%. Our findings suggest that, if crop residues can be effectively utilized, China can significantly reduce coal consumption and improve air quality.

To fuel its rapidly expanding economy, China's demand for energy has increased more than four-fold during the past 30 years, with coal being the primary energy source. Over-reliance on coal has led to China becoming the world's largest emitter of sulfur dioxide and greenhouse gases. In order to reduce the over-reliance on coal for power and heat generation and to mitigate associated environmental and health problems, China has implemented a series of regulatory policies to promote renewable energy production.

In this study, we use county-level data to see how much renewable energy can be produced from cellulosic biomass. Cellulosic biomass can be derived from agricultural sources, such as crop residues and perennial energy grasses, and forest sources, such as forest residues and woody biomass. Crop residues mainly include corn stover, wheat straw, and rice straw. As compared to the fossil fuels that they can displace, cellulosic biomass can offer greater potential for various environmental benefits. Our study focuses on crop residues, including corn stover, wheat straw and rice straw.

Our analysis shows that: (i) China could produce up to 250 million metric tons of crop residues annually if a biomass price of $100 per metric ton made this profitable; (ii) Rice straw is likely to be

Key Points

- China has the potential to produce about 250 million tons of crop residues each year.
- Rice straw, wheat straw, and corn stover (residue) are likely to be the primary biomass types for bioenergy production in China.
- Combining agricultural biomass with coal in power plants that are currently coal-fired has the potential to reduce coal consumption, improve air quality, and reduce greenhouse gas emissions.
- The prices that fuel buyers are willing to pay for biomass affects how profitable it is for farmers to collect these by-products of farming.

the main biomass type, representing about 47% of total residue production, while corn stover and wheat straw can potentially contribute 28% and 25%, respectively, to total biomass production in China; (iii) To create the incentives for Chinese farmers to begin collecting crop residues for bioenergy purposes, biomass prices of $40-50 per metric ton would be required ; and (iv) production of crop residues is expected to occur in regions with high yields of corn, wheat, and rice and low costs of producing these crops.

It is possible to add biomass into the fuel mix at power plants that are currently coal-fired, a process known as "co-firing." This approach could reduce reliance on coal, improve urban air quality and reduce carbon emissions that affect global climate.

Conclusions

Our findings suggest that, to encourage farmers to harvest crop residues for bioenergy production, the Chinese government should target areas with high yields and low costs for corn, wheat and rice. Moreover, with the estimated large amount of crop residues, China has great potential to reduce reliance on coal and improve urban air quality by co-firing agricultural biomass with coal at coal-fired power plants.

ABOUT THIS BRIEF

This brief is based on "Assessment of the Potential Biomass Supply from Crop Residues in China," Environment for Development Discussion Paper Series 15-06 (2015), by Xiaoguang Chen, published by the University of Gothenburg, Sweden and Resources for the Future, Washington, DC. The DRB series is associated with the EfD Discussion Paper series.

FURTHER READING

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