China's Shift from Coal to Heat Pumps Increases Copper Demand

Study: Coal to Electricity

Research Conducted by: Brilliance Consulting, China

Presented: November 2017

One of the initiatives that China has undertaken to combat its long-standing concern over pollution is the government-supported *Coal to Electricity* program. The International Copper Association (ICA) commissioned research to analyze the positive impacts this program will have on the environment and its correlation to copper demand.

Key Findings:

- In Beijing alone, more than 150,000 households were installed with air source heat pumps (ASHPs) in 2016, accounting for 76% of the broader coal to electricity initiative.
- As a consequence of the shift to electric, power grid and transformer upgrades are needed, which will lead to an average of 15 kilograms (kg) of additional copper demand per household.
- A typical household ASHP contains approximately 20 kg of copper.
- More cities in the north of China will follow the trend of shifting away from coal fired boilers.

Coal to Electricity Initiative

Supported by the Chinese government, the coal to electricity program is designed to remove coal-fired boilers in exchange for electrical space heaters, such as ASHPs.

- 12 key cities in Northern China will invest 20 billion renminbi (RMB) in clean heating in the next three years, from 2017 to 2020.
- In Beijing, government subsidies are currently 24,000 RMB per ASHP unit.
- The remaining 2,000 RMB will be paid by homeowners.
- In 2017, in Beijing and northern China, more than 400,000 household are set to replace coal fired boilers with ASHPs.

Coal to Electricity: a Benefit to Copper

Beyond the grid and transformer upgrades, the coal to ASHP shift has the highest copper intensity within the broader coal to electricity initiative. The 20 kg of copper contained in the average ASHP unit can be found in:

- Evaporators (6 kg)
- Compressors (3 kg)
- Condensers (5 kg)
- Other components (6 kg)

Benefit to the Environment

The switch from coal technology to ASHPs and air-to-water heat pumps (AWHPs) has a significant environmental impact. Each household heat pump installation mitigates coal burning by an average of 3.3 tonnes. The reduction of coal burning reduces the amount of particulate matter being released into the atmosphere, including:

- Carbon monoxide
- Nitrogen oxide
- Sulfur dioxide
- Volatile organic compounds

Beijing AWHP 2016 Contributions	
Coal reduction (0,000 tons)	50.3
SO^2 reduction (tons)	3722
Nox reduction (tons)	805
CO reduction (tons)	70466
VOCs reduction (tons)	2012
PM10 reduction (tons)	6790
PM2.5 reduction (tons)	5432

For more information on copper demand or ICA, visit www.copperalliance.org.

For more information on copper's use in sustainable energy, visit www.sustainablecopper.org.

For enquiries, email colin.bennett@copperalliance.org.uk or bryony.samuel@copperalliance.org.uk.

Cu International Copper Association
Copper Alliance