BLAZING A TRAIL TO CLEANER COAL

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discusses how the implementation of pre-combustion solutions make coal more environmentally responsible during its period in transit from mine to end energy user.

Contrary to public opinion, coal usage for energy production is on the rise, with a 1.4% increase in global coal consumption in 2018 to a 4 year high of 3.772 billion toe. It remains a balancing act to weigh environmental concerns with the benefits of providing cheap and reliable energy to global citizens. Emerging countries such as China and India have realised that the only way to provide reliable and affordable sources of energy is through coal usage. Environmental concerns about coal usage are in some cases justified and in other situations over inflated. Instead of a blanket demonisation of coal usage, one needs to look at addressing the individual concerns along every point of its environmental impact curve, applying technology solutions where possible.

Not a single raindrop believes it is responsible for the flood, but each one contributes to it. The key is to carefully examine what each of the environmental impacts are before applying technology where possible to reduce/eliminate it. One of those environmental points is the negative impact of coal dust lost during transportation and energy production.

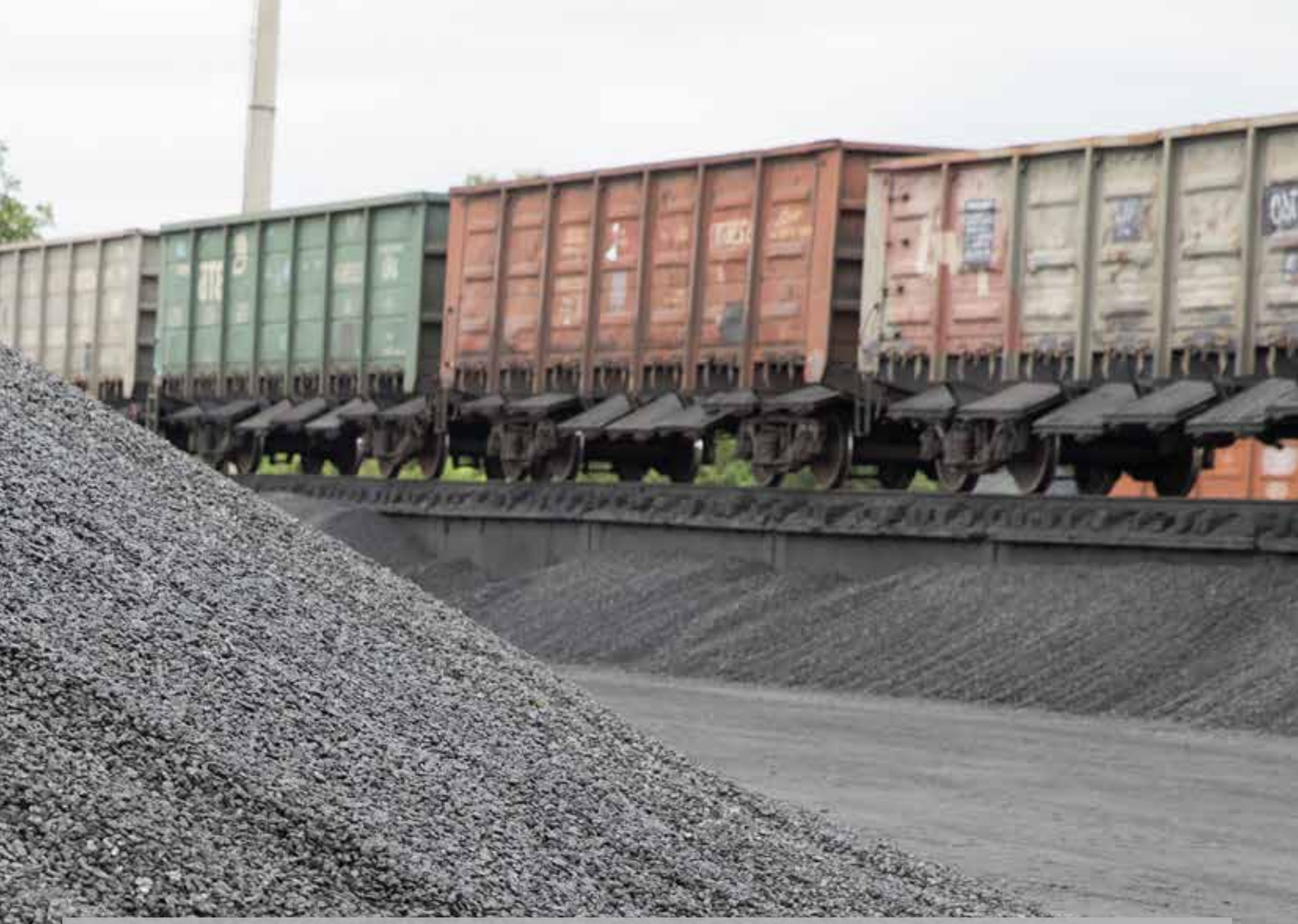
Why is demand growing?

The growing population and the increased demand for access to energy is driving energy consumption. During the 20th century, the global population increased from 1.65 billion to 6 billion people. The first 19 years of the 21st century saw an additional 1.8 billion people added, giving a total global population of 7.8 billion people today. By 2040, that number is expected to increase to 9.2 billion people. No country has the right to prevent another from providing energy to its citizens, especially given that the developed world has grown and advanced because of coal. Approximately 1 billion people across the world have no access to energy today and the need will continue to grow. This will put an increased drain on the energy grid and every country has to be able to support it.

In 2018, thermal coal imports into India rose 19% to 172 million t, showing the fastest pace of growth since 2014. Indonesia accounted for 61% of India's thermal coal imports, while South Africa and the US accounted for a combined total of 29%. During the same period, China imported 281 million toe of coal including thermal, metallurgical and anthracite. Domestic output in China also increased in 2018 by an additional 100 million toe vs 2017. Japan imported 210 million t of coal in 2018 (it imports 99% of all coal that it uses). Australia exported 61% of Japan's numbers, while Indonesia, Russia and North America accounted for another 35%. All indicators show that despite increases in the use of renewable energy, there will continue to be a growing demand for coal. In all of these cases, coal is being transported by rail and sea.

Transporting coal

Only a small percentage of coal is utilised close to the mine mouth. The rest is moved via many modes of transportation, the main form of which is via rail, where it is moved using uncovered open-top railcars. This is due to the risk of self-combustion of the coal if the cars are covered. As coal is brittle, up to 3% of the total weight of the coal can be lost via



coal dust during an average rail trip. In other words, on an average 125 railcar journey, 250 000 lb of coal dust can be blown off the carts and dispersed across land and waterways. Coal dust is comprised of chemical elements such as arsenic, lead and toxic heavy metals. It has been shown that prolonged exposure to coal dust can cause lung and heart issues, including bronchitis and emphysema in adults and children. Coal dust clouds can also limit the vision of motorists who happen to be alongside the railcars.

Spontaneous combustion and water pollution remain a concern. When coal dust enters waterways it has a negative impact on both humans and wildlife. Coal dust also provides major challenges with respect to clogging trains and instances have been shown where it may have contributed to derailing of railcars. The cost of maintaining/cleaning rail cars is just another cost that is ultimately passed on to the end energy user. There is no question that something should be done to address this 'avoidable pollution' issue.

Many coal shippers apply surfactants to their coal. This is a chemical compound that reduces the amount of coal dust blown off during transportation. It is an in-transit dust suppressant agent applied to the top layer of coal in the railcar to reduce coal dust loss. It lowers the surface tension between the solid and the liquid. This is a costly and environmentally toxic manner of mitigating coal dust pollution that is not completely effective.

So, what can be done to address this issue?

Firstly, one must accept the fact that global coal consumption is on the rise due to its reliability and affordability. Simply advocating for its demise is futile. So long as coal continues to be used, there will be an issue with coal dust. However, through the use of technology one can come close to eliminating it.

Clean Coal Technologies, Inc. has a proven technology that does two key things in the fight to ensure a more environmentally responsible use of coal.

- It reduces the amount of coal consumed by the power plant for the same level of energy production. The lower ranked coal is beneficiated at the mine mouth to produce a better quality coal, which in turn leads to less coal being transported. So, for example, instead of transporting 3 million t of 8300 Btu coal, Clean Coal Technologies Pristine M™ beneficiates that coal at the mine and upgrades it to approximately 11 000+ Btu. Therefore, the mine needs to transport 2 million t of the upgraded coal in order to meet the energy producers' needs. There is an immediate 33% reduction in the transportation of coal.
- The patented process of Pristine M coats the upgraded coal with a layer of heavy hydrocarbons. This step not only stabilises the processed coal that makes it hydrophobic but, as a consequence, produces a dust-free end product for transportation. The key concern of coal dust loss during transportation has been eliminated.

Figure 1. Coal sprayed with water and chemicals to reduce coal dust loss during transportation.

Figure 2. Treated coal using Pristine M™ technology eliminating all coal dust prior to transportation.

Conclusion

There is no doubt that coal is here to stay, at least for the foreseeable future. Any attempt to ban coal usage and transportation is naïve, ignores the issues and is convenient laziness. Identify, accept and implement technological solutions to address the many aspects of coal usage and make each stage cleaner. It is a global challenge and there should be a global effort in sharing technologies with developing countries in order to improve the inevitable continued growth in coal consumption. Technology sharing programmes such as those conducted by the US Department of Energy and university research departments such as those at the University of Wyoming are making coal usage more environmentally responsible. The primary focus of these initiatives is based on post-combustion solutions.

Technologies such as those by Clean Coal Technologies, Inc. focus on pre-combustion solutions. By carefully examining each point along the environmental impact curve Pristine M has taken the first step towards eliminating coal dust pollution from the transportatation of coal. We should expend time and effort on technology solutions instead of advancing the demonisation of coal usage that provides affordable and reliable energy to the global population. WC