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Interactive comment on "Carbon and air pollutant emissions from China's cement industry 1990–2015: trends, evolution of technologies and drivers" *by* Jun Liu et al.

Anonymous Referee #1

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Cement industry is one of the largest contributors to the industrial emissions of carbon dioxide and air pollutants in China. Based on intensive unit-based information, this study investigated the carbon and air pollutant emissions from China's cement industry during 1990-2015, explored the emission trends, evolution of technologies and drivers to changes of emissions. This work contributed to the development of China's high-resolution emission inventory, which is very useful for the atmospheric community. The manuscript also provided new insights for future emission mitigation of China's cement industry. The topic is within the scope of ACP and the manuscript is generally well written. I have a few comments before it can be accepted for publication.

One major advantage of the new emission inventory is the unit level data. I believe this should be emphasized throughout the manuscript.

Is the cement output in 2014 the same with the output in 2015? Otherwise the growth rate between 1990-2014 and 1990-2015 should be different. Page 1, Line 16: "We found that, from 1990 to 2015, accompanied by a 10.9-fold increase in cement production, CO2 , SO2, and NOx emissions from China's cement industry increased by 626%, 59%, and 658%, whereas CO, PM2.5 and PM10 emissions decreased by 9%, 66%, and 63%, respectively. " Page 8, Line 246: "From 1990 to 2014, the production of cement and clinker increased from 0.21 and 0.16 billion tons to 2.5 and 1.4 billion tons, i.e., by 10.9 and 8.2 times, respectively."

Page10ïijŇLine 282- 291ïijŽin the chapter of 3.2.1 CO2 emissionsïijŇthe contents are mixing the period of 1990-2014 with the period of 1990-2015, which is unclear to readers.

Page 11ïijŇLine 320-323ïijŇ"The decline of PM emissions after 1996 was due to the implementation of the new emission standards for the cement industry issued in 1996 (GB4915-1996, Table S1) and the slowing down of the economy in the Asian financial crisis. The PM emissions rebounded after the financial crisis but dropped again after 2003, despite a continuous increase in cement production at an annual growth rate higher than 10%." In Fig. 9, the PM2.5 emissions kept decreasing during 1990-2002, and only rebounded in 2003. It's difficult to judge whether the rebound is due to the financial crisis or not.

There is some inconsistency of the numbers. The authors should carefully double check the data: (1) Page 1, Line 16ïijŇ"We found that, from 1990 to 2015, accompanied by a 10.9-fold increase in cement production, CO2 , SO2, and NOx emissions from China's cement industry increased by 626%, 59%, and 658%, whereas CO, PM2.5 and PM10 emissions decreased by 9%, 66%, and 63%, respectively. " Page 9, Line 275ïijŇDuring the 25 years, the cement production increased dramatically, by 10.5

times. During that time, the CO2 , SO2 , and NOx emissions from the cement industry increased by 627%, 56%, and 659%, whereas the CO, PM2.5 and PM10 emissions decreased by 9%, 63%, and 59%, respectively, indicating that significant technology transitions occurred in the past 25 years. Page 15, Line,438ïijŇ“From 1990 to 2015, the CO2 , SO2 , and NOx emissions from the cement industry increased by 627%, 56%, and 659%, whereas the CO, PM2.5 and PM10 emissions decreased by 9%, 63%, and 59%, respectively. ” (2) Page 6ïijŇLine 169- 291ïijŇ“From 2011 to 2015, the proportion of kilns equipped with LNB technology increased from 3% to 40%, and the installation percentage of LNB in newly established kilns increased from 13% to 64%. The SNCR technology developed later in the 2000s. During the 12th FYP, the SNCR installation experienced unprecedented explosive growth. The penetration rate has increased even faster than that of the LNB technology, from 1% of all the kilns in service in 2011 to 88% in 2015. ” Page10ïijŇLine 307-308ïijŇ“In 2011, only 11% and 1% of the clinker was manufactured in kilns equipped with LNB and SNCR facilities, whereas by 2015, the percentages sharply increased to 50% and 97%.” Please explain the meaning of the cumulative ratio occurred in Fig. 4 and Fig. 10 in more details.

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