Response to Referee #2

We thank the reviewers for the careful reading of the manuscript and helpful comments. According to the suggestions of the reviewer, the reviewers' comments have been carefully addressed, and the paper is carefully revised. We believe that the revised paper has been significantly improved after addressing the comments of the reviewers.

Comment: *Green Light Program in China on air quality was not evaluated. The subject of this study is valuable and has potential value on air pollution control. Some minor suggestions that the authors may consider to follow. 1) Haze is one kind of phenomenon in the meteorological record. Normally we say haze, hazy day, but not reasonable to say haze pollution. I suggest that the paper instead haze pollution of haze or aerosol/*$PM_{2.5}$ *pollution.*

Response: Thanks for the valuable comments, and we replaced "haze pollution" with "haze" in the text.

Comment: 2) *In line 147-148, what's the reason of "The decrease of* NO_x *emission was 6 year later than the decrease in* SO_2 *emissions"? Although, denitrification in thermal power generation after 2012 (Hu et al., 2016), the* NO_x *emission from transportation was increase much in this period.*

Response: We agreed the reviewer that the NO_x emission from transportation was still increase after 2012. However, **Figure 2** do not include NOx emissions from transport, only showing the NO_x emissions from thermal power plants, and the data respected to the previous studies of *Liu et al., 2015 (Fig. 4)* and *Tong et al., 2018 (Fig. 2A)*. We revised inexact description to explain more clearly **in Line-154:** "Distinguished from the increase trend of NOx emission from transportation (Hu et al., 2016), the decrease of NO_x emission from power sector started to decrease in 2012 due to the significant technological improvement of coal-consumption weighted mean NOx removal efficiency (Hu et al., 2016; Tong et al., 2018)."

Comment: *3) In the thermal power generation, there should be large differences in the air pollutants treatment technology in 2001 and 2010. I wonder whether the study consider the coal-saving induced by the GLP in the condition of different purification efficiency of air pollutants (SO_2 and NO_x etc.) in thermal power generation in 2001 and 2010.*

Response: We agreed with the reviewer that the there should be large differences in the air pollutants treatment technology in the thermal power generation. Between the base case (with the GLP) and sensitivity cases (without the GLP), we focus on the potential emission reductions derived by the potential lighting electricity savings induced by the GLP, excluding other influence factors, and estimated with the same purification efficiency of air pollutant emission. We added descriptions of this issue **in Line-268:** "It is worth noting that, in the present study, we focused on the potential emission reductions derived by the potential lighting electricity savings induced by the GLP. And the emission reduction was confined at the improvement of luminous efficacy, which is the core of the GLP (Guo et al., 2017). Between the base case (with the GLP) and sensitivity cases (without the GLP), the coal-saving induced by the GLP was estimated with the same purification efficiency of air pollutant emissions between the base case (with the GLP) and sensitivity cases (without the GLP). And the ratio of power electricity goes to lights is same with the ratio of artificial lighting to the total electricity consumption, which is 10–14% (Lv and Lv, 2012; Zheng et al., 2016)."

Comment: 4) *In the introduction, I suggest give a brief review of emission reduction of air pollutants on the structure of boundary layer and its impact on other species, eg. O_3. Two of the references related: Li Z., et. al, Aerosol and boundary-layer interactions and impact on air quality, National Science Review, 4, 810-833, doi:10.1093/nsr/nwx117, 2017. Gao J., et al. "Effects of black carbon and boundary layer interaction on surface ozone in Nanjing, China." Atmospheric Chem- istry and Physics 18.10(2018):7081-7094.*

Response: We added a brief review of emission reduction of air pollutants on the structure of boundary layer and its impact on other species and add some reference regarding the discussion **in Line-82:** "Emission reductions of air pollutants can substantially reduce the aerosol loading, and thus influenced the boundary layer, which is inherently connected to air pollution (Li et al., 2017). The interactions between aerosol and boundary layer can influence the surface ozone significantly, and more attention should be paid when controlling ozone pollution (Gao et al., 2018)."

References

Tong, D., Zhang, Q., Liu, F., Geng, G., Zheng, Y., Xue, T., Hong, C., Wu, R., Qin, Y., Zhao, H., Yang, L., He, K., 2018. Current Emissions and Future Mitigation Pathways of Coal-Fired Power Plants in China from 2010 to 2030. Environmental Science & Technology 52, 12905-12914.

Li, Z., Guo, J., Ding, A., Liao, H., Liu, J., Sun, Y., ... & Zhu, B., 2017. Aerosol and boundary-layer interactions and impact on air quality. National Science Review, 4(6), 810-833.

Gao, J., Zhu, B., Xiao, H., Kang, H., Pan, C., Wang, D., & Wang, H. 2018. Effects of black carbon and boundary layer interaction on surface ozone in Nanjing, China. Atmospheric Chemistry and Physics, 18(10), 7081-7094.