



## 16<sup>th</sup> INTERNATIONAL CONFERENCE ON CARBON DIOXIDE UTILIZATION

# Carbon Reduction Potential of Coal to Olefin Industry by CCS Technology in China

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Olefins (ethylene, propylene, butadiene and butylene) are the most important petrochemicals and the primary building blocks for various chemical intermediates, polymers and rubbers, which is critical to the development of national economy [1]. There are several technologies to obtain olefins in the worldwide, such as naphtha cracking, dehydrogenation of light alkanes, methanol to olefins (MTO) and coal to olefins (CTO). As the situation in China, the olefin production grows quickly due to great amount of oil-to-olefins (OTO) projects launched in China, the self-sufficient rates of ethylene and propylene were increased up to 53% and 74% in 2015 [2]. However, there is still a big gap between the domestic supply and demand, which is in urgently needed to be filled by olefins based on alternative resources. China's resource endowment, with the characteristics of "more coal, less oil, and poor gas", underlines the necessity for taking CTO technology. It is predicted that by 2020, 6.03 Mt ethylene production in China will come from the CTO route, which is greatly improved compared to 1.53 Mt in 2014. Therefore, it is foreseeable that the industry of CTO will play more and more important role.

However, CTO industry is facing the problems of high CO<sub>2</sub> emissions. Therefore, the mitigation potential by different mitigation pathway is evaluated. From Fig. 1, the carbon emission is only 4.53 Mt in 2010. In 2015, the carbon emission is obviously increased to 81.06 Mt. It is predicted that up to 2020, the carbon emission will be sharply attained to 235.26 Mt. Furthermore, if all planned CTO projects go into operation in 2030, the carbon emission will be 390.10 Mt. With the development of energy consumption, the carbon emission will decrease 17% to 195.54 MtCO<sub>2</sub>, if reaching the 2020 advanced level. In 2030, if the energy consumption

attains the 2030 advanced level, the carbon emission may be decreased from 390.10 MtCO<sub>2</sub> to 297.64 MtCO<sub>2</sub>, 23.70% maximum reduction. In addition, if 40% CO<sub>2</sub> storage rate by CCS technology is considered, in 2020 the carbon emission could be reduced to 138.87 MtCO<sub>2</sub> and in 2030 to 211.52 MtCO<sub>2</sub>. The total mitigation rate will be 40.97% in 2020 and 45.78% in 2030. Therefore, combined the technology improvement and CCS technology, great potential for carbon emission reduction could be attained.

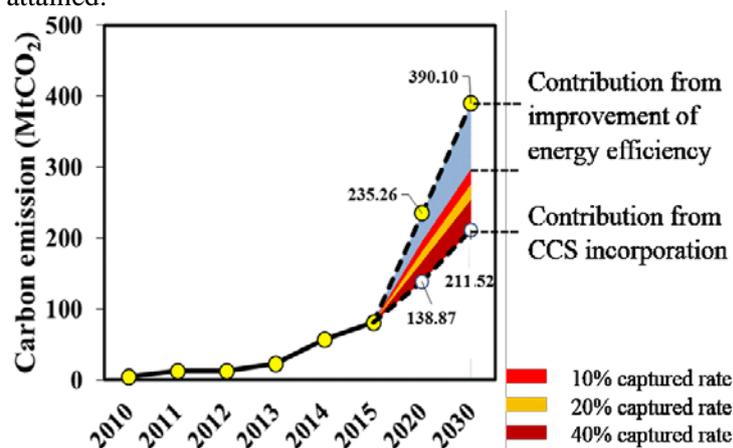


Figure 1. The mitigation potential by CCS in CTO industry

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### References

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