

Evaluation of Sustainable CO<sub>2</sub> capture and utilization processing paths for CO<sub>2</sub> reduction and economics with computational calculating tool

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The global warming due to the anthropogenic greenhouse gas (GHG) emission such as fossil fuel usage and industrial processes has become an intensely debated issue recently. To manage the GHG (especially, CO<sub>2</sub>) emission in the industrial sectors, CO<sub>2</sub> capture, utilization (CCU) technologies are being viewed as viable alternatives. However, applying CCU technologies to industrial processes brings several challenges. First is varieties of selecting suitable strategies among a large number of available technological options. Second is that the optimal selection and design problem should be performed with multiple objectives (profit vs. CO<sub>2</sub> reduction) and various constraints. In this study, various combinations of CCU technologies are applied to several CO<sub>2</sub> sources and evaluated concerning CO<sub>2</sub> life cycle assessment (LCA), and economics with computational calculation tool called called ArKaTAC<sup>3</sup> (Aramco/KAIST-Tool for Analysis of CO<sub>2</sub> capture & Conversion systems). Then, those paths are compared under different country conditions (South Korea, USA, Europe, China, Saudi Arabia) to find out which path is optimal in every country.