Annex 1: Selected Background Figures and Tables

The NAPSNet Policy Forum provides expert analysis of contemporary peace and security issues in Northeast Asia. As always, we invite your responses to this report and hope you will take the opportunity to participate in discussion of the analysis.

Recommended Citation

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From Technological Alternatives to Reduce Acid Gas and Related Emissions from Energy-Sector Activities in Northeast Asia by David Von Hippel

- Table A1.1: Technical Alternatives to Reducing Emissions
- Table 1.1: Estimated Emissions of Acid Gases in Northeast Asia in 1990 (thousand tonnes)
- Table 2-1: Cost Estimates for Post-Combustion SOx and NOx Reduction Measures for the Utility and Industrial Sectors
- Table 2.3: Representative Cost Estimates for Selected Centraland Off-Grid Power Generation Facilities
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- Figure A1.2: Diagram of Flue Gas Desulfurization Process for SO_x Control
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- Figure A1.5: Comparison of Three Types of Gasifiers, and Diagram of an Integrated Gasification Combined Cycle (IGCC) Plant

Figure A1.1: Diagram of Post-ESP Sorbent Injection Process for SOx Control

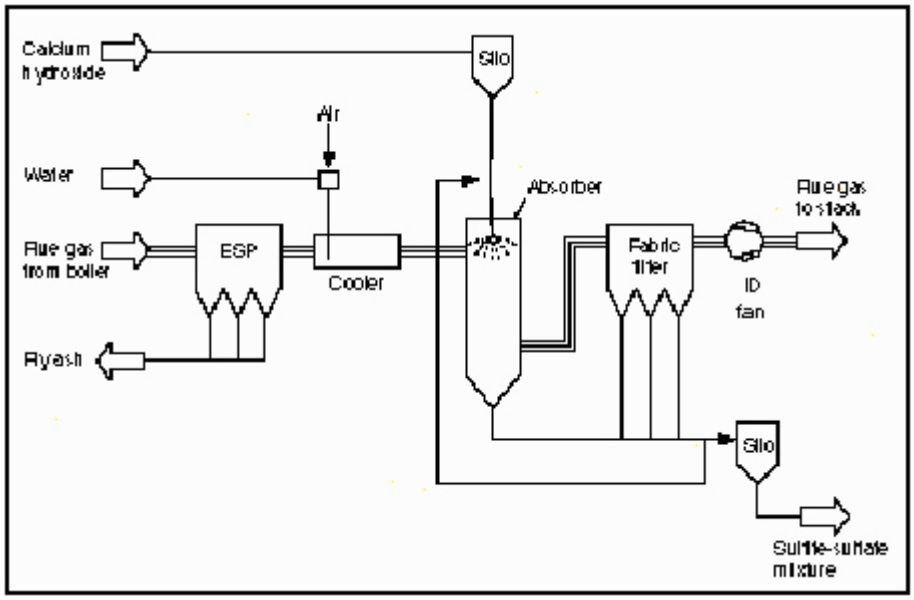


Figure A1.2: Diagram of Flue Gas Desulfurization Process for SO_x Control

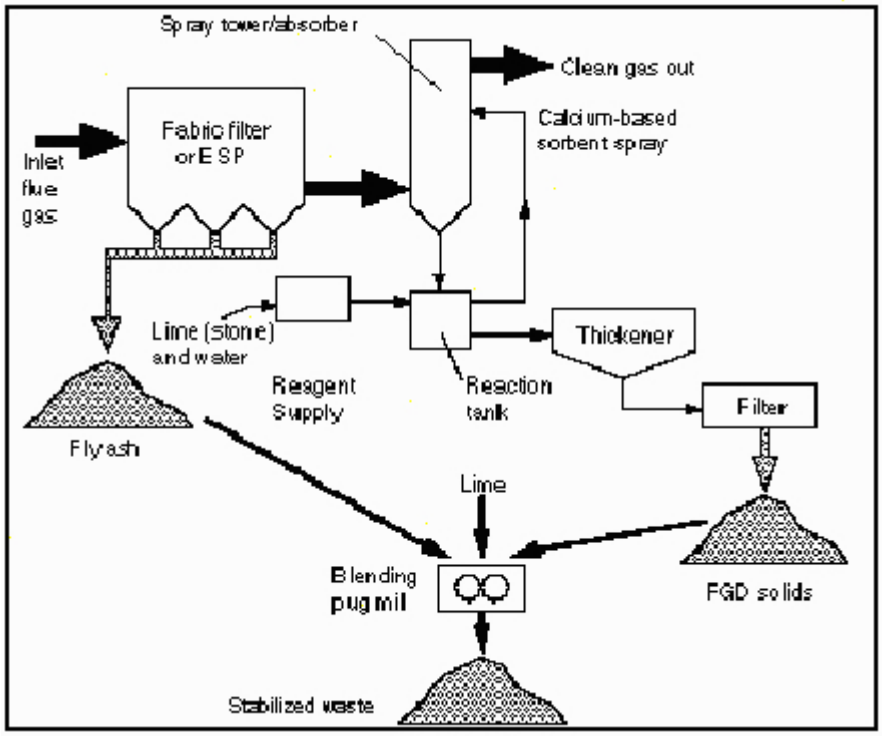


Figure A1.3: Diagram of Dry Scrubber Process for SOx Control

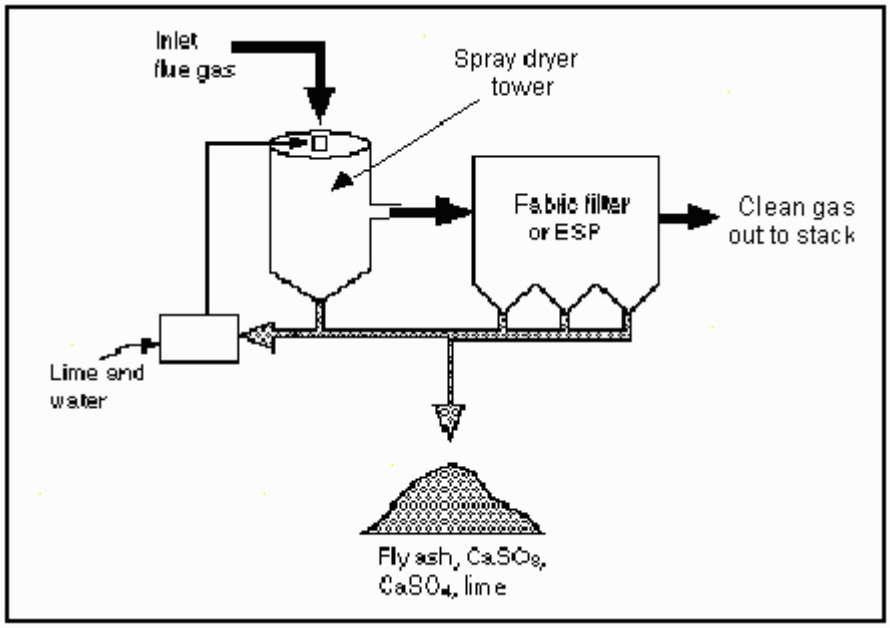


Figure A1.4: Comparison of Pulverized Coal and Atmospheric Fluidized-Bed Boilers

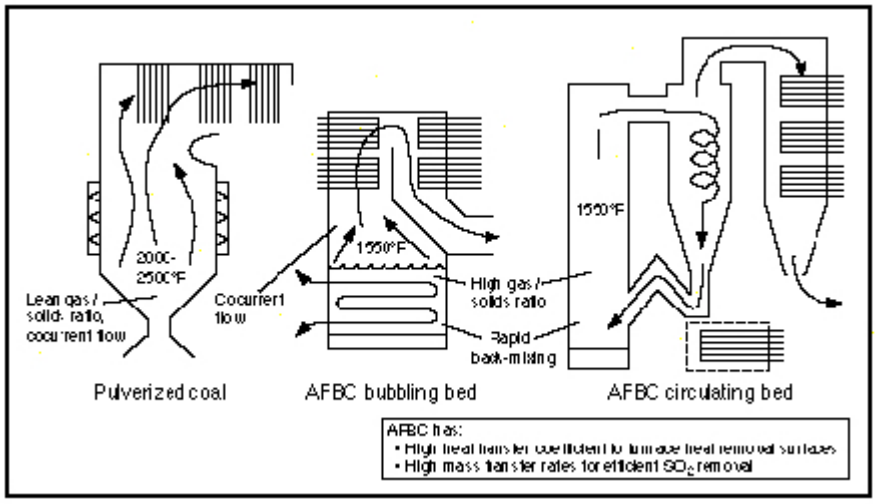
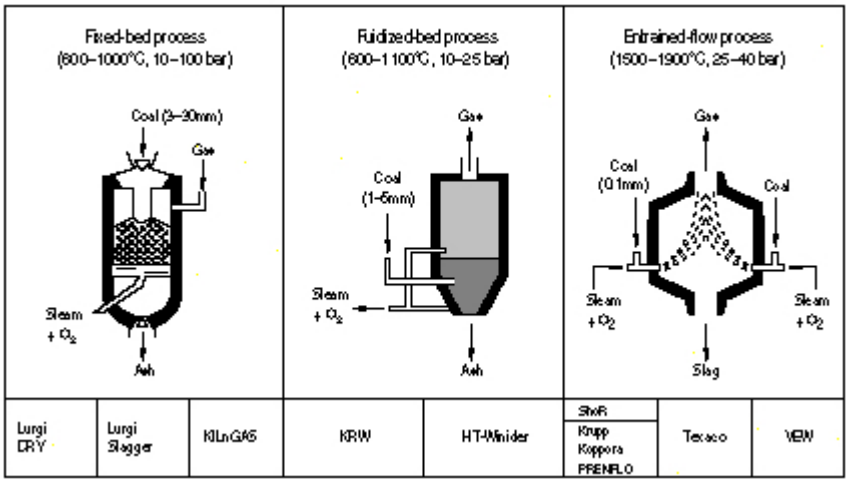


Figure A1.5: Comparison of Three Types of Gasifiers, and Diagram of an Integrated Gasification Combined Cycle (IGCC) Plant



w. Costs and efficiencies for most options from page 67 of Johansson, T.B., H. Kelly, A.K.N. Reddy, and R.H. Williams, "Renewable Fuels and Electricity for a Growing World: Defining and Achieving the Potential", Chapter 1 in Renewable Energy: Sources for Fuels and Electricity, edited by T.B. Johansson, H. Kelly, A.K.N. Reddy, and R.H. Williams, Island Press, Washington, D.C., USA. Note that these costs represent a blend of currently available technology and projections for technologies now in the commercialization phase. As a consequence, the cost figures shown here should be taken as representative estimates only. Costs for biomass gasifiers from Stassen, H.E., (1995), Small-Scale Biomass Gasifiers for Heat and Power: A Global Review, World Bank Technical Paper no. 296, Energy Series, The World Bank, Washington, D.C., USA. Costs for diesels are from Ramani, K.V., (1993), The Asian Development Bank's Approach to Rural Energy Development in the 1990's, Draft policy paper. Costs for hydro are from Shanker, A. and G.G. Krause, "Decentralized Small Scale Power Systems", Chapter 4-3 in Saunier, G. editor (1992), Rural Electrification Guidebook For Asia and the Pacific, Asian Institute of Technology, Bangkok, Thailand, page 254, and from Zhi Xiaozhang and Deng Bingli, Small "Hydro Power Development for Rural Electrification in China", Chapter 5-5, same volume.

x. Estimates for the costs of nuclear generating facilities are from Page 18 of Wu Changlun et al, editors, China: Issues and Options in Greenhouse Gas Control, Alternative Energy Supply Options to Substitute for Carbon Intensive Fuels, Subreport Number 5. The World Bank, Industry and Energy Division, Washington, D.C., USA. December 1994. Estimates of fixed O&M costs are based on a range of different estimates provided. Variable O&M costs are for fuel only (quoted in the source at 440 Yuan/kW, 4.7 Yuan/$, and 6000 hours of operation per year.

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