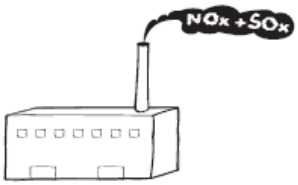

TRADE-OFFS AND CO-BENEFITS ACCOMPANYING NOx CONTROL

NOx Control Trade-offs and Co-benefits Beyond the Source

Emissions of greenhouse gases and other atmospheric pollutants occur at stages of the life cycle other than power generation. These stages include raw material extraction, component manufacture, fuel and material transportation, and facility construction and dismantling. To the extent that greenhouse gas emissions are representative, information compiled by The World Energy Council (2004) would suggest that direct stack emissions are far more dominant than the other indirect stages of the life cycle. See Figure S11.

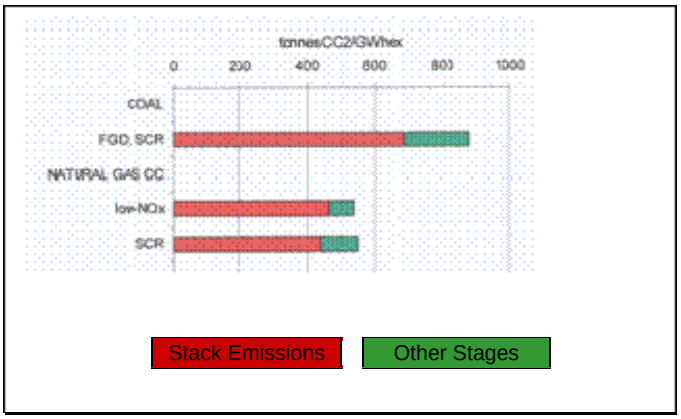

Figure S11. Greenhouse Gas Emissions from Combined Heat and Power Systems (Source: World Energy Council 2004)

The National Renewable Energy Laboratory (NREL) has performed a life cycle assessment (LCA) that examined coal-fired power systems. Included was the scenario of a coal-fired power plant equipped with flue gas treatment technology for SOx control and combustion modifications for NOx reduction.

Another life cycle assessment evaluated a natural gas combined cycle power system equipped with selective catalytic reduction (SCR) for NOx control. The scope of the analysis included power plant operation, construction and decommissioning of the power plant, construction of the natural gas pipeline, natural gas production and distribution, and ammonia production and distribution for NOx removal. Natural gas production and distribution, along with power plant operation, represented 99.5% of the nearly 500 g CO_2-equivalent/kWh life cycle global warming potential. Ammonia production and distribution constituted nearly 20% of the balance.

References

World Energy Council. 2004. *Comparison of energy systems using life cycle assessment*. London: World Energy Council. http://www.worldenergy.org/documents/lca2.pdf