

NEMS-CTS: A Model and Framework for Comprehensive Assessment of CCS and Infrastructure

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The National Energy Technology Laboratory is funding a NEMS-CTS (CO₂ Transportation and Storage) model that will provide for modeling of CO₂ pipelines and pipeline networks across the lower 48 states. An integrated NEMS based analysis used by the National Energy Technology to assess CCS retrofitting of existing coal fired power plants was updated to factor in plant specific variations in the costs of capture and regional variations in the costs of transmission and sequestration. Pipeline networks in the updated model are configured endogenously to be optimally consistent with the latest capacity and cost data for the U.S. sequestration resource base. The model will provide for analysis of various source, sink and pipeline combinations as well as different economic and policy scenarios. This paper will present a recent application of the model to assess the role of CCS in a Clean Energy Standard scenario. Documentation will also be presented for key parts of the model, including: (1) capture costs - the original generic model based on the Conesville Study and corrections based on heat rate and emission control configuration now include corrections for other site specific details such as capacity and location; (2) sequestration capacity and costs - NATCARB and other data bases are used for capacity and formation properties which are combined with drilling, monitoring, and other cost estimates in various cost models; (3) transmission costs - pipeline cost data and GIS data on siting constraints are combined in various cost models in a GAMS based optimizer that configures an evolving pipeline network ; (4) NEMS integration - the GAMS GDX utility is used to interface NEMS and the GAMS based optimizer (CTS Module) such that the evolving pipeline network and its associated cost adders for transmission and sequestration are consistent with the penetration of CCS in NEMS.