Stringent pollution control requirements have accelerated installation of limestone-based flue gas desulfurization (FGD) systems in coal-fired power plants. This trend toward increasing numbers of FGD units is expected to continue into the future. Because of the importance of high-calcium limestone as a scrubbing agent, it is essential that issues associated with the transport, availability, and suitability of high-calcium limestone resources for use in FGD power plants be addressed. Nearby sources of suitable limestone raw material must be found to feed existing and new scrubber installations and to aid in the selection of proper resources for desulfurization systems in the future.

Illinois has abundant limestone and dolomite resources. However, high-calcium limestone is not readily available throughout the state. The suitability of limestone for FGD applications also varies, and the most suitable limestone resources also are not widely available. Through grants from the Illinois Clean Coal Institute, the ISGS has been conducting a statewide study dealing with the inventory and characterization of limestone and dolomite resources. This work has resulted in a database and maps showing the quality and quantity of limestone and dolomite resources near existing and planned Illinois utility sites that will potentially use this material to remove sulfur dioxide from their stack gases. Limestone containing more than 95% CaCO$_3$ commonly occurs in the pre-Pennsylvanian rocks in the western and southern parts of Illinois along the Mississippi and Ohio Rivers. Existing quarries currently extract these materials from the Mississippian units, but the potential for high-calcium limestone mining also exists in rock units from the Ordovician and Devonian systems in the southern part of the state. Limited amounts of Pennsylvanian-age limestone are present in the central part of the state and are mined at a few locations. These limestones are variable in purity but, in some cases, may contain between 90 and 95% CaCO$_3$. Dolomite predominates in northern Illinois, especially the Chicago area, where much of the material is used as construction aggregate.

Calculated reactivity data for high-calcium limestones showed that they should be the most reactive sorbents for FGD systems. However, sulfur reactivities vary among the tested limestones and appear to be more dependent on the proportions of typical limestone constituents (fossil fragments, microcrystalline calcite matrix, sparry calcite cement, non-skeletal grains, etc.) as well as physical properties such as absorption than on limestone purity alone. Dolomites are generally not suitable as scrubbing agents in FGD systems due to the much lower reactivity of dolomite. This presentation will highlight the distribution and properties of existing and potential high-calcium limestone resources in Illinois.