Millions of tonnes of aggregates are transported across England and Wales each year, which causes constant concerns in regard to CO2 emissions. Much of that concern arises out of the long journeys from quarries to construction sites, and the fact that the main mode of transfer is by road. The aim of this paper is to describe the construction of a spatial decision support system (SDSS) to examine the impacts of scenarios to reduce the level of CO2 emissions. The SDSS is made up of a GIS containing a set of spatial models (including a spatial interaction model and a microsimulation model) underpinned by a detailed transport network of road and rail routes across England and Wales. The spatial interaction models are first calibrated to reproduce the existing set of flows of aggregates between quarries and local authority districts. The distance decay component is the travel distance equivalent across the road and rail networks. Based on these flows, linear models can be set up to estimate the amount of CO2 emissions associated with the existing set of flows. Then a series of what-if scenarios are set up which look at how changes in any part of the geography of production, the level of demand in certain areas or the transport process will impact the CO2 emissions. The paper demonstrates the capability of the SDSS in responding to the various spatial policies applied in different stages of the supply chain of the aggregates markets.