This paper presents a new prototype decision support system named COSIMA-DSS for composite methods for assessment - decision support system. This user-friendly system makes it possible for decision makers to assess large infrastructure projects and take special account of various uncertainties in a systematic and explicit way. The model applied is based on cost-benefit analysis (CBA) embedded in a wider multi-criteria analysis (MCA) and makes use of scenario analysis (SA) and Monte Carlo simulation (MCS). A particular concern of the model is the handling of varying information across the assessment criteria and the application of SA to inform the MCS parameter setting. After the presentation of the modeling principles, some ex-post case calculations for the Øresund Fixed Link connecting Denmark and Sweden are presented. These illuminate different aspects of appraisal uncertainty and demonstrate the features of the COSIMA-DSS model as a useful decision support tool. It is finally concluded that appraisal of large infrastructure projects can be effectively supported by dealing with uncertainty issues in accordance with the described principles.