Potential genetically engineered (GE) biofuel plant species come in all possible combinations—plant habits (grass, shrub, and tree) x life forms (annual and perennial) x status (native and introduced) x human use (crop and wild). A few of these possible combinations were never tested either under experimental field trials or as large-scale commercial crops. Thus GE biofuel crops have the potential to pose unique regulatory challenges that were never tackled by regulators before. For example, a general environmental risk assessment protocol revolves around the golden risk triangle—crop-trait-receiving environment. Unlike first generation commercialized GE crop plants, such as corn and soybean, where crop x receiving environment x trait combinations were fairly well-understood by developers and regulators, regulators may have to charter relatively unknown issues with respect to one, two or all three corners of crop-trait-receiving environment variables of the risk assessment triangle during the environmental release of GE biofuel plant species. At one end of the spectrum regulators and/or developers have to devise and implement effective field trial protocols to minimize unintended gene flow and persistence in the environment during the experimental phase, while at the same time developers must collect necessary data on various environmental variables to satisfy regulatory requirements for the potential commercial scale crop production. Depending on the biofuel crop and trait, some of the environmental concerns and data may be unique to biofuel crops. The presentation will explore both regulatory challenges and potential regulatory solutions for the environmental release of GE biofuel plants. Examples will be given for a range of biofuel traits and crops including grasses, oilseeds, and trees.