



## Expert Elicitations of 2100 Emission of CO<sub>2</sub>

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Emission scenarios such as Shared Socioeconomic Pathways (SSPs) and Representative Concentration Pathways (RCPs) are used intensively for climate research (e.g. climate change projections) and policy analysis. While the range of these scenarios provides an indication of uncertainty, these scenarios are typically not associated with probability values. Some studies (e.g. Vuuren et al, 2007; Gillingham et al., 2015) took a different approach associating baseline emission pathways (conditionally) with probability distributions. This paper summarizes three studies where climate change experts were asked to conduct pair-wise comparisons of possible ranges of 2100 greenhouse gas emissions and rate the relative likelihood of the ranges. The elicitation was performed under two sets of assumptions: 1) a situation where no climate policies are introduced beyond the ones already in place (baseline scenario), and 2) a situation in which countries have ratified the voluntary policies in line with the long term target embedded in the 2015 Paris Agreement. These indirect relative judgments were used to construct subjective cumulative distribution functions. We show that by using a ratio scaling method that invokes relative likelihoods of scenarios, a subjective probability distribution can be derived for each expert that expresses their beliefs in the projected greenhouse gas emissions range in 2100. This method is shown to elicit stable estimates that require minimal adjustment and is relatively invariant to the partition of the domain of interest. Experts also rated the method as being easy and intuitive to use. We also report results of a study that allowed participants to choose their own ranges of greenhouse gas emissions to remove potential anchoring bias. We discuss the implications of the use of this method for facilitating comparison and communication of beliefs among diverse users of climate science research.