The intermittency of wind generation creates nonlinear uncertainties in wind power forecasting (WPF). Thus, additional operating costs can be incurred for balancing these forecasting deviations. Normally, large wind power penetration requires accurate quantification of the uncertainty-induced costs. This paper defines this type of costs as wind power uncertainty incremental cost (WPUIC) and wind power uncertainty dispatch cost (WPUDC), and it then formulates a general methodology for deriving them based on probabilistic forecasting of wind power. WPUIC quantifies the incremental cost induced from balancing the uncertainties of wind power generation. WPUDC is a balancing cost function with a quadratic form considering diverse external conditions. Besides, the risk probability (RP) of not meeting the scheduled obligation is also modelled. Above models are established based on a newly developed probabilistic forecasting model, varying variance relevance vector machine (VVRVM). Demonstration results show that the VVRVM and RP provide accurate representation of WPF uncertainties and corresponding risk, and thus they can better support and validate the modelling of WPUDC and WPUIC. The proposed cost models have the potential to easily extend traditional dispatches to a new low-carbon system with a high penetration of renewables.