New van der Waals density functionals have shown that the thermodynamic and structural properties of DFT-based liquid water are very much improved with respect to those of GGA density functionals. Unfortunately, the DFT description of liquid water is still behind that of polarizable force-field model potentials that have been fitted to reproduce high level quantum chemistry ab initio data (at the CCSD(T) level and beyond). We present here a study of the structural and dynamical properties of a newly developed van der Waals density functional optimized to reproduce the same many-body partition energies (up to 3 body terms) used in the fitting of the MB-Pol (J. Chem. Theory Comput. 10, 2906 (2014)) force field. We will show how improved 2-body and 3-body interactions modify the density and compressibility of liquid water and ice, bringing the accuracy of DFT-based water to that of the state of the art polarizable force fields.