Abstract. If $Y$ is a diagram of spectra indexed by an arbitrary poset $\mathcal{C}$ together with a specified sub-poset $\mathcal{D}$, we define the total cofibre $\Gamma Y$ of $Y$ as \[\text{cofibre}(\text{hocolim}_D(Y) \longrightarrow \text{hocolim}_C(Y))\]. We construct a comparison map $\hat{\Gamma}_Y : \text{holim}_C Y \longrightarrow \text{hom}(Z, \hat{\Gamma}Y)$ to a mapping spectrum of a fibrant replacement of $\Gamma Y$ where $Z$ is a simplicial set obtained from $\mathcal{C}$ and $\mathcal{D}$, and characterise those poset pairs $\mathcal{D} \subset \mathcal{C}$ for which $\hat{\Gamma}_Y$ is a stable equivalence. The characterisation is given in terms of stable cohomotopy of spaces related to $Z$. For example, if $\mathcal{C}$ is a finite polytopal complex with $|\mathcal{C}| \cong B^m$ a ball with boundary sphere $|\mathcal{D}|$, then $|Z| \cong_{PL} S^m$, and $\hat{\Gamma}Y$ and $\text{holim}_C(Y)$ agree up to $m$-fold looping and up to stable equivalence. As an application of the general result we give a spectral sequence for $\pi_* (\Gamma Y)$ with $E_2$-term involving higher derived inverse limits of $\pi_* (Y)$, generalising earlier constructions for space-valued diagrams indexed by the face lattice of a polytope.