**Supplementary Note for:**

**Rebound effects could offset more than half of avoided food waste and loss**

Margaret Hegwood1,2\*, Matthew G. Burgess1,2,3\*, Erin M. Costigliolo4,5, Pete Smith6, Bojana Bajželj7, Harry Saunders8, and Steven J. Davis5,10\*

**Derivation of Rebound Ratio and Key Properties**

The rebound ratio is equal to (Fig. 1c),

(S1)

Note that ∆*C* = ∆*T* + ∆*W*, by definition. Rewriting (S1) in terms of ∆*C* yields:

(S2)

Solving for (S2) ∆*C* yields:

(S3)

Since ∆*W* and ∆*L* are always positive (because we are imagining scenarios of avoided waste and loss), ∆*C* is always positive (i.e., food security improves). In other words, reducing loss and/or waste always increases food consumption, as long as the rebound ratio is positive (generally the case, with downward-sloping demand and upward-sloping supply).

Note that that , also by definition. Rewriting (S1) in terms of ∆*P*,

(S4)

Solving (S4) for ∆*P*,

(S5)

Since ∆*L* and ∆*W* are positive, ∆*P* is negative (i.e., production, and environmental impact decrease) so long as RR < 1.

With no waste (∆*W* = 0), we can see from equation (S2) that RR becomes (as in Fig. 1a):

(S6)

With no loss (∆*L* = 0), we can see from equation (S1) that RR becomes (as in Fig. 1b):

(S2)