**Table of Rebound effects for use in the Rebound Framework Paper**

| **Component of economy-wide energy rebound** | **Origin/Mechanism** | |
| --- | --- | --- |
| Existing typologies  (Sorrell (2009) / Jenkins et al. (2011)  / Thomas & Azevedo (2013) / Walnum et al. (2014)) | Rebound mechanisms paper  (*comparison in italics to Sorrell/Jenkins/*  *Thomas & Azevedo / Walnum*) |
| Microeconomic rebound: these rebound mechanisms occur at the single device level, within the static economy, based on responses to the reduction in implicit price of an energy service. | Direct rebound: describes the direct response to the single energy efficiency improvement. Jenkins et al. (2011) and Walnum (2014) split into two sub-classes:   * Substitution effects: this captures the substitution of that energy service for the other goods or services (consumers) or inputs to production (producers). * Income/output effects: This is the increasing demand for that energy service by producers to expand their output ('an output effect') or consumers (an 'income effect').   Other notes: commonly substitution + income effects are assessed via combined efficiency elasticities | **1. Emplacement effect:** The emplacement effect accounts for performance of the Energy Efficiency Upgrade (EEU) only. No behavior changes occur. The direct energy effect of emplacement of the EEU is expected device-level energy savings. By definition, there is no rebound from direct emplacement effects. (*This effect is implicitly included by other authors, as expected energy savings*)  **2. Substitution effect** (*as other authors*)  **3. Income effect.** (*as other authors*) |
| Indirect rebound: describes the indirect response to the single energy efficiency improvement. Sorrell (2009) and Jenkins et al. 2011 split into two sub-classes:   * Re-spending and re-investment effects: If consumers and firms see net cost savings from energy efficiency improvements, this may increase consumer expenditures or investments in production - increasing demand for goods, services, and factors of production, which in turn require energy to produce and support. * Embodied energy effects: The energy ‘embodied’ in the efficiency improvements themselves will offset some portion of the energy savings achieved.   Other notes: Commonly respending/reinvestment effects are assessed via combined cross-price / cross-sector efficiency elasticities | **4. Emplacement effect** = Differential lifecycle energy effects (versus counterfactual) of the EEU, i.e. embodied energy (emb), and implied energy demand from maintenance and disposal (Md). (*Other authors include embodied effects (emb), but not energy/effects associated with Md*)  **5. Substitution effect:** (*Other authors typically include within the re-spending and re-investment effects)*  **6. Income effect:** (*Other authors typically include within the re-spending and re-investment effects)* |
| Macroeconomic rebound:  These mechanisms originate from the dynamic response of the economy to reach a stable equilibrium (between supply and demand for goods and energy services). They combine various short and long run effects. | Thomas and Azevedo (2013) split into 5 components:   * a lower market price for energy, * changes in economic structure, * economic-competiveness * investment and disinvestment, * labor market changes   Sorrell 2009, Jenkins et al 2011, and Walnum et al 2014 split into three effects:   * Market price effect * Composition effect * Economic growth effect | **7. Macroeconomic rebound effect:** made up of numerous components including:  7a: Energy market effect  7b: Composition effect  7c: Productivity effect comprising   * Growth effect * Scale effect * Labor supply effect * Disinvestment effect   (*Close alignment to Thomas and Azevedo 2013. Sorrell 2009, Jenkins et al 2011, and Walnum et al 2014 fold the scale and dis/investment effects into economic growth effect, and include labour market effects within the indirect factors of production response).* |

**Microeconomic rebound:** We apply the term ‘microeconomic rebound’ to be at the single device-level (i.e. for a single consumer/producer), and to assume there is no change in prices. It is a partial equilibrium response.

**Macroeconomic rebound:** We apply the term ‘macroeconomic rebound’ to comprise aspects which feature at a whole economy level, including market/price effects, composition effects, and productivity effects (growth, scale, labour supply, and disinvestment effects).