UNIVERSITY BUSINESS • EXERCISE SHEET

# 10.7 Sustainability in operations

Name: _____ Class: _____ Date: _____ **Total: 15 marks**

**KEY WORDS** carbon footprint • system boundary

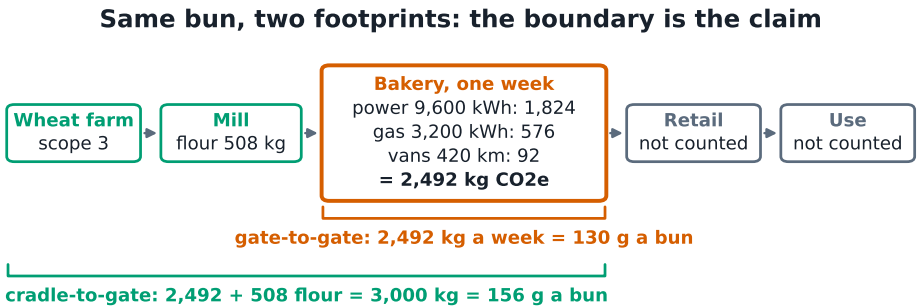
## Objective

Measure a footprint inside a stated boundary, move the boundary and see the number move, and test a circularity claim with its loss rate.

## 1 Key knowledge and worked examples

### Boundaries and loops

Gate-to-gate = scope 1 + 2 on site; cradle-to-gate adds upstream scope 3. Compare only inside one boundary. A reuse loop pays only if losses + washing cost less than the single-use item.




*Same bun, two footprints - the boundary is the claim*

### Worked example. The bun

1,824 + 576 + 92 = 2,492 kg a week = 130 g a bun ✓; + 508 flour = 3,000 = 156 g ✓. Trays: breakeven return 96.5% ✓.

## 2 Practice

**2.1** A pastry kitchen: 6,000 kWh electricity (0.19 kg/kWh), 2,000 kWh gas (0.18), 300 van km (0.22); 12,000 pastries a week. The gate-to-gate footprint and grams per pastry. [4]

**2.2** Flour 600 kg a week at 0.55 kg CO2e a kg. The cradle-to-gate total and the rise in per cent. [3]

**2.3** A renewable tariff at 0.06 kg/kWh. New site total, the site fall in per cent, and the cradle-to-gate fall in per cent. [4]

**2.4** Trays: 26,000 single-use a year at 0.25. Returnable at 6.00, a two-week cycle, 97% returns, washing 0.04 each. Pool cost, running cost, saving, payback, and the breakeven return rate. [4]