

Session 2 exercises:

Units and conversions and use

of Excel spreadsheet

Units and conversions

The International System of Units (SI system) generally used in the manual:

- ❖ SI basic unit of **mass** is the **gram (g)**
- ❖ SI basic unit of **energy** is the **joule (J)**
- ❖ SI basic unit of **length** is the **metre (m)**
- ❖ SI basic unit of **time** is the **second (s)**
- ❖ SI basic unit of **power** is the **watt (W) [= 1 J/s]**

The following units are also recognised for use in the SI system

- ❖ **metric tonne (t)** [= 1,000,000 g or 1,000 kg]
- ❖ **hectare (ha)** [= 10,000 square metres (m²)]
- ❖ **minute (min)** [= 60 s]
- ❖ **hour (h)** [= 3600 s]
- ❖ **litre (L or sometimes l)** [= 1,000 cm³]

Units and conversions

❖ Units of greater magnitude denoted thus:

Symbol	Prefix	Multiple	
P	peta	1,000,000,000,000,000	10 ¹⁵
T	tera	1,000,000,000,000	10 ¹²
G	giga	1,000,000,000	10 ⁹
M	mega	1,000,000	10 ⁶
k	kilo	1,000	10 ³
h	hecto	100	10 ²
c	centi	0.01	10 ⁻²
m	milli	0.001	10 ⁻³

Therefore one kilogram (kg) equals one thousand (10³) grams, and one megagram (Mg) equals 10⁶ grams.

Units and conversions

Exceptions to use of SI units in the APINA manual:

- ❖ Fuel consumption activity data as reported by the International Energy Agency (IEA) Balances are expressed as **kilotonnes oil equivalent (ktoe)** where 1 toe = 10⁷ kcal (kilocalories). The APINA workbook therefore allows for fuel consumption data to be input as ktoe (as well as in tonnes (t) or terajoules (TJ)).
- ❖ Similarly, Net Calorific Values (NCVs) for fuels given by the IEA are expressed as **tonnes oil equivalent per tonne (toe/t)**. Therefore the APINA workbook is also set up to allow NCVs to be input in these units.

Units and conversions

Exercise A:

1. 2,000 kg = t
2. 356,000 Mg = kt
3. 65,000 mg = kg
4. 10⁶ g = kg
5. 10¹² m = km
6. 6 million tonnes = kt
7. 25,000,000 MJ = PJ
8. 0.0025 TJ = MJ
9. 10,000,000 m² = km²
10. 0.250 Mtoe = ktoe

Units and conversions

Exercise B:

1. 1 ha = m²
2. 0.75 km² = ha
3. 250 kg/kt = g/kg
4. 50 g/kg = %
5. 45 t/TJ = kg MJ⁻¹
6. 150 ktoe = TJ (Note: 1 Mtoe = 4.1868 x 10⁴ TJ)
7. 150 toe t⁻¹ = TJ t⁻¹
8. 80 g SO₂ /kg = kg SO₂ t⁻¹
9. 50 g NMVOC per litre =kg NMVOC /hl (Note: hl = hectolitre)
10. 2,000,000 m³ /week = x 10⁶ m³ yr⁻¹

Exercise C

– practical session: getting to know the workbook

- ❖ Using an Excel spread sheet
- ❖ Structure of APINA emissions inventory preparation workbook:
 - division into worksheets,
 - navigation menus,
 - freeze panes and scrolling in worksheets
 - general data input areas (white),
 - general data output areas (green),
 - understanding the formulae used,
 - final summary sheet
 - recording tables for reference source(s) of activity data and emission factors if defaults not used (transparency of data)