

GreenGov Exercise Book

Fifteen hands-on exercises with the Greenknot Municipal Corporation dataset — with the computations shown

Version 0.32 · Companion to the GreenGov User Manual

Every expected figure in this book was produced by the tool's own engine against the shipped dataset, and every exercise that involves arithmetic shows that arithmetic, so a reviewer can check the tool against this book and this book against a calculator. Greenknot Municipal Corporation is fictional; see the test-pack README for the data statement. Manual section references (\$) point into the User Manual.

You need, both from the **Learn** row on the GreenGov landing page:

1.  **Excel workbooks** — download and unzip to a folder you can find again. This is the Greenknot estate as Excel data-call templates: one file per sector, in exactly the format GreenGov exports and imports. The walkthrough below builds the estate from them, which is the same thing you will do with your own offices' spreadsheets.
2.  **Exercise book** — this document.

Optional shortcut:  **Exercise dataset** → **Load into workspace** drops the finished estate straight into your workspace with no importing. Use it if you want to jump to the analysis exercises (Module B onward); use the workbooks if you want to learn how data actually gets into the tool. Nothing you do to either touches anyone else's copy, and nothing leaves your browser.

The estate at a glance: 10 premises · 25,550 m² · 1,346 FTE · baseline 2024 · horizons 2030/2050 · India grid 0.71 kgCO_{2e}/kWh · Hot-dry. The Central Office (Civic Centre) — 9,500 m², 480 FTE — is the worked office throughout.

Walkthrough — an entire ES analysis, click by click (60 min)

The fifteen exercises after this are drills: each isolates one skill and proves one number. The walkthrough is the opposite — it does the whole job once, from an empty workspace to a published report, so you know what the pieces are for before taking any of them apart. Follow it with the workbook folder open beside you.

Every expected figure below was produced by the tool itself and is re-checked by the project's automated tests on every build. If your screen disagrees with this book, that is a finding worth reporting.

Part 1 — Get the data in (20 min)

This is the part most estates actually struggle with, so it comes first. Offices do not have the tool open; they have spreadsheets. GreenGov's answer is the data call: export a template, circulate it, re-import the filled file. You are about to be on the receiving end of five such files.

Step 1 · Create the project. Landing page — + **New Project**. Name it Greenkot walkthrough, country India, **baseline year 2024, target year 2030**, long-term 2050. Create.

The target year is asked for at the start because every projection, scenario and goal in the tool is computed to it. Baseline = the year your data describes; target = the year you are planning to. Both stay editable under **Reference — Factors & Method**.

Step 2 · Import the setup workbook. Go to **Setup — Organisation & Offices** — 📁 **Import filled template** — choose **SETUP-organisation-offices-goals.xlsx** — confirm.

Expected: 10 premises appear · organisation reads *Greenkot Municipal Corporation* · 5 goals arrive with them · **estate 4,270 tCO_{2e}** · **Tier-1 share 0%** · Central Office **1,577.99 t**.

Read that pair of numbers carefully. You supplied nothing but floor area, headcount, country and climate zone — and the tool still produced a complete estate footprint. Those 4,270 t are entirely *declared defaults*: benchmark intensities for a hot-dry office, flagged Tier 3. The 0% Tier-1 share is the tool telling you, honestly, that not one number here came from a measurement. This is a legitimate starting point — never a reportable result.

Step 3 · Energy. Sectors — Energy — 📁 **Import filled template** — **ENERGY.xlsx**.

Expected: **3,544 t** · **Tier 1 = 53%** · Central Office **1,331.97 t** · 50 stock records.

The estate total *fell by 726 t* the moment real invoices replaced the benchmark. That direction is not luck: the default was deliberately conservative, and Greenkot's offices are less electricity-intensive than the generic hot-dry benchmark assumes. The honest signal is the jump from 0% to 53% measured — the footprint did not improve, our knowledge of it did. The workbook also carried the lighting, cooling, equipment, water-heating and pumping **stock counts**: how many of each technology are installed. Those counts are what scenarios later act on.

Step 4 · Mobility. Sectors — Mobility — import **MOBILITY.xlsx**.

Expected: **3,958 t** · **Tier 1 = 50%** · Central Office **1,446.15 t** · 80 stock records.

This time the total *rose by 414 t*, and the Tier-1 share slipped three points. Both make sense: the sheet added fleet fuel, air travel, rail, freight contracts and staff commuting — activity the setup defaults barely covered — and most of it arrives as Tier 2 (modelled from counts and distances), which dilutes the measured share. A baseline getting *bigger* as you learn more about it is the normal shape of honest measurement.

Step 5 · Water and waste. Sectors — Water & Waste — import **WATER-WASTE.xlsx**.

Expected: 3,926 t · Tier 1 = 51% · Central Office 1,424.79 t · 130 stock records.

Small movement in tonnes, large movement in what you can now say: metered water, three separated waste streams, and therefore a real **diversion rate** instead of an assumption. Central Office has now reached the 1,424.79 t that Exercise 2 reproduces by hand, line by line.

Step 6 · Procurement and ICT. Sectors – Procurement – import PROCUREMENT - ICT.xlsx.

Expected: 3,926 t — unchanged — · 140 stock records · tender counts now populated.

A sheet that changes no tonnes is not a wasted sheet. Paper was already covered; what arrives here is the **ICT equipment stock** and the **green-tendering counts**. Neither shifts the operational footprint, and both are needed for the scenarios and goals you are about to build. Procurement is where an estate's influence outlives its own meters.

Where you now stand: 3,926 tCO_{2e} across 10 premises, 51% of it measured, 140 technology stock records, 5 goals waiting. That is a defensible baseline. *(Shortcut for later: the FULL - workbook.xlsx in the same folder carries all five sheets at once. And blank-templates/ holds the identical sheets, emptied — that is what you send to your own offices.)*

Part 2 — Turn data into a decision (40 min)

#	Page	What you are doing	Expected
7	Estate Dashboard	Read the baseline. How the 3,926 t splits by premises and by source; which offices dominate.	3,926 t · 51% Tier 1 [Ex 1, 5]
8	Sectors — any page, office selector	Interrogate one office. Central Office, every tab: the numbers you imported, and the emissions they produce.	1,424.79 t [Ex 2, 3]

#	Page	What you are doing	Expected
9	Scenarios	Say what could change. BAU is what happens with no action. Two planning slots hold technology-stock transitions — T8—LED, chiller replacement, fleet electrification — each attributed to the actor who must actually deliver it.	three slots [Ex 6, 7]
10	Compare Scenarios	Test the plan against your target year. Each scenario at 2030 and 2050 against BAU — and how much of the fall is your action rather than the national grid decarbonising anyway.	BAU 3,680 · Moderate 3,410 · Ambitious 2,258 [Ex 9]
11	ES Goals	State the commitment. Targets attached to the indicators that carry them, each with its own target year and automatic decade milestones.	goals met / missed [Ex 10]
12	ES Goals — gap advisor	Close the gap. Where the plan falls short, the advisor names the measures that would close it, in cost order, each linking to the page where you edit it.	ranked gap list [Ex 11]
13	Analysis Report	Publish. A printable report carrying the numbers <i>and</i> the method version and factor set that	method statement [Ex 12, 15]

#	Page	What you are doing	Expected
		produced them. Print – Save as PDF.	
14	Actuals & MRV	Come back next year. Enter what actually happened, compare it against the trajectory you committed to, and record which measures were genuinely implemented.	variance flags [Ex 13, 14]

Two habits worth forming while you do it. **Watch the tier, not just the total** — a falling footprint built on Tier-3 guesses is not an achievement, and steps 2–6 showed you exactly how much a total can move without anything real changing. **Separate what you did from what happened to you** — step 10 splits your own abatement from grid decarbonisation, and that distinction is what survives an auditor.

Module A — Baseline and honesty

Exercise 1 — Import and orient (5 min)

If you did the walkthrough you already have the estate; open it and skip to the figures below. Otherwise take the shortcut: landing page → **Learn** → 🎓 **Exercise dataset** → **Load into workspace**. Either way, read the Estate Dashboard (pinned at the top of the sidebar).

Expected: 10 premises · **3,926 tCO_{2e}** baseline (2024) · Tier-1 share **51%** · per-person 2,917 kg/FTE (3,926,000/1,346).

The computation behind the headline. The estate total is the plain sum of ten per-office inventories, each built as §4 of the manual. No estate-level adjustment, no normalisation — if you sum the “Footprint by premises” bars you get the headline.

Question: which premises carry the measured share? Open **By office (all data)**: the Central Office (76.6% Tier 1) and Water Works carry invoice data; ward offices run on Tier 2–3. That mix produces the estate’s 51%.

Exercise 2 — One office by hand (25 min — the core exercise)

Sectors → any page, office selector: *Greenkot Central Office (Civic Centre)*. Collect its entered data from the Activity tabs, then reproduce its 1,424.8 t total with a calculator, using the factors from Manual Annex A.

The computation (every line should match §5 of the manual and the screen):

Component	Arithmetic	Result
Scope 1	8,200 L diesel $\times$ 2.68	21.98 t
Scope 2	1,520,000 kWh $\times$ 0.71	1,079.20 t
Air	$92,000 \times 0.15 \times (1 + 0.08 \times 0.5) + 18,000 \times 0.11 \times (1 + 0.08 \times 1.9) = 14,352 + 2,281$	16.63 t
Car / rail	$224,000 \times 0.17 + 61,000 \times 0.04$	40.52 t
Fleet	$9,800 \times 2.31 + 14,200 \times 2.68$	60.69 t
Freight (table)	tanker + van + collection rows	17.00 t
Commuting	see Exercise 3	147.34 t
Waste	$62,400 \times 0.45 + (24,000 + 9,600) \times 0.02$	28.75 t
Water	$4,820 \times 0.34$	1.64 t
Paper	$4,800 \text{ reams} \times 500 \times 0.005 \times 0.92$	11.04 t
Total		1,424.79 t ✓

Checks along the way: the 8% premium-cabin share raises air emissions by the premium share times (multiplier-1) — not by multiplying all air travel; fleet fuel is Scope 3 here because these litres were entered as travel activity (a boundary choice stated in the method); the three waste streams give a computed diversion of $(24,000 + 9,600) / 96,000 = 35\%$, which is why the landfill indicator reads 65%.

Exercise 3 — Commuting: activity in, indicator out (15 min)

Mobility → **Staff commuting** tab, Central Office. The table holds six modes.

The computation. Commuting days = $220 \times (1 - 0.05) = 209$. Each row is staff $\times$ one-way km $\times 2 \times 209 \times$ intensity:

Mode	Row	kg
2-wheeler (0.083)	$258 \times 7 \times 2 \times 209 \times 0.083$	62,657
Bus (0.10)	$58 \times 9 \times 2 \times 209 \times 0.10$	21,820
Car solo (0.17)	$68 \times 11 \times 2 \times 209 \times 0.17$	53,153
Carpool (0.068)	$26 \times 12 \times 2 \times 209 \times 0.068$	8,868
e-2-wheeler (0.021)	$16 \times 6 \times 2 \times 209 \times 0.021$	843
Walk/cycle (0)	—	0
S3c		147,341 = 147.34 t ✓

Now set WFH to 20%: days become $220 \times 0.80 = 176$, and since every row scales by days, S3c scales by $176 / 209$: $147.34 \times 176 / 209 = 124.07 \approx 124.1 \text{ t } \checkmark$ — the office total falls to 1,402 t. Set WFH back to 5.

Point: you changed one behavioural datum; the per-FTE indicator moved because it is computed. Nowhere did you touch an emissions number.

Exercise 4 — Scoring by hand (15 min)

Open **By office (all data)** — Central Office row: performance **39**.

The computation (\$6). Score each indicator with $\text{clamp}((\text{value}-\text{bad})/(\text{good}-\text{bad})\times 100)$, cap Tier-3-fed ones at 40, average within domains, then take the geometric mean:

Indicator	Value	Goalposts (100/0)	Score
Energy (primary) kWh/m ²	3,074,276/9,500 = 323.6	60/300	0
GHG kg/m ²	1,424,790/9,500 = 150.0	5/120	0
Renewable %	18	80/0	22.5
Travel kg/FTE	134,847/480 = 280.9	50/800	69.2
Water m ³ /FTE	4,820/480 = 10.04	6.4/25	80.4
Waste kg/FTE	96,000/480 = 200	100/400	66.7
Landfill %	65	0/100	35.0
Paper sheets/FTE/day	2.4M/(480×220) = 22.7	15/60	82.9
Green tenders %	31/186 = 16.7	80/0	20.8
Space m ² /FTE	19.8	12/35	66.1

Domain means: Energy & carbon (0+0+22.5)/3 = 7.5 · Mobility 69.2 · Resources (66.7+35+82.9)/3 = 61.5 · Water 80.4 · Procurement 20.8 · Governance 66.1. Geometric mean = $\exp(\text{mean of } \ln(7.5, 69.2, 61.5, 80.4, 20.8, 66.1)) = \mathbf{39} \checkmark$.

Point: the arithmetic mean of those domains is 50.9. The geometric mean's 39 is the design: a catastrophic energy domain cannot be bought off with good paper habits. Note the primary-energy step — $1,520,000 \times 2 + 8,200 \times 3.8 \times 1.1 = 3,074,276$ kWh — without which the energy indicator would flatter electricity-heavy offices.

Exercise 5 — Silence vs measurement (10 min)

Register a premises: “Greenkot North Annex”, 1,200 m², 80 FTE, India, Hot-dry. Enter nothing else. Open its row.

The computation (Tier-3 defaults, Annex C). Electricity $1,200 \times 200 \times 0.80 = 192,000$ kWh → 136.3 t; generator $1,200 \times 200 \times 0.20 / 3.8 = 12,632$ L → 33.9 t; travel $80 \times 350 = 28,000$ kg = 28 t; water $80 \times 12 \times 0.34 = 0.33$ t; waste $80 \times 250 \times (0.85 \times 0.45 + 0.15 \times 0.02) = 7.7$ t; paper $30 \times 80 \times 220 \times 0.005 \times 0.92 = 2.4$ t. $\approx \mathbf{208.6$ t — every part Tier 3, score capped, ° provisional.

Now enter electricity = 60,000 kWh at Tier 1 and diesel = 0 at Tier 1. The office total collapses (the EUI default was cautious) and the ° clears as measured data displaces proxies. Delete the office afterwards () — estate returns to exactly 3,926 t.

Point: silence produced an honest but expensive guess; ten minutes with one invoice beat it. That asymmetry is deliberate.

Module B — Planning

Exercise 6 — The three slots (10 min)

Setup → Scenarios. Rename s1 to “Commissioner’s programme”; press  Standard name. Read the  Clear confirmation for s2 (112 measures + 188 transitions across 10 premises) and Cancel. Note the slot-id pills and that no “add scenario” exists.

Expected: interventions s1 = **128** (68+60), s2 = **300** (112+188); ★ on s1. Rename s1 again and visit Trajectory and MRV releases — every page follows the new name because pages read the slot, not a stored string.

Exercise 7 — A transition, a-b, and calibration (20 min)

Energy → **Lighting**. Central Office: 600 T8 · 150 CFL · 200 LED · 40 HPSV (4 rows of a 10-technology catalogue — zero-count rows are hidden; the Excel template carries all ten columns).

The computation (\$8.2). The s1 plan on the T8 row is — LED at 50%. From Annex D, T8 = 110, LED = 35 kWh/fixture/yr:

$$\Delta = 600 \times 50\% \times (110 - 35) = 22,500 \text{ kWh/yr}$$

$$\text{at 2030 under BAU grid: } 22,500 \times 0.573 = 12.9 \text{ tCO}_2\text{e/yr}$$

Also on this tab: the calibration line. Bottom-up lighting+cooling+equipment implied kWh is compared with the metered 1,520,000; if implied exceeded metered, every delta would scale by metered/implied (\$8.2 — at this office electricity’s scale is 1.0, but the water-fixtures inventory over-implies and carries scale 0.644: a fixtures transition saves 64.4% of its naïve arithmetic).

Now open **Policies & operations**: the LED measure is greyed  **superseded** for this office — the table now owns the lighting decision, so the checkbox cannot double-count it.

Exercise 8 — The plan travels in Excel (20 min)

Download the ENERGY template (any Excel bar). Inspect Scenarios, ScenarioPlan (one row per transition: Office · Category · Current technology · Slot · Switch to · %), ScenarioMeasures. Then rebuild everything from spreadsheets: create an empty project and import, in order, from templates/filled/:

After	Estate t	s1 2030	s2 2030
SETUP	4,270	3,816	3,083

After	Estate t	s1 2030	s2 2030
+ENERGY	3,544	3,004	1,999
+MOBILITY	3,958	3,460	2,343
+WATER-WASTE	3,926	3,399	2,254
+PROCUREMENT	3,926 ✓	3,410 ✓	2,258 ✓
-ICT			

Why 4,270 after SETUP: ten registered premises with no activity data run entirely on Tier-3 defaults (Exercise 5's arithmetic, ten times over) — higher than reality because the defaults are deliberately cautious. Each sector workbook then replaces proxies with data *and* carries its own slice of the plan, which is why the scenario columns converge too.

Also try: rename “Ward Office — East Zone” to “Ward office East” in a copy of the SETUP file and re-import into the original project — the reconciliation dialog opens, proposes the match, and writes nothing until you decide.

Exercise 9 — The grid: driver vs anchor (15 min)

Reference — Factors & Method, grid row **India** (0.71).

The computation (\$7). Under the 3.5%/yr driver: $\text{grid}(2030) = 0.71 \times 0.965^6 = \mathbf{0.573}$. Now anchor: target year 2035, factor 0.35 — $\text{grid}(2030) = 0.71 \times (0.35/0.71)^{(6/11)} = 0.71 \times 0.4930^{0.5455} = \mathbf{0.483}$, implied rate $1 - (0.35/0.71)^{(1/11)} = \mathbf{6.2\%/yr}$ (the page shows the implied figure).

Expected on Compare: BAU 2030 falls 3,680 → **3,295 t**; s1 3,410 → **3,037 t**. Remove the anchor; numbers return.

Question: did the programme improve? No — and the tool refuses the claim: with the grid frozen at 0.71, BAU 2030 is **4,260 t**, so 580 t of the un-anchored BAU “improvement” (and more under the anchor) is the grid's doing, reported separately on Compare precisely so it cannot be booked as estate achievement.

Module C — Results, goals, and the gap

Exercise 10 — Read the goals honestly (10 min)

Results — ES Goals (reporting against ★ s1).

Expected: 0/5 met. GHG 3,410 vs ≤2,159 · renewable 8.3% vs ≥50 · landfill **53.5%** vs 0 · water 9.26 vs ≤8 · travel 428 vs ≤336.

Two computations worth doing by hand. Landfill under s1: baseline share 76.4%; the plan moves 30% of the landfill stream out — $76.4 \times (1 - 0.30) = \mathbf{53.5\%}$ (\$9.2 — an indicator adjustment; the tonnes were already counted once in the transition delta). Switch ★ to s2 briefly: renewable = (generated + green-purchased)/consumed = **30.0%** — rooftop PV

displaces purchases *and* counts as renewable consumption, yet still misses 50 (\$9.1). Water 4.02 ✓ and travel 324 ✓ are met under s2. Switch ★ back to s1.

Exercise 11 — The gap advisor (20 min)

On each unmet goal press 🚫 How to close the gap and read the verdicts:

Goal	Verdict	Reading
Renewable ≥50%	✓ reachable with 5 additions	green tariff at 4 offices + PV at HQ
Zero landfill	✓ with 11	deepen every diversion contract to 100%
Water ≤8	✓ with 3	dual-flush + sensor taps at HQ, dual-flush at Water Works
Travel –25%	✓ with 5	travel policies + fleet at Solid Waste Mgmt
GHG –45%	● not reachable : all 347 candidates reach 2,378 vs 2,159	residual needs green tariff / driver policy / target revision

What the numbers are. Each row's effect is the projection engine re-run with that single candidate added to the ☒ plan (no heuristics); the cumulative column applies them in rank order. Check one by hand: the top GHG candidate, rooftop PV at HQ (ab 10–30%, mid 20%): the office's remaining 2030 electricity $\times 0.20 \times \text{grid}(2030) \approx 185 \text{ t}$ — the advisor's figure.

Discussion: the Actor column is the point — the renewable gap belongs to the payer of utilities, the landfill gap to owners' contracts, the travel gap to occupiers. The advisor turns “off track” into a negotiation list, and it says out loud when the catalogue cannot close a gap, which is information a red chip never gave you.

Exercise 12 — Consistency spot-check (10 min)

Pick the ☒ figure 3,410 t and find it on: Compare (s1 at 2030), ES Goals (GHG row, ☒ Plan column), Trajectory (☒ series at 2030), the Dashboard with the s1 lens, and the Energy page Results tab (its slice 2,419 t + Mobility 878 + Water&Waste/upstream 113 = 3,410 within rounding). One engine, one number, five pages.

Also note: Water & Waste and Procurement & ICT Results show the *same* upstream slice, and the Procurement page says so — its instruments shrink that shared slice (green tenders, ICT lifetime) rather than owning a separate one. That is a documented boundary decision, not a leak.

Module D — Ex-post and assurance

Exercise 13 — Actuals and the trajectory (10 min)

Ex-post — Annual Actuals: 2025 entered for the Central Office; the other nine carry forward at Tier 3, flagged. Trajectory: the 2025 dot sits at **3,892 t**, marginally above the BAU expectation of **3,878** — “Above BAU”, with the Tier-1 column saying how much of that actual is truly measured.

Exercise 14 — Attribution: the implemented register (15 min)

MRV & Data Calls — *Implemented interventions*: three 2025 entries at the Central Office (setpoints/night shutdown, maintenance contract, first-floor LED). Back on Trajectory, the ex-post card reads, for 2025:

Actual	Expected (BAU)	Expected (implemented)	Claimable	Unexplained
3,892	3,878	3,691	-187 t	+201 t

The computation (\$11). Expected-implemented is the projection under a synthetic scenario containing only the three registered items; claimable = 3,878 – 3,691; unexplained = 3,892 – 3,691. The +201 is mostly nine premises of carried-forward Tier-3 actuals — visible, attributable, and the reason a savings claim without this register is just a hope. Add a fourth register entry and watch both columns move.

Exercise 15 — Freeze a release (10 min)

MRV — ❄️ **Freeze release**: a row with baseline/BAU/☒-plan totals, approved-call count and an FNV-1a content hash, archiving the factor versions. Then change any factor on the Factors page: live numbers move, the release does not, and the factor library version now ends - edited. The published figure remains regenerable and every deviation from it is traceable — which is the entire purpose of MRV.

Answer key

Ex.	Key figures
1	3,926 t · 51% Tier 1 · 2,917 kg/FTE
2	21.98 + 1,079.20 + 134.85 + 41.43 + 147.34 = 1,424.79 t
3	209 days → 147.34 t; WFH 20% → 176 days → 124.1 t
4	domain means 7.5/69.2/61.5/80.4/20.8/66.1 – geometric 39
5	proxy office ≈ 208.6 t, all Tier 3, ° provisional
6	s1 128 interventions · s2 300

Ex.	Key figures
7	$\Delta = 600 \times 0.5 \times (110 - 35) = 22,500 \text{ kWh} \approx 12.9 \text{ t}$ at 2030
8	$4,270 - 3,544 \rightarrow 3,958 - 3,926 \rightarrow 3,926 \cdot s1$ $3,410 \cdot s2 \text{ } 2,258$
9	grid 0.573 vs anchored 0.483 · BAU 3,680 – 3,295 · grid share 580 t
10	s1 landfill $76.4 \times 0.70 = 53.5\%$ · s2 renewable 30.0%
11	reachable with 5/11/3/5 additions; GHG unreachable (2,378 vs 2,159)
13	2025: 3,892 vs BAU 3,878
14	claimable –187 t · unexplained +201 t

Instructor's note: exercises 2, 4, 7 and 9 are the ones to grade — they test whether the learner can reproduce the tool, not merely operate it.