MODULE 7.5 REASONING

Great question—and your intuition is right.

**TL;DR (what, when, why)**

* **What “wiring CAPEX & equity” means:** Making the **investing flows (CapEx)** and **financing flows (equity injections/dividends, plus debt draw/repay if needed)** flow-through the statements so that **Cash, PP&E, Debt, and Equity** move consistently and the **Balance Sheet balances** each month.
* **When to do it:** Do a first, working **M6 (Balance Sheet)** **now** with the files we already have (no changes to M3/M5). Then, **after** you finalize the capital structure in M7 (equity sizing/timing), do an **M7.5 “wiring” pass** to plug **final CapEx & Equity schedules** into the statements and **re‑run M6**.
* **Why this order:** M7 will change **equity timing/amounts** (and possibly debt draw/repay), so wiring those **before** M7 would force rework. With M7.5 we wire once, with the final schedules, and **M8/M9** can then rely on fully consistent data.

**What “wiring” actually changes in the model**

Think of three buckets of cash flow and their Balance Sheet impact:

1. **Operating (CFO)** — already handled by **M5** (from **NPAT + DA ± NWC\_CF**).
   * **Where it lands:** moves **Cash**; affects **Retained Earnings** via NPAT (already in M2/M5).
2. **Investing (CFI)** — **CapEx** (PP&E additions) and any disposals.
   * **Where it lands:**
     + **PP&E**: PP&E\_end = PP&E\_begin + CAPEX - Depreciation - Disposals
     + **Cash**: CFI = -CAPEX + Proceeds\_Disposals (usually negative while building)
   * **What’s missing today:** We haven’t yet fed monthly CapEx into the statements. In the provisional M6 we can run without it (PP&E only shrinks by Depreciation), but to be economically correct we need the CapEx schedule (wired in **M7.5**).
3. **Financing (CFF)** — **Equity injections**, **dividends**, and (optionally) **Debt principal draw/repay** if you choose to show the full cash flow statement in M6.
   * **Where it lands:**
     + **Equity/Paid-in Capital**: Equity\_end = Equity\_begin + Equity\_Injections - Dividends + NPAT (+/- OCI).
     + **Cash**: CFF = +Equity\_Injections - Dividends (+ Debt\_Draw - Debt\_Repay if included).
   * **What’s missing today:** We haven’t yet fed **equity injections/dividends** into Equity and Cash. This is the second half of the wiring (also done in **M7.5**).

**Result once wired (M7.5):**  
**Cash\_end** = **Cash\_begin + CFO + CFI + CFF**  
and the accounting identity **Assets = Liabilities + Equity** holds each month with **PP&E**, **Cash**, **Debt**, and **Equity** all moving in sync.

**Why not wire now?**

* **M7 (capital-structure optimization)** will almost certainly alter **equity timing/amounts** and may tweak **debt draw/repay** cadence.
* If we wire now, we’ll wire twice. Doing it as **M7.5** is one clean step with the final schedule.

**What we deliver now with M6 v1 (provisional Balance Sheet)**

* **Inputs used (no changes to prior modules):**
  + **CFO** from m5\_cash\_flow\_statement\_final.parquet (we already produce this).
  + **NPAT** and **DA** from m2\_pl\_schedule.parquet (for retained earnings and PP&E depreciation).
  + **Tax** from M4 (if you want to surface *Tax Payable*; otherwise keep it simple in v1).
  + **Debt outstanding** from M3 (optional in v1; if present we show the liability line; if not, we keep a single “Debt” opening balance flat and log a warning).
* **What M6 v1 computes (and balances):**
  + **PP&E** decreases by **Depreciation** (CapEx assumed 0 for now).
  + **Equity** increases by **NPAT** (retained earnings), no equity injections/dividends yet.
  + **Cash** moves with **CFO** only (no CFI/CFF yet).
  + **Identity still holds** because both sides adjust consistently (PP&E ↓ by DA; CFO adds back DA so Cash ↑; Equity ↑ by NPAT). You’ll see a *“Provisionally wired”* flag in the smoke report and debug dump so no one mistakes this for final economics.
* **Artifacts (proposed):**
  + outputs\m6\_balance\_sheet.parquet
  + outputs\m6\_smoke\_report.md
  + outputs\m6\_debug\_dump.json (resolved files, column mappings, and boolean flags like "capex\_wired": false, "equity\_wired": false)

This gives you a **working** and **internally consistent** Balance Sheet right now—good enough to proceed to M7 optimization—while clearly marking that CapEx/Equity aren’t wired yet.

**What exactly M7.5 wiring will do**

After M7 finalizes equity/debt, **M7.5** will:

1. **Ingest schedules** (prefer M3 artifacts; otherwise a small M7.5 artifact):
   * **CapEx schedule** (monthly): one column, e.g., CAPEX\_NAD\_000 (+ synonyms like Capital\_Expenditures\_NAD\_000, PPE\_Additions\_NAD\_000).
   * **Equity flows** (monthly):
     + Equity\_Injection\_NAD\_000 (+ synonyms)
     + Dividends\_Paid\_NAD\_000 (+ synonyms)
   * (Optional) **Debt flows** if you want M6 to compute **full** cash flow statement later:
     + Debt\_Draw\_NAD\_000, Debt\_Repay\_NAD\_000 (+ synonyms) and/or **Debt outstanding** closing balance.
2. **Update M6 math to include CFI/CFF:**
   * **PP&E** = prior PP&E + **CapEx** − **Depreciation** (− Disposals if any).
   * **Equity** = prior Equity + **NPAT** + **Equity\_Injection** − **Dividends**.
   * **Cash** = prior Cash + **CFO** + (−**CapEx**) + **Equity\_Injection** − **Dividends** (+ Debt\_Draw − Debt\_Repay, if included).
3. **Contracts & synonyms:**
   * Add CapEx and Equity roles to **M6 input contract** (and to M3 contract if they originate there).
   * Keep your proven “synonym mapper” style so older names still pass (and log the mapping to m6\_debug\_dump.json).
4. **Tests:**
   * Smoke: identity **Assets = Liab + Equity** holds to the cent (or tolerance).
   * Contract validator: CapEx & Equity roles found (or fail fast with a clear message).
   * Simple unit: if CapEx only = X in month t, then ΔPP&E = X − Depreciation\_t and ΔCash = CFO\_t − X (with equity=0).

**Will postponing wiring break M8/M9?**

* **M8** (reporting) can run with a **“Provisional” badge** on Balance Sheet outputs; visuals will be internally consistent but **under-invested** (PP&E smaller, Cash larger).
* **M9** (end-to-end tests) should **exclude** CapEx/Equity assertions **until** M7.5 lands. Keep only identity & schema tests on M6 v1. Once M7.5 is merged, flip on the strict tests.

**Practical implications for your repo (no churn to M3/M5 now)**

* **Do not change M3 or M5 now.**
* Implement **M6 v1** to read only the **current artifacts** (M2/M4/M5; optional M3 debt balance if it’s trivially available).
* **Document** in docs\m6\_contract.md that capex\_wired=false, equity\_wired=false in this release.
* Plan **M7** (optimize equity).
* Execute **M7.5** (wiring) with minimal code deltas focused in **M6**:
  + Add CapEx & Equity discovery + synonyms.
  + Extend the balance math.
  + Turn on strict tests.

**“Module 7.5” work package (so the Coding Agent can start later, not now)**

**Inputs (monthly):**

* CAPEX\_NAD\_000 (or synonyms).
* Equity\_Injection\_NAD\_000, Dividends\_Paid\_NAD\_000 (or synonyms).
* (Optional) Debt\_Draw\_NAD\_000, Debt\_Repay\_NAD\_000 or **Debt\_Closing**.

**Outputs:**

* A small parquet (or embed directly into M6) that M6 reads to augment CFI/CFF.

**Acceptance criteria:**

* M6 recompute yields **Assets = Liabilities + Equity** per month.
* m6\_debug\_dump.json lists the exact source files & chosen columns for CapEx/Equity.
* Smoke and unit tests pass; contract validator confirms CapEx/Equity roles.

**No changes to M3/M5 necessary** if we stage CapEx/Equity as an M7.5 artifact—later we can migrate the source to M3 once convenient.

**Answering your last two sub‑questions directly**

* **“What will it imply to wire CAPEX & equity flows?”**  
  Adding **investing** (CapEx) and **financing** (Equity) flows so **PP&E**, **Cash**, and **Equity** move with the cash statement. Technically: new role discovery + synonyms, extend M6 formulas, update contracts/tests, add debug flags and smoke checks.
* **“When will we do it—after optimizing equity offering?”**  
  **Yes.** Do **M6 v1** now (provisional). Run **M7** (optimize equity). Then **M7.5 wiring** with the final equity schedule (and CapEx schedule if not already available), and re‑run M6 for the **final** Balanced Balance Sheet. That sequencing avoids rework and keeps M8/M9 green when you turn on stricter tests.

If you want, I can draft:

* docs\m6\_contract.md (provisional now, strict after M7.5),
* a tiny src\terra\_nova\modules\m6\_balance\_sheet\runner.py stub that reads current artifacts and emits m6\_balance\_sheet.parquet + m6\_smoke\_report.md + m6\_debug\_dump.json,
* and a smoke test tests\smoke\test\_m6\_smoke.py (identity check, schema check, and the provisional flags).