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USER MANUAL · OPERATING GUIDE

Investment Valuation System

A project finance appraisal tool for sponsors, consultants and advisors

DOCUMENT VERSION

1.0

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HOW TO USE THIS MANUAL

Read sections 1–3 to get the tool installed and producing your first appraisal. Sections 4–8 are reference material to consult as questions come up. Section 9 lists honest model limitations and section 11 contains the legal disclaimer.

1. Introduction

WHAT IT IS

The Investment Valuation System is a single-file Python desktop tool that produces a bank-grade project finance appraisal PDF from a set of user-supplied inputs. It computes the full suite of metrics that lenders and sponsors use to evaluate a transaction — NPV, IRR, DSCR, LLCR, PLCR, DuPont decomposition, tornado sensitivity and Monte Carlo risk simulation — and assembles them into an 8-page report suitable for internal review or for sharing with bankers, investors and advisors as a first-cut case.

WHO IT IS FOR

- Sponsors evaluating a potential infrastructure or project finance investment
- Independent consultants advising sponsors or developers on deal structuring
- Bankers and analysts who want a fast, structured screen before committing to a full credit memo
- Family offices, private credit funds and infrastructure investors evaluating mezzanine opportunities

WHAT IT DOES — AT A GLANCE

- Three-tranche capital stack: own equity, bank finance, and private investor (mezzanine) with equity kicker
- Two amortisation styles for bank debt: annuity (level total payment) and equal principal
- Three repayment styles for private investor capital: annuity, equal principal, and bullet (interest-only with balloon)
- Construction-phase modelling with interest-during-construction (IDC) capitalised into the depreciable base
- Operating-phase P&L, free cash flow, depreciation schedule, and tax with optional loss carry-forward
- Rating-implied cost of capital (AAA → CCC table) with automatic credit spread and equity premium
- 5,000-iteration Monte Carlo simulation across revenue, costs, CAPEX and rates
- Depreciation advisory: compares four schedules and identifies the tax-shield-optimising option
- Five-step DuPont decomposition with mid-life snapshot and time-series evolution

2. Installation & Running

REQUIREMENTS

The tool requires Python 3.9 or newer and four standard scientific libraries. All dependencies are widely available and pre-installed in most Python data-analysis environments.

Python	Version 3.9 or newer
NumPy	For numerical arrays and linear algebra
Pandas	For dataframe-based scheduling and reporting
Matplotlib	For PDF rendering and chart generation
Pillow	For logo loading, transparency, and icon support
tkinter	For the desktop GUI (bundled with Python on Windows / macOS; install python3-tk

INSTALLATION

Install the dependencies in one command via pip. The Python script is a single self-contained file — there is no package to install or compile.

INSTALL COMMAND

```
pip install numpy pandas matplotlib pillow
```

RUNNING THE GUI

Launch the desktop interface with the standard Python interpreter. The window opens with the default demo project (Project Helios — a 600 MW combined-cycle power plant) loaded so you can immediately click Generate Appraisal and see a working output.

LAUNCH GUI

```
python investment_valuation.py
```

RUNNING HEADLESS (CLI MODE)

For batch processing, server environments, or when you want to skip the GUI entirely, pass the --cli flag. The tool reads the INPUTS dictionary at the top of the script and writes Investment_Appraisal.pdf directly.

CLI MODE

```
python investment_valuation.py --cli
```

3. The Interface — A Walk-Through

The desktop GUI organises every input into five thematic tabs. Each tab renders a two-column form with field labels above the entries; hovering the cursor over a label reveals a guidance tooltip. The bottom action band carries Open / Save / Save As for project files, the output-file picker, and the Generate Appraisal button.

TAB 1: PROJECT IDENTITY

- Project name — appears as the headline title on the cover page
- Project subtitle — a short descriptive line below the project name
- Sponsor — the developing entity (shown in assumptions and reporting)
- Advisor / your firm — the name shown in every page header
- Currency — 14 currencies supported, used for all monetary formatting
- Logo file — PNG / JPG / WebP image used on the cover and headers (Browse to select)

TAB 2: CAPITAL STACK & FINANCING

The most structurally important tab. At the top sits a beige header strip with two tickboxes: Use bank finance and Use private investor capital. Untick a source and its related fields disable visually; the model treats an unticked source as a zero share regardless of typed values.

- Own equity share — your contribution as % of CAPEX (always required, even at 100%)
- Bank finance: rate, tenor, repayment style (annuity or equal principal)
- Private investor: share, coupon rate, tenor, repayment style (annuity / equal principal / bullet) and equity kicker
- Live ALLOCATION readout under the toggles shows the running total — turns burgundy if shares don't sum to 100%

TAB 3: CONSTRUCTION & OPERATIONS

- Funding requirement (CAPEX) in millions — total construction cost excluding interest during construction
- Construction period and plant operating life in years
- CAPEX profile — comma-separated percentages per construction year (e.g. 20, 45, 35; must sum to 100)
- Year-1 revenue / operating cost / maintenance, each with an annual escalation rate

3. The Interface — continued

TAB 4: TAX, CREDIT & RETURNS

- Corporate tax rate — single statutory rate applied to taxable income
- Depreciation horizon — leave blank for straight-line over plant life, or enter accelerated horizon in years
- Loss carry-forward (NOL) — enable to let losses offset future taxable income
- Credit rating — drives the implied credit spread and equity risk premium via an internal rating table (AAA → CCC)
- Risk-free rate — current 10-year benchmark used as the base of the equity hurdle
- Equity risk premium — leave blank to auto-derive from the credit rating, or override with a specific value
- Working capital — % of revenue tied up in working capital (built up in year one, released at end of life)
- Salvage value — % of CAPEX recovered as terminal value at the end of the operating period

TAB 5: RISK SIMULATION

- Sensitivity shock range — ± range applied to each driver in the tornado analysis
- Monte Carlo iterations — number of simulated scenarios (5,000 is the recommended default)
- Random seed — set for reproducible Monte Carlo runs across reports

FILE MENU AND KEYBOARD SHORTCUTS

Ctrl + N	New project — resets all inputs to defaults
Ctrl + O	Open project — load a previously saved .json file
Ctrl + S	Save — writes to the current project file
Ctrl + Shift + S	Save as — prompts for a new filename
F5	Generate Appraisal — renders the PDF in the output path
Ctrl + Q	Exit — prompts to save if there are unsaved changes

UNSAVED-CHANGES INDICATOR

A small dot (●) appears in the window title bar after any field is modified. The dot clears after Save, Save As, Open, or New. If you try to close or open another project with unsaved changes, a confirmation dialog appears.

4. Understanding the Appraisal Outputs

The output is an 8-page A4-landscape PDF in the same navy + gold corporate aesthetic. Each page is described below.

PAGE 1 — COVER

Project title, subtitle, eight headline metric tiles (funding, NPV, project IRR, own-equity IRR, WACC, min DSCR, LLCR, payback), and a colour-coded verdict ribbon (STRONG BUY / BUY / CONDITIONAL / HOLD / DECLINE) with a one-line rationale.

PAGE 2 — EXECUTIVE SUMMARY

Six KPI tiles, a cumulative cash flow profile, an NPV-vs-discount-rate curve showing both project and equity NPV profiles, the capital structure donut (2 or 3 slices depending on whether the private investor is engaged), and a credit committee verdict box with bullet rationale.

PAGE 3 — ASSUMPTIONS & CAPITAL STRUCTURE

Two side-by-side tables (Project & Operations and Financing & Cost of Capital), followed by a depreciation advisory section that compares four depreciation schedules and quantifies the NPV uplift from accelerating depreciation to maximise the tax shield.

PAGE 4 — CASH FLOW ANALYSIS

Operating-phase revenue, EBITDA and net income overlay; an average-annual P&L waterfall bridge; FCFF (project free cash flow) versus FCFE (equity free cash flow) bar chart; and the cumulative discounted cash flow profile.

PAGE 5 — DEBT SERVICE & COVERAGE

Principal and interest stacked bars with the outstanding-balance line overlay; the year-by-year DSCR profile with covenant thresholds at 1.30× (bank covenant), 1.10× (distress) and 1.00× (default); CFADS versus debt service; and four coverage tiles (min DSCR, average DSCR, LLCR and PLCR). In all-equity structures this page shows a placeholder noting that coverage ratios do not apply.

4. Outputs — continued

PAGE 6 — SENSITIVITY ANALYSIS

A horizontal tornado chart showing NPV impact of ± shocks on each value driver, sorted by impact; a two-way heatmap of revenue × cost shocks with the NPV-zero contour line; and a break-even / risk indicator table showing how far revenue can fall and the debt rate can rise before NPV crosses zero.

PAGE 7 — RISK SIMULATION

A histogram of 5,000 Monte Carlo NPV outcomes, with P10, P50 and P90 vertical reference lines; a cumulative probability (S-curve) chart; and a risk summary table reporting mean NPV, standard deviation, coefficient of variation, worst-percentile outcome, and the probability of positive NPV.

PAGE 8 — DUPONT DECOMPOSITION

A mid-life snapshot showing the five DuPont components multiplied together to produce ROE (Tax Burden × Interest Burden × Operating Margin × Asset Turnover × Equity Multiplier = ROE), a returns-through-operating-life chart (ROE / ROA / ROIC with equity hurdle and WACC reference lines), and a rebased component-evolution chart showing how each driver shifts over the project's life.

KEY METRIC DEFINITIONS

NPV (Net Present Value)	Sum of project cash flows discounted at WACC
IRR (Internal Rate of Return)	Discount rate at which NPV = 0
WACC	Weighted average cost of capital across all tranches
DSCR	Cash Flow Available for Debt Service ÷ Total Debt Service
LLCR	PV of CFADS over loan life ÷ Outstanding debt
PLCR	PV of CFADS over project life ÷ Outstanding debt
FCFF / FCFE	Free cash flow to firm (unlevered) / to equity (levered)
MIRR	Modified IRR assuming reinvestment at WACC

5. The Capital Stack — Four Funding Modes

The Capital Stack & Financing tab supports any combination of three capital sources. Tick or untick the two toggles to switch between the four canonical structures below.

MODE 1 — BANK FINANCE + OWN EQUITY

Tick 'Use bank finance', leave 'Use private investor' unticked. This is the classic project finance structure. Senior bank debt is amortised annuity or equal-principal over the tenor; the sponsor's equity earns the residual cash flow. Typical equity share 20–40%.

MODE 2 — PRIVATE INVESTOR + OWN EQUITY

Untick 'Use bank finance', tick 'Use private investor capital'. The project is funded by a private investor (PE fund, family office, infrastructure fund, or similar) plus your own equity. The investor receives both contractual interest payments and a kicker share of the residual equity flows.

MODE 3 — BANK + PRIVATE INVESTOR + OWN EQUITY

Both toggles ticked. The full three-tranche capital stack. Bank debt is senior; private investor capital sits subordinated to the bank but senior to equity; sponsor equity takes the residual after both debt tranches are serviced. The report shows separate own-equity IRR and private-investor IRR so you can see what each party earns.

MODE 4 — OWN EQUITY ONLY (SELF-FUNDED)

Both toggles unticked. The project is funded entirely by sponsor equity. There is no debt service, so the Debt Service & Coverage page shows a placeholder explaining that coverage ratios are not applicable. The relevant metrics in this case are Project NPV, Project IRR and Own-equity IRR (which equals Project IRR in the absence of leverage).

STRUCTURING WORKFLOW

Start in Mode 1 to understand the baseline bank-financeable structure. Switch to Mode 3 when negotiating with a mezzanine investor to see how their share and kicker affect your sponsor IRR. A deal is structurable only when ALL three parties clear their hurdles simultaneously: bank covenant DSCR, investor required return, and your own equity hurdle.

6. Saving & Loading Projects

Every input on every tab is saved to a single human-readable JSON file. Use Save As to write the first version, then Save to overwrite, or open an existing file with Open. A small dot (●) in the window title bar indicates unsaved changes.

- Files are plain JSON — you can edit them in any text editor
- A metadata header records the file format version and timestamp
- Backward compatibility: older saved files still load when new fields are added
- Toggle states (use bank finance / use private investor) are persisted alongside the share values
- Output PDF path is also saved, so reloading a project restores where the report writes

PROJECT FILE LOCATION

Project files default to the current working directory. Choose any extension you like (.json or .vproject are both fine; the system uses JSON internally either way).

7. Customising the Logo and Branding

The advisor logo appears in three places: the cover page upper right, the top-left corner of every content page header, and the GUI's own header band. To swap in your own logo, use the Logo file field on the Project Identity tab and browse to a PNG, JPG, or WebP image.

- Any image format readable by Pillow is accepted (PNG, JPG, JPEG, GIF, BMP, WebP)
- White or near-white backgrounds are automatically rendered transparent for clean placement on the navy header
- The top ~62% of the image is treated as the medallion (and used in page headers); the full image appears on the cover
- Leave the field blank for a logo-free report
- An embedded fallback logo (the MK crest) is used when no file is provided

8. Verdict System & Best Practices

HOW THE VERDICT IS SCORED

The cover-page verdict is calculated from a 9-point scorecard across the metrics that matter most to both sponsors and lenders.

STRONG BUY	8–9 points ·	Project clears every coverage and return hurdle with material headroom
BUY	6–7 points ·	Project meets institutional return and coverage thresholds
CONDITIONAL	4–5 points ·	Acceptable but requires structuring concessions or risk mitigations
HOLD	2–3 points ·	Marginal economics or coverage; revisit assumptions before committing
DECLINE	0–1 points ·	Returns or coverage are insufficient at the proposed terms

BEST PRACTICES

- Run the appraisal at base case first to verify the deal economics in your favour, then test downside scenarios
- Use the Monte Carlo histogram and the P10 figure as the primary downside reference — banks will run their own
- If the verdict is STRONG BUY in base case but Monte Carlo P10 is materially negative, the structure relies on favourable variables and needs more equity cushion or contracted revenue
- When negotiating with bankers or investors, switch capital stack modes to show the impact of their proposed terms
- Save each scenario as a separate project file (.json) so you can compare base case, downside case, and stress case
- The depreciation advisory shows the NPV uplift from accelerating depreciation — but always confirm tax treatment with qualified counsel before adopting in real-world structuring

9. Known Limitations

This tool is a sponsor-grade screening and structuring system. It is deliberately simpler than the transaction-grade models a tier-1 bank or infrastructure fund would build for a credit committee submission. The following simplifications are known and intentional — but you should be aware of them, particularly before sharing outputs externally.

CASH FLOW MODELLING

- Monte Carlo applies independent shocks to revenue, costs, CAPEX and interest rates; correlations are not modelled
- Operational variables (dispatch curves, capacity factors, fuel price passthrough) are aggregated into a single revenue figure
- Working capital is a flat percentage of revenue rather than separate accounts receivable / payable / inventory schedules
- Decommissioning provisions, environmental restoration costs, and end-of-life CAPEX are not modelled

CAPITAL STRUCTURE

- Reserve accounts (DSRA, MRA, Tax Reserve) are not modelled — these are standard features of bankable PF structures
- Distribution lockup tests and cash sweep covenants are not implemented
- Refinancing assumptions (common in real PF) are not supported; tenor is fixed at deal closing
- Front-end fees, commitment fees, letter-of-credit costs, and other transaction costs are not captured

TAX & COST OF CAPITAL

- Single corporate tax rate; jurisdictional complexity, withholding taxes, treaty optimisation are not modelled
- Interest deductibility caps (e.g. Section 163(j) in the US capping deductions at 30% of EBITDA) are not enforced
- Tax depreciation classes (MACRS in the US, capital allowances elsewhere) are simplified to a linear schedule
- Discount rate is a single-point CAPM derivation with rating-implied premia; no country risk premium, no size premium, no term structure

IMPLICATIONS

The tool is excellent for sponsor decision-making and for screening with a banker or investor in an introductory conversation. For final credit committee submission at a tier-1 institution, the analysis should be supplemented by a full transaction model with the items above, typically built in Excel by a banking advisor or financial modeller.

10. Glossary of Financial Terms

Annuity	Loan repayment style where the total annual payment is constant; interest declines and principal rises over the life of the loan.
Bullet	Loan structure where interest is paid annually but the entire principal is repaid in a single balloon payment at maturity.
CAPEX	Capital expenditure — the upfront cost of building the project, paid during the construction phase.
CFADS	Cash Flow Available for Debt Service. Operating cash flow before any debt repayments — the numerator of DSCR.
COD	Commercial Operation Date — the moment construction ends and revenue begins.
DSCR	Debt Service Coverage Ratio. CFADS divided by total annual debt service (principal + interest). Bank covenant is typically ≥ 1.30×.
DuPont	Five-step decomposition of ROE into operating, financial and tax components, revealing what drives equity returns.
EBITDA	Earnings before interest, taxes, depreciation and amortisation. A pre-financing, pre-tax measure of operating cash generation.
Equity kicker	An equity participation (warrants, conversion rights, or an outright share of residual equity flows) attached to a debt-like instrument as part of the investor's return.
FCFE	Free Cash Flow to Equity. Cash left for equity holders after operating expenses, tax, capex and debt service.
FCFF	Free Cash Flow to Firm. Project-level cash flow before financing, used for project NPV at WACC.
IDC	Interest During Construction. Loan interest accrued while the project is being built, typically capitalised into the depreciable asset base.
IRR	Internal Rate of Return. The discount rate at which a cash flow stream's NPV equals zero.
LLCR	Loan Life Coverage Ratio. PV of CFADS over the loan life ÷ outstanding debt at COD. Lenders typically require ≥ 1.40×.
Mezzanine	Subordinated capital sitting between senior debt and equity. Commonly debt-like cash flows plus an equity kicker. Provided by private investors, not banks.
MIRR	Modified IRR. Assumes intermediate cash flows are reinvested at WACC rather than at the IRR itself.
Monte Carlo	A statistical simulation that runs the model thousands of times with random input shocks to produce a probability distribution of NPV outcomes.
NOL	Net Operating Loss carry-forward. A tax loss that offsets future taxable income in subsequent years.
NPV	Net Present Value. The sum of cash flows discounted to the present at the relevant discount rate (WACC for project, equity hurdle for equity).
PLCR	Project Life Coverage Ratio. PV of CFADS over the project's full life ÷ outstanding debt. Includes the 'tail' of unleveraged cash flow as additional cushion.
Salvage value	Terminal value at end of project life — recoverable assets, equipment resale, land sale, etc.
Sponsor	The lead developer or operator of the project. Provides equity and is the primary residual claimant.
WACC	Weighted Average Cost of Capital. The blended cost of equity, senior debt, and mezzanine, weighted by their share of the capital structure.

11. Disclaimer

IMPORTANT — PLEASE READ

This software and its output are provided as a financial modelling and screening tool. They do not constitute investment, legal, tax, or accounting advice, and are not a substitute for professional financial modelling, due diligence, or transaction structuring services.

The Investment Valuation System ("the Software") is provided by M Kraus, Consultant, to assist sponsors, advisors, and finance professionals in the early-stage evaluation of project finance and infrastructure investments. The output of the Software — including the appraisal PDF and all associated metrics, charts and recommendations — is intended for indicative, illustrative, and internal screening purposes only.

NATURE OF THE ANALYSIS

While the underlying financial mechanics (net present value, internal rate of return, debt service coverage ratio, loan and project life coverage ratios, DuPont decomposition, sensitivity analysis, and Monte Carlo simulation) are implemented in accordance with widely-recognised project finance methodology, the model embeds simplifying assumptions that are NOT appropriate substitutes for transaction-grade financial models. Section 9 of this manual lists the principal limitations in detail.

USER RESPONSIBILITY

Outputs are based entirely on user-supplied inputs. The accuracy of the analysis depends on the accuracy and appropriateness of those inputs. The user is solely responsible for verifying the suitability of all assumptions and the applicability of the methodology to their specific project, jurisdiction, and circumstances. For any real-world investment decision, users must engage qualified financial advisors, lawyers, tax counsel, and engineers as appropriate.

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