



MODULE MANUAL

TEA, LCA, uncertainty and sensitivity

Derive cost and environmental impact from one controlled process basis

DOCUMENT BASIS

Product workflows, visible results, review criteria, evidence boundaries and controlled handover.

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6 OCTOBER 2026



Document control

One controlled basis for public product guidance.

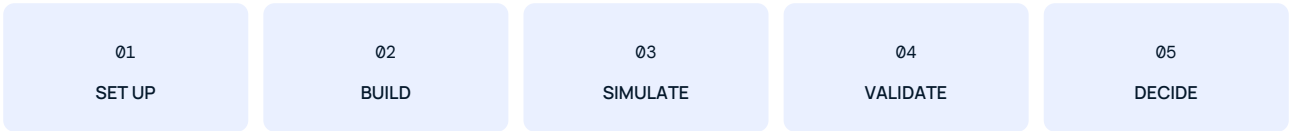
FIELD	VALUE
Document ID	M08-EN-4.2
Release	4.2
Reviewed	6 October 2026
Audience	TEA, LCA, Strategy, Process Engineering, Investment Review
Purpose	Which process option is economically and environmentally preferable, under which assumptions and uncertainty?
Owner	Acatian Product and Engineering

APPLICABILITY LIMIT

This manual explains the product workflow and the evidence needed to interpret its outputs. It does not replace qualified engineering judgement, customer quality systems, safety review, equipment-vendor data or validation for a regulated intended use.

Scope and use

Use the navigation path, input register, visible-result description, review criteria and handover record together. A screen or exported number without its model version, basis, unit, evidence status and limitations is not a controlled engineering result.

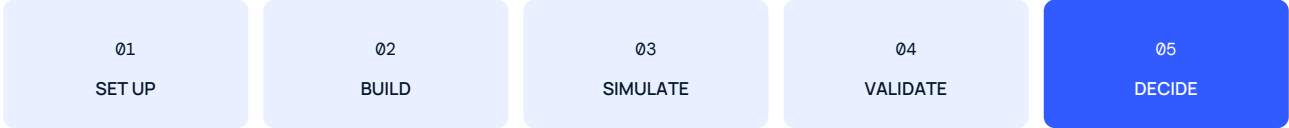


LANGUAGE

This document is written consistently in English. Product navigation names remain as displayed in the interface.

TEA, LCA, uncertainty and sensitivity

Derive cost and environmental impact from one controlled process basis



ENGINEERING DECISION	PATH IN ACATIAN
Which process option is economically and environmentally preferable, under which assumptions and uncertainty?	Decide > Economics / LCA / Sensitivity

PRIMARY USERS	PERMITTED MATURITY
TEA, LCA, Strategy, Process Engineering, Investment Review	Screening with proxies; Calibrated with supplier/site data; Validated after methodological and technical review

START WITH THE DECISION

TEA and LCA must use the same product quantity, yield, time basis and system boundary. Acatian traces flows, costs, factors, allocation, uncertainty and sensitivity to source.

Expected artifacts

ARTIFACT	RECIPIENT
Module result package	Engineering reviewer
Readiness register	Model owner
Controlled version	Project team

Prepare the model

INPUT	WHY IT MATTERS	READY WHEN
Functional unit	Creates one denominator for all scenarios.	Product, quality, quantity, location and period are defined.
LCI and material flows	Covers media, buffer, energy, water, waste and transport.	Flow, unit, stage, geography and source exist.
Cost basis	Covers media, consumables, labour, utilities, waste, equipment and facility.	Price date, currency, region, range and source are documented.
Equipment and CAPEX	Links size, count, installation and scaling.	Quote/correlation, index, basis and life are set.
Allocation and cut-off	Controls co-products, recycle and excluded flows.	Method, rationale and sensitivity are documented.
Uncertainty	Prevents false precision.	Min/mode/max or distribution and correlations are set.

Preflight check

CHECK	Confirm the correct project, branch and controlled version
CHECK	Verify units, provenance and permissions
CHECK	Save a restore point before a decision-relevant change
CHECK	Keep blocking gaps visible

Workflow

01

Set goal and scope

Define decision, audience, boundary, FU, allocation and impact method.

VISIBLE RESULT: The study header is complete.

02

Build inventory

Classify boundary streams, utilities, cleaning, transport and waste.

VISIBLE RESULT: LCI contains external exchanges and explicit lifecycle stages.

03

Calculate cost

Calculate variable/fixed OPEX, CAPEX, working capital and output basis.

VISIBLE RESULT: Cost stack and cost/kg close to the same production amount.

04

Calculate impacts

Apply factors to quality-reviewed exchanges.

VISIBLE RESULT: LCIA shows category, unit, stage and contributor.

05

Run uncertainty

Run Monte Carlo with documented distributions and seeds.

VISIBLE RESULT: Median, P5/P95 and stability are visible.

06

Assess sensitivity

Compare key drivers and scenarios.

VISIBLE RESULT: Driver ranking explains the decision and actions.

07

Interpret and export

Document hotspots, trade-offs, limitations and gaps.

VISIBLE RESULT: The complete package is reviewable and opens correctly.

Review the result

CRITERION	PASS CONDITION	IF IT FAILS
Scope and structure	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Units and balances	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Evidence and uncertainty	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Reproducibility	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.
Review state	The documented criterion is satisfied and supported by traceable evidence.	Correct the model or keep the output Not decision-ready.

APPLICABILITY LIMIT

Database factors and price proxies are screening data until region, technology, year and supply chain are reviewed.

Troubleshooting

OBSERVATION	LIKELY CAUSE	CORRECTION
The result looks plausible but cannot be explained	Inputs, units, model version or evidence are missing.	Open the relevant register, restore traceability and rerun.
A change affects unexpected outputs	Dependencies or imported mappings were not reviewed.	Inspect the change plan and before/after diff; undo if required.
The module appears complete but readiness is low	Required industrial evidence is still missing.	Assign the visible gaps and keep maturity at Screening or Not decision-ready.

Controlled handover

ARTIFACT	RECIPIENT	MUST CONTAIN
Module result package	Engineering reviewer	Inputs, calculations, results, units, intervals, maturity
Readiness register	Model owner	Gap, required work, owner, due date, intended use
Controlled version	Project team	Branch, version, change note, reviewer and restore point

Completion check

CHECK	The active project, branch, version and intended use are visible.
CHECK	Inputs carry units, provenance, review state and uncertainty where relevant.
CHECK	Blocking model, physical, numerical and evidence gaps are closed or assigned.
CHECK	The result maturity matches the available evidence.
CHECK	The output package opens correctly and includes its limitations.

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