Tools for Choosing Consistent and Robust Business Models for Forest Ecosystem Services

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Forest EcoValue

Fondazione Lombardia per l'Ambiente

From territorial context to business models, towards financial robustness

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Why decision tools matter for Forest Markets?

- FES deliver high societal value but often lack direct market prices → business models must address public-good features.
- FES often are public goods creating “market failures” and unsustainable arrangements (or no arrangement at all)
- Forest EcoValue provides a transferable methodology: assess context, select BMAs, test sustainability and risk.
- Output is practical: shortlist + implementation priorities for stakeholders, the private sector, and policy makers

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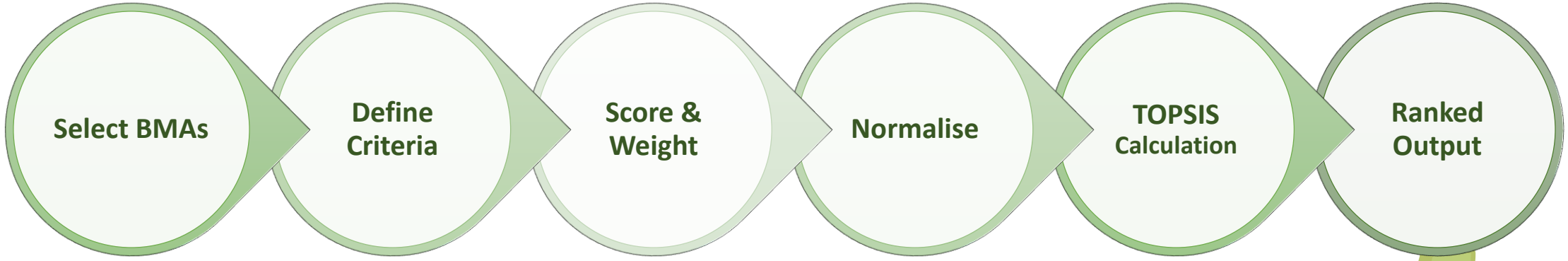
Tool 1: Multi Criteria Analysis.
From Profiling Living Labs to BMAs ranking

Estimating the **degree of similarity to an "ideal solution"** between Living Lab conditions and Business Model Archetype requirements



This is not a business plan; but a structured shortlist for feasibility studies and policy action.

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Ten Business Model Archetypes

- Crowdfunding – BMA1
- Environmental finance – BMA2
- Experience selling – BMA3
- Freemium – BMA4
- Green chemistry – BMA5
- Public Private Partnership (PPP) – BMA6
- Reverse auction – BMA7
- Social enterprise – BMA8
- Subscription – BMA9
- Trash to cash – BMA10

Business Models (BMs)

- Incentivize organizations and communities to **engage in ecosystem services provision**
- Can develop **payment schemes for public goods**, leveraging market mechanisms and innovative approaches (e.g., commercial TV)
- Identify, communicate, and **convey the benefits of FES to relevant beneficiary groups.**
- **Formulate payment schemes or agreements** to increase the supply of PGs, including through incentives for private provision

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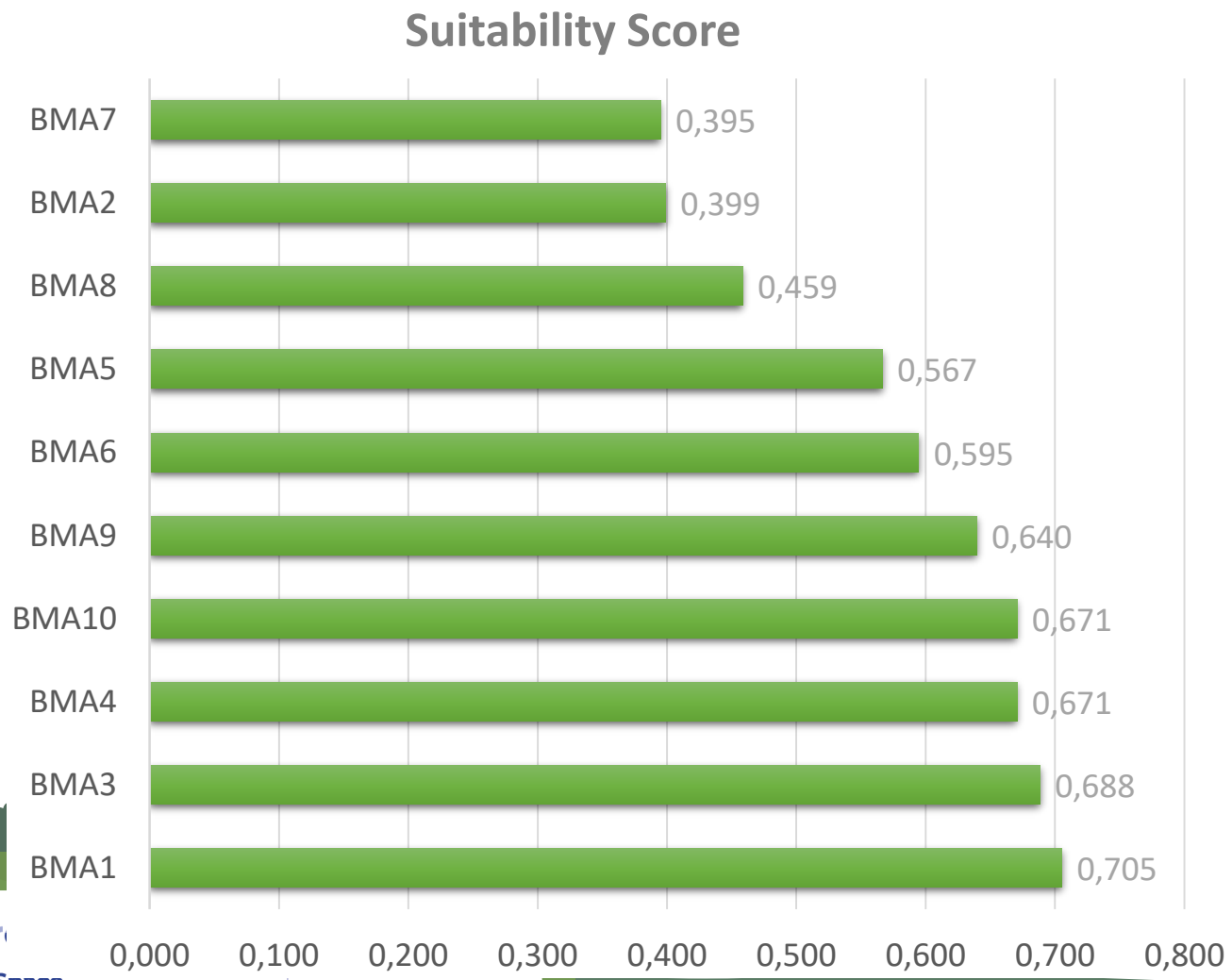
The BMA Ranking Output

(TOPSIS score 0–1)



Each BMA gets a **similarity score to the "ideal solution"** under 7 concepts

Close scores indicate **multiple viable options** for the site

Actual choice based on implementation constraints (governance, costs, regulatory readiness)

"Shortlist decision point": Only top BMAs move to deeper assessment

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Gap Analysis: Strengths, bottlenecks, and "watch-outs"

The FEV TOPSIS Framework highlights:

- **Top Contributors** (territory strengths driving success)
- **Watch-outs** (critical vulnerabilities)
- Watch-outs flag concepts where the BMA requires high performance but the territory scores low → **implementation risk**.
- **We turn ranking into an action agenda** (capacity building, policy alignment, cost efficiency).

C1	**DEVELOPMENT AREA:** Significant improvement needed. This is a primary target for strategic investment (pilot projects, training, infrastructure) to close the gap.
C3	**KEY STRENGTH:** Leverage this high performance as a pillar of the BMA. Use in marketing and to attract strategic partners.
C4	**CRITICAL VULNERABILITY**: High-risk area that could compromise the entire model. Requires immediate intervention and risk mitigation strategies BEFORE implementation**.**

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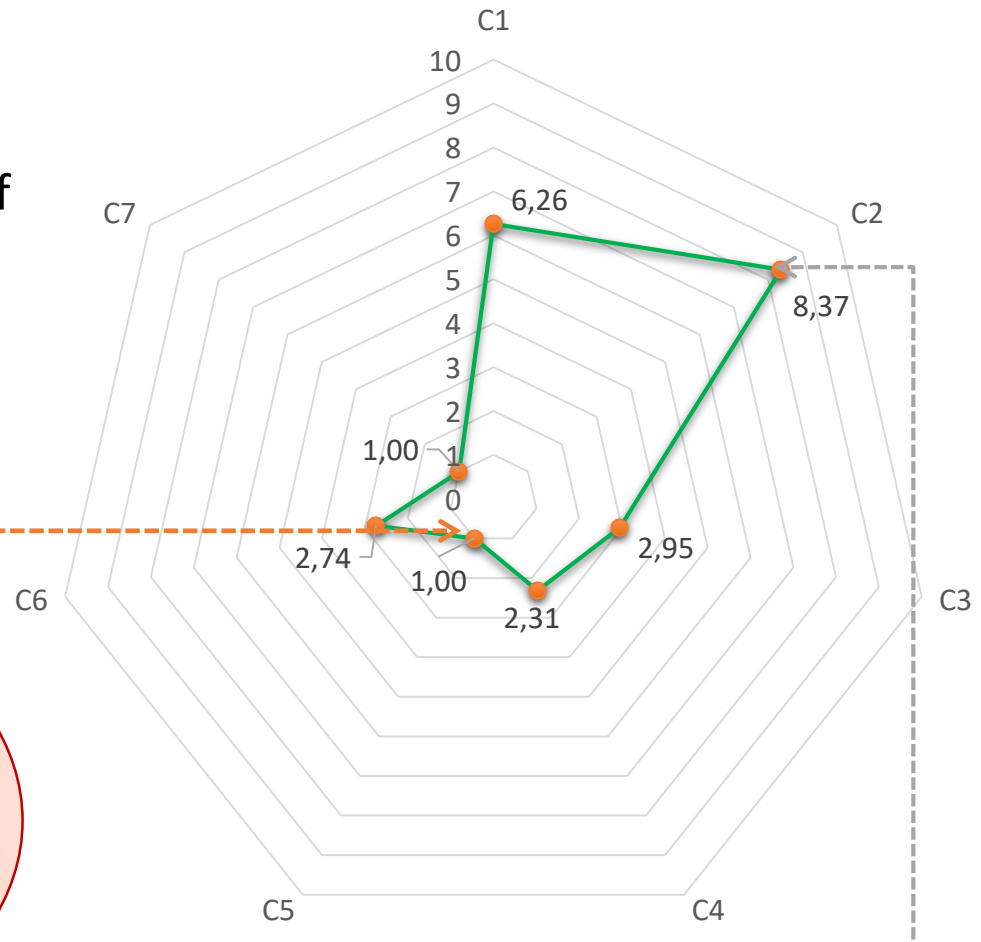
The Concepts driving “fit”

Concepts connect Living Lab data to Business Model Canvas logic

Weights reflect relative importance of each concept for each BMA/site

Hinto to the gap analysis: “fit” is not only score, but where gaps exist



C1	Ecosystem Services	6.26
C2	Local Demand	8.37
C3	Regulations and Policies	2.95
C4	Operational Costs	2.31
C5	Governance and Management	1.00
C6	Social Benefits	2.74
C7	Technological Innovation	1.00

WARNING!

Implementation can also be blocked by imbalances (e.g., high demand but low governance/ cost efficiency)!

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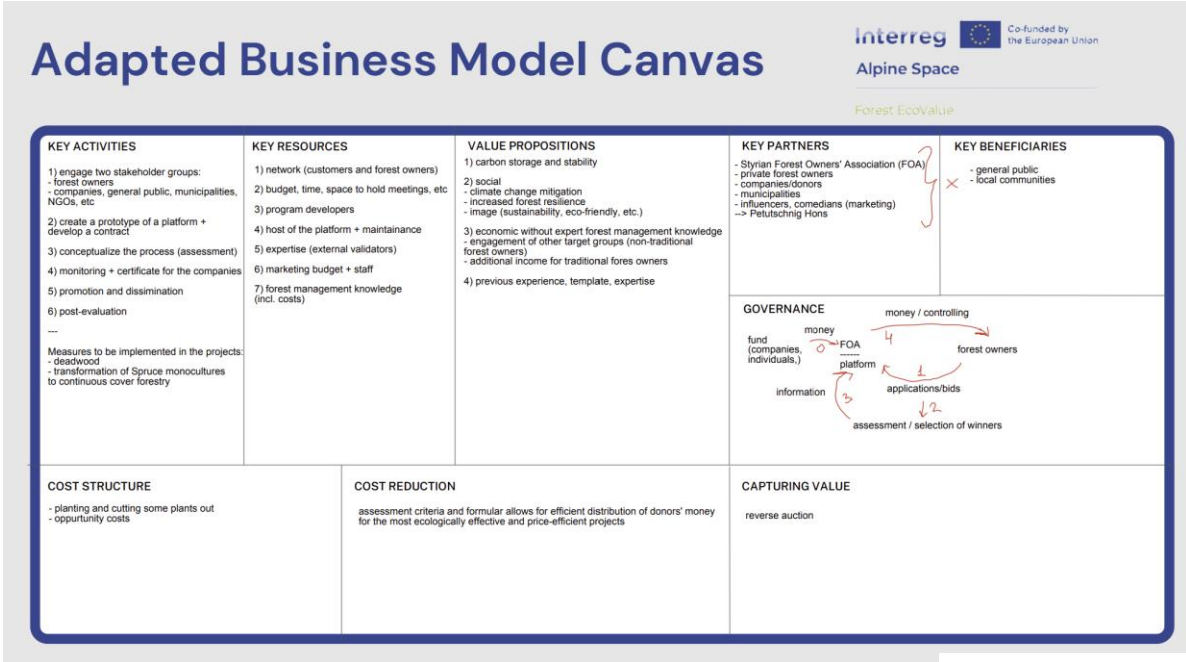
From hints to invention: the business model canvas for FES

- LLs constructed their business models following a classical scheme
- BMC adapted to fit the FES unique features identified in “market design” and ecosystem services markets and payment schemes
- Resulting categories aligned to the original BMC and Alpine Space LUIGI project GI BMC



Tool 2: Rapid Assessment through Deterministic Scenarios *(Baseline / Moderate / Stress)*

Deterministic scenarios*:
Business Model based on assumed parameters

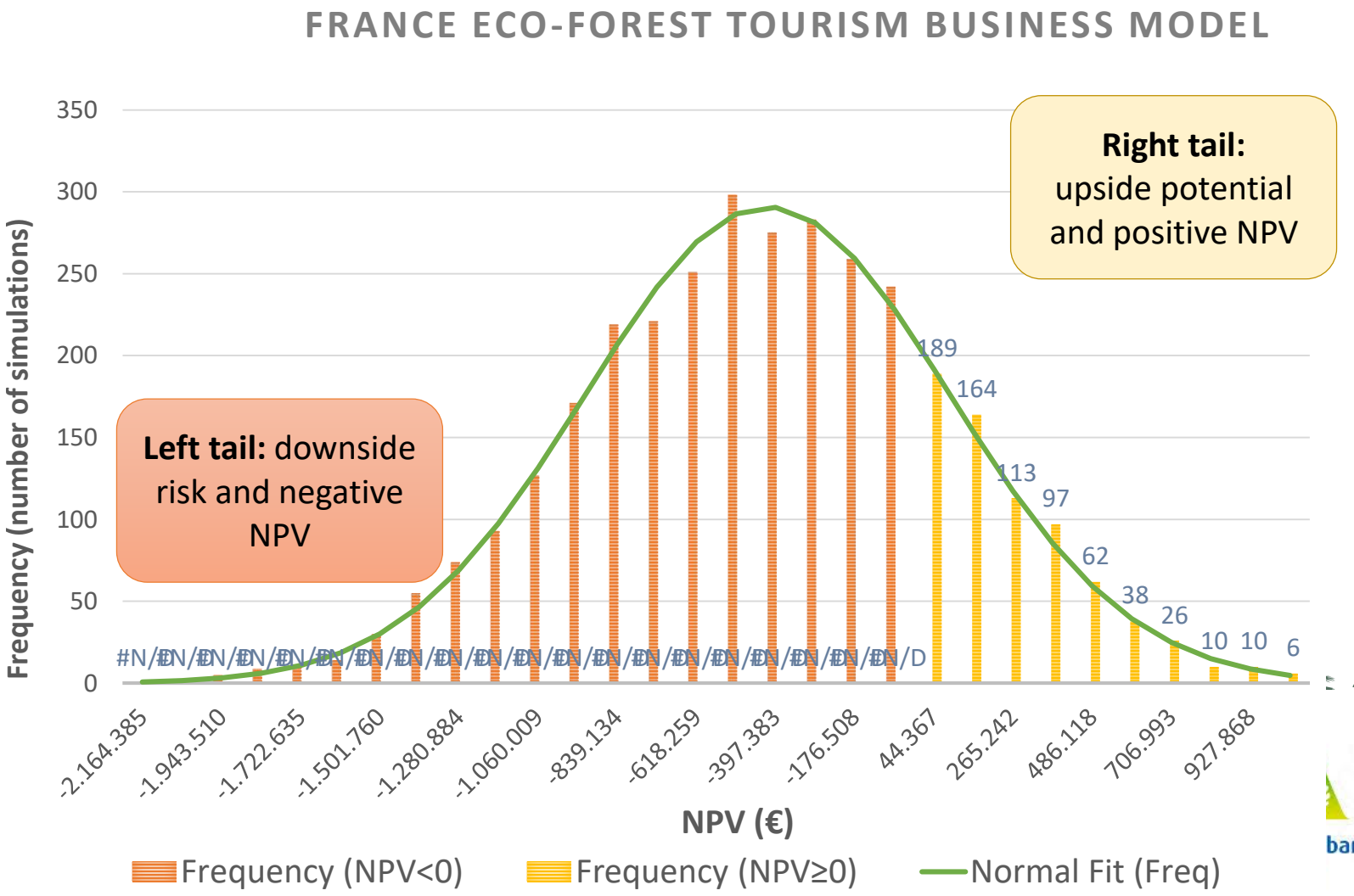
Metric	Baseline	Moderate	Stress Test
€ NPV (€)	120,000	250,000	–50,000
? Payback Period (yrs)	3.0	2.3	>5
CO_2 Sequestered (t)	1,200	1,800	800

- **Business model simulation** under three scenarios to test sensitivity and trade-offs.
- **Track financial metrics (NPV, IRR, Payback)** alongside **impact metrics (e.g., CO_2, ha, service outputs).**
- **Purpose:** show what must be true for viability (break-even conditions) and what breaks the model.

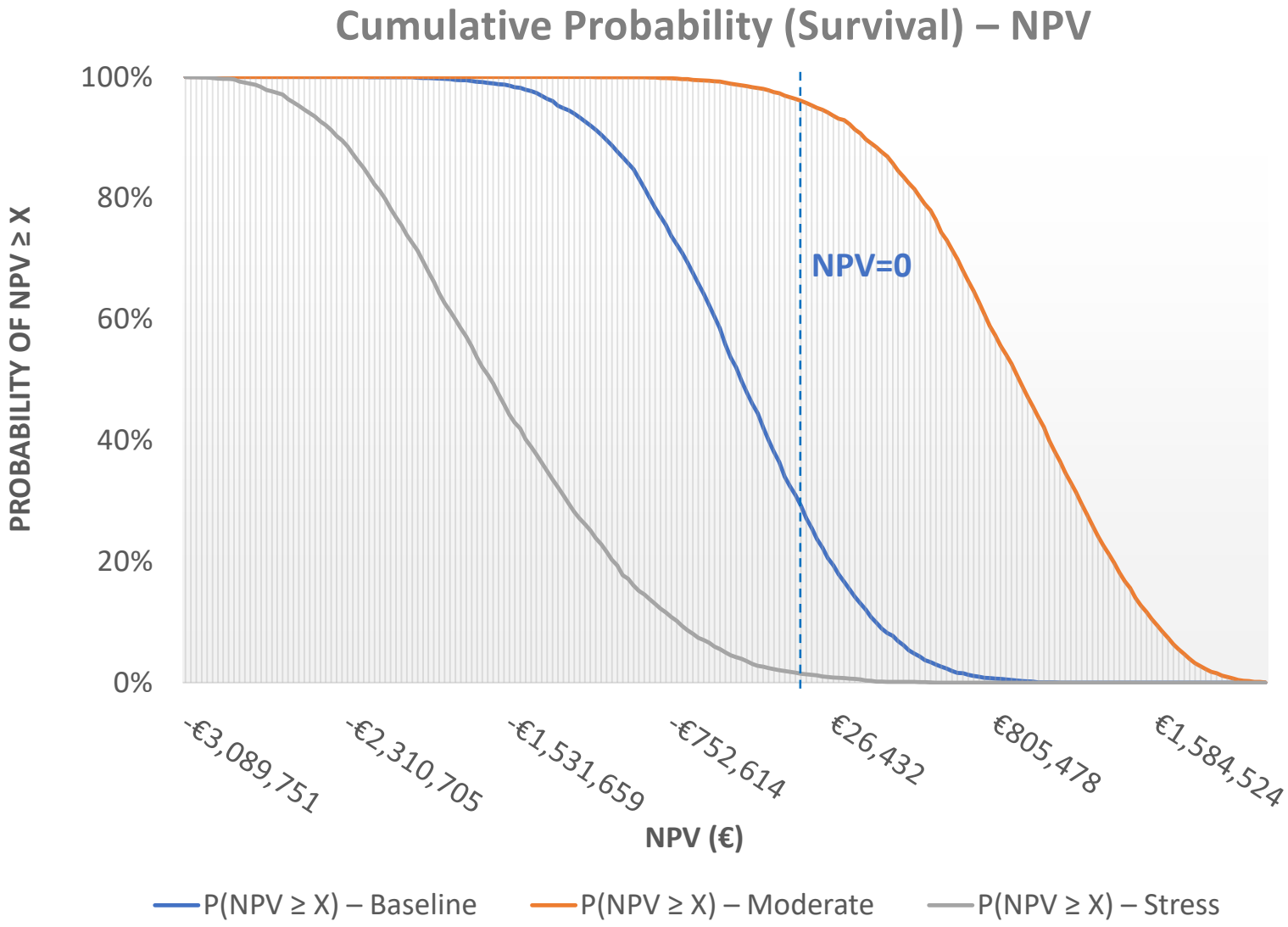
** Scenarios are illustrative and primarily support method demonstration and discussion.*

Tool 3: NPV Distribution under Uncertainty
(Monte Carlo Simulation)

- **Frequency distribution of Net Present Value (NPV)** obtained from MC simulations (5000 runs)
- The horizontal axis shows NPV outcomes (€).
- The vertical axis shows their frequency
- The bars show how often a NPV range occurs when multiple inputs vary simultaneously
- **From single-point results to risk-adjusted performance**
- ***How likely is the business model to be economically viable?***



Towards a Risk-adjusted View: Checking the probability of meeting your targets



For the same NPV, **the higher line (scenario) shows a safer scenario**

Higher curve (scenario) → higher probability to beat the same NPV threshold

Intersection **at NPV = 0: "safety" indicator**

Use levers to shift the curve upward by stabilizing key drivers.

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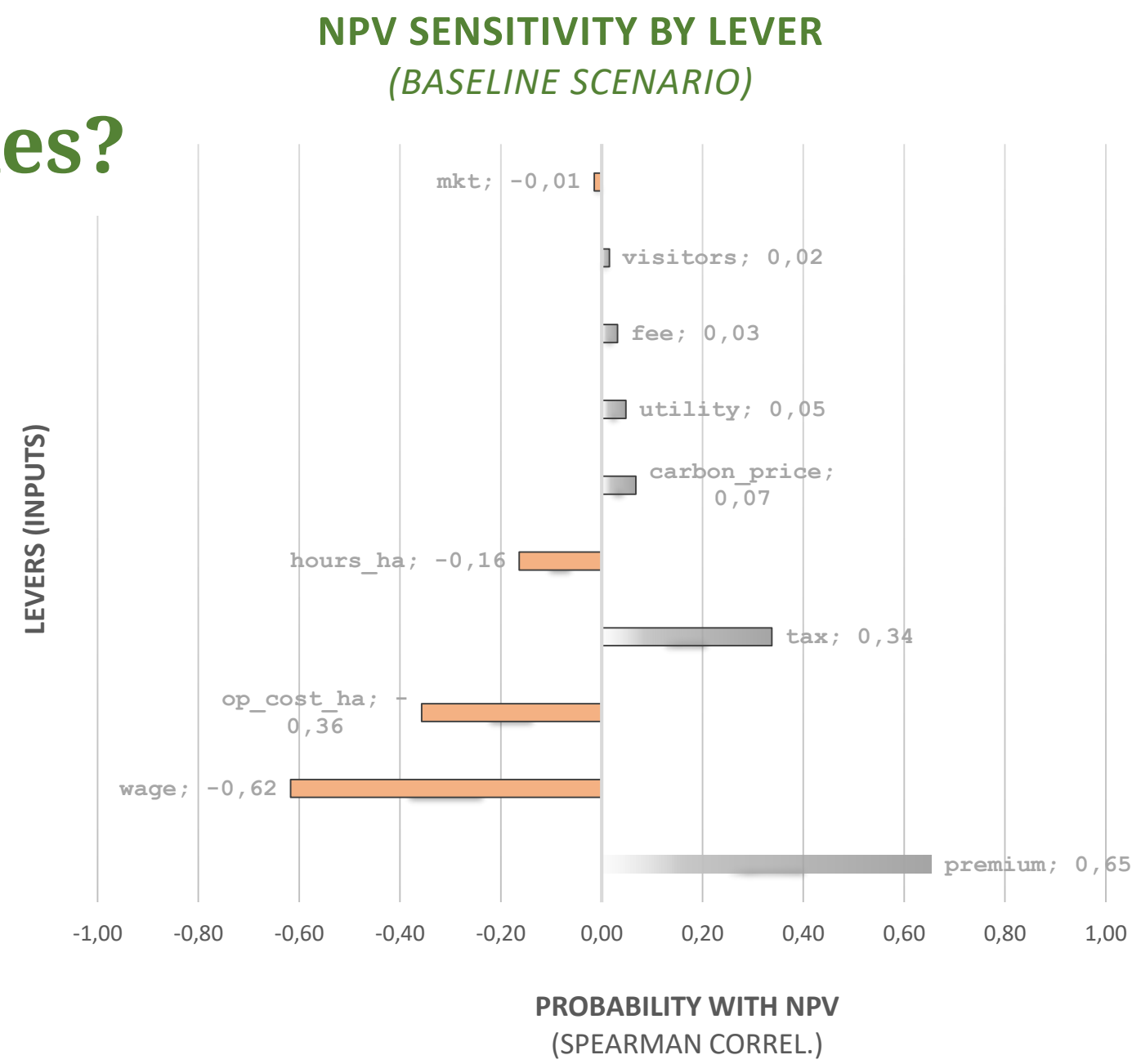
Tool 4: The Drivers of Value Creation: accelerators or brakes?

- **Top positive drivers (↑ NPV):** premium pricing; recurring/local fees; strong contracted revenues (suggestion)
- **Top negative drivers (↓ NPV):** wage levels; opex per hectare; compliance/operating overhead
- Drivers determine **negotiation priorities** (contracts)
- Drivers **help set policy priorities** (e.g. reduce transaction costs, build capability)



Limitations today but promising steps tomorrow

- **Illustrative nature** of current results
- **Limited scope and basis of the ranking** (TOPSIS based on 5 FEV Living Labs and expert inputs): no prescriptive results
- **Need for a finance-oriented assessment framework** usable by private and public financial institutions to assess ***«project bankability»***
- **Separation between value creation and risk exposure**
- **Explicit treatment of policy dependence** of business models
- **Reward robustness across scenarios** over optimisation
- **Indicators and scores must remain transparent**, interpretable, and auditable **for banks, investors and public authorities**

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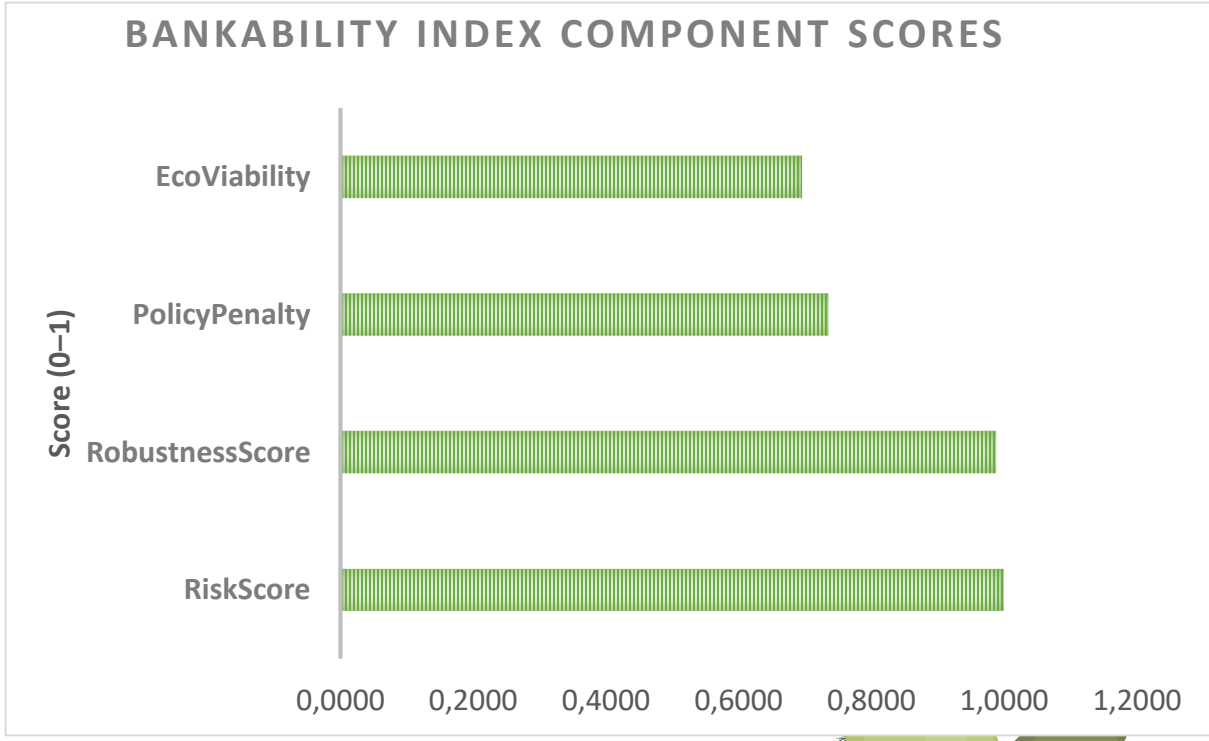
Looking ahead: towards a Bankability Index?

- Concept for future research: a composite framework to express investment-readiness of FES business models.
- Builds on FEV tools (TOPSIS ranking, scenarios, Monte Carlo, drivers) to synthesise:
  - **Financial risk**: probability and severity of losses under uncertainty
  - **Distributional robustness**: stability of outcomes across scenarios
  - **Policy autonomy**: degree of dependence on public programmes and incentives
- **Not a rating, but a transparent communication tool** to support dialogue between territories, policymakers and financing institutions



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