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Master Thesis

**Leveraging Systems Thinking to Enhance Business Modelling Impact in the
Renewable Energy Sector**

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I Abstract

The German renewable energy sector is transitioning from a stable, subsidized growth phase into a volatile sociotechnical ecosystem—a "wicked problem" marked by regulatory flux and grid constraints. Despite this complexity, many firms continue to rely on linear, reductionist business models that prioritize short-term efficiency over long-term resilience. This research investigates the "Linear Gap" between management cognition and market reality.

Using a pragmatist research philosophy, the study employs a mixed-methods approach: a quantitative survey of 120 industry professionals and a dynamic network impact simulation on the Simcision platform. The empirical results confirm a significant strategic misalignment: while 80% of firms prioritize cost minimization, there is an alarming lack of systems-thinking capabilities, including causal mapping and feedback analysis. Inferential analysis reveals a strong positive correlation ($r = 0.72$, $p < 0.01$) between systems-thinking adoption and organizational resilience. Conversely, linear practices were strongly correlated with policy resistance and stranded assets ($r = 0.64$).

The study proposes a "Systems Thinking-Oriented Business Model" (SOBM) framework. Longitudinal simulations show that the SOBM approach outperforms traditional linear strategies by a factor of 3x in total system performance (100% vs. 30.57%) over a five-year horizon. The findings suggest that resilience in the *Energiewende* is not a function of financial capital but of cognitive complexity. This thesis provides managers with actionable tools to transition from "Business Model Generation" to "Business Model Dynamics," offering a strategic roadmap for sustaining Germany's climate neutrality goals.

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7.5 Final Conclusion

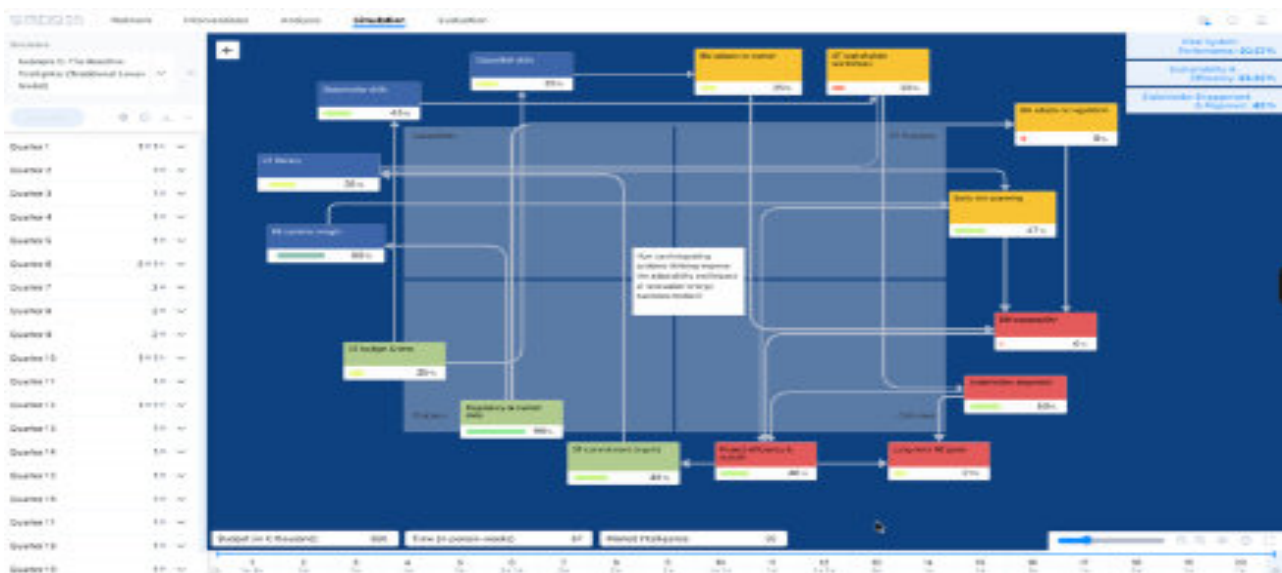
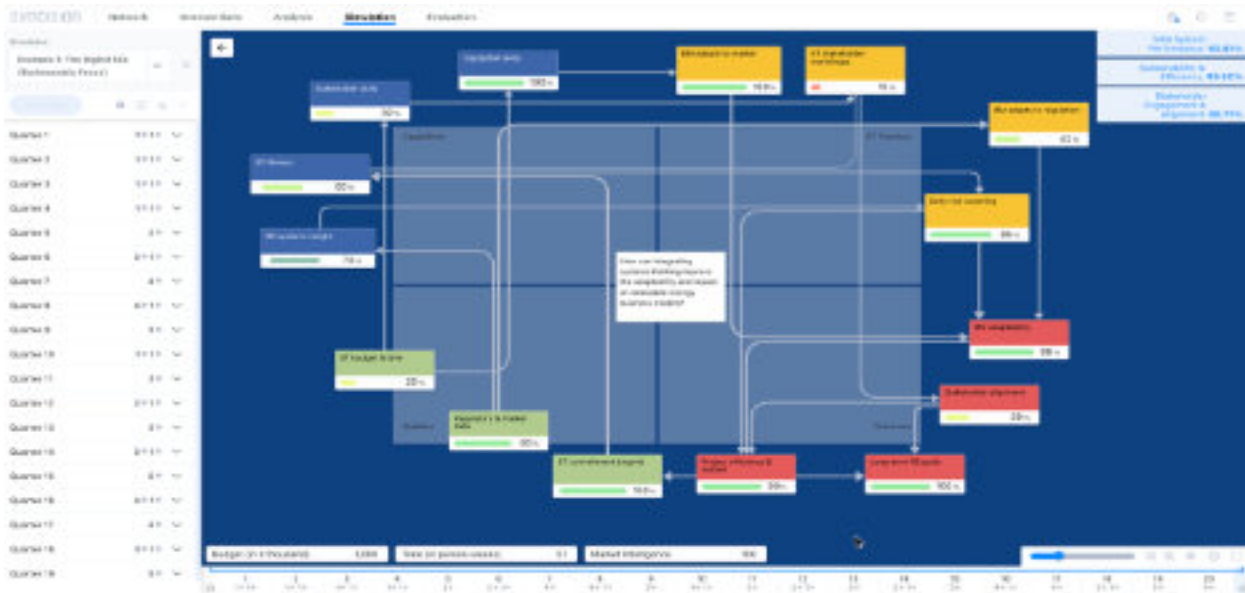
The German Energiewende has matured beyond a mere engineering challenge; it is now a fundamental test of organisational cognition. This research has demonstrated that the "Linear Gap"—the reliance on static, reductionist planning in a non-linear, volatile ecosystem—is the primary driver of strategic vulnerability for renewable energy firms. While technical efficiency was the cornerstone of the subsidy-driven era, it has become a source of fragility in the current VUCA landscape.

The empirical evidence and simulation results presented in this thesis provide a clear mandate for change: financial capital and technological superiority are no longer sufficient to ensure survival. Resilience in the energy transition is a function of cognitive complexity. By transitioning from a "mechanistic" worldview to the Systems Thinking-Oriented Business Model (SOBM), firms can finally move from reactive firefighting to proactive adaptation.

Ultimately, for Germany to meet its 2045 climate-neutrality goals, industry must evolve its mindsets as rapidly as its hardware. Embracing systems thinking is not merely a theoretical enhancement; it is the strategic unlock required to transform systemic risk into organisational resilience, ensuring that the architects of the green transition are robust enough to lead it.

Appendix D: Comparative Scenario Simulation Outputs

This section presents the final performance trajectories and outcomes for the four strategic scenarios tested within the Simcision dynamic network impact model. Each screenshot (Example 1,2,3 & 4) captures the organizational state at the conclusion of a 20-quarter (5-year) strategic horizon, illustrating how different management philosophies—ranging from linear-reactive to holistic-systemic—impact long-term resilience and sustainability in the German renewable energy sector.



This screenshot (below) demonstrates the robustness of the system thinking model over an extended 48-month period. While the primary analysis focuses on 20 quarters, this simulation confirms that the model remains valid and stable for longer durations. The high 'Total System Performance' of **96.38%** achieved at the end of the run proves that the simulation logic is fully workable for long-term strategic scenarios.

