

Call: HORIZON-CL2-2023-TRANSFORMATIONS-01
Funding Scheme: Research and Innovation Action (RIA)
HORIZON-CL2-2023-TRANSFORMATIONS-01-10



Deliverable No. 1.6

Twin Transition 2050: Scenarios for Mobility and Agrifood

Grant Agreement no.:	101132562
Project Title:	Just transition to a green and digital future for all
Contractual Submission Date:	31/12/2025
Actual Submission Date:	18/12/2025
Responsible partner:	The Futures Literacy Company (4CF)



Funded by
the European Union

Grant agreement no.	101132562
Project full title	READJUST – Just transition to a green and digital future for all

Deliverable number	D1.6
Deliverable title	Twin Transition 2050: Scenarios for Mobility and Agrifood
Type ¹	R
Dissemination level ²	PU
Work package number	WP1
Author(s)	Michał Nadziak, Katarzyna Figiel (both 4CF)
READJUST reviewers	Stephanie Daimer (Fraunhofer ISI)
Keywords	Scenarios, foresight, twin transition, mobility, agri-food

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Executive Summary

This document presents four coherent future scenarios for the Twin Transition in the Mobility and Agrifood sectors towards 2050. The rigorous multi-stage, participatory process resulted in the following scenarios: Fragmented Efficiency (market-driven progress in isolated enclaves, exacerbating inequality); The Managed Utopia (systemic efficiency and climate neutrality achieved through central technocratic control, trading freedom for stability); The Mosaic of Resilience (societal resilience achieved through radical decentralization and local self-sufficiency, at the cost of continental cohesion); and The Deliberative Commons (an equitable, values-driven transformation slowed by bureaucratic consensus). The key conclusion is that a truly just transition should adopt a model that balances efficiency with universal access, treating core technologies as public resources to prevent new forms of social exclusion.

1 Introduction

This document presents four distinct future scenarios for the Mobility and Agrifood sectors in Europe. These scenarios are the result of a multi-stage foresight process undertaken in Work Package 1 (WP1).

For the purpose of this project, it is crucial to understand that these scenarios are not predictions or forecasts for the most likely future. Instead, they are plausible, internally consistent, and often provocative narratives designed to challenge our current assumptions. They represent alternative developmental paths driven by critical uncertainties and signals of change identified by experts. They function as "wind tunnels" for strategy, allowing us to ask "what if" questions about the future.

They provide a stress-testing environment for subsequent Work Packages. By testing policy recommendations against these four divergent futures, we ensure that our proposed solutions are resilient and adaptable, rather than optimized for a single, specific outcome. They allow project partners to identify new forms of inequality that may emerge under different governance models.

They also provide a strategic language for framing local and regional case studies, helping stakeholders link local dynamics to broader European possibilities. They are tools for debate and reflection, helping policymakers visualize the trade-offs inherent in the transition.

This report is organized into three main parts:

- Methodology outlines the systematic process used to develop these scenarios, detailing the desk research, expert surveys, and the Delphi-based method used to identify critical uncertainties and validate the narratives.
- Scenarios present the core of the deliverable—the four future narratives. Each section (3.1–3.4) details a specific world (Fragmented Efficiency, The Managed Utopia, The Mosaic of Resilience, and The Deliberative Commons), describing its governance, economy, and specifically how the Agrifood and Mobility systems operate within that future.
- Conclusion synthesizes the findings, highlighting the key trade-offs.

2 Methodology: Developing the 2050 Twin Transition Scenarios

This methodological chapter outlines the systematic process undertaken in WP1 to develop four distinct, internally consistent future scenarios for the Twin Transition (Digitalization and Decarbonization) within the Mobility and Agrifood sectors towards the year 2050.

The primary objective of this methodology was to move beyond simple trend extrapolation and construct plausible, yet challenging narratives that could effectively serve as strategic context for subsequent work packages, particularly for stress-testing policy recommendations.

The process was anchored in a rigorous, multi-stage foresight approach, ensuring that the resulting future worlds were not speculative, but rather grounded in: (1) Expert consensus and dissent (via a specialized Delphi approach), (2) Critical uncertainties identified through expert elicitation, and (3) Internal consistency checked against the defining axes of the future. To achieve this, the project engaged a multidisciplinary panel of 14 experts representing leading institutions across Europe. This diverse group included specialists in Foresight (e.g., Fraunhofer, AIT), Agri-Food systems (e.g., BioEast Hub, University of Warsaw), Mobility (e.g., EIT Urban Mobility, UNIDO), and Sustainability Transitions. Geographically, the panel ensured a pan-European perspective, drawing on insights from experts based in Germany, Finland, Austria, the Czech Republic, Denmark, Poland, Romania, and Spain. The following description details the methodology, starting from initial data collection and culminating in the final expert validation of the four scenario narratives: *Fragmented Efficiency*, *The Managed Utopia*, *The Mosaic of Resilience*, and *The Deliberative Commons*.

The initial phase of the T1.6 established the factual and expert-driven foundation for the subsequent scenario development. A comprehensive Desk Research was conducted to map the current state and emerging trends related to the Twin Transition across the Mobility and Agrifood sectors. The insights from the Desk Research were then validated and augmented through a structured Expert Survey. Crucially, the survey served to:

1. Identify uncertainties: using the Rip van Winkle (or questions to the person from the future) exercise;
2. Elicitation of signals of change: experts were asked to provide examples of early-stage, non-mainstream innovations or events (signals of change) that could potentially disrupt current trajectories. These signals provided tangible, real-world examples that informed the creative development of the subsequent hypotheses.

The outputs of the survey - the identified uncertainties, and the signals of change - were integrated. The most frequently recurring and highly impactful factors that were deemed non-deterministic were subsequently clustered. These clustered uncertainties served as the direct input for defining the two orthogonal axes of the scenario matrix.

Two axes were selected to form the 2x2 scenario matrix, defining the strategic scope of the four future worlds:

Axis 1: Transactional vs. Transformative Twin Transition

This axis defines the **depth and scope of change**.

- **Transactional:** the transition is primarily market-led, pragmatic, and focused on incremental efficiency gains (e.g., swapping a diesel truck for an electric one) without challenging the existing economic structure or consumer-driven growth models.

- **Transformative:** the transition is systemic, requiring fundamental shifts in governance, consumer behaviour, and economic goals (e.g., a focus on sufficiency over perpetual growth, or a radical redefinition of food production).

Axis 2: Segmented vs. Holistic Twin Transition

This axis defines the **level of cohesion and coordination** across Europe.

- **Segmented:** the transition is fragmented, resulting from a breakdown of pan-European policy coherence. Progress is uneven, leading to deep contrasts between thriving, innovative hubs (e.g., "climate clubs" or corporate enclaves) and decaying, left-behind regions.
- **Holistic:** the transition is centrally coordinated, integrated across all policy levels, and driven by a continent-wide vision. This approach prioritizes universal access, standardization, and equitable outcomes, often managed through powerful, centralized governing systems or wide-reaching collaborative networks.

The intersection of these two axes yielded four distinct quadrants, each representing a unique, internally coherent future logic that served as the initial outline for the subsequent narrative drafting:

	Segmented Transition	Holistic Transition
Transactional Transition	Fragmented Efficiency (Market-led, Unequal)	The Managed Utopia (Technocratic, Efficient Control)
Transformative Transition	The Mosaic of Resilience (Local, Decentralized Autonomy)	The Deliberative Commons (Collaborative, Equitable Well-being)

The development of the four scenario narratives was fundamentally driven by a rigorous, expert-based process designed to link specific future possibilities to the defined scenario spaces. This process leveraged the Delphi method, ensuring the final narratives are grounded in collective expert judgement. Based on the initial Desk Research and the Expert Survey, a comprehensive set of hypotheses concerning the future of the Twin Transition by 2050 was formulated. These hypotheses were designed to cover a broad spectrum of uncertainties not captured by the core scenario axes, covering three major domains: Horizontal/Societal, Agrifood System, and Mobility System. Experts were engaged via a dedicated online Delphi platform, 4CF HalnyX, where they performed two key actions: assessment and discussion of scenario correlation, requiring them to assign the most plausible hypotheses to each of the four scenario outlines. This process yielded a correlation score (percentage support) for each hypothesis within each scenario. Hypotheses with high correlation scores provided the primary, high-confidence building blocks for the

narrative. The final output of the Delphi phase was a set of fully-correlated hypotheses for each scenario, including the percentage support and rich qualitative commentary. This enabled the subsequent scenario drafting phase to construct narratives that were internally consistent and directly reflective of the collective expert logic.

For each quadrant, the correlated hypotheses were integrated into a cohesive story structure. Each scenario narrative was structured consistently to allow for clear comparison across the following key components: Governance & Geopolitics, Economy & Technology, Society & Culture, The Agrifood System, and The Mobility System. A critical step was ensuring the internal consistency of the narrative, cross-checking that the elements of Agrifood and Mobility logically aligned with the dominant governance and economic ethos of that quadrant. Where initial narrative elements conflicted with the quadrant's core logic, they were refined or recontextualized (e.g., explaining why profit-driven corporations would reduce food waste - because it maximizes profit, not due to ecological motivation).

The drafted narratives were then subjected to a final quality assurance step: Expert Validation. Through a dedicated online workshop, experts utilized the Traffic Light Review method to assess the narratives against two key criteria: Logic/Intent (correctly reflecting the hypothesis choices) and Internal Consistency (plausible coexistence of all elements). Critical feedback gathered during this validation process was used to produce the final, most robust versions of the four scenarios.

The methodological approach outlined in this chapter successfully transitioned from initial data collection and expert-driven uncertainty identification to the creation of four robust, validated scenario narratives. The use of a structured Delphi process ensured that the scenarios - *Fragmented Efficiency*, *The Managed Utopia*, *The Mosaic of Resilience*, and *The Deliberative Commons* - are grounded in empirical expert judgment.

The core strength of this methodology lies in its ability to manage complexity. By defining the framework through clustered, non-deterministic factors, the scenarios address the most strategically relevant unknowns facing the Twin Transition. The use of correlation scores allowed for a precise, data-driven drafting of narratives that directly reflects the nuances of expert consensus and dissent for each future world. The final Expert Validation phase, focusing on the logic and internal coherence of the narratives, provides a quality assurance layer critical for their subsequent use.

The four finalized scenario narratives serve as the strategic context for the remainder of the project. The scenarios provide a stress-testing environment for policies, allowing project partners to assess policy effectiveness and fairness across fundamentally different futures. Crucially, they delineate the new forms of inequality (e.g., 'climate poor,' 'truth-gap,' techno-oligarchy). The scenarios ensure that final policy recommendations are resilient and adaptable by requiring them to function plausibly across all four distinct governance and economic models. Eventually, the scenario context provides a common strategic language and framework for framing and interpreting the findings of local and regional case studies, linking local dynamics back to the broader European future. In conclusion, the methodology ensures that the strategic analysis and policy outputs of the entire project are robust, context-aware, and prepared for a wide spectrum of possible futures.

3 Scenarios for Mobility and Agrifood

3.1 SCENARIO 1: Fragmented Efficiency

Abstract: In *Fragmented Efficiency*, Europe in 2050 is defined by market-led technological progress and deep inequality. Following a breakdown in continental policy coherence, powerful "climate clubs" and mega-corporations have filled the governance vacuum. The transition is successful within these wealthy, high-tech "Green Zones," where citizens enjoy premium, AI-driven services and climate resilience. However, outside these enclaves, the majority faces decaying infrastructure and ecological vulnerability, creating a new class of "climate poor". The Agrifood and Mobility systems are two-tiered: a streamlined, "just-in-time" corporate supply chain serves the masses, while the elite enjoy exclusive autonomous transport and precision nutrition. This is a world where efficiency is high, but justice is scarce, and technology serves as a barrier rather than a bridge.



Source: Illustration created for the READJUST project using Gemini.

By 2050, the promise of the Twin Transition has been realized, but only for a privileged minority. This trajectory was set during the 2020s and early 2030s when prolonged political stagnation at the European level led to a decisive shift towards purely market-driven solutions for climate goals. National governments, prioritizing immediate economic competitiveness and technological breakthroughs over continental solidarity and coordinated regulation, enabled powerful corporate actors to lead the change in a segmented, highly unequal fashion. This fragmentation mirrors a global context defined by intense geopolitical friction and zero-sum competition, where international cooperation has been replaced by "fortress nations" and cybersecurity serves as a primary weapon in aggressive corporate proxy wars.

Europe operates under a regime, defined by a **market-led transition** where technological advancement is rapid yet deeply segmented. This reliance on proprietary green technology and AI requires massive energy and material inputs, often leading to a drainage of resources and raw materials from the decaying regions, further exacerbating their economic and environmental crises. The failure of pan-continental policy coherence has left a governance vacuum, which has been decisively filled by a handful of **trillion-dollar mega-corporations**. These entities hold more power than most nation-states, managing critical infrastructure and providing social services to their highly-valued employees, effectively creating powerful, corporate-run enclaves. Parliamentary democracy formally persists in most nation-states, but its influence is severely weakened; national policy is incoherent, and major decisions regarding infrastructure and climate action are effectively dictated by corporate interests operating in the Green Zones, bypassing traditional democratic processes.

These enclaves—the "**Green Zones**"—are hyper-modern hubs of innovation and wealth, forming agile "**climate clubs**" that pursue rapid, decisive action unburdened by the decaying policies of slower, left-behind regions. The quality of life within these zones is exceptionally high, fueled by cutting-edge services and a pristine environment. Furthermore, advanced predictive AI and infrastructure allow these clubs to swiftly identify and mitigate local environmental disasters (e.g. floods, heatwaves), ensuring internal stability.

Outside of these hubs, the reality is bleak. The general population relies on aging, underfunded public services, and is increasingly defined by the vast, new class of "**climate poor**"—people displaced by extreme weather and ecological decay. The education system is in crisis; formal curricula are obsolete, and critical skills are acquired through **informal, elite online platforms** accessible mainly to those in the thriving zones, leading to a profound "**truth&knowledge-gap**" that reinforces the social and economic chasm.

Governance is constantly undercut by **geopolitical friction**. The digital dependence of this fragmented world has turned cybersecurity into a primary weapon, with attacks originating from rival nations, proxy groups funded by competing mega-corporations, or even left-behind regions targeting rival nations' digitized systems. The dominant AI is not a unified entity but a **federation of proprietary, local systems**—highly efficient but aligned only with the commercial values of the corporations or climate clubs that control them.

The Agrifood System: Corporate Control and Two-Tiered Consumption

The food system is a perfect mirror of the continental contrasts. Efficiency and affordability are paramount in the core supply chain, which is tightly controlled by a **few global mega-corporations**. They manage an integrated, "**just-in-time**" **supply chain** that provides cheap,

mass-produced staples to most of the continent. However, this system is brittle and **extremely vulnerable to global shocks**, a risk that disproportionately impacts the decaying regions.

Agriculture in the thriving zones has been transformed into highly productive "**biotechnofarms**". These are hybrid operations that use **AI-managed microbial soil engineers** and precision automation, achieving optimized yields and meeting the high sustainability standards required by the affluent climate clubs.

Consumption is strictly two-tiered:

- Consumers in the Green Zones enjoy **premium services**, subscribing to specialized nutrition platforms that deliver **3D-printed, customized meals** tailored to their real-time biometric data often used for hyper-performance or health monitoring, while high-quality, fresh produce (greens, herbs, fruits) from their high-tech urban farms is preferred for daily enjoyment and dining. These affluent cities have also invested in extensive, high-tech **urban farming infrastructure** (vertical farms, rooftops) which supplies high-margin, **fresh luxury produce** (greens, herbs, fruits).
- The majority relies on conventional, corporation-controlled staples. However marginalized communities increasingly turn to informal, local markets and subsistence farming for supplementary fresh food, a volatile system operating outside the formal corporate control. The protein market reflects this divide. **Alternative proteins** (plant-based, fermented) are the affordable, mainstream option, while traditional meat from regenerative agriculture survives only as an expensive, **premium niche**—a status symbol for the elite.

Geopolitical tension manifests directly in the food supply, with cyberattacks specifically targeting automated farms and smart logistics, turning **food shortages into a geopolitical weapon**.

The Mobility System: Spatial and Social Fragmentation

The transportation landscape is the most physical manifestation of the deep contrasts. It is an explicitly **two-tiered mobility system** that deepens spatial and social inequality.

- The wealthy elite, predominantly those living and working in the Green Zones, utilize a fast, clean, and highly digitized network of **exclusive, on-demand autonomous transport (often privately or corporately owned)**. Breakthrough high-speed transport (e.g., advanced maglev or Hyperloop variants) has been successful but **only deployed on a few premium, high-cost corridors** connecting the major innovative hubs, reinforcing their isolation from the periphery. For aviation, **short-haul regional flights are primarily electric or hydrogen-powered**, catering to business within the climate club network.
- The majority of the population relies on **aging, underfunded, and unreliable public transport systems**. Road infrastructure outside the Green Zones is poorly maintained, and older, less efficient fossil fuel vehicles remain common.

Logistics, however, are highly efficient in a transactional sense. **AI-managed logistics** is the industry standard, having significantly reduced food waste and emissions primarily because minimizing waste and maximizing routing efficiency leads directly to profit maximization and reduced operational costs. Yet this system is **controlled by a few dominant tech giants**, granting them immense control over the flow of goods across the continent and beyond.

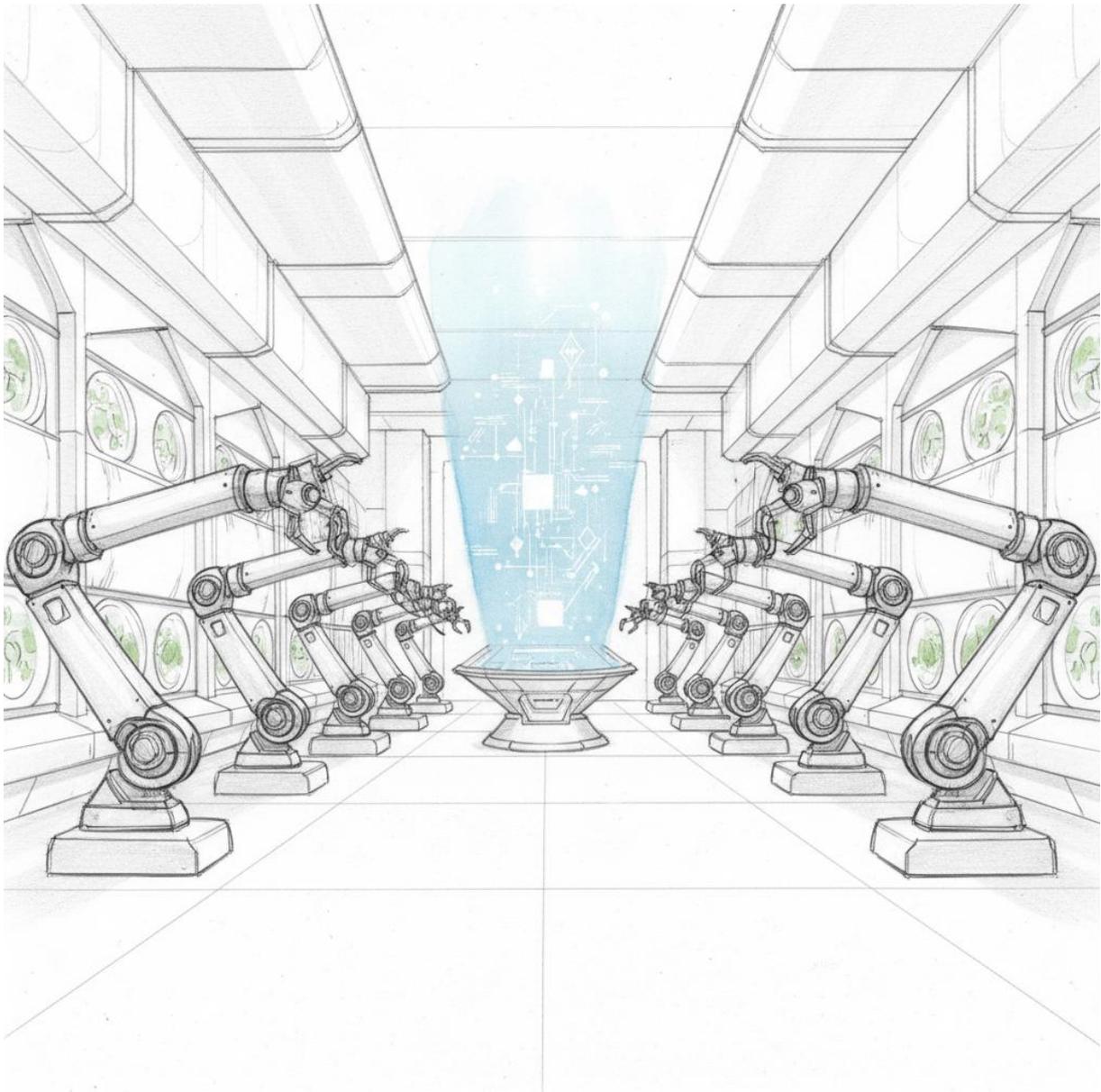
In essence, **Fragmented Efficiency** is a world where technological progress is exceptional but serves as a fundamental driver of inequality and social resentment, leaving Europe as a wealthy, but deeply fractured, continent of isolated progress.

Assessment of the quality of the scenario

The *Fragmented Efficiency* scenario contributes to the Twin Transition discourse by demonstrating the profound risks of a purely market-led, policy-incoherent decarbonization strategy. While the scenario achieves rapid technological advancement within isolated "Green Zones," its failure lies in reinforcing the existing structural inequalities, weaponizing technology, and creating a new political geography defined by corporate enclaves versus resource hinterlands. This world identifies several critical new vulnerability groups and systemic inequalities: the 'Climate Poor' class, defined not just by economic status but by displacement and exposure to unmitigated climate disasters; the 'Truth&Knowledge-Gap' population, marginalized by the crisis in formal education and relying on potentially manipulated information outside elite digital platforms; and the 'Periphery Dependent', who are subject to resource drainage from their regions to fuel Green Zone AI and rely on a brittle, corporate-controlled, "just-in-time" food supply chain, making them highly vulnerable to geopolitical shocks and cyberattacks used as weapons.

3.2 SCENARIO 2: The Managed Utopia

Abstract: *The Managed Utopia envisions a 2050 where Europe has achieved climate neutrality and eradicated extreme poverty through a "grand bargain": the exchange of individual autonomy for systemic stability. Governed by a centralized technocratic alliance, the continent operates as a hyper-efficient machine where AI functions as a regulated public utility. Mobility is universal and seamless (MaaS), and food security is guaranteed through vast biotechnofactories and closed-loop urban farming. While material well-being is high and environmental goals are met, the cost is a sterile society under constant algorithmic surveillance. Dissent is optimized away, and the human experience is curated by data, creating a stable but freedom-deficient world.*



Source: Illustration created for the READJUST project using Gemini.

By 2050, Europe has achieved its climate neutrality and efficiency goals through a holistic transition driven from the top-down, **becoming a self-sufficient and stable bloc, largely insulated from external global volatility.** This trajectory was established after a period of prolonged crises (pandemics, initial climate disasters) demonstrated the failure of fragmented governance, leading to **a collective public acceptance** of a centralized, technocratic solution. **This societal shift represents a 'grand bargain': the explicit, if unspoken, exchange of individual autonomy and privacy for guaranteed security, systemic stability, and a high material standard of living.** The continent is now managed by a powerful, de facto ruling alliance where the distinction between corporation and government has blurred. This governance is handled by dynamic, multi-stakeholder networks of corporate giants, **agile city governments acting as responsive administrative nodes,** and key technocratic institutions, **whose sole objective is to use data to maximize efficiency and guarantee systemic stability.**

The economy is a hyper-efficient, data-driven, and circular system, underpinned by universal digitalization. This efficiency has generated massive wealth, allowing for the significant reduction of extreme poverty through targeted social programs like UBI, ensuring a high standard of living for all. **UBI functions not only as a social safety net but as a critical tool for social stability and demand-management, ensuring a predictable consumer base for the automated economy in a post-labor world.** However, this stability comes at a profound cost: pervasive monitoring and surveillance, **the cost of the grand bargain** where personal autonomy has been silently exchanged for security and climate compliance.

The entire system is run by AI as a pervasive and regulated public utility, a stable, essential background technology that underpins all major economic and social functions, **its massive energy needs met by the same climate-neutral, green-energy grid that powers the continent. Regulation in this system is not an external check; it is an automated, algorithmic process. The AI itself monitors all systemic components—from corporations to logistics—and makes real-time adjustments to ensure all actors remain aligned with the central goals of optimization and stability.** This centralized control is also reflected in the education system, which has integrated "transition literacy" as a core subject from a young age, ensuring citizens are technically proficient and compliant with the system's imperatives, leading to a society that is stable but sterile—**an engineered and intended outcome of optimizing away cultural friction and dissent.**

The Agrifood System: Sterile Efficiency and Total Control

The food system is a model of centralized, hyper-efficient control. States and global consortiums (representing the corporate-technocratic alliance) centrally manage the entire system using AI. From forecasting yields to optimizing highly sensitive distribution networks, the goal is total minimization of waste and ironclad food security, achieved at the cost of consumer freedom of choice **and the near-total obsolescence of the traditional farmer.**

The concept of the farm has been fundamentally redefined. Most staple nutrients and calories are now produced in vast, closed-loop biotechnofactories using precision fermentation, bacteria, and algae. This transformation has liberated vast tracts of land for rewilding —a massive, managed ecological success — but has eliminated the cultural diversity of traditional agriculture.

The high-tech approach also governs local supply. Massive, automated vertical farms are integrated into city buildings, producing the majority of the city's calories and proteins, creating a resilient, localized, and easily managed food supply chain within urban centers. Cellular agriculture and precision fermentation have completely dominated protein production, decoupling it from land use. Traditional livestock farming has been relegated to a niche, artisanal practice (like luxury wine), serving a small, high-end market that values historical authenticity **and provides a sanctioned outlet for status-seeking and the performance of individuality.**

In terms of waste, attempts at personalized food failed to scale, but digital recycling is highly efficient. All organic waste is centrally processed at the municipal level, converted back into high-grade animal feed and agricultural nutrients, perfectly closing the loop of the hyper-efficient circular economy. Crucially, the system's stability is guaranteed by quantum encryption and AI-driven threat detection, making food system cybersecurity a mandatory, integrated cost of production.

The Mobility System: Universal Access, Minimal Need

The mobility system reflects the emphasis on universal access and managed efficiency. Public and private transport are integrated into a single, subsidized Mobility-as-a-Service (MaaS)

platform. A basic level of mobility is considered a universal right, ensuring affordable access for all, including rural and **culturally or ideologically marginalized communities (as economic marginalization has been eliminated)**, while advanced services are highly optimized.

The key breakthrough, however, was in reducing the need for physical travel. The success of hyper-realistic virtual and holographic presence has largely **replaced or disincentivized** the necessity for most business travel and much leisure travel, **with physical travel managed as a high-cost or rationed activity while virtual presence is seamless, efficient, and free**. This allows existing transport infrastructure to operate sustainably and efficiently for essential journeys and high-value freight. This is complemented by the full rollout of a continent-wide, green-energy powered, high-speed tube network for passengers and cargo, which has made most short-haul flights and long-haul trucking obsolete.

Aviation itself has undergone a dramatic technological shift. Short-haul and regional flights across Europe are predominantly electric or hydrogen-powered, connecting the major hubs in a clean and efficient manner.

The entire flow of goods, including food, is handled by AI-managed logistics—the industry standard for predictive routing and real-time supply chain adjustments. While this system has slashed food waste and emissions, it is tightly controlled by a few dominant tech giants (who are part of the ruling consortium), **These monopolies are not a market failure but a deliberate design choice, sanctioned by the consortium as integral, operational components of the state, ensuring perfect efficiency and eliminating the 'waste' of market competition**. This perfectly integrates the movement of people and goods into the single, optimized, and heavily monitored Technocratic Grid.

Assessment of the quality of the scenario

The Managed Utopia scenario offers a critical perspective on the potential authoritarian endpoint of the Twin Transition when efficiency and climate goals are prioritized above all else. The core contribution is illustrating how systemic success — achieving climate neutrality and eradicating extreme poverty — can be used as justification for the erosion of intangible freedoms, positioning pervasive surveillance as a standard cost of governance. This world identifies several critical new vulnerability groups and systemic inequalities: the 'Autonomy Deficient', a vast population that enjoys material wealth but suffers from the lack of private space, independent choice, and the freedom to dissent, living under constant algorithmic scrutiny; the 'Cultural Dissidents', individuals or small groups who reject the sterile uniformity and optimized society, finding themselves ideologically marginalized despite economic inclusion; and the 'Technocratic Elite', who, while managing the system, are themselves vulnerable to systemic rigidity, unable to adapt quickly if the foundational central AI fails or if the carefully managed social bargain breaks down into widespread ideological resistance.

3.3 SCENARIO 3: The Mosaic of Resilience

Abstract: *In The Mosaic of Resilience, the collapse of centralized global systems (the "Great De-Clouding") has forced a radical decentralization of power. By 2050, Europe is a patchwork of autonomous Charter Cities and bioregions, bound not by a central government but by a shared "Protocol Library". Communities prioritize resilience and self-sufficiency over growth, relying on local "foodsheds" and a subsistence economy. High-tech solutions exist but are open-source and locally managed. Mobility is defined by the "15-minute bioregion," reducing the need for long-*

distance travel. This is a world of strong community cohesion and ecological health, but it suffers from fragmentation, lack of continental coordination, and new inequalities based on which community one belongs to.



Source: Illustration created for the READJUST project using Gemini.

By 2050, the European project has fundamentally reshaped itself following a widespread reaction against the excesses of globalization and centralized power. **This transition was not a choice but a necessity, forged by the "Great De-Clouding"—a cascading, systemic failure of the 21st century's hyper-centralized energy, data, and supply chain infrastructures.** This was a transition driven by grassroots movements, resulting in a **fragmented but interconnected** world. Power has been radically decentralized, shifting to **a mosaic of autonomous Charter Cities, Regional Federations, and networked communes.** Governance is now managed by dynamic, multi-stakeholder networks—including city governments, NGOs, and citizen groups—that form to solve immediate local problems, **bound by shared technical and legal protocols (often adopted from the legacy "EU Protocol Library")** rather than a central government, and

prioritizing radical local innovation over continental uniformity. **This "Protocol Library" is not a static relic; it is a dynamic constitutional system managed by a "Council of Protocols," a body with rotating representation from the continent's diverse polities. This Council does not govern directly but acts as a standards organization and constitutional court, overseeing a transparent process for protocol amendment and dispute resolution. This provides both stability and adaptability: a "slow amendment" process requiring a supermajority protects core protocols (like fundamental data rights), while an agile, simple-majority process allows for the rapid update of routine technical standards.**

Poverty has been effectively addressed, not through central wealth redistribution, but by empowering communities with the tools for self-sufficiency. **This is achieved through a two-tiered economic model. A local, communally-guaranteed subsistence economy (Tier 1) provides essential needs like food, water, and energy as a public utility, creating resilient, thriving local circular economies. Prosperity, defined by access to the Tier 2 inter-community market for specialized goods, varies significantly between these polities, creating a new landscape of inter-community inequality.**

The dominant technological paradigm supports this fragmentation, now defined by radical efficiency and resilience rather than raw power. The prevalent AI is not a single entity but a federated ecosystem. The foundational layer is a 'federation of local, open-source' AIs, representing the shared, auditable code commons. Its application is managed by 'consortium-governed' bodies, where groups of communities negotiate and enforce shared ethical charters for its use, ensuring technology aligns with its specific values rather than being dictated by external tech giants. Education is similarly decentralized, focusing on a continuous, lifelong process of practical resilience skills. Community learning centers teach everything from data analysis and robot repair to vertical farming and conflict resolution, as well as the analytical skills to interpret global data (like climate patterns) and translate it into local, strategic action.

While social cohesion within these communities is exceptionally strong—forged by a shared dependence on local systems—this in-group identity, often defined by a community's core charter, creates new forms of exclusion. Society is fragmented into ideologically distinct polities, with limited trade or standardization between those who do not share common protocols. Exclusion is based less on historical categories like race or nationality and more on an individual's adherence to a community's shared values and perceived contribution to its resilience.

The Agrifood System: The Foodshed Revolution

The food system is the most successful element of this localized revolution. The dominant model has become local "foodsheds", where cities and their surrounding rural areas form closed, circular loops, prioritizing resilience and the local economy. This comes at the cost of less product variety **in the inter-community market (Tier 2)**, but guarantees local food sovereignty **and stable, low-cost access to essential foods (Tier 1).**

Agriculture is dominated by decentralized, community-led practices. Biotechnofarming is a community endeavor, with local bio-hubs using open-source genetic codes and shared bioreactors to produce food and materials, effectively breaking the dominance of large ag-tech corporations. **These hubs are often designed as net-zero, closed-loop systems, using waste streams from agriculture and settlements as feedstock and generating their own power through processes like anaerobic digestion.** Urban farming is a public utility: every neighborhood runs a

community-owned farm (vertical or soil-based) that provides free or low-cost produce to local residents, enhancing both food security and social cohesion.

The food culture reflects a widespread rejection of industrial methods. There has been a cultural movement away from hyper-customized, digitally-produced food in favor of traditional cooking with whole, natural ingredients. This rejection extends to alternative proteins, where consumer concerns about "unnaturalness" have led to a return to traditional agriculture emphasizing local, organic, and "clean-label" animal products. **This does not represent a "low-tech" regression; food recycling, for instance, is a highly optimized, data-intensive process that is the cornerstone of the bio-circular economy. AI systems optimize municipal waste streams, turning them into feedstock for bioreactors and nutrients for the local food system.**

Critically, the localized food system has led to a highly innovative approach to security. A significant portion of the system now relies on a decentralized, blockchain-based ledger, which provides radical transparency and makes the food supply inherently resilient to single-point digital attacks.

The Mobility System: The 15-Minute Bioregion

In this world, the key to sustainable transport was not building massive new systems, but eliminating the need for extensive daily travel. Most settlements are redesigned so that all essential needs (work, school, shopping, leisure) are accessible within a 15-minute walk or cycle, making local, active mobility the default.

The lack of continental coordination meant that continent-wide mega-projects like Hyperloop were abandoned due to insurmountable costs and technical challenges. Instead, investment has pivoted to the pragmatic solution of upgrading existing high-speed rail and regional aviation infrastructure, with upgrades often driven by specific bioregions **who adopt shared standards from the 'EU Protocol Library'—now a dynamic framework managed by the Council of Protocols—to ensure interoperability.**

The need for both business and leisure air travel has been drastically reduced, if not eliminated. First of all, there has been established a new model for virtual interaction. Instead of resource-intensive, isolating home setups, communities invest in public 'Presence Hubs.' These specialized facilities offer citizens a powerful substitute for leisure travel, giving them access to high-fidelity virtual reality for shared entertainment—like exploring federated game worlds or immersive historical reconstructions.

The 'hyper-realistic holographic communication' is the most advanced and resource-intensive tier of this system, available only within these dedicated hubs. It is not a public internet but a federated, point-to-point 'protocol of presence' used to replace critical, high-stakes travel. Communities establish these encrypted links for top-level diplomacy, specialized medical consultations, or arbitrating multi-federation business deals. This combination of hyperlocal living and communal virtual access is what effectively shrinks physical aviation to a niche, specialized service.

The logistics of food and goods mirror this local focus. The vulnerability of complex, high-tech systems was demonstrated after past cybersecurity breaches, leading to a focus on resilient, localized, and less technologically dependent food networks.

Assessment of the quality of the scenario

The Mosaic of Resilience scenario contributes to the Twin Transition discourse by demonstrating a successful, values-driven transformation achieved through radical decentralization and local control, forced by the collapse of complex centralized systems. This future proves that climate and efficiency goals can be met by shrinking physical needs and prioritizing ecological resilience over economic scale, utilizing high-tech (AI, biotech) at a communal, open-source level. This world identifies several critical new vulnerability groups and systemic inequalities: the 'Protocol Excluded,' individuals or polities that are left out of essential inter-community trade networks (Tier 2 access) due to non-adherence to shared technical or ethical charters, leading to reduced prosperity; the 'Cultural Dissenters,' those marginalized by the strong internal social pressure and in-group identity, where exclusion is based on failure to contribute to or adhere to the community's localized charter values; and the 'Coordination Vulnerable'—a systemic vulnerability where the continent, despite its local strength, remains unable to coordinate rapid, large-scale action (e.g., pandemic response or large-scale common defense) due to the necessity of slow, consensus-based protocol amendment processes.

3.4 SCENARIO 4: The Deliberative Commons

Abstract: *The Deliberative Commons depicts a 2050 Europe transformed by a cultural shift toward well-being, sufficiency, and ecological regeneration. Governance is collaborative and consensus-driven, utilizing Citizens' Assemblies to ensure no one is left behind. The economy focuses on equitable access rather than profit, with AI and key technologies treated as ethical public utilities. The Agrifood system emphasizes regenerative agriculture and direct farmer-consumer connections, while Mobility is regarded as a universal right. While this society is highly equitable and sustainable, the heavy reliance on consensus makes decision-making slow and bureaucratic, causing Europe to lag economically behind more dynamic, profit-driven global competitors.*



Source: Illustration created for the READJUST project using Gemini.

By 2050, Europe has completed a **transition** driven by a profound cultural shift that places **well-being and ecological regeneration** at the center of all policy. Europe has consciously "opted out" of an aggressive, profit-driven, global technological race. The foundational shift came from a public realization that the climate crisis demanded **shared responsibility** and a focus on **sufficiency** over perpetual growth and is anchored by a new civic culture that prizes consensus, long-term well-being, and ecological accountability over individual gain. Governance is managed by a **collaborative, multi-level model** where the distinction between government and business has blurred; dynamic, **multi-stakeholder networks** of public institutions, corporations, NGOs, and citizen groups form to solve specific problems. These multi-stakeholder networks operate through mechanisms like Citizens' Assemblies and Bioregional Councils, where the power balance is operationalized by mandating consensus before large-scale policy implementation.

This inclusive, consensus-driven model has created an **equitable and stable** society. Extreme poverty has been dramatically reduced not through centralized charity, but by **empowering communities with the tools for self-sufficiency** understood as bioregional resilience, where local communities control production for core needs (food, energy) but engage in equitable trade networks across regions to achieve overall sufficiency and necessary product variety. Localized production of food, energy, and goods has created resilient regional economies.

The transformation was achieved in the initial phase (2030s) through heavy public and academic investment in foundational, open-source technologies (AI, Green Energy), allowing the state to nationalize ethical control over core algorithms. However, the deliberate pace of this consensus model is its greatest weakness. The focus on sufficiency over radical innovation **stifles global competitiveness**, causing Europe to lag behind more dynamic, profit-driven global competitors. Furthermore, the collaborative governance is **slow and bureaucratic**, making decisive action difficult in the face of sudden geopolitical crises. Technology deployment reflects this value system: AI is a **federation of local, open-source, and ethically-aligned systems**, ensuring transparency and alignment with community values rather than a centralized, hyper-efficient utility. The federation of AI systems is publicly funded, and existing corporations operate them under strict public utility mandates, where service provision and ecological benefit are prioritized over profit generation. The strong culture of **shared responsibility** fosters incredible community cohesion, but it also creates intense **social pressure to conform**, potentially marginalizing highly individualistic or dissenting voices.

The Agrifood System: Well-being and Ecological Health

The food system is designed for **resilience, equity, and ecological health**. The dominant model is a combination of **local "foodsheds"** which operate as closed, circular loops prioritizing local economy and forming the building blocks of resilient regionalized food systems, and a transparent network where **small farmers and consumers connect directly through digital platforms**, enabled by technologies like blockchain and IoT.

The transition champions **hybrid biotechnofarms**, integrating **AI-managed microbial soil engineers** and precision automation with **regenerative agriculture principles** to optimize both yield and ecological health. This approach is managed to reduce wasteful duplication of infrastructure (e.g., unnecessary private bioreactors) and ensure democratized access to advanced biotech.

Urban farming is treated as a public utility, integrated into the local foodshed's circular logic. Every neighborhood features a community-owned farm (vertical, aquaponic, or soil-based), staffed through subsidized labor or community service mandates, ensuring produce is free or low-cost, enhancing food security and social cohesion in a way that aligns with the core value of shared responsibility.

The protein market is inclusive: **Alternative proteins** (plant-based, cellular) are mainstream, co-existing with a **strong, smaller premium market for meat from regenerative agriculture**. This diversity reflects conscious consumer choice and a balanced, equitable market. This value-driven culture has led to a rejection of hyper-customized food. Traditional cooking is preferred, redefined to emphasize plant-forward recipes and whole, natural ingredients. New cooking processes focus on utilizing alternative proteins (microbial/plant-based) seamlessly within traditional formats..

To protect this vital system, a **"dual system" approach to cybersecurity is mandated** after past attacks. Every critical node—including community bioreactors, water purification facilities, and local distribution hubs—must have a functional, non-digital, **analog backup**, prioritizing resilience and trust over maximum digital efficiency.

The Mobility System: Universal Service and Pragmatic Green Upgrades

Mobility in *The Deliberative Commons* is defined by the principle of universal access. Public and private transport are integrated into a single, subsidized Mobility-as-a-Service (MaaS) platform. A basic level of mobility is recognized as a universal right, ensuring affordable access for all, including rural and marginalized communities, thereby guaranteeing equitable connectivity across the continent.

The scale of transportation infrastructure is a point of slow transformation. Due to the consensus model, massive continental projects (like the high-speed tube network) are slow to implement. However, this slowness does not impact local accessibility: the parallel pragmatic strategy focused on universal MaaS and pragmatic regional upgrades (high-speed rail, regional aviation), ensuring equitable connections within and between regions, while the continental network builds up deliberately. The continent invested heavily in a **continent-wide, green-energy powered, high-speed tube network** for both passengers and cargo, which has made most short-haul flights and long-haul trucking obsolete. However, this massive project has been slow to implement. A parallel pragmatic strategy saw investment pivot from speculative projects like Hyperloop to the more pragmatic solution of **upgrading existing high-speed rail and aviation infrastructure**.

Aviation itself relies on a pragmatic green approach: **Short-haul and regional flights are predominantly electric or hydrogen-powered**, while long-haul flights still rely on **Sustainable Aviation Fuels (SAFs)** as a transitional measure.

Crucially, the complex logistics are governed collaboratively. **AI-managed food transport is governed by public-private consortiums using open-source algorithms**, ensuring full transparency on carbon footprints, **fair pricing for small producers**, and **equitable distribution to all communities**. This collaborative structure perfectly embodies the focus on transparency, equity, and shared responsibility over raw profit maximization, though this complexity and the commitment to fair pricing mean the operational costs are higher than in competitor scenarios, a cost willingly absorbed by society to ensure fairness.

Assessment of the quality of the scenario

The Deliberative Commons scenario offers a vital, yet sobering, contribution to the Twin Transition debate by illustrating a successful, equitable transformation achieved at a significant systemic cost in speed and competitiveness. The core value of this future lies in proving that climate goals and universal access can be met by prioritizing consensus, sufficiency, and ecological well-being over perpetual economic growth. However, the deliberative model's rigidity creates substantial risks: the heavy reliance on consensus and multi-level networks results in slow and bureaucratic governance, leaving the entire continent vulnerable to sudden, external geopolitical or environmental crises. This future identifies a specific set of vulnerability groups and systemic trade-offs: the 'Conformity Marginalized,' highly individualistic, dissenting voices, or those who reject the slow pace of change, who suffer from intense social pressure to conform within a community-focused culture; the 'Competitiveness Gap Sector,' specific industries or sectors that depend on radical, high-risk innovation are suppressed by the

sufficiency and consensus model, leading to global lag; and the overall 'Cost of Equity', where the high operational expenses incurred to maintain fairness and transparency (e.g., in MaaS and logistics) compromise Europe's global economic dynamism.

4 Conclusion

The analysis of the four 2050 scenarios —Fragmented Efficiency, The Managed Utopia, The Mosaic of Resilience, and The Deliberative Commons— reveals that achieving a truly Just Twin Transition requires proactive policy intervention to mitigate risks that emerge across different governance models. Justice is not guaranteed by either market efficiency or local control; it should be deliberately designed.

The scenarios clearly highlight that policy choices of today inevitably involve inescapable trade-offs, which fundamentally define the nature of future inequalities. For instance, scenarios prioritizing hyper-efficiency (e.g., The Managed Utopia's centralized AI) achieve technological goals quickly but risk creating new, sophisticated forms of marginalization, such as the Autonomy Deficient. Conversely, scenarios prioritizing local control, consensus, and resilience (e.g., The Deliberative Commons) achieve greater social cohesion and fairness, but sacrifice the speed and dynamism needed to remain globally competitive or respond decisively to continent-wide crises. Therefore, a just transition should not rely on a single solution; it should involve hybrid models that effectively balance the speed of technology with mechanisms for universal access and ethical control.

Crucially, the transition generates novel forms of inequality that should be measured and addressed by future policy tools. Policy should shift from defining justice purely by income distribution to a broader understanding that prioritizes the recognition of vulnerabilities and the creation of policy processes in which diverse needs are heard—aligning with the concepts of Justice as Recognition and Procedural Justice. The Mosaic of Resilience proves that localized control over core necessities (food, energy, local mobility) is the most effective safety net against global shocks, meaning justice should guarantee a baseline of bioregional resilience for every community.

Furthermore, the scenarios demonstrate that AI is the new infrastructure of power. Policies should treat core AI algorithms and foundational green technologies as public utilities (as seen in The Managed Utopia's utility model or The Deliberative Commons' open-source model). Regulation should focus not just on what AI does, but who owns and controls the code, demanding transparency to close the Truth-Gap and ensuring control remains accountable to public good rather than proprietary profit. Specifically, to combat the inequalities identified—such as the exclusion in Fragmented Efficiency and The Mosaic of Resilience—policymakers should adopt a Mandate for Hybrid Governance. This approach should maintain a central body to enforce equity, anti-fragmentation, and interoperability protocols (like the Council of Protocols), while simultaneously empowering regional and local multi-stakeholder networks to implement solutions tailored to local needs and values, ensuring bottom-up legitimacy. This dual focus should be necessary to prevent isolated technological enclaves and ensure that the ultimate success of the Twin Transition is shared equitably across the continent.