GREENING THE ARTERIES OF EUROPE'S ECONOMY

A NEW FRAMEWORK FOR BUILDING SUPPLY CHAIN RESILIENCE AND STRATEGIC AUTONOMY

ARDABELLE CAPITAL

Who we are

Ardabelle invests in mission critical industrial and business services platforms that make European value chains more resilient, more efficient, and more sovereign, supporting them as an architect, not as a mere shareholder

Supply chain 2.0 strategy

- Creating Europe's future green leaders
- Combining financial support with strategic guidance
- Targeting profitable mission-critical industrial and business services companies

Creating value through 4 pillars

- Resource preservation and productivity
- Sustainable delivery
- Material circularity and extended life
- Analytics and management

Source: Ardabelle Capital analysis

WITH WHOM DID WE BUILD THIS?

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Source: Ardabelle Capital analysis

NARRATIVES ON RESILIENCE & SUSTAINABILITY ARE CONTRASTED TO SAY THE LEAST

“

If all policies are in sync with our climate goals, decarbonization will be an opportunity for growth.

- Mario Draghi

“

Drill, baby, drill!

- Donald Trump

1. What’s resilience – and why now?
2. How vulnerable are we?
3. What’s at stake – and how to win?
4. Who’s ahead – and who’s lagging?
5. What’s next?

1. CLIMATE SHOCKS ARE ALREADY CASCADING INTO SYSTEMIC CRISES

Extreme weather events are no longer rare outliers – they are becoming the norm, triggering chain reactions from local communities to global financial systems

Stage 1: The climate event

- Global temperatures rise beyond critical thresholds
- Extreme weather becomes more frequent and severe
- Disasters compound across regions simultaneously

Stage 2: Immediate human impact

- Populations displaced and infrastructure destroyed
- Public health crises from air quality and heat exposure
- Natural ecosystems permanently degraded

Stage 3: Economic shockwaves

- Insurance markets collapse in high-risk regions
- Property values erode household and municipal wealth
- Investments and development grind to a halt

Stage 4: Systemic contagion

- Credit markets tighten as banks reassess risk exposure
- Municipal budgets collapse, public services are cut out
- Systemic shocks ripple through financial systems

7 out of 9 planetary boundaries crossed | 1.5°C Paris target increasingly out of reach

Source: Stockholm Resilience Center, 2025; IPCC Sixth Assessment Report; Ardabelle Capital analysis

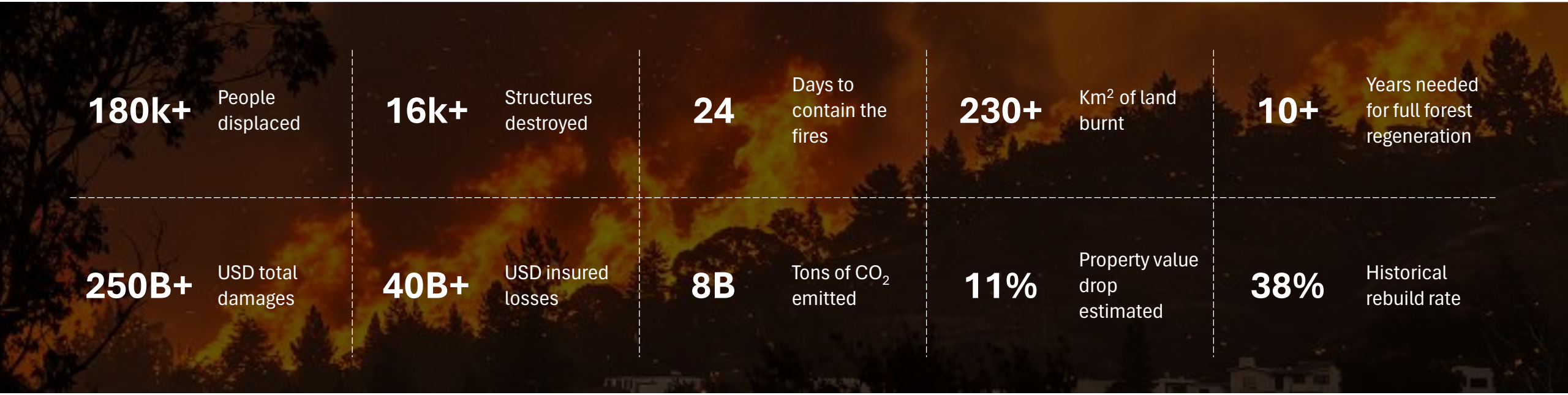
1. CALIFORNIA'S JANUARY 2025 WILDFIRES HAD CONSEQUENCES RANGING FROM BIODIVERSITY LOSS TO FINANCIAL SYSTEM INSTABILITY

Climate trigger: in California (**January 2025**) record wildfires fueled by drought and extreme heat

Direct impacts: neighborhoods razed, thousands evacuated, decades of forest lost

Economic cascade: major insurers had pulled out in 2024, leaving homeowners uninsured and real estate value plummeting

Consequences: $250B+ damages, banks tightening credit, municipalities losing tax base and pension funds exposed



The January 2025 California wildfires exemplify how climate shocks cascade into systemic crises—**$250B+ in damages, 16k+ structures destroyed, and decade-long recovery**. With fire seasons intensifying globally, **California's story is repeating in Australia and Southern Europe**, underscoring the urgent need for resilient infrastructure, rapid response systems, and climate adaptation investment.

Source: AccuWeather; UNDRR GAR 2025; World Weather Attribution; CAL FIRE; Ardabelle Capital analysis

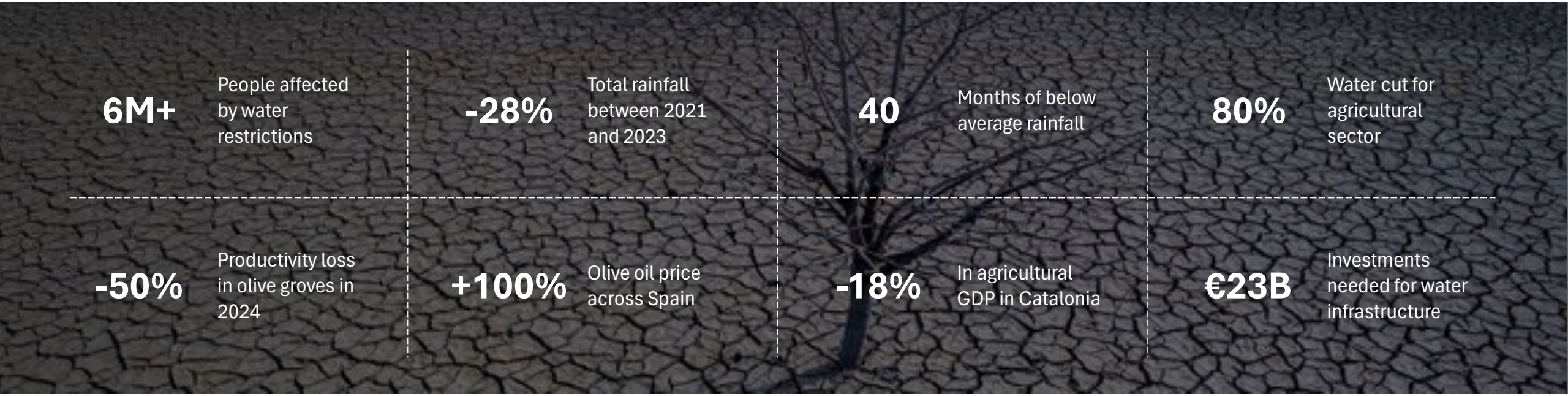
1. 2024 CATALONIA'S MOST SEVERE DROUGHT SINCE 1916 TRIGGERED SIGNIFICANT ECONOMIC DISRUPTION AND FAR-REACHING SOCIAL CONSEQUENCES

Climate trigger: record heat and 40 months of low rainfall in Catalonia, Spain

Direct impacts: reservoirs historically low levels (16% of capacity vs. 70% normal), crop failures and water restrictions

Economic cascade: infrastructure investments required, agricultural GDP losses and food price inflation

Consequences: 6M+ people on restrictions, tourism affected leading to global community stress



Spain's drought crisis demonstrates **Europe's accelerating climate emergency: intensifying extreme events with mounting impacts** on populations, ecosystems, and economies. As climate shocks—droughts, wildfires, floods, heatwaves—intensify across Europe, **resilient infrastructure, supply chains and adaptive systems are survival imperatives**, not optional enhancements.

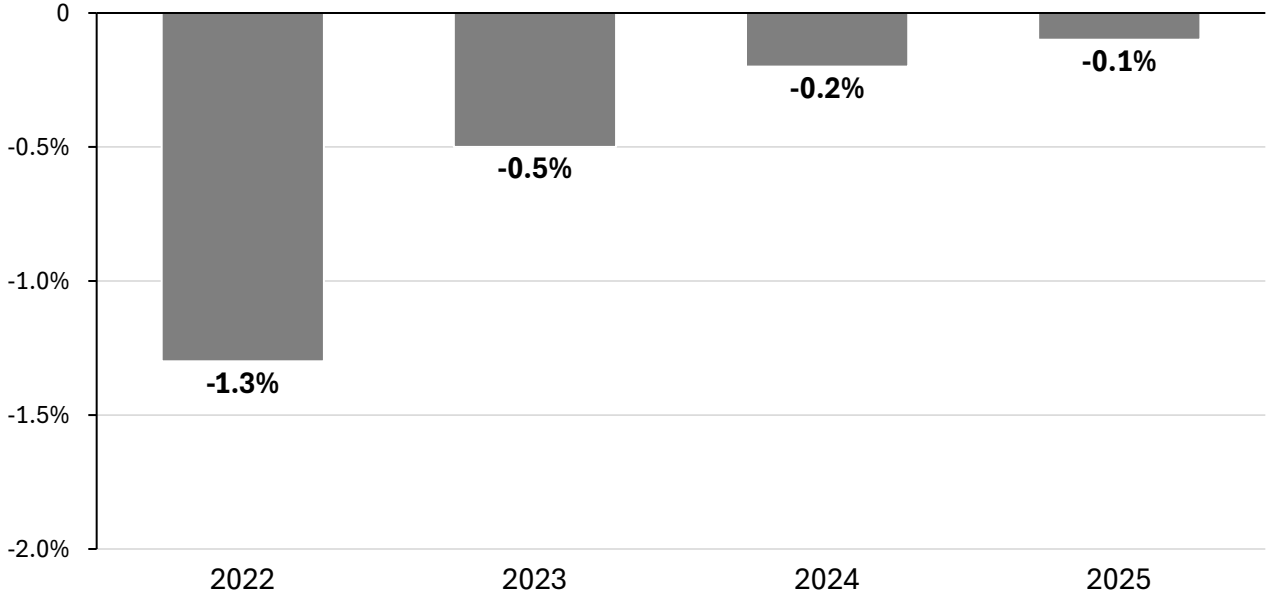
Source: UNCCD Drought Hotspots 2023-2025; Lobelia Earth (2024); Catalan Water Agency; Ardabelle Capital analysis

1. GEOPOLITICAL DEPENDENCIES EXPOSE EUROPE'S SUPPLY CHAIN VULNERABILITIES

Ukraine war: €738B and counting in economic costs

Estimated impact on EU GDP growth of the Ukraine war

In %, based on European Commission forecast revisions



Energy crisis: gas prices spiked 400%, threatening industrial base

Supply disruptions: €738B cumulative cost to EU economy

Security spending: defense budgets rising, crowding out green investments

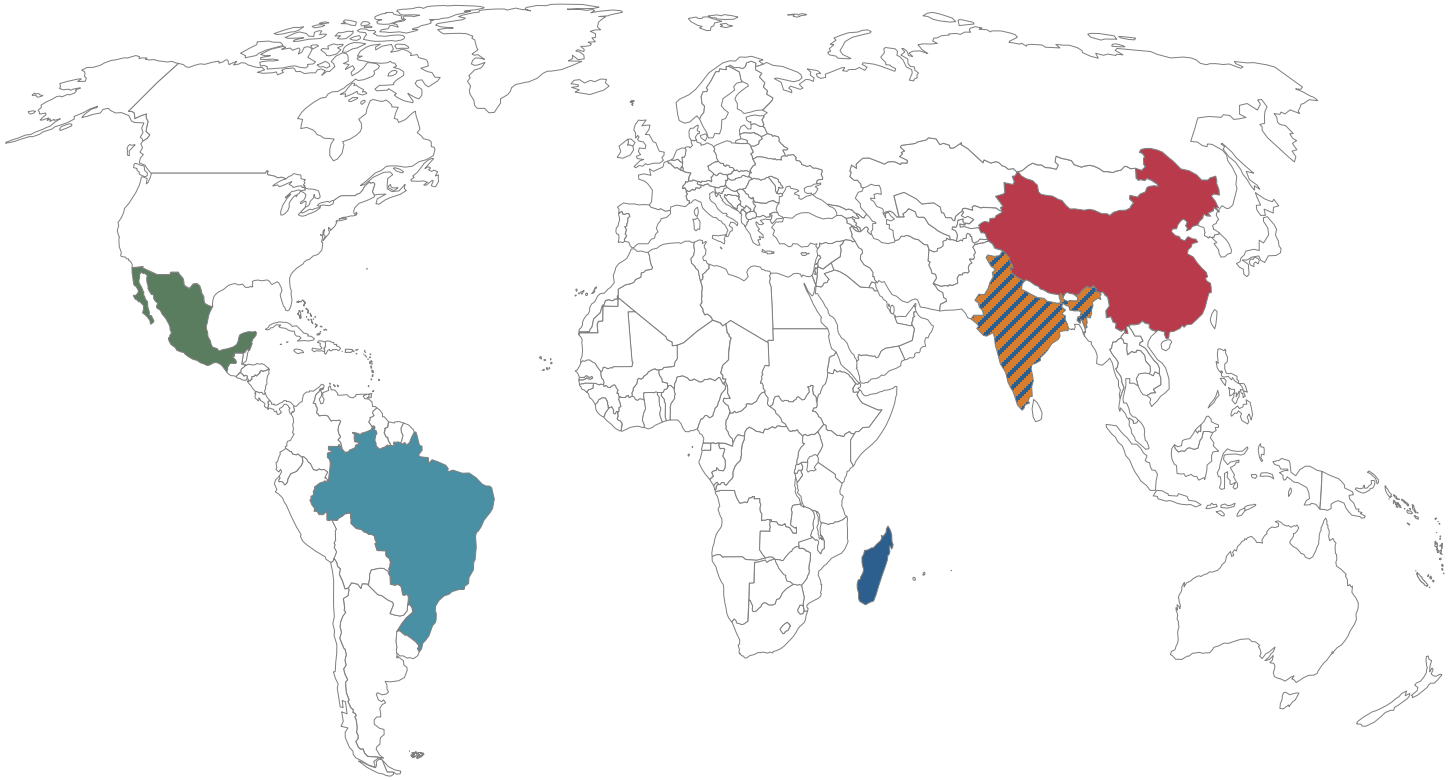
Food security: grain exports disrupted, global food inflation

Europe faces compounding geopolitical shocks exposing critical supply vulnerabilities. **Without strategic diversification and resilient supply chains, economic sovereignty remains at existential risk.**

Source: Eurostat, 2024; European Commission growth forecasts; Ardabelle Capital analysis

1. SOURCING AUTONOMY IS CRITICAL: MANY RAW MATERIALS FACE SINGLE-COUNTRY DEPENDENCY, AS ILLUSTRATED BY THE LIPSTICK INGREDIENTS EXAMPLE

Lipstick ingredients geographic sourcing concentration
(main ingredients, by main producer country)



CASTOR OIL

~60% of oil base - primary emollient and binder

India - Single-state monopoly; Gujarat/Rajasthan: 87% of domestic output; highly climate-sensitive crop

>85%
India share of global production

CARNAUBA WAX

Primary structural wax - gives lipstick its shape and hardness

Brazil - Sourced exclusively from Piaui/Ceara; no viable synthetic substitute at scale; drought-sensitive

~90%
Brazil share of global production

MICA

Shimmer and pearlescent finish - present in virtually all lipsticks

India/Madagascar - near-zero traceability below tier 2; child labour risk and EU CSRD scrutiny

~25%
India share of global mica supply

IRON OXIDE PIGMENTS

Primary colorants - defines every shade across the range

China - Hebei province dominates synthetic iron oxide processing; geopolitical disruption risk

~60%
China share of global processing

CANDELILLA WAX

Vegan beeswax alternative - used in natural and premium formulations

Mexico - Chihuahuan Desert shrub; export licensing controlled by Mexican govt; limited scalability

~95%
Mexico share of global production

The beauty industry carries a structural and underpriced raw material concentration risk. Lipstick is a clear illustration: **5 critical ingredients, 5 single-country dependencies**, including geopolitical adversaries. This exposure threatens supply continuity across the entire chain demanding for **more product reformulation, circular sourcing, and resilient supply chains**

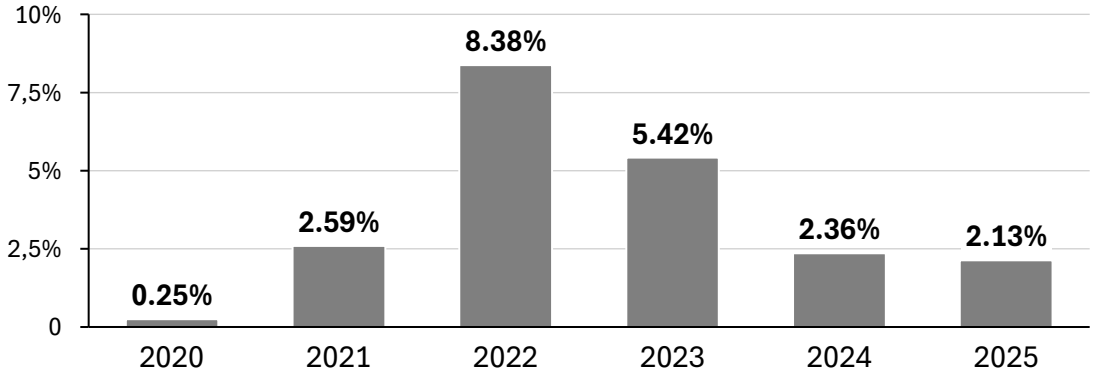
Source: Verisk Maplecroft; Mexican government export licensing documentation; FAO agricultural data; Ardabelle Capital analysis

1. ECONOMIC PRESSURES COMPOUND AS TRADE CONFLICTS AND INFLATION ERODE COMPETITIVENESS

Inflation shock eroded wages and competitiveness

Inflation rate for Euro area

(2020 – 2025)

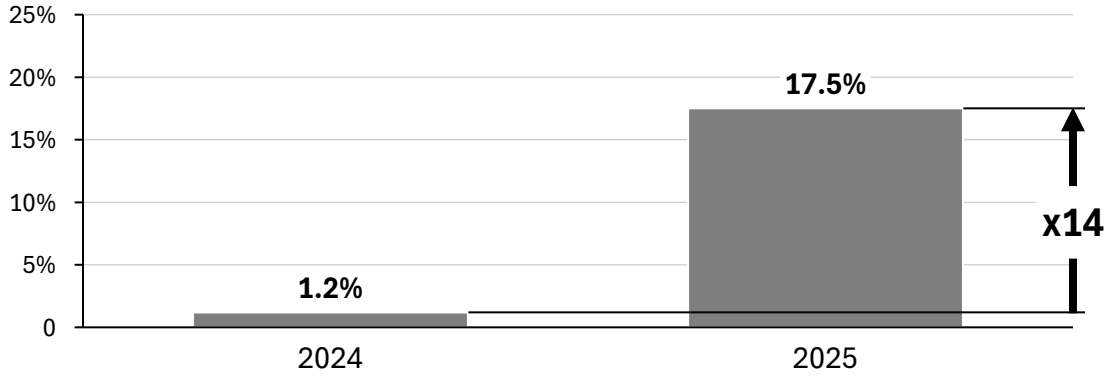


- **Purchasing power collapse:** real wages down 3-5% as inflation outpaced growth
- **Household pressure:** energy and food inflation damaged consumer spending
- **Monetary policy trap:** ECB rate hikes choked investment and growth
- **Competitiveness erosion:** high input costs undermined EU export performance

Tariffs jumped 14x in 2025, putting €150B+ at risk

Average tariff on US imports from the EU

(2024 – 2025)



- **Automotive sector at risk:** €150B+ in exports facing tariffs
- **Pharmaceutical vulnerabilities:** supply chains weaponized in trade disputes
- **Retaliatory spiral:** EU forced into trade war posture
- **US decoupling:** tariffs strain strategic partnerships

Europe is squeezed by dual economic pressures—**tariffs jumped 14x**, risking €150B+ in exports, while **persistent inflation eroded real wages** 3-5% and industrial competitiveness. **Without cost-competitive structures and stable trade partnerships, Europe's industrial base faces permanent decline.**

Source: European Central Bank; US Trade; Capital Economics; Ardabelle Capital analysis

2. WHAT THE IPCC PROJECTS FOR EUROPE BY 2050 IF NOTHING CHANGES

"The overall impacts of climate change on European agriculture could produce a significant loss for the sector: up to 16 % loss in EU agriculture income by 2050, with large regional variations"

Mediterranean
- Large increase in heat extremes and decrease in precipitations
- Increase of droughts
- Risk of biodiversity loss
- Increase in water demand
- Decrease in crop yields

Boreal region
- Increase in precipitations (including heavy precipitations)
- Damage risk from winter storms
- Increase in crop yields

Atlantic region
- Increase in heavy precipitations
- Risk of river and coastal flooding
- Damage risk from winter storms

Continental region
- Increase in heat extremes and decrease in summer precipitations
- Risk of river floods

Mountain region
- Higher than av. temperatures increase
- Upward shift of plant and animal species
- Increasing risk from rock falls and landslides
- Change in plant species

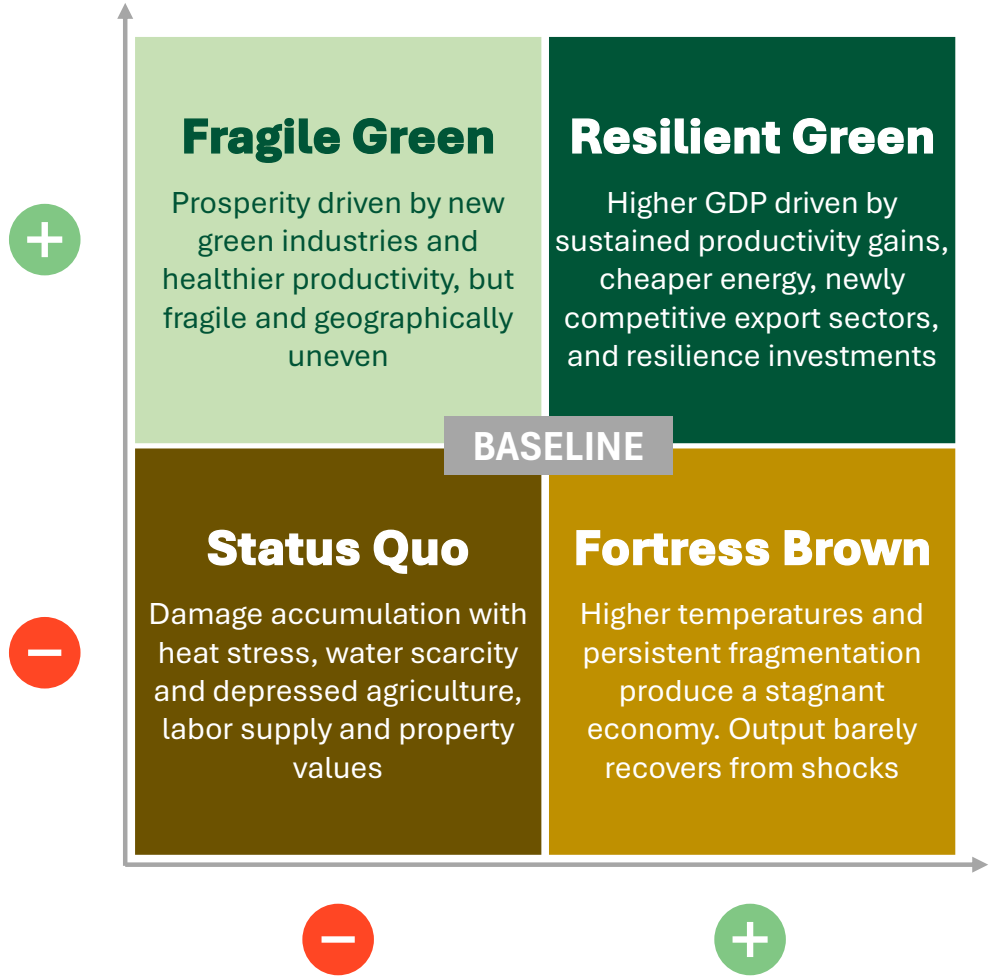
Coastal zones
- Increasing sea level
- Movement of seawater into fresh water aquifers

Note: projection follows a +2.7°C trajectory, slightly worse Status Quo and Fortress Brown scenarios
Source: IPCC Sixth Assessment Report; Ardabelle Capital analysis

2. WE BUILT FOUR SCENARIOS TO PROJECT THE FUTURE OF EUROPE

Sustainability

As the ability to minimize ecological footprint through circular practices, innovation, and efficient resource use



Resilience

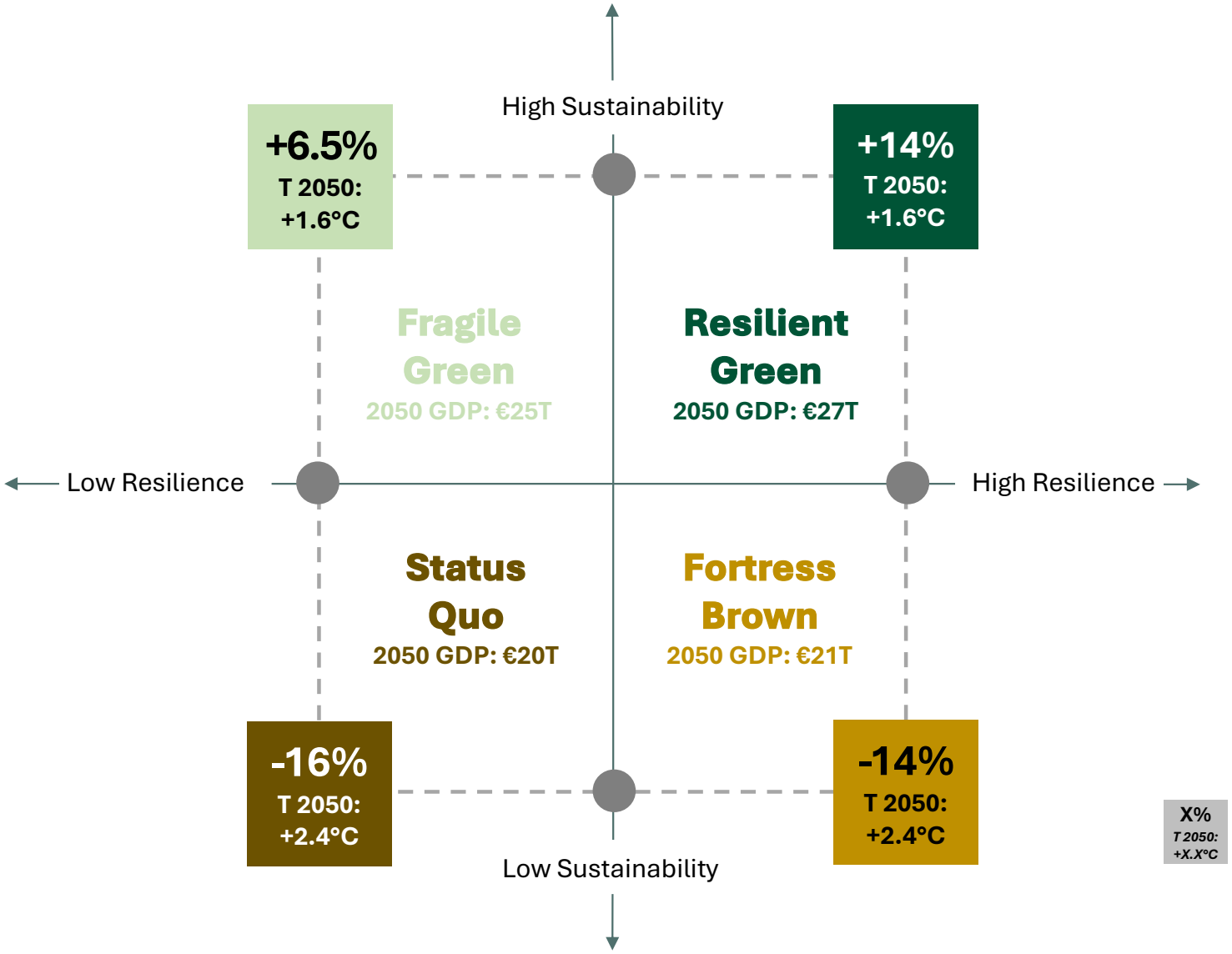
As the ability to metabolize crises rather than simply survive

Note: Baseline treats climate and geopolitical shocks as externalities, from a €18T EU27 GDP in 2024, growing at 1.1% annually (midpoint across six major institutional forecasts), leading to a €23.9T GDP by 2050
Source: Ardabelle Capital analysis

KEY INSIGHTS

- Each scenario is based on two axes: its level of **investments in resilience** and its level of **commitment to sustainability**
- The scenarios are compared against a **baseline representing EU's GDP natural growth** between 2024 and 2050
- The range of outcomes is substantial: only **high sustainability scenarios outperform the baseline**
- Resilience alone barely compensates for lack of sustainability. However, **resilience + sustainability more than doubles the outcome**

2. RESILIENCE AND SUSTAINABILITY CHOICES DETERMINE €7T DIFFERENCE BY 2050

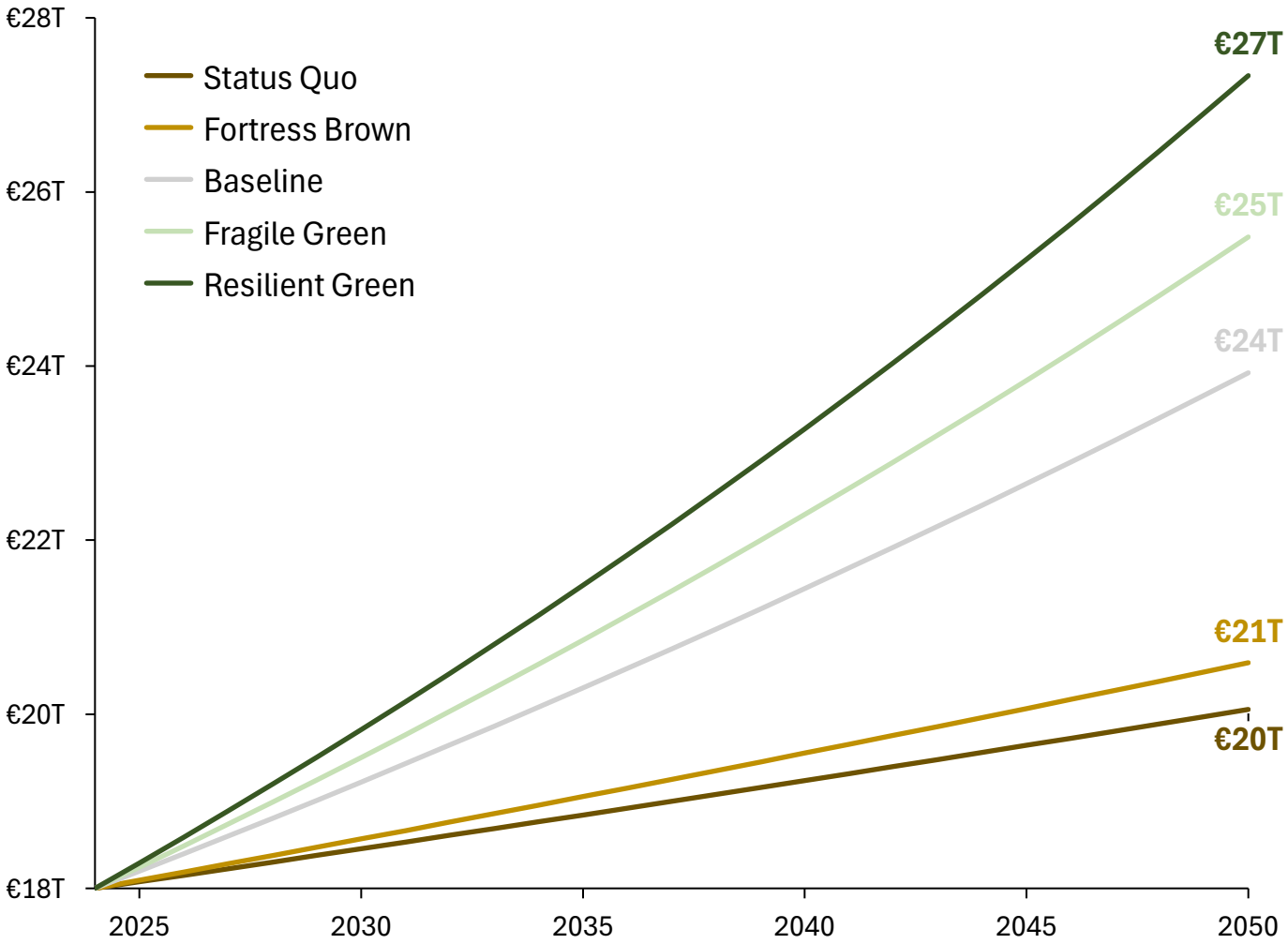


Source: Ardabelle Capital analysis

2. EUROPE'S CHOICE: €27T COORDINATED GROWTH OR €20T FRAGMENTED DECLINE BY 2050

GDP evolution across scenarios vs Baseline

(in €T, 2024 – 2050)



Europe's low-carbon transition **curbs climate damages through mitigation, tech adoption, and ecosystem gains**. Diversification, natural capital, and low fossil dependency boost resilience without stranded assets, **limiting temperature increase to 1.6°C by 2050**

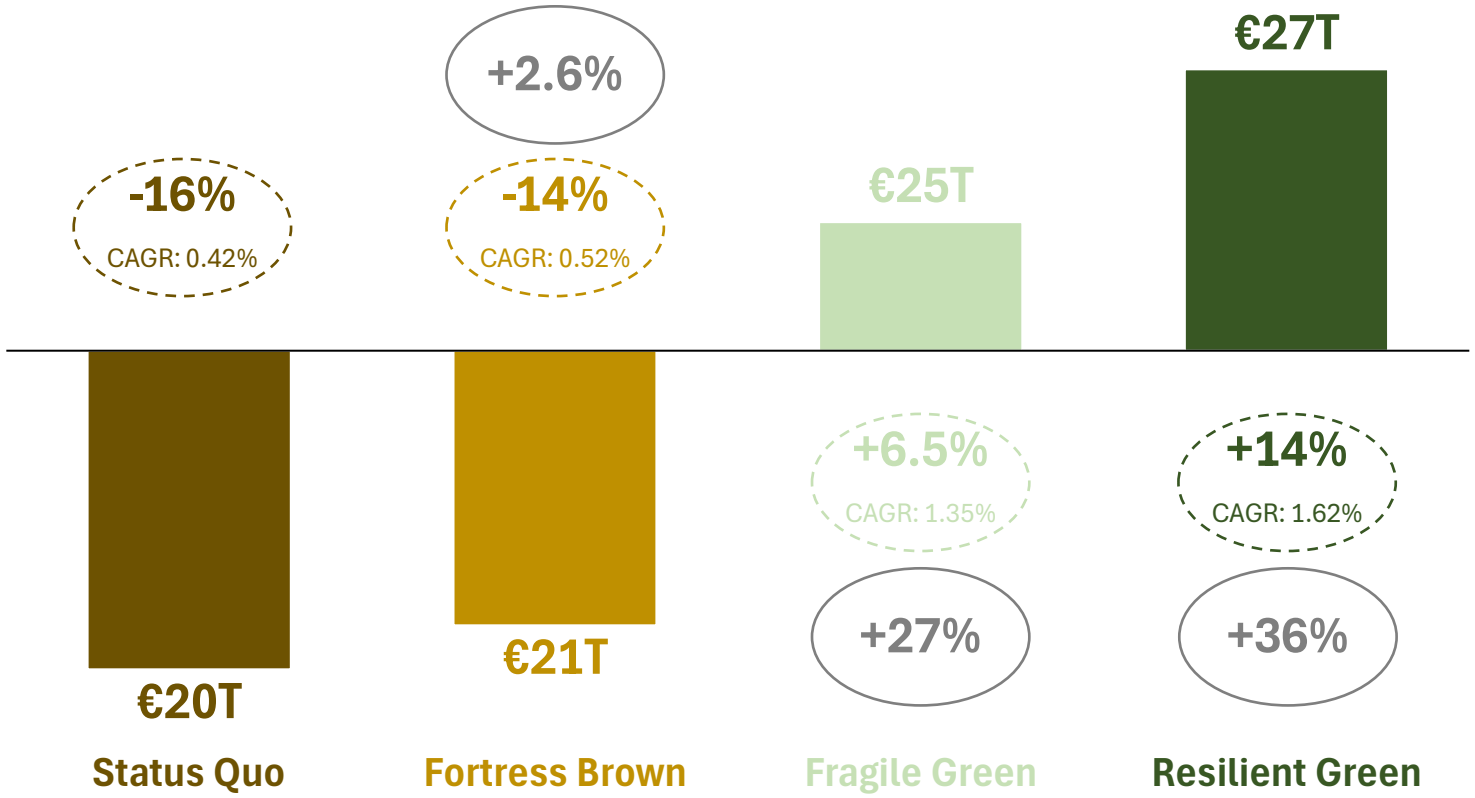
Uncoordinated green transition **limits warming to +1.6°C**, avoiding severe climate damage, but fragmented governance and incomplete implementation **prevent Europe from capturing full technological and economic benefits**

Europe prioritizes **resilience over decarbonization**. Strong adaptation and energy security reduce vulnerabilities, but fossil fuel dependence delivers **high emissions and severe climate damages**: warming reaches **+2.4°C by 2050**

Europe fails to transition. By 2050**, Earth is 2.4°C hotter**, devastating agriculture, labor productivity, health and infrastructure. GDP stagnates at €20T, -16% below Baseline, with persistent geopolitical shocks

Source: Ardabelle Capital analysis

2. OUR SCENARIOS CREATE FOUR TRAJECTORIES, INCREASINGLY GROWING FURTHER APART BY 2050

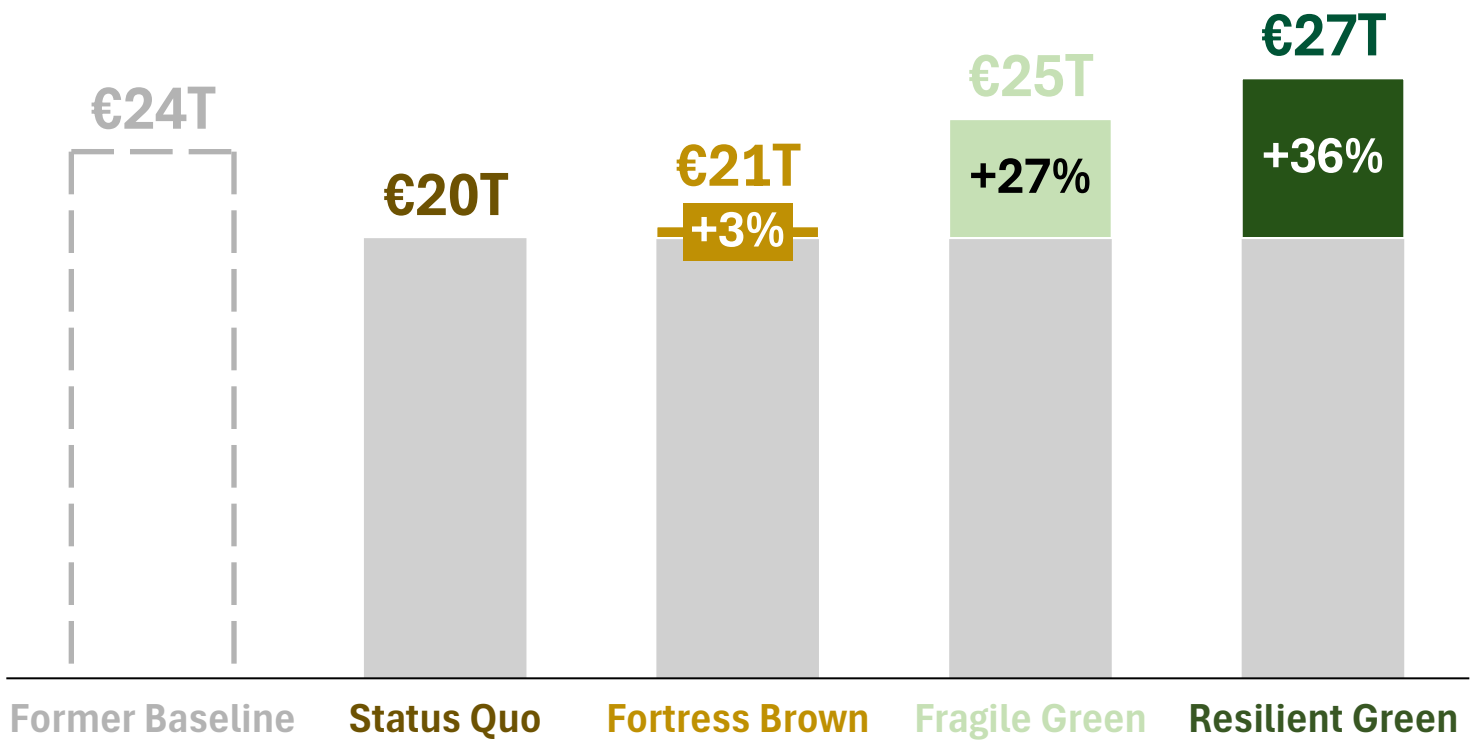


Source: Ardabelle Capital analysis

Main observations:

- Both Status Quo and Fragile Green scenarios stress the **impact of resilience**: absence of resilience **forfeits €2 - 7 trillion** in upside, creating massive consequences in its wake
- **The cost of inaction is tremendous**: there is a 36% gap between the Status Quo and the Resilient Green trajectories – roughly €7T
- In the "No Green and No Resilient" scenario, **Europe's +2.4°C by 2050 turns into a structural shock multiplier**, inevitably leading to poor economic growth (0.42% p.a.)

2. IN THIS CONTEXT, THE STATUS QUO SCENARIO SHOULD SERVE AS THE TRUE BASELINE



2050 EU GDP with updated and more realistic baseline

Source: Ardabelle Capital analysis

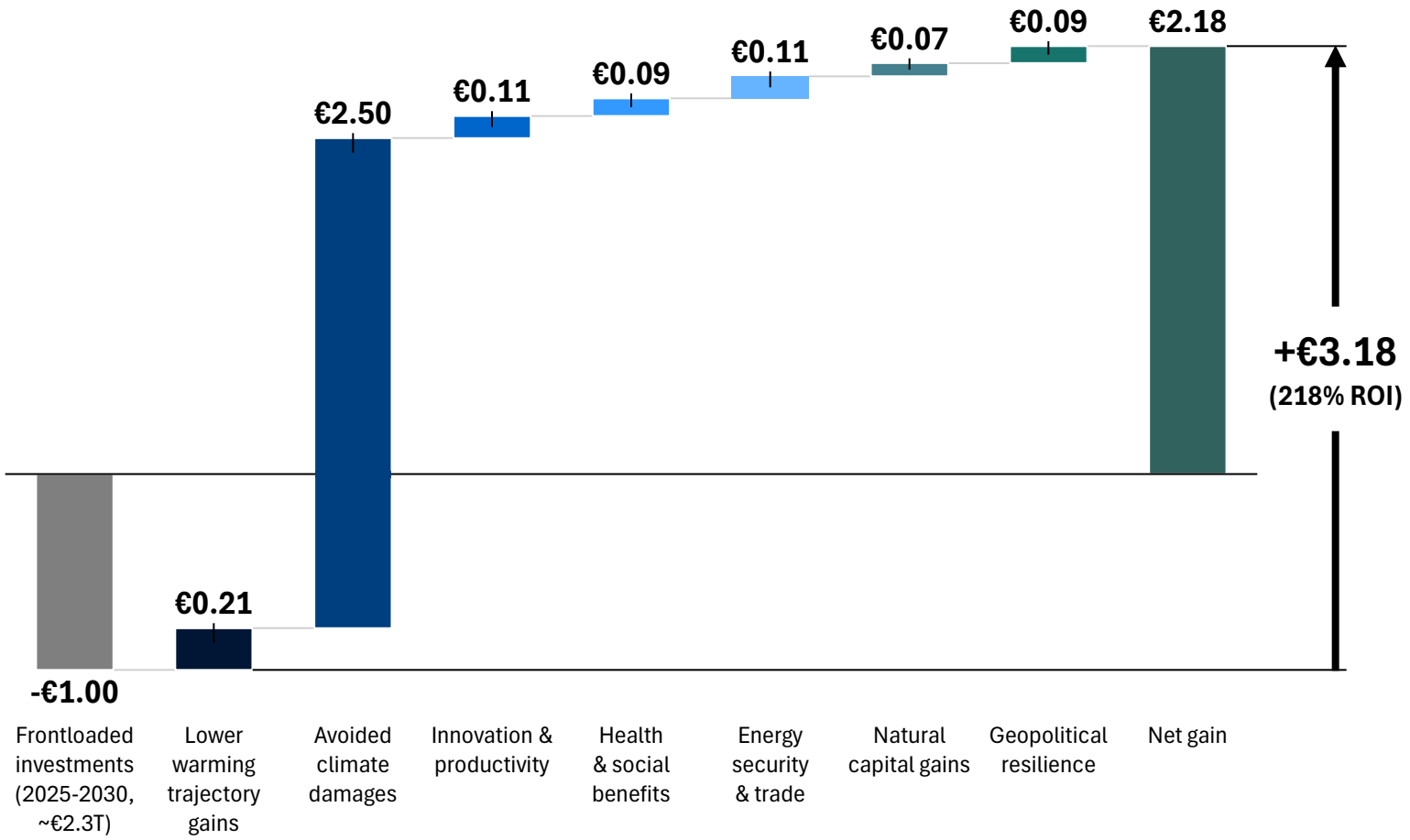
Main observations:

- **Conventional €24T baseline is unrealistic:** it assumes climate shocks as mere externalities, not core factor
- **Status Quo becomes the baseline:** €20T reflects Europe's true do-nothing trajectory
- **36% GDP divergence by 2050:** Resilient Green represents gains from deterioration, not costs from idealized potential

2. FRONTLOADED INVESTMENTS ENABLE 218% ROI MAINLY VIA AVOIDED DAMAGE

Decomposing Resilient Green's Return On Investment in 2050

Comparing Resilient Green to Status Quo baseline (2% GDP invested annually, 2025-2030)



- **Every €1 invested returns €3.18:** frontloading 2% GDP (2025-2030) generates **€2.18 net economic gain** plus recouped investment
- **Avoided damages dominate returns:** preventing climate shocks accounts for 80% of gains, combining **resilience to adapt** with **sustainability to mitigate**
- **Frontloading is essential:** delaying action escalates post-2040 costs at **lower efficiency** and **higher unit prices** than proactive investment

Disclaimer: investment estimates vary across studies; this 218% ROI is directionally accurate but inherently approximate given modelling uncertainties

Source: Ardabelle Capital analysis

2. TWELVE STRATEGIC TAKEAWAYS TO TURN CLIMATE POLICY INTO GROWTH

01 - Inaction is extremely costly: Status Quo cuts GDP ~36% by 2050 (€20T vs €27T potential), with structural damage from climate impacts, shocks, and fossil lock-in

02 - Delays amplify fragility: postponed action compounds climate, energy, and geopolitical shocks—triggering sharply higher adaptation costs later

03 - Partial transitions fall short: fragmented or fossil-heavy strategies (Fragile Green, Fortress Brown) still leave GDP below potential and increase stranded-asset risks

04 - Risks interact multiplicatively: climate damages magnify energy and geopolitical shocks, making integrated climate–energy policy essential

05 - Only a fully coordinated green transition delivers growth: *Resilient Green* turns climate policy into a growth engine, lifting GDP ~14% above baseline by 2050

06 - Coordination beats spending alone: timing, scale, and governance coherence matter more than total outlays for positive economic outcomes

07 - Front-loading mitigation pays off: early investment (1.5 – 2.5% of GDP/year in the 2020s) avoids nonlinear damages and reduces long-term adaptation costs

08 - Growth channels of Resilient Green: innovation and productivity gains, energy security and lower import volatility, and major health and social co-benefits

09 - Innovation is a structural multiplier: low-carbon tech diffusion, industrial modernization, and R&D spillovers generate endogenous growth

10 - Smart adaptation is cost-effective: nature-based and targeted measures deliver resilience at lower cost than reactive hard infrastructure

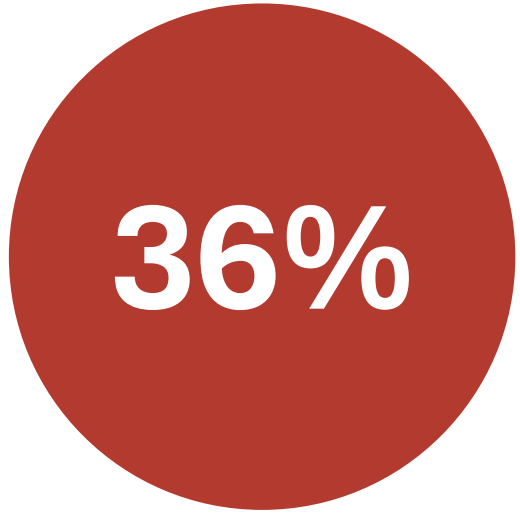
11 - Unilateral decarbonization still benefits Europe: even without global coordination, Europe can decarbonize up to four fifths of its economic activity alone

12 - Early investments deliver 218% ROI: allocating 2% of GDP to climate investments through 2030 would create a €3.18 return in 2050 for every €1 invested

Source: Ardabelle Capital analysis

2. TAKEAWAY 01: INACTION IS EXTREMELY COSTLY

Status Quo **cuts GDP ~36% by 2050** (€20T vs €27T potential), with **structural damage** from climate impacts, shocks, fossil lock-in and **underinvestment** in innovation and resilience



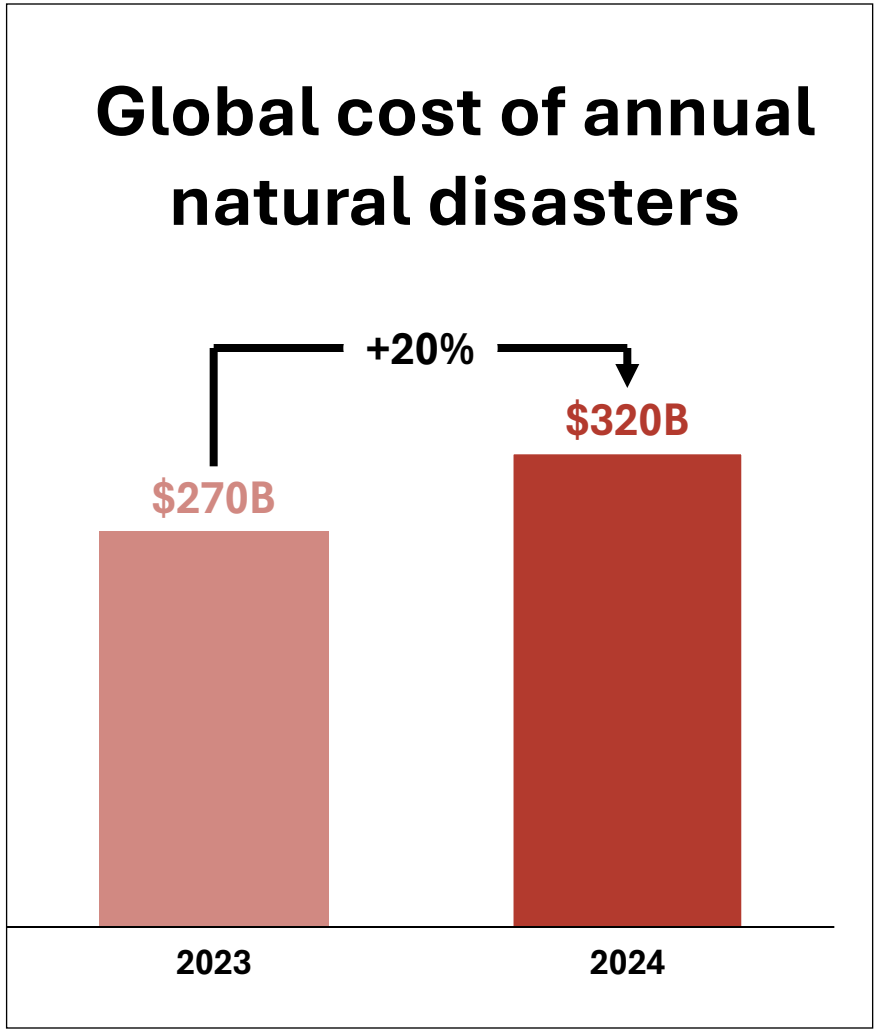
Key implication

The Status Quo is not a neutral trajectory: it is **an active decision to forgo €7T** in reachable GDP, accept structural damage and give up on future generations

Source: Ardabelle Capital analysis

2. TAKEAWAY 02: DELAYS AMPLIFY FRAGILITY

Postponed action compounds climate, energy, and geopolitical shocks, triggering sharply **higher adaptation costs later**. Even modest warming produces increasing economic losses over time



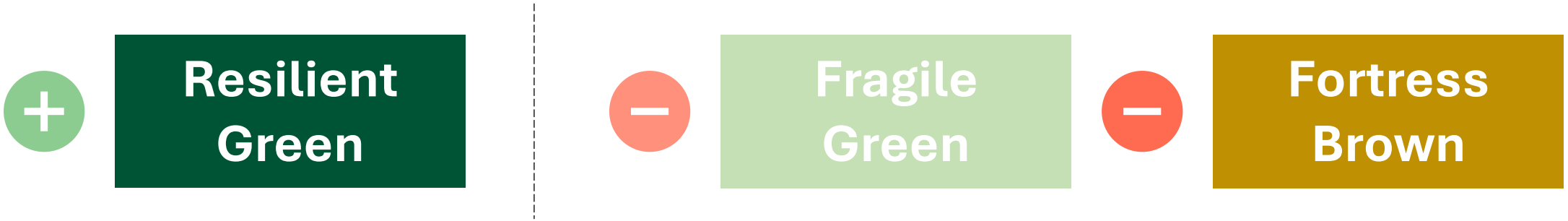
Key implication

Postponement is a compound-interest trap — deferred action does not reduce costs; it **defers and multiplies them exponentially**

Source: BCG White Paper "Climate adaptation and resilience financing", 2026; Ardabelle Capital analysis

2. TAKEAWAY 03: PARTIAL TRANSITIONS FALL SHORT

Fragmented or fossil-heavy strategies **still leave GDP below potential** (Fragile Green -7% below Resilient Green potential, Fortress Brown -25% below potential) and **increase stranded-asset risks and path dependency effect**



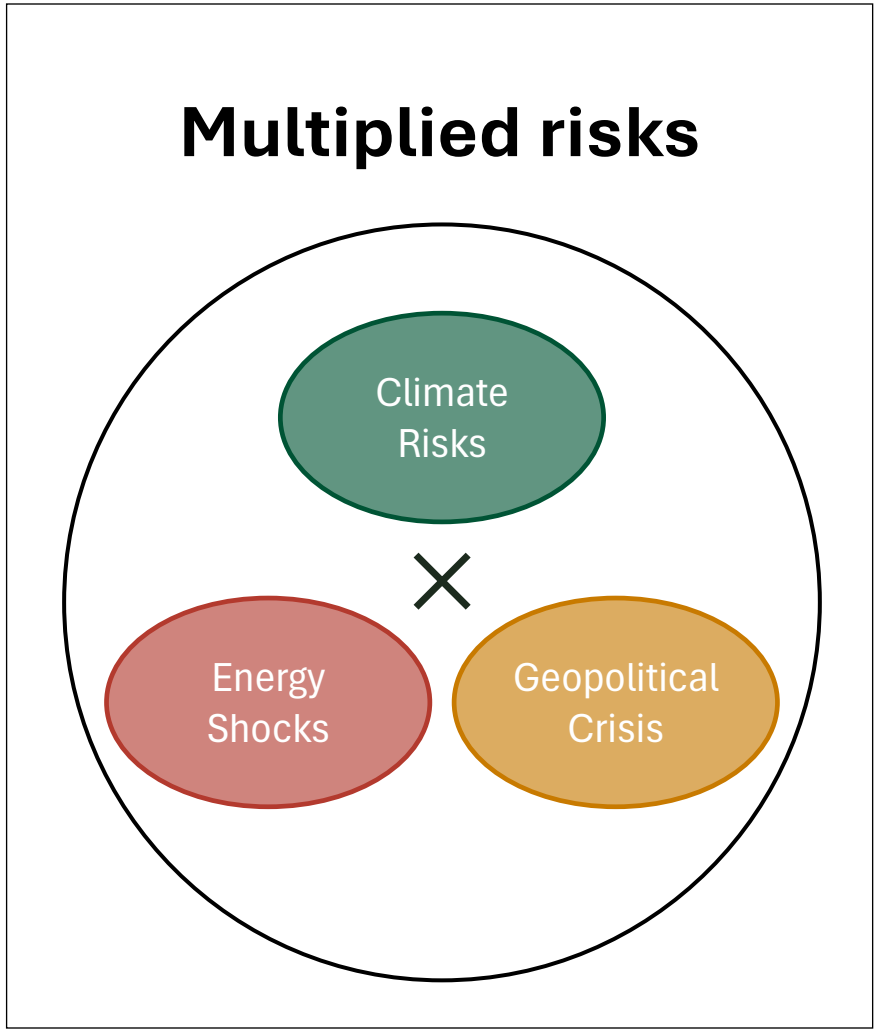
Key implication

Half investing in the transition falls short. Only a **full transition captures the total** dividends created by the investments in resilience, sustainability and sovereignty

Source: Ardabelle Capital analysis

2. TAKEAWAY 04: RISKS INTERACT MULTIPLICATIVELY

Climate damages **magnify energy and geopolitical shocks**, making integrated climate–energy policy essential



Key implication

Siloed climate, energy and trade **policies generate compounding fragility**. Policy integration is not optional — it is the core systemic hedge

Source: Ardabelle Capital analysis

2. TAKEAWAY 05: ONLY A FULLY COORDINATED GREEN TRANSITION DELIVERS GROWTH

The *Resilient Green* path turns climate policy into a **growth engine**, lifting GDP 14% above former baseline by 2050, and **36% above Status Quo**

Key implication

Full policy coordination across EU member States, and ideally all around the globe is the **decisive variable**: it converts **climate obligations into GDP growth opportunities**

Coordination enables best growth trajectory

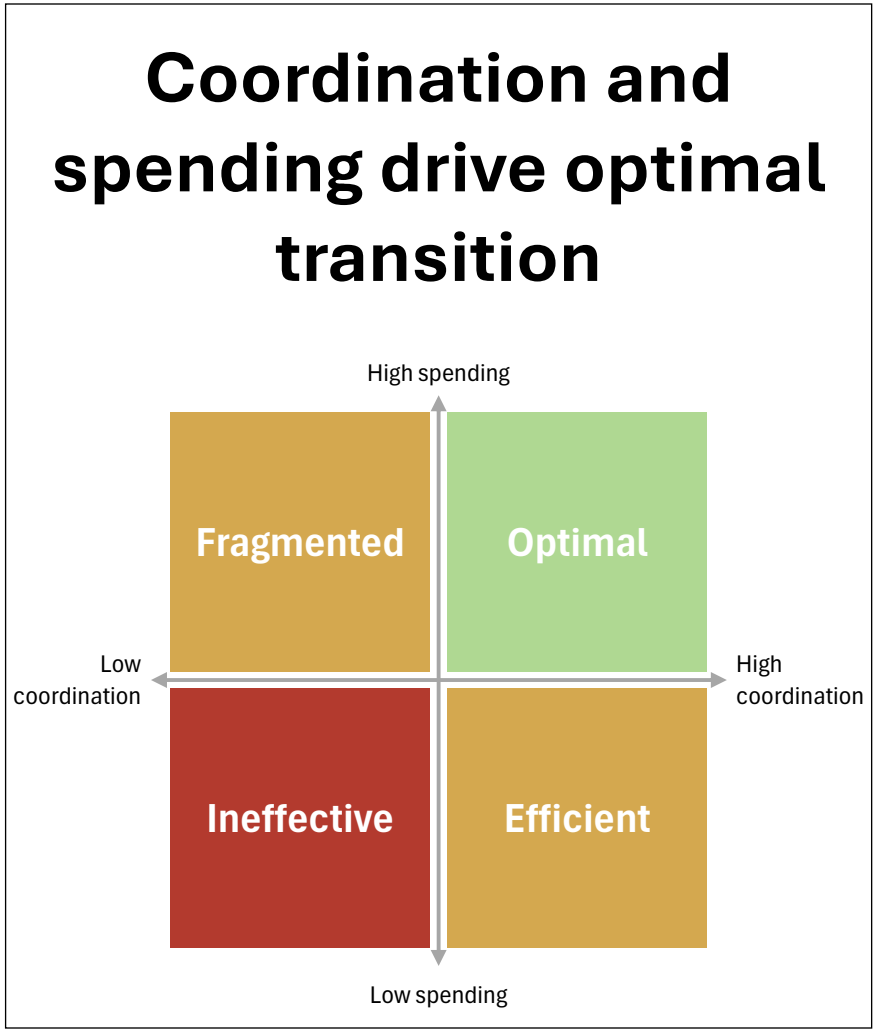
Source: Ardabelle Capital analysis

2. TAKEAWAY 06: COORDINATION BEATS SPENDING ALONE

Timing, scale, and governance coherence **matter more than total outlays** for positive economic outcomes

Key implication

Coordination of capital allocation multiplies impact: **well-timed compact investments outperform** larger fragmented budgets



Source: Ardabelle Capital analysis

2. TAKEAWAY 07: FRONT-LOADING MITIGATION PAYS OFF

Early investment (1.5 – 2.5% of GDP/year in the 2020s) **avoids nonlinear damages** and **reduces long-term adaptation costs**

2025	2026	2027	2028	2029	2030
€370B	€370B	€380B	€380B	€390B	€400B

→ **€2.3T in 6 years**

Key implication

The 2020s are the **decisive investment decade**. Every year of delay raises the eventual cost of action and shrinks the available policy space

Note: investments estimated using 2% of GDP annually, midpoint between leading institutions (EC, IEA, EIB, OECD and EEA)
Source: Ardabelle Capital analysis

2. TAKEAWAY 08: GROWTH CHANNELS OF RESILIENT GREEN

Three channels activate growth: **innovation and productivity** gains from low-carbon technology; **energy security** and lower import bill volatility; and major **health and social** co-benefits, compounding over time

1 **Innovation & productivity**

2 **Energy security**

3 **Health & social gains**

Key implication

The correct way to frame the transition is as a **growth and competitiveness agenda** — not merely a climate one. All three channels reinforce each other

Source: Ardabelle Capital analysis

2. TAKEAWAY 09: INNOVATION IS A STRUCTURAL MULTIPLIER

Low-carbon tech diffusion, industrial modernization, and R&D spillovers **generate endogenous growth**, making the transition a powerful industrial and innovation platform

Low carbon tech × **Industrial modernization** × **R&D spillovers** = **Structural growth**

Key implication

Treat industrial decarbonization as **an R&D and innovation policy, not a compliance burden**. The returns are **structural and compounding**

Source: Ardabelle Capital analysis

2. TAKEAWAY 10: SMART ADAPTATION IS COST-EFFECTIVE

Nature-based and targeted measures deliver resilience at lower cost than reactive hard infrastructure. **Managed prevention consistently outperforms emergency cure at macro scale**

Key implication

Smart and preventive adaptation investments **avoid more consequent repair costs**. The investment case is clear and unambiguous

€1 in smart adaptation shields against €3-5 in future costs

Source: UNDRR, Global Assessment Report on Disaster Risk Reduction, 2025; World Resource Institute, 2024; Ardabelle Capital analysis

2. TAKEAWAY 11: UNILATERAL DECARBONIZATION STILL BENEFITS EUROPE

Even **without global coordination**, Europe can decarbonize up to **four fifths** of its economic activity alone, and **still benefit from it**

Energy sovereignty

Reduced reliance on fossil fuel imports and geopolitical risk

Trade competitiveness

Lower energy costs strengthen European exports globally

Innovation leadership

First-mover advantage in clean technologies drives long-term value

Key implication

It does not make any sense for Europe to wait for the US, China or anyone to engage in the Resilient Green trajectory. The economic case for unilateral action speaks already for itself

Source: Bilal & Känzig, "Does unilateral decarbonization pay for itself?", 2025; Ardabelle Capital analysis

2. TAKEAWAY 12: EARLY INVESTMENTS DELIVER 218% ROI

Allocating 2% of GDP to climate investments through 2030 would create a **€3.18 return in 2050 for every €1 invested**

Key implication

Investing in transition enabling companies and facilities is not only a **growth engine** but also a **unique investment vehicle**

Unique investment opportunity

€1

↓

€3.18

Note: investments estimated using 2% of GDP annually, midpoint between leading institutions (EC, IEA, EIB, OECD and EEA)
Source: Ardabelle Capital analysis

3. RESILIENCE IS A NECESSARY RESPONSE FOR A SUSTAINABLE AND SOVEREIGN EUROPEAN UNION

In our context, Europe must move **from recovery to transformation,** to become more resilient, through:

Risk anticipation

Planning, calibration, and prioritization to minimize disruptions before they occur

Impact absorption

Ability to withstand shocks without structural failure or critical loss of function

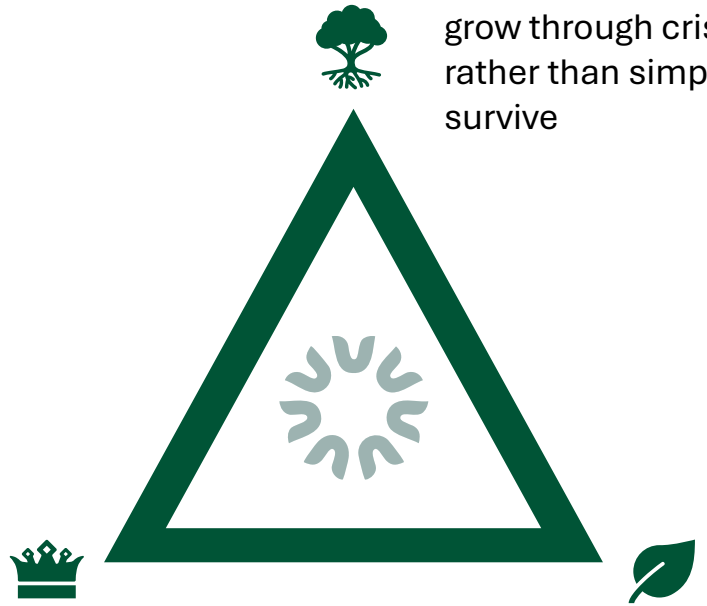
Depth of improvement

Post-crisis transformation to emerge stronger, more agile, and more competitive than before

Recovery speed

Rapidity in restoring operational functions and stakeholder trust

Resilience does not exist in isolation: it forms an indivisible trinity with **sustainability** and **sovereignty**



Resilience: ability to grow through crises rather than simply survive

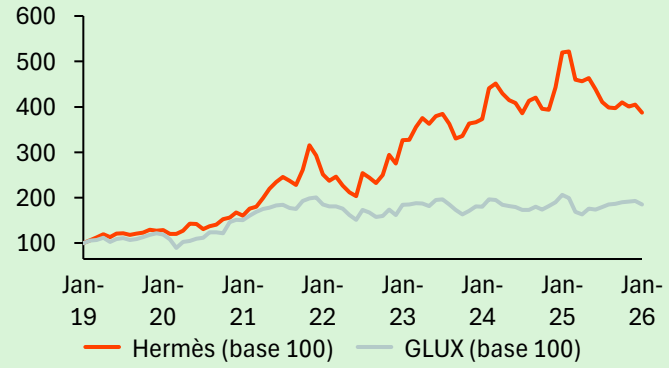
Sovereignty: Europe's ability to shape its own destiny, for instance through green transition, renewable energy and circular economy

Sustainability: reducing dependence on finite resources while protecting ecosystems that sustain economies

Source: Ardabelle Capital analysis

3. RESILIENCE ENABLES COMPANIES TO RECOVER WHEN FACING SHOCKS, ADAPT AND THRIVE

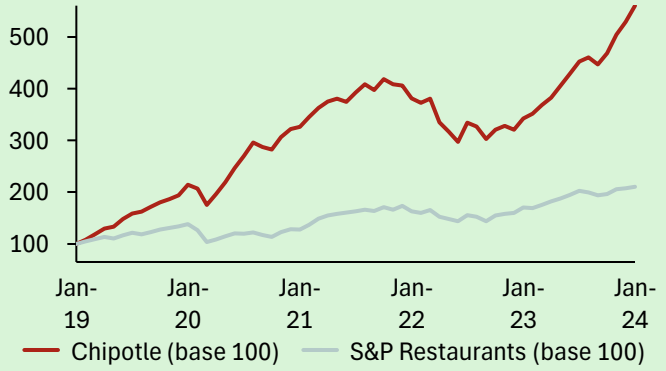
Total return for Hermès vs Global Luxury ETF (2019 – 2026)



Resilience initiatives explaining the overperformance:

- **Vertical supply chain integration:** acquired key suppliers (J3L, tanneries), bringing 60%+ production in-house and insulating from global logistics disruptions
- **Countercyclical capacity investment:** opened new ateliers and launched in-house training school during 2020 downturn, addressing binding production constraints
- **Fixed-cost operating leverage:** sustained demand growth on a predominantly fixed-cost base converted volume into permanent margin expansion, demonstrating how vertically integrated capacity absorbs shocks without relying on pricing

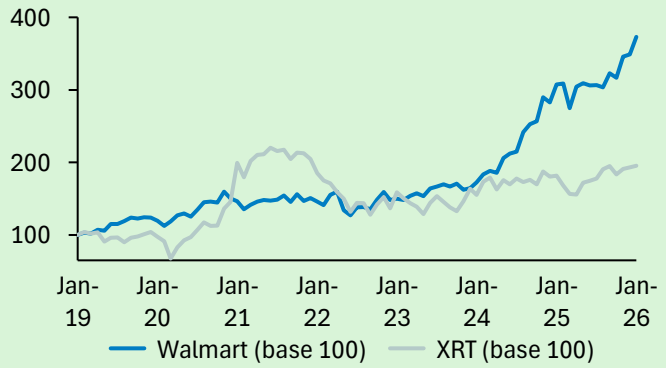
Total return for Chipotle vs S&P 500 Restaurant sub-index (2019 – 2024)



Resilience initiatives explaining the overperformance:

- **Pre-built supply chain buffers**: multi-supplier redundancy and centralised prep kitchens built from 2016, delivering zero stock-outs across 2,800+ locations during COVID
- **End-to-end traceability as a brand moat**: full farm-to-counter visibility post-2015 crisis converted a structural vulnerability into a verifiable quality promise, sustaining premium pricing through inflation
- **Digital infrastructure as a margin multiplier**: Chipotlanes and loyalty app deployed pre-pandemic captured the delivery surge without aggregator dilution, pushing digital to 35%+ of revenue by 2023

Total return for Walmart vs Retail Industry ETF (2019 – 2026)



Resilience initiatives explaining the overperformance:

- **Logistics automation:** retrofitted 42 distribution centers with robotics, achieving 20%-unit cost reductions vs. legacy sites
- **Nearshoring ahead of disruption:** expanded Latin American sourcing by 17% and committed $350bn to domestic US procurement, reducing China concentration before tariff escalation
- **Fixed costs into competitive moat:** 50%+ of e-commerce fulfilment automated, 60% of stores on automated freight — driving 20% delivery cost reductions for two consecutive years

Source: LSEG data; companies annual reports; Ardabelle Capital analysis

3. SEVEN STRATEGIES CAN BE USED AT SEVERAL LEVELS TO BUILD RESILIENCE, SUSTAINABILITY & SOVEREIGNTY

Macro level

Decarbonizing energy

Example: Denmark's energy transition

Macro level

Reorienting Europe's industrial base toward strategic sectors

Example: EcoTitanium

Supply chain level

Building operational resilience and market adaptability

Example: olive oil price volatility

Company level

Improving strategic supplier engagement and collaboration

Example: Evonik's crisis management

Company level

Leveraging AI and data

Example: Unilever AI-driven supply chains

Company level

Embedding sustainability in product design

Example: Danone's 400ml Evian bottle

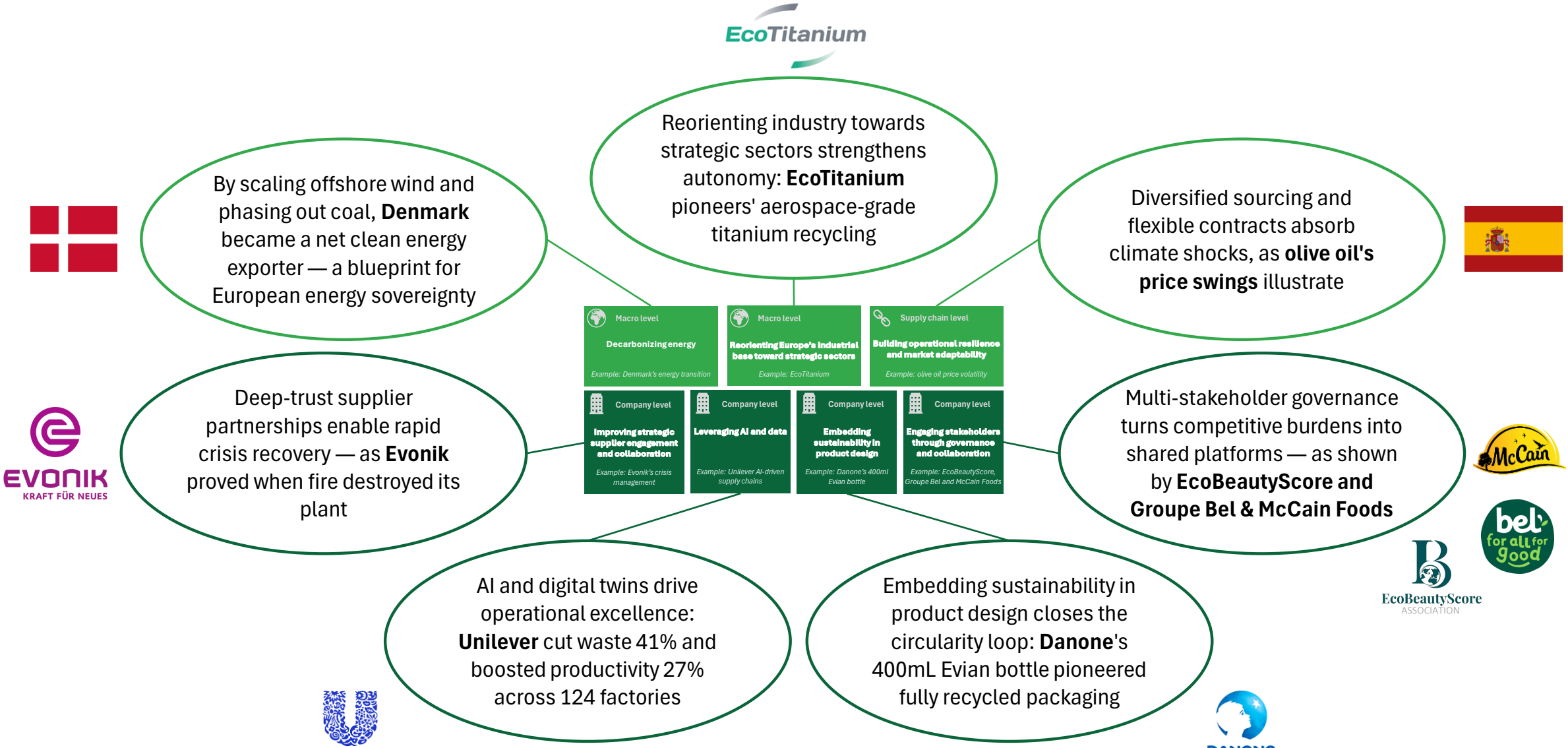
Company level

Engaging stakeholders through governance and collaboration

Example: EcoBeautyScore, Groupe Bel and McCain Foods

Source: Ardabelle Capital analysis

3. THESE STRATEGIES MOBILIZE ALL STAKEHOLDERS IN THE VALUE CHAINS TO DEVELOP RESILIENCE, SUSTAINABILITY AND SOVEREIGNTY



Source: Ardabelle Capital analysis

3. DECARBONIZING ENERGY IS AN ESSENTIAL LEVER FOR EUROPE'S RESILIENCE & SUSTAINABILITY

Macro-level strategy

Electrifying end-uses: shifting from 70% fossil-heavy energy mix to cleaner electricity grids

Accelerating renewable deployment: reducing dependency on imported fossil fuels Europe barely produces

Substituting: deploying biofuels and hydrogen for heavy transportation and industry

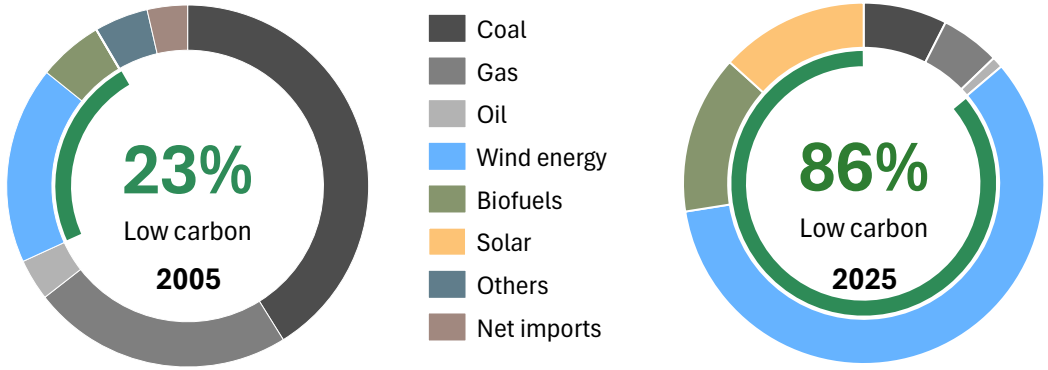
Closing the energy efficiency gap: unlocking economically viable energy-saving solutions

Strengthening energy sovereignty: breaking reliance on volatile external suppliers

Denmark's energy transition: from fossil dependency to renewable leadership

Denmark's electricity mix transformation (2005 vs. 2025)

Based on LowCarbonPower organization data



- **Accelerating offshore expansion:** Denmark built 6,000+ MW offshore wind (2005-2025), making it the backbone of future EU energy security
- **Coal collapse:** coal dropped by 80%+ while maintaining grid stability and industrial competitiveness
- **Strategic export capacity:** Denmark shifted from net importer to clean power exporter (12 TWh annually), now supplying Germany and the Netherlands

Source: LowCarbonPower, February 2026; Danish Energy Agency; Ardabelle Capital analysis

3. REORIENTING EUROPEAN INDUSTRY BASE TOWARDS STRATEGIC SECTORS STRENGTHENS AUTONOMY

Macro-level strategy

Reducing critical supply dependencies: localizing production of strategic inputs in Europe

Stimulating domestic low-carbon demand: deploying public procurement to anchor local industry capacity

Scaling circular and bio-based innovations: replacing fossil inputs with renewable feedstock and advanced recycling

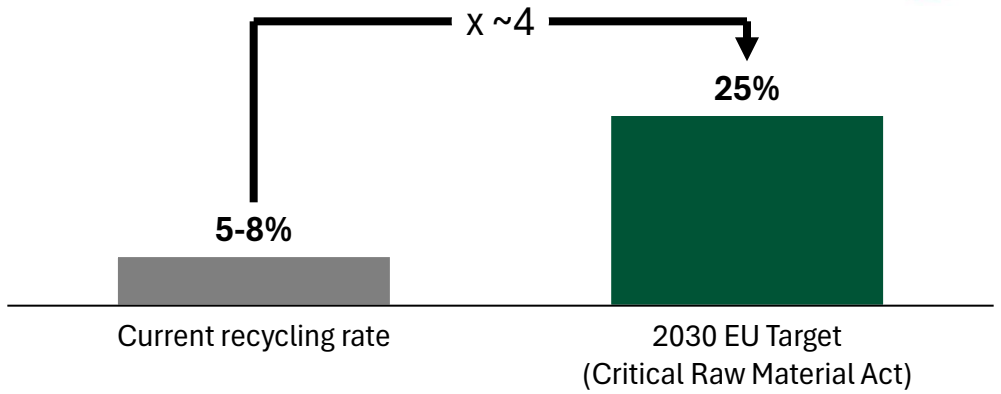
Reorienting workforce toward green sector: reskilling labor as jobs shift from fossil to transition industries

Protecting Europe's clean-tech leadership: scaling innovation financing to maintain patent competitiveness

EcoTitanium: Europe's only aerospace-grade titanium recycling facility

Europe's titanium recycling gap: far from 2030 targets

Based on European Commission data



- **Scaling vulnerability:** EU imports 6x more titanium than it exports, exposing aerospace and defense (400,000 jobs) to supply shocks
- **EcoTitanium proves viability, but stands alone:** France's facility recycles aerospace-grade titanium successfully, yet remains Europe's only such plant – far below the scale needed for 2030 targets
- **Massive capacity gap threatens autonomy:** current 5-8% recycling rate must increase 4-fold to meet EU's 25% target, requiring investments in EcoTitanium-scale facilities across member states

Source: European Commission 2024; Ardabelle Capital analysis

3. OPERATIONAL RESILIENCE AND MARKET ADAPTABILITY BOLSTER SUPPLY CHAINS

Supply chain-level strategy

Reducing cost volatility: using fewer materials and energy, diversifying suppliers, and optimizing inventory to reduce price exposure during shortages

Creating sustainable value: developing products with lower environmental impact to capture growing consumer demand and premium pricing opportunities

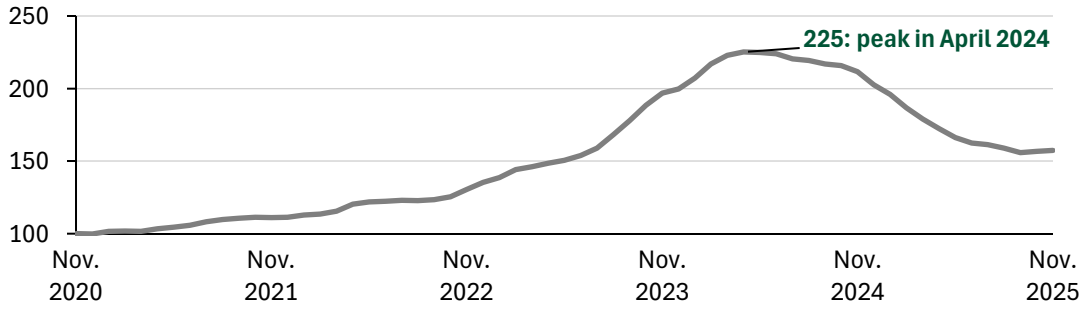
Mapping and mitigating risks: identifying vulnerable suppliers and practices, building redundancy, and preparing for climate-related disruptions

Building supply chain flexibility: establishing multi-sourcing, geographic diversification, and alternative inputs to maintain operations during disruptions

Olive oil price volatility: climate shocks create boom-bust price cycles

European olive oil price volatility (Nov. 2020 - Nov. 2025)

Based on Eurostat data – price index rebased to Nov. 2020 = 100



- **Boom-bust cycle amplified by climate:** Spanish drought halved production, spiking prices 50%; 2025 recovery brought 25% decline, creating volatility throughout supply chains
- **Bidirectional disruption:** price surges forced reformulations; subsequent drops created inventory losses, volatility impacts exceed individual shocks
- **Building shock absorbers:** diversified sourcing, flexible contracts, and inventory management reduce exposure to climate-driven swings in both directions

Source: Eurostat, November 2025; Ardabelle Capital analysis

3. STRATEGIC SUPPLIER ENGAGEMENT AND COLLABORATION CREATE RESILIENCE AND TRUST

Company-level strategy

Building trust-based supplier relationships: fostering close partnerships with fewer suppliers to enable rapid problem-solving during crises

Enabling collaborative crisis response: creating communication channels allowing quick identification of temporary substitutes when disruptions hit

Co-developing long-term sustainable practices: partnering with suppliers on decarbonization and regenerative initiatives across the value chain

Supporting supplier capacity building: providing resources and technical assistance to strengthen suppliers' resilience and sustainability capabilities

At Evonik, trust-based collaboration enables rapid crisis response

Evonik plant fire: suppliers found component substitutes in days

EVONIK
KRAFT FÜR NEUES

- **Fire destroyed Evonik's German plant,** threatening critical component supply to downstream customers
- **Trusted suppliers responded in days,** identifying and providing substitute components through pre-existing deep relationships
- **Concentrated partnerships proved faster** than broad supplier networks when crisis response speed mattered most

Source: Harvard Business Review, "Building a resilient supply chain" 2012; Ardabelle Capital analysis

3. LEVERAGING AI AND DATA DRIVES OPERATIONAL EXCELLENCE IN RESILIENT SUPPLY CHAINS

Company-level strategy

Building end-to-end supply chain visibility: using real-time tracking to identify bottlenecks, risks, and inefficiencies as they emerge

Measuring Scope 3 emissions and traceability: deploying AI and satellite data to map deforestation risks and meet regulatory requirements

Enabling predictive analytics for disruptions: forecasting supply shocks by combining internal data with external signals like weather and commodity prices

Shifting from reactive to anticipatory operations: using AI-driven insights to dynamically rebalance sourcing and optimize inventory before crises hit

Unilever AI-driven supply chain: operational excellence and cost efficiency

AI optimization across manufacturing and distribution drives productivity gains and cost savings

€3M	27%	41%
Annual savings per Brazilian lighthouse factory	Productivity improvement across sites (’20-’24)	Average waste reduction across network

- **Lighthouse sites deliver breakthrough results:** Brazil's Indaiatuba facility increased capacity 20% while saving €3M annually through AI-driven process optimization and digital twins
- **Scale transformation:** 124 factories achieved 27% productivity gains and 41% waste reduction worldwide (2020-2024), with 23,000 employees trained in digital manufacturing tools
- **Targeted excellence:** Germany cut food waste 55% (€1.24M saved); Missouri reduced raw material waste 32.5%, delivering one-third of Unilever's global waste savings

Source: Unilever Corporate Communications, 2025, How digital transformation drives operational excellence; Ardabelle Capital analysis

3. EMBEDDING SUSTAINABILITY IN PRODUCT DESIGN HELPS EMBRACE TOTAL CIRCULARITY

Company-level strategy

Designing for resource efficiency: using fewer materials and energy to reduce costs and footprint

Enabling input flexibility: accepting alternative materials to reduce supplier dependency

Integrating circular principles: repurposing waste streams and designing for end-of-life recyclability

Monetizing sustainability: converting green features into revenue growth and market share

Innovating for Scope 3: creating products that enable customer emissions reductions

Danone's 400mL Evian bottle: closing the plastic loop through circular packaging redesign

From fossil based to fully circular: how Evian rebuilt its supply chain around recycled PET

DANONE
ONE PLANET. ONE HEALTH

- **Material substitution at scale:** all Evian and Volvic bottles now made from 100% recycled PET, eliminating 7,000 tonnes of virgin plastic and 10,000+ tonnes of CO_2 annually
- **Circular design embedded in the product:** the label-free bottle eliminates the non-recyclable label entirely, removing a key contamination barrier in PET recycling streams
- **Upstream supply chain investment:** €900m packaging transformation programme securing recycled feedstock through Deposit Return Schemes and partnerships with Veolia and Loop Industries

Source: Danone and Evian websites; Ardabelle Capital analysis

3. RESILIENCE & SUSTAINABILITY CAN BE OBTAINED THROUGH MULTI-STAKEHOLDER GOVERNANCE

Company-level strategy

Building cross-competitor alliances: collaborating with industry rivals on shared challenges like water security and supplier sustainability

Mobilizing employee mindset: training workforce to quickly sense and react to supply chain disruptions and opportunities

Partnering with governments: engaging public actors to co-invest in resilience infrastructure and regulatory frameworks

Creating industry platforms: establishing shared assessment systems that reduce duplication and accelerate supply chain transitions

Attracting strategic investments: mobilizing finance toward resilience initiatives through SBTi, MacArthur Foundation, and other frameworks

EcoBeautyScore: industry collaboration turns competitive burden into shared platform

Industry-standard A-E environmental scoring across Europe

EcoBeautyScore ASSOCIATION

EcoBeautyScore
ENVIRONMENTAL IMPACT
A B C D E
Compared to other face care products sold in the European market

- **Collaborative breakthrough:** 70+ beauty companies (L'Oréal, Beiersdorf…) co-created shared environmental methodology, creating industry-standard scoring platform, launched in 2025
- **Shared burden, accelerated impact:** single EU PEF-based system covering 16 planetary impacts cutting duplicated R&D costs while building consumer trust and enabling transparent product comparison
- **Collective action over competition:** free platform access for all company sizes ensuring benefits extend industry-wide, with pioneer brands (Garnier, Nivea, Neutrogena) already publishing scores

Source: EcoBeautyScore Association website; L'Oréal; Ardabelle Capital analysis

3. RESILIENCE & SUSTAINABILITY CAN BE OBTAINED THROUGH MULTI-STAKEHOLDER GOVERNANCE

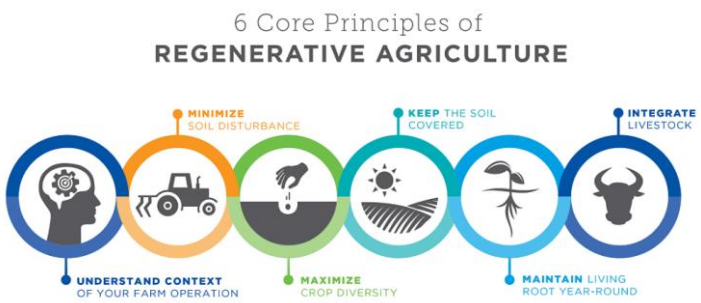
Groupe Bel: embedding biodiversity from farm to fork

Cross-sector collaboration accelerating dairy's biodiversity transition

- **Dairy emissions drive Scope 3:** milk production impacts biodiversity, deforestation, and water across Bel's value chain
- **WWF partnership and regenerative transition launched:** 100% of milk from farms transitioning to regenerative agriculture by 2030; dsm-firmenich's Bovaer feed supplement deployed to cut cow methane emissions
- **42% emissions cut achieved:** GHG reductions between 2017-2023, achieving 97% renewable electricity at sites and 50% dairy supply chain reduction target by 2035

McCain Foods: regenerative agriculture partnership with potato growers

McCain's Regenerative Agriculture Framework adoption progress



71%
Onboarding rate among farmers in 2024

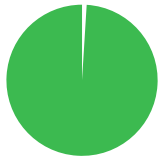
100%
Target by 2030

- **Climate shocks threatening yields:** multiple adverse events per year (vs. historical 10–15-year cycles) jeopardize potato supply through rainfall volatility, temperature extremes, and disease
- **Regenerative framework deployed with growers:** six-principle framework extended crop rotations from 6 to 9 years, integrated 14 species, and incorporated livestock grazing
- **Strong results across metrics:** 25% yield increase, 9% GHG reduction per ton, lower nitrogen use, with 71% of acreage onboarded by 2024

Source: companies' websites; Ardabelle Capital analysis

3. INVESTMENT IN KEYSTONE SME SUPPLIERS GENERATES MAJOR RETURNS IN RESILIENCE, SUSTAINABILITY AND STRATEGIC AUTONOMY

Scale & position



99%

of EU businesses

~ 50%

of private employment

70-95%

of corporate Scope 3 emissions lie in supply chains dominated by SMEs

A critical bottleneck

Financial constraints:

Only 1/6 of SME climate adaptation needs are currently funded

Operational fragility:

70-80% of SMEs lost 30-45% of revenue during COVID; 12 percentage points more severe than large firms

Technical capacity gap:

Most SMEs lack internal sustainability expertise yet control upstream emissions

The multiplier effect

Cascading innovation:

Strategic SME adoption of low-carbon practices diffuses standards across supply chain tiers

Non-linear returns:

Every €1 spent on climate adaptation yields €2-43 ROI through avoided damage and productivity gains

Systemic tipping points:

Small actors at structural nodes trigger irreversible change when external conditions approach critical thresholds

Source: Eurostat, 2024; Persefoni, 2024; 3Degrees, 2024; J.P. Morgan, 2025; World Bank, 2023; McKinsey, 2022; Ardabelle Capital analysis

4. FIVE SECTORIAL DEEP DIVES TO UNCOVER LEVERS AND INDUSTRY PRACTICES

We analyzed sectorial levers and practices through 4 main angles

Upstream concentration vs fragmentation: how supply-chain structure shapes vulnerability and decarbonization pathways

Scope 3 materiality and emission hotspots: identifying where carbon footprints concentrate and intervention leverage is highest

Regulatory and reputational exposure: mapping compliance risks, transparency pressures, and stakeholder accountability dynamics

SME enablement as systemic multiplier: understanding how mid sized suppliers act as leverage points for value-chain transformation

Case studies: F&B and Luxury & Fashion

Economic resilience emerges from sectoral capacities to anticipate disruptions, reorganize processes, and maintain value under constraint

Food & Beverage: optimizing complex supply chains and significant environmental footprint

Luxury & Fashion: aligning heritage value and sustainable transformation

Beauty: integrating consumption dynamics and product innovation

Defense: safeguarding strategic sovereignty and industrial capabilities

Construction & Public Works: solving input tensions and public/private cooperation issues

Note: deep dives on Beauty, Defense, and Construction & Public Works are not presented here; see report appendix for further details
Source: Ardabelle Capital analysis

4. BUILDING RESILIENCE AND SUSTAINABILITY AS COMPETITIVE ADVANTAGES

Risk mapping & management

Develop robust frameworks to identify potential threats, assess their impact on sustainable initiatives, and implement proactive strategies. This includes using advanced risk assessment methodologies, establishing early warning systems for emerging challenges, and adopting adaptive management approaches to ensure long-term resilience

Transition financing

Mobilize public and private financial resources to support sustainable initiatives and innovative economic models

Data, AI & traceability

Establish robust systems to track material flows and ensure transparency throughout the value chain

Capacity building

Develop the necessary skills and knowledge to efficiently implement circular practices

Green tech & innovation

Encourage the development and adoption of sustainable technological solutions that reduce ecological footprint and optimize resource utilization

Waste management & resource efficiency

Minimize waste at the source and maximize the reuse, recycling, and recovery of materials to create closed loops

Governance & collaboration models

Foster multi-stakeholder cooperation between governments, businesses, and civil society to create an ecosystem conducive to systemic change

Source: Ardabelle Capital analysis

4. F&B COMPANIES EMBEDDING RESILIENCE WILL OUTPERFORM VOLATILE MARKETS

F&B's faces risks related to nature, agricultural value chains and scope 3 emissions

- **F&B's perishable, active nature makes sustainability and resilience inseparable**, amplifying operational fragility and reputational exposure
- **Key pressures: climate-volatile inputs, deforestation risks, and cold chain structural tensions** require comprehensive resilience approaches
- **F&B emissions are concentrated upstream in Scope 3** yet disclosure rates remain low and inconsistent
- **Main emission sources: agriculture, fertilizers, livestock, and energy-intensive processing** dominate the carbon footprint

Zoom on process & logistics efficiency:

Pernod Ricard

Pernod Ricard's seaweed-based biocontrol in its vineyards

Via its Martell Mumm Perrier-Jouët subsidiary, Pernod Ricard is replacing synthetic fungicides with seaweed-derived biostimulants across its vineyards. Seaweed extract stimulates the vine's own defence mechanisms. This initiative covers 690 hectares of vineyards

Zoom on digital traceability

IBM Food Trust™

IBM Food Trust's blockchain traceability for food & beverage supply chains

IBM Food Trust enables retailers, suppliers, and growers to record every supply chain handoff on a shared, immutable ledger. Adopted by Walmart, Carrefour, and Nestlé, it reduced mango provenance tracing from 7 days to 2.2 seconds, with Walmart mandating it for 200+ suppliers since 2020

Zoom on by-product valorization:

evergrain by ABInBev

EverGrain's upcycling of barley residues

EverGrain is a sustainable ingredient company founded by AB InBev, leveraging the brewer's scale to generate positive social and environmental impact. Its mission is to unlock the potential of barley spent grain producing protein bars for instance

Source: Ardabelle Capital analysis

4. BUILDING RESILIENCE IN THE F&B SECTOR CAN BE ACHIEVED AT EVERY LEVEL

Initiatives from the Food & Beverage sector

Transition financing

- Income accelerators
- Dairy weather insurance
- Commodities forwards

Data, AI & traceability

- Food Trust Consortium
- Supplier portals
- ESG audits

Capacity building

- Training plans
- Water stewardship

Green tech & innovation

- Plant-based ingredients
- Edible coating
- Solar cold rooms

Waste management & resource efficiency

- Dynamic pricing
- Upcycled ingredients
- Community cooperatives

Governance & collaboration models

- Local sourcing policies
- Responsible sourcing reporting

Source: Ardabelle Capital analysis

4. LUXURY AND FASHION: COMBINING SUSTAINABILITY WITH MARGIN RESILIENCE

Reputation or biodiversity risks amongst others threaten Luxury and Fashion brand value

- **Fragmented supply chains create opacity risks:** Tier 2+ subcontracting exposes to human rights violations and provenance failures that threaten brand integrity
- **Four shock vectors converge:** demand & geographic concentration, supply constraints, reputation crises, and regulatory pressures require embedded resilience strategies
- **Biodiversity threat:** millions of hectares deforested to develop leather supply and critical animal welfare certification gap (only 3% of globally sourced wool coming from certified animal welfare standards)

Zoom on material substitution:

LabDenim™

LAB Denim's patented indigo-free post-weave colorization

LAB Denim has developed the world's only indigo-free denim via its patented technology. By applying 100% bio-based chemistry after weaving, it eliminates synthetic indigo and petrochemical bleaches, cutting water use by over 90% vs. conventional production and producing near-zero finishing waste

Zoom on green tech & innovation

HERMÈS PARIS

Hermès' new sustainably designed workshop

Hermès' L'Isle-d'Espagnac workshop (opened 2025) is a 5,800 m^2 positive-energy leather goods facility in France, built with locally sourced low-carbon materials within a 250 km radius. Equipped with 1,800 m^2 of solar panels and geothermal heating, it houses 260 artisans and created 300 regional jobs

Zoom on by-product valorization:

CHANEL

Chanel's Nevold recycled textile/leather B2B platform:

Chanel's Nevold is a B2B circularity hub, transforming textile and leather waste into luxury-grade materials via recycling, spinning, and leather upcycling partners. Recycled leather is already used in 30% of Chanel bags and 50% of its shoes, with the open platform also serving external brands

Source: Ardabelle Capital analysis

4. TO GAIN RESILIENCE LUXURY & FASHION FIRMS DEVELOP COMPARABLE INITIATIVES

Initiatives from the Luxury & Fashion sector

Transition financing

- Circular materials investments
- Sustainability loans
- Micro-grants for ateliers

Data, AI & traceability

- Blockchain Consortium
- Environmental tracking
- ESG audits

Capacity building

- New materials production – Research Partnerships
- Eco-design initiatives

Green tech & innovation

- Bio-based materials
- Solar-powered workshops
- Modular production systems

Waste management & resource efficiency

- Upcycled materials
- Clothes take-back
- Community cooperatives

Governance & collaboration models

- Supplier inclusion scorecards
- Environmental P&L

Source: Ardabelle Capital analysis

5. EUROPE IS AT A CROSSROADS AND MUST CHOOSE ITS DESTINY

The evidence

- **Four scenarios reveal stark differences:** up to €7.2T gap between coordinated action (Resilient Green) and inaction (new Status Quo-Baseline)
- **Timing is critical:** as benefits are structurally delayed and inaction compounds
- **Resilient Green wins** thanks to multiple growth channels convergence:
  - Avoided climate damages
  - Innovation & productivity
  - Health & social co-benefits
  - Energy security & trade
  - Natural capital gain

The imperative

- **Coordinated multi-stakeholder action framework:**
  - Financial institutions
  - Governments
  - Corporates
  - Citizens & civic institutions
- **Frame resilience and sustainability as core industrial priorities** and growth levers, not as regulatory burdens
- **Act decisively now**: frontloading captures 80% of benefits — anchor action in a European Industrial Resilience Pact (Net Zero Industry Act, Critical Raw Material Act and Single Market Emergency Initiative)

Coordinated and frontloaded green transition is **Europe's pathway to technological leadership and prosperity**

Source: Ardabelle Capital analysis

5. WHAT ARE OUR RECOMMENDATIONS TO...

Financial actors

- Channel capital into green and resilient infrastructure and supply chains
- Develop blended finance vehicles and resilience bonds
- Make adaptation investable: physical climate risk in lending and underwriting
- Reinforce insurance: parametric SME schemes and pooled reinsurance

Corporates

- Participate in European sectoral coalitions to pool standards and accelerate decarbonization
- Map Tier 2+ suppliers; establish diversification thresholds for critical inputs
- Build bottom-up value chain resilience
- Scope 3 leadership: carbon targets in supplier contracts

European and national governments

- European Industrial Resilience Pact: unify industrial and sovereignty policies
- Diversify supply chains; resilience criteria in public procurement
- Allocate capital to sectors moving from grey to green
- Uphold binding regulatory ambition: EU ETS, CBAM, PPWR and Green Deal financing mechanisms

Citizens and civic institutions

- Demand transparency and responsibility
- Promote a culture of long-term value
- Foster societal resilience through community-level adaptation capacity
- Strengthen territorial resilience through place-based development strategies

Source: Ardabelle Capital analysis

“

We do not inherit the Earth from our ancestors, we borrow it from our children

- unattributed

Ardabelle

APPENDIX

2. FOUR SCENARIOS FOR EUROPE: HYPOTHESIS TO UNDERSTAND OUR MODEL

$$\Delta GDP = [\text{Climate impact}] + [\text{D1} + \text{D2} + \text{D3} + \text{D4} + \text{D5}] + [\text{PathDep}] + [\text{Geopolitical shock effects}]$$

MACROECONOMIC HYPOTHESIS

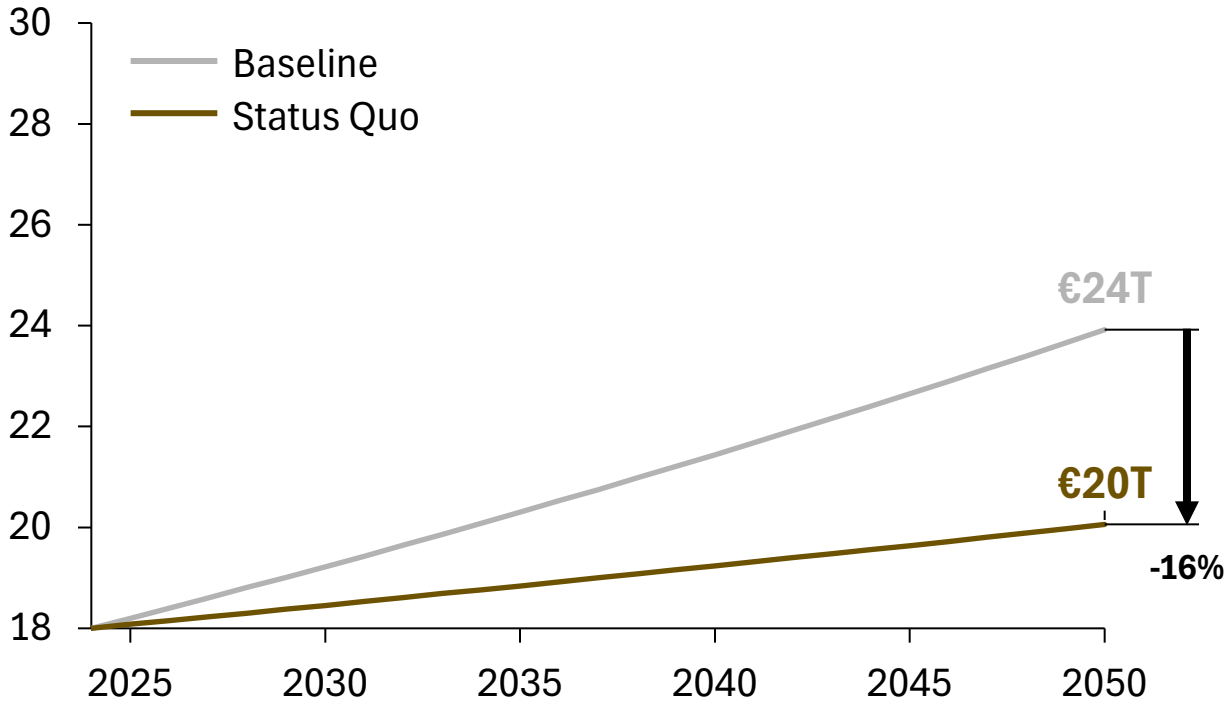
Parameter	Value	Source
Year	2024	*n.a.*
EU GDP (€T) 2025	18	*n.a.*
"Natural" Growth Rate	1.1%	OECD, IMF, Banque de France
Effect of +1 C° on GDP	-12%	Bilal & OECD
EU GDP 2050 – Neutral (€T)	23.92	Per construction
Effect of path dependency on brown scenario	-1.5%	Chen *Climate Change Economics*
ΔT baseline	+2,4°	IPCC
ΔT by scenarios	1.6 °C / 2.4 °C	IPCC
Impact of 1 geopolitical shock on GDP	-1.10%	Sampograno OFCE
Number of shocks encountered (to 2050)	3,5	Global peace index 2024

DEVIATION HYPOTHESIS

Scenario	Status Quo	Fortress Brown	Fragile Green	Resilient Green
D1 - Damages avoided	0%	*0%*	*8%*	*8%*
D2 – Productivity & jobs dividend	0%	*1.5%*	*5%*	*9%*
D3 – Social & co-benefit	0%	*0.3%*	*1%*	*4%*
D4 – Diversification (+ToT)	0%	*3%*	*2%*	*5%*
D5 – Natural Capital	0%	*0.2%*	*2%*	*3%*
Path Dependency	0%	*-1.5%*	*0%*	*0%*

Source: Lead researchers' interviews; Ardabelle Capital analysis

2. SCENARIO 1: STATUS QUO – Europe fails to transition. By 2050, Earth is 2.4°C hotter, devastating agriculture, labor productivity, health and infrastructure. GDP stagnates at €20T, -16% below Baseline, with persistent geopolitical shocks

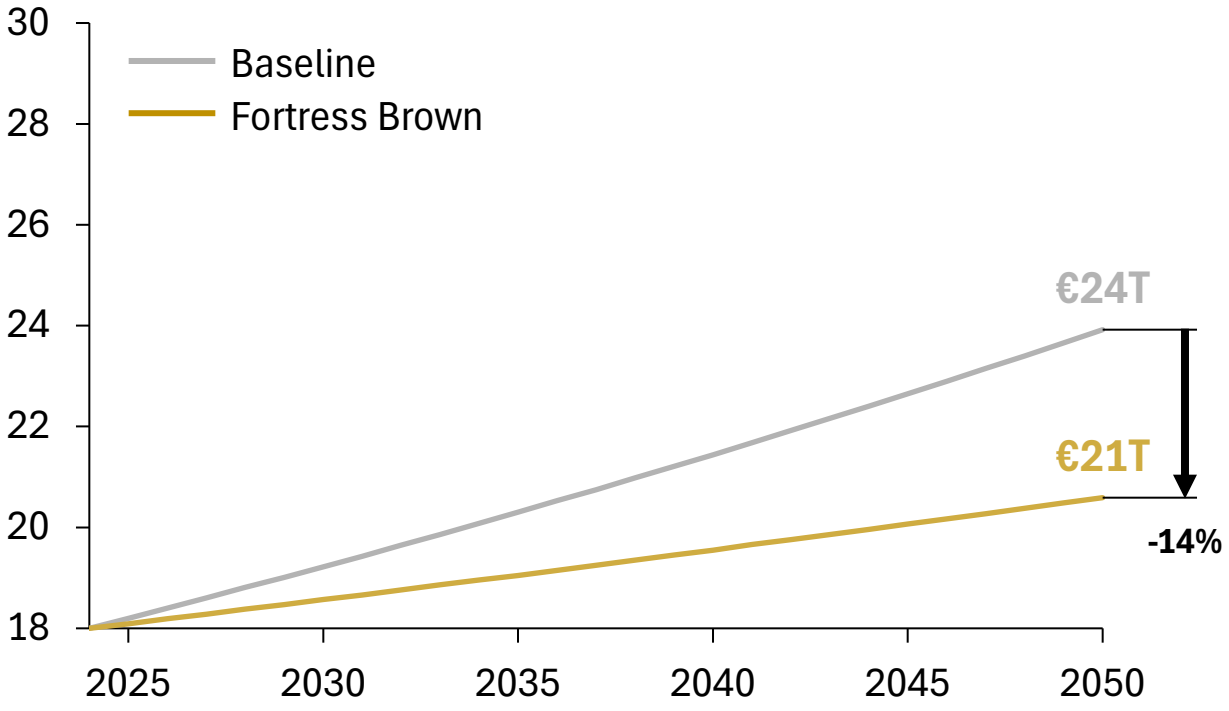


Status Quo scenario trajectory vs. baseline (in €T, 2024 - 2050)

- Climate damages **reduce growth by 0.4% annually**. Repeated geopolitical shocks **compound damages** in a non-resilient Europe. By 2050, **GDP barely reaches €20T**, with anemic 0.42% annual growth
- **Fiscal pressure intensifies:** unemployment rises, climate disasters multiply, insurance claims surge, and deficits explode under **compounding crises pressure**
- SMEs financial stress escalates: ~25% cease operations through **closure, acquisition, or prolonged inactivity**, hollowing out the economic base
- Public **trust collapses** as state capacity erodes, fueling **political instability and further fragmenting European unity**

Source: Ardabelle Capital analysis

2. SCENARIO 2: FORTRESS BROWN – Europe prioritizes resilience over decarbonization. Strong adaptation and energy security reduce vulnerabilities, but fossil fuel dependence delivers high emissions and severe climate damages: warming reaches +2.4°C by 2050

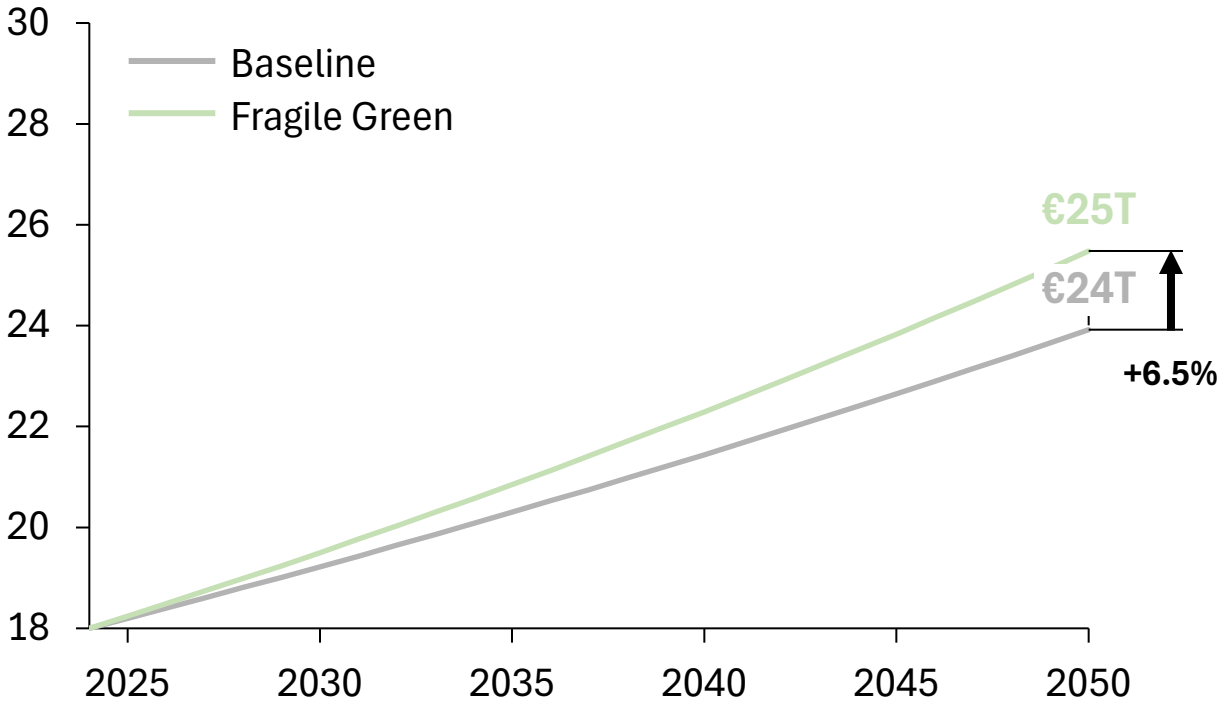


Fortress Brown scenario trajectory vs. baseline (in €T, 2024 - 2050)

- Climate damages accumulate, but **resilience investments buffer** Europe **from the geopolitical shocks**
- Growth remains subdued, reflecting a **secular atony** that prioritizes security and predictability over innovation and expansion
- SMEs face significant regional divergence, **thriving only when they align** with state-directed protective objectives
- Internationally, the **EU becomes an insulated fortress increasingly disconnected** from global innovation networks, diplomacy and climate governance
- This scenario illustrates a **defensive, high-security approach without coordinated decarbonization,** mitigating some risks but leaving the EU exposed to climate-related losses

Source: Ardabelle Capital analysis

2. SCENARIO 3: FRAGILE GREEN – Uncoordinated green transition limits warming to +1.6°C, avoiding severe climate damage, but fragmented governance and incomplete implementation prevent Europe from capturing full technological and economic benefits

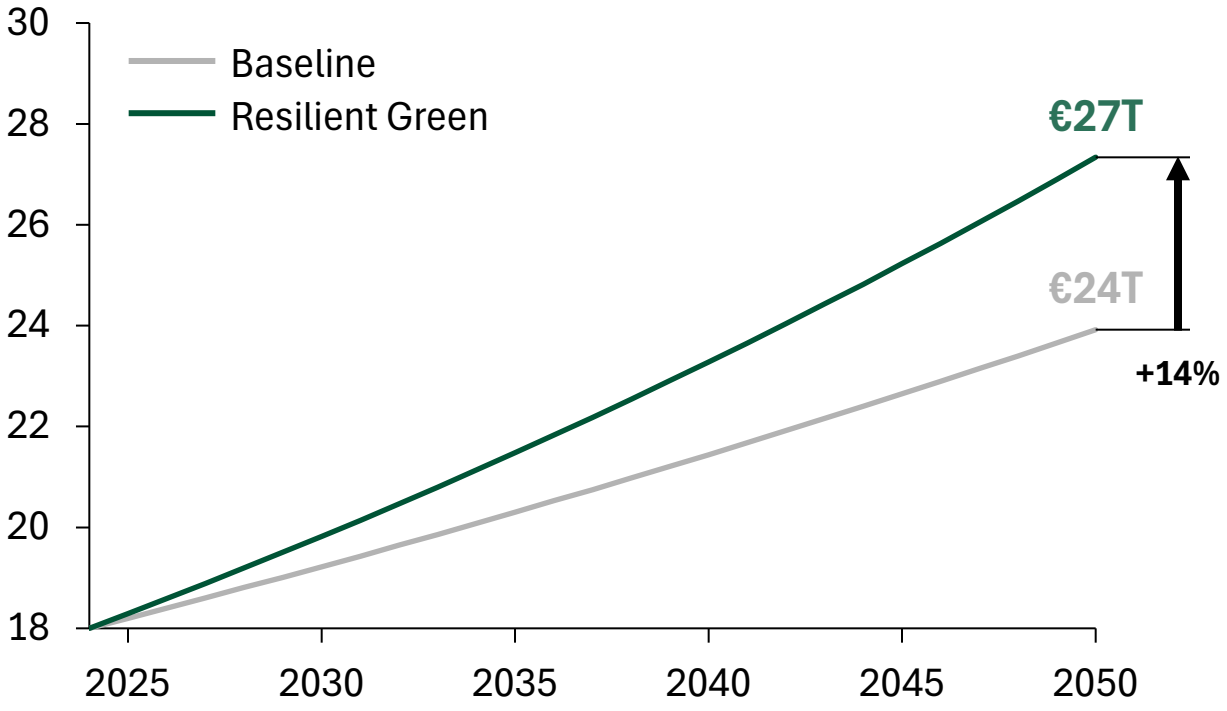


Fragile Green scenario trajectory vs. baseline (in €T, 2024 - 2050)

- Economic performance reflects **tension between growth ambitions and structural instability**. GDP reaches **€25T** by 2050, outperforming baseline by 6.5% **but falling short of potential**
- **Green innovation drives growth**, but dependence on **global supply chains leaves Europe exposed** to repeated disruptions
- SMEs emerge as **green transition leaders**, yet struggle with **volatile input costs** and burdensome **compliance** with fragmented global standards
- Employment **grows in expanding green sectors**, but **job losses persist in traditional industries** exposed to supply chain volatility

Source: Ardabelle Capital analysis

2. SCENARIO 4: RESILIENT GREEN – Europe's low-carbon transition curbs climate damages through mitigation, tech adoption, and ecosystem gains. Diversification, natural capital, and low fossil dependency boost resilience without stranded assets, limiting temperature increase to 1.6°C by 2050



Resilient Green scenario trajectory vs. baseline (in €T, 2024 - 2050)

- Europe emerges as a **model of sustainable and resilient growth**, leading to a **€27T GDP in 2050**, driven by technological breakouts, quality upgrades in production and the expansion of intra- and extra EU global trade
- Europe becomes a global **reference point for ecological sovereignty and sustainable development**, playing a leading role in international governance
- **SMEs flourish** as public procurement, access to R&D, transition funds and collaborative innovation hubs allow them to innovate, internationalize and contribute to policy design
- **Confidence in public institutions is high,** with widespread geographic and social mobility, **improved health** and job satisfaction

Source: Ardabelle Capital analysis

2. EUROPE CAN BENEFIT FROM UNILATERALY DECARBONATING UP TO 84% OF THE NECESSARY EFFORTS TO MITIGATE GLOBAL WARMING

Each ton of CO_2 emitted worsens global warming, causing economic damage worldwide. When a country reduces its emissions, it bears the full cost, but the benefits are shared globally. For large economies like the EU, even without international coordination, the domestic share of avoided damages is large enough to make the investment worthwhile

Domestic cost of carbon

The domestic economic damage from one additional ton of CO2

=

Marginal abatement cost

The cost of greening one additional percentage point of the economy

Results

- Unilaterally optimal to decarbonize **84% (EU)** and **86% (US)** of the economy
- Domestic cost of carbon: ~$220/t (US & EU), 10x higher than conventional estimates with local temperature model
- Under such temperature models, only ~30% would be justified

Context and comments

- Entire result hinges on one methodological shift: global vs. local temperature shocks, since local temperature poorly correlates with extreme events, contrary to global models
- Wide confidence intervals — true damages could be significantly lower

Source: Bilal & Känzig, "Does unilateral decarbonization pay for itself?", 2025; Ardabelle Capital analysis

4. OPERATIONAL LEVERS AND INDUSTRY PRACTICES ACROSS ALL SECTORS

Lever Category	Operational Levers	Food and Beverage	Beauty	Luxury and Fashion	Defense	Construction , Public Works
1. Transition Financing	Direct Incentives	Income Accelerators	Co-investment Platforms	Circular materials Investments	Matched funding	Low-carbon procurement fund
	Risk Sharing / Insurance	Dairy weather insurance	—	—	Advanced payment schemes for SMEs	—
	Blended Finance / Forward Contracts	Commodities Forwards	—	—	—	Investment facilities
	Sustainability-linked Loans	—	Specialized Loans	Sustainability loans	—	Growth Financing
	Micro-grants for SMEs	—	—	Micro-grants for ateliers	—	Supplier equipment/machinery grants
2. Data and Traceability	Digital Traceability	Food Trust Consortium	Consortium	Blockchain Consortium	Data traceability	Digital tracking
	Supplier Portals	Supplier portals	—	—	ESG portals	Supplier qualification portals
	Footprinting & LCA	—	SPICE environmental scoring	Gucci Scrap-less environmental tracking	—	Eiffage carbon/materials footprinting
	Compliance & Auditing	ESG audits	—	ESG audits	—	ESG + safety audits
	Reporting Frameworks	—	EcoBeautyScore consortium	—	—	EPDs (Environmental Product Declarations)
3. Capacity Building	Supplier Training	Training Plans	Training Plans	Training Plans	Training Plans	Training Plans
	Resource Stewardship	Water stewardship	—	—	—	—
	Innovation Partnerships	—	—	New materials production – Research Partnerships	New materials production – Research Partnerships	New materials production – Research Partnerships
	Eco-design Programs	—	—	Eco-design initiatives	—	Low-carbon designs
	Social Empowerment	—	Women Support Initiatives	—	—	—
4. Green Tech. & Innovation	Material Substitution	Plant-based ingredients	Bio-based materials	Bio-based materials	Lightweight composite components	Low-carbon cement
	Green Packaging Innovation	Edible coating	Eco-design packaging standards	—	—	Circular concrete packaging pilots
	Advanced Recycling	—	Carbios enzymatic PET recycling	—	—	CDW (construction waste) recycling – ECOCycle
	Sustainable Infrastructure	Solar cold rooms	—	Solar-powered workshops	Energy-efficient shipyards	Electrified machinery
	Process & Logistics Efficiency	Responsible farming, drone fertilizing	—	Modular production systems	Additive manufacturing	Logistics waste reduction initiatives
5. Waste Management	Retail Waste Reduction	Dynamic pricing	—	—	—	—
	Upcycling & By-product Valorization	Upcycled ingredients	Upcycled ingredients	Upcycled materials	Closed-loop aluminum	Upcycled materials
	Closed-loop Systems	—	Circular water systems	Cloths take-back	Component remanufacturing	Recycled aggregates
	Supply Chain Efficiency	—	—	—	Remanufacturing frameworks	On-site sorting and reuse
	Community Engagement	Community cooperatives	—	Community cooperatives	—	Construction waste programs
6. Governance & Collaboration	Long-term Partnerships	Mars multi-year farmer partnerships	—	—	—	SME partnerships
	Standards & Certifications	Rainforest Alliance, Fairtrade	ISO 16128, RSPO	RJC / GOTS / LWG	NATO procurement standards	ISO 14001 / LEED
	Supplier Inclusion Policies	Local sourcing policies	Ethical Sourcing Charter	Supplier inclusion scorecards	SME participation rules	Social procurement clauses
	Transparency & Reporting	Responsible sourcing reporting	Sustainability reporting	Environmental P&L	Defense procurement transparency audits	CSRD mandatory reporting

Source: Ardabelle Capital analysis