SPEECH

From climate and nature risks to economic resilience and competitiveness

Keynote speech by Frank Elderson, Member of the Executive Board of the ECB and Vice-Chair of the Supervisory Board of the ECB, at the Green Swan 2026 Conference

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Introduction

We are living in a time of profound economic, geopolitical and technological uncertainty. Yet amid all this uncertainty, one thing is clear: climate change and nature degradation will continue to shape our economies and societies, and we will have to deal with the consequences. Climate change and nature degradation are a certainty in an uncertain world. The events of this summer have reminded us of that reality in the most tangible way possible.

For Europe, the summer of 2026 was not simply another warm season. It was the warmest summer ever recorded in Western Europe, marked by severe droughts, devastating wildfires, water scarcity and mounting pressure on ecosystems across the continent.[1] Water levels in major European rivers fell to exceptionally low levels, affecting transport, industry and energy production. At the same time, large areas of land were destroyed by fires and important economic sectors faced disruptions.[2]

Europe is warming faster than any other continent at more than twice the global average.[3] The human toll has been severe, with tens of thousands of excess deaths linked to extreme heat recorded during the summer months.[4]

This summer also served as a reminder of how much our economies depend on nature. Water scarcity affected not only households and agriculture, but also manufacturing, transport and energy production. Across Europe, pressure on ecosystems highlighted the fact that healthy forests, soils, rivers, wetlands and oceans are not just environmental assets, but that they provide essential ecosystem services on which economic activity relies every day, and which often go unnoticed until they are put under strain.[5]

Taken together, this summer's events conveyed a simple but powerful message: climate and nature are not external to our economies. They are embedded within them and, increasingly, they are becoming a macroeconomic concern.

This raises a number of important questions.

How can we strengthen economic resilience in a world of more frequent climate and nature-related shocks?

How do we ensure that, as we pursue the green transition, we also strengthen competitiveness, energy security and long-term prosperity?

And which barriers still stand in the way of the investment needed to make that happen?

Let me address each of these questions in turn.

Climate and nature crises pose a systemic risk

Let me take one step back.

When a drought, flood or wildfire occurs, attention immediately and naturally focuses on the event itself. Taken in isolation, the economic and financial consequences may appear manageable. Yet individual events only tell part of the story. It is a bit like focusing on individual symptoms while ignoring the underlying disease. The more important question is how climate and nature-related shocks add up, interact, reinforce one another and affect economies over time.

In this context, I am reminded of an observation by the economist and author Simon Sharpe.[6] Scientists are trained not to overstate risks. Risk managers are trained not to underestimate them. This points to a trade-off that central bankers and supervisors know well. Faced with uncertainty, we can err in both directions: we can reassure ourselves too readily that a risk will not materialise, or we can raise a false alarm. Reducing the likelihood of one increases the likelihood of the other. Our task is therefore to reduce uncertainty as far as possible through better data and analysis, carefully assess the consequences of getting it wrong, and respond proportionately.[7] We cannot predict the future with certainty, but we can try to understand how risks may evolve, identify vulnerabilities and strengthen resilience.

This is the perspective central banks and supervisors should take when looking at climate and nature crises.

The challenge is compounded by the fact that we are not dealing with a static risk. As temperatures rise and physical hazards intensify, the economic consequences are becoming increasingly dynamic and material.

A growing body of evidence shows that climate-related shocks can leave lasting economic scars. Extreme heat reduces labour productivity. Droughts affect agriculture, industry and transport. Floods damage infrastructure and disrupt production. Investment may be postponed, populations may relocate and economic output can remain below trend for years after major events.[8]

They do not just affect economic activity, but already increasingly affect prices as well. This summer provided fresh examples of this: high temperatures and low water levels disrupted parts of Europe's energy system and contributed to higher wholesale electricity prices, while extreme weather continues to influence food prices.[9] Climate shocks therefore affect not only growth but also inflation dynamics.

These risks are also inherently cross-border. Food price shocks, supply chain disruptions and migration pressures do not stop at national frontiers.

Nature-related risks operate through similar channels. Recent ECB research suggests that severe water scarcity alone could put up to 24% of the euro area's economic output at risk. At the same time,

a significant share of economic activity and bank lending remains exposed to flood risk.[10]

The lesson is not that a single drought, flood or wildfire will trigger a macroeconomic crisis. As these disasters become more frequent and severe, the lesson is that a hotter planet and nature degradation are increasingly becoming structural drivers of economic and financial outcomes.

This matters directly for central banks and supervisors. Our job description is clear. We are responsible for maintaining price stability and safeguarding banks' safety, soundness and financial stability. As climate and nature risks increasingly affect productivity, growth, inflation and the resilience of the financial system, taking them into account falls squarely within our mandate. That is why central banks need macroeconomic models and forecasting procedures that reflect the impact of climate change and nature degradation and keep track of the changing structure of the economy.[11]

That is also why forums such as the Green Swan Conference matter. Bringing together central bankers, supervisors, policymakers and academics from around the world is itself an important contribution to resilience. In a world that is facing increasing geopolitical fragmentation and risks, international cooperation and collective efforts remain some of our most essential and valuable tools for advancing our knowledge and addressing shared risks.

Economic resilience requires both adaptation and mitigation

This brings me to my second point.

When discussing the impact of the climate and nature crises, it is important to distinguish clearly between adaptation and mitigation. Adaptation addresses the consequences. Mitigation addresses the causes. We need both.

The reality is that the consequences of climate change and nature degradation will continue to unfold for years to come. Past emissions have already warmed the planet and set in motion changes that cannot simply be reversed overnight. Meanwhile, greenhouse gases continue to accumulate in the atmosphere. We cannot make the risks we already face disappear.[12] That means societies, households, firms and financial institutions need to take pre-emptive action and strengthen their resilience.

We need advanced early-warning systems and infrastructure that can withstand extreme weather. We need better water management, including, flood prevention, energy-efficient cooling and measures against water leakage. We need more resilient energy systems and cities, transport networks and production systems that can continue functioning under more challenging climatic conditions. Adaptation is not optional, it is a necessity for our economies to remain resilient and competitive in the future.

This is not starting from zero. Across Europe, regions and cities are already investing in climate resilience, while initiatives at EU level are supporting adaptation and strengthening our preparedness for water scarcity, floods and wildfires.[13][14] These efforts show what can be done. The challenge now is to accelerate them and bring them to scale.

But adaptation alone is not enough. Without mitigation, the scale of adaptation required becomes progressively larger and more costly. In some places, particularly low-lying coastal areas and small

island states, climate change may eventually make adaptation extraordinarily difficult, if not impossible. Mitigation therefore remains essential.

The more effectively we can mitigate climate change and protect nature, the lower the future adaptation costs will be. And the better we adapt, the more resilient our economies will become during the transition. There is no silver bullet. But there is a clear direction of travel.

The transition is a competitiveness strategy

Let me now turn to what I believe is one of the most important debates currently taking place in Europe: the green transition as a central pillar of competitiveness. It is perhaps also an area where policymakers and businesses in many parts of Asia are already providing valuable lessons. And the next panel in today's conference, on resilience building in the real economy, with business sector representatives from the Philippines, Japan and Europe, couldn't be timelier in this respect.

In Europe, resilience, energy security, competitiveness and the green transition are still too often perceived as competing objectives. I believe that is the wrong way to think about it. Firms cannot remain competitive if their operations become increasingly vulnerable to climate and nature-related shocks. Instead, resilience and energy security are increasingly becoming preconditions for competitiveness. And if managed well, the transition, which includes both adaptation and mitigation, can reinforce all three.

The question is no longer whether the global economy will transition to green energy. The question is who will be well positioned as we move forward along the transition path. And when the transition is complete, who will own and finance the assets of the new economy, and who will be left holding the stranded assets?

The good news is that many elements of the transition increasingly make economic sense on their own merits.

Consider energy. Europe remains heavily dependent on imported energy, much of it fossil fuel-based.[15] This dependency creates vulnerabilities, exposes households and firms to geopolitical shocks and amplifies uncertainty. Recent events have once again demonstrated the economic costs of these dependencies.

By contrast, renewable energy and electrification can strengthen resilience by reducing dependence on imported fossil fuels and improving energy security. Yet Europe is still far from an electrified economy. Electricity currently accounts for only around a quarter of final energy consumption.[16] This leaves considerable potential for electrification across transport, buildings and industry to reduce fossil fuel dependence while supporting both decarbonisation and economic resilience.[17]

The good news is that the economics of the transition have fundamentally improved. Renewable energy technologies are increasingly cost-competitive and, in many cases, already cheaper than new fossil-fuel alternatives.[18] The International Energy Agency estimates that a significant share of residential heating, road transport and industrial heat could already be electrified cost-effectively.[19] And we are now beginning to see the resilience benefits of cleaner electricity systems. During recent energy shocks, electricity prices have proved less vulnerable to fossil-fuel price fluctuations in

countries with greater low-carbon generation. Spain is a case in point: as solar generation has expanded, its electricity prices have become less dependent on gas markets and less volatile.[20]

The same logic applies beyond energy. Healthy soils, reliable water resources and resilient ecosystems are not just environmental assets. They are also productive assets. Agriculture, food production and many industrial activities depend on them. Preserving natural capital and adapting to a changing climate therefore helps safeguard food security, strengthen resilience and support long-term competitiveness.

The case for the green transition is therefore no longer solely an environmental one. It is also very much a competitiveness, resilience and security argument. By reducing dependence on imported fossil fuels, a more electrified, renewables-based energy system strengthens strategic autonomy, makes the economy better able to absorb shocks and reduces exposure to energy price volatility, which may also, through indirect and second-round effects, affect headline inflation over time.[21]

A successful transition is not merely about avoiding future costs. It is also about capturing opportunities. This makes the case for clean energy a macroeconomic argument.

That is why I continue to believe that what Europe needs – what the world needs – is not simply a transition and adaptation strategy. What we need is a “smart transition”: one that puts sustainable and resilient competitiveness at its core, combines mitigation and adaptation, and invests in technologies, infrastructure, skills and institutions that strengthen prosperity while reducing risk.

What is holding investment back?

If the economic rationale is increasingly clear, an obvious question follows: why is progress not faster?

Research consistently points to two barriers in particular. The first is uncertainty, understood in a broad sense to include political, economic and regulatory uncertainty. The second is access to finance.[22]

Let me start with uncertainty.

Economic theory is clear. Households, firms and financial institutions only commit capital to long-term investments when they believe the rules of the game will remain broadly stable. This is especially true for transition-related investments such as energy infrastructure, industrial transformation and electrification.

All these investments require large upfront commitments and long planning horizons. Policy instability increases the cost of waiting and when investors wait, progress slows.

Evidence from the euro area bank lending survey confirms that uncertainty weighs on demand for loans to finance green investment.[23] Yet uncertainty affects more than investment decisions. It also affects financing conditions. As uncertainty rises, banks become more cautious, tighten credit standards and reduce their willingness to take risk.[24] The result is a double constraint: firms postpone investment and financing becomes harder to obtain, which in turn can further amplify the impact on demand. This is particularly damaging for green investment, which requires substantial initial investments and long-range planning.

Let me be clear. This is not a case for rigid policymaking. Instead, I am making a case for predictability. The transition requires certainty for long-term planning.

The second challenge is financing.

The scale of the challenge should not be underestimated. Around the world, meeting climate and nature objectives will require unprecedented levels of investment. In Europe alone, this amounts to hundreds of billions of euros in additional investment every year for years to come.[25]

Many transition-related investments are capital-intensive and have long payback periods. That makes them sensitive to financing conditions. Banks have an important role to play, particularly in Europe's bank-based financial system.[26] At the same time, deeper capital markets will be necessary to complement bank financing and help innovative firms and technologies to scale up.

The scale of investment required also underlines the importance of international capital flows and cross-border cooperation.

International cooperation also helps safeguard fairness by ensuring that firms investing in the transition are not placed at a systematic disadvantage relative to those that do not. This requires a level playing field, underpinned by common standards, credible international commitments and mutual trust. Credibility also means not backtracking on legislative commitments on which firms have based long-term investment decisions. Without such predictability, progress will inevitably become both more difficult and more costly.[27]

Conclusion

Let me conclude.

Earlier, I described climate change and nature degradation as a certainty in an uncertain world. The summer of 2026 demonstrated precisely why. Climate and nature risks are no longer distant possibilities. They are already shaping economic outcomes today.

The conclusion is clear.

Building stronger resilience will require a proactive and comprehensive response that combines adaptation and mitigation with sustained investment, effective international cooperation and, above all, the resolve to act before risks fully materialise.

When properly executed, investing in adaption and the transition is not merely about avoiding damage. It is an opportunity to build a more productive, more resilient and more competitive economy. A world of greater resilience is also a world of greater prosperity. The task now is to ensure that we move towards that future deliberately, credibly and with sufficient speed. Climate change and nature degradation may be a certainty in an uncertain world, but how we respond to them remains very much a matter of choice.

Thank you for your attention.

1.

See the European Environment Agency's webpage on "Climate change challenges Europe's resilience".

2.

Throughout Europe, particularly in France and Spain, almost 400,000 hectares of land have burnt. For more information, see the Copernicus webpage on the seasonal trend for the European Union.

3.

In Europe, temperatures have been rising by approximately 0.56°C per decade since the mid-1990s, more than double the global average, and compared, for instance, with 0.40°C for global land and 0.46°C per decade in Asia. See "Why is Europe warming so quickly?" for more details.

4.

This summer's extreme temperatures have harmed people's health, with more than 30,000 excess deaths recorded between mid-June and mid-August in Europe. See EUROMOMO for more details.

5.

See Ceglar, A. et al. (2025), "Nature at risk: Implications for the euro area economy and financial stability – Economic and financial risks stemming from degradation of ecosystem services", *Occasional Paper Series*, No 380

6.

See Sharpe, S. (2023), *Five Times Faster: Rethinking the Science, Economics, and Diplomacy of Climate Change*, Cambridge University Press, 15 April.

7.

See Elderson, F. (2026), "Ensuring resilience in the face of uncertainty", keynote speech at the ECB-Bank of England Conference on supervising climate risk in a non-linear world, European Central Bank, 14 October.

8.

On average, economic activity in affected regions is estimated to be 1.5% lower two years after a heatwave and 3% lower four years after a drought, driven in part by lower productivity and people relocating (see Usman, S. et al. (2025), "Going NUTS: The regional impact of extreme climate events over the medium term", *European Economic Review*, No 178). These findings are consistent with recent evidence gathered by the Network for Greening the Financial System, which analysed 31 extreme weather events across 28 countries between 2015 and 2025. The report finds that extreme weather shocks can have significant and persistent effects on output, employment and inflation, with outcomes varying according to countries' exposure, economic structure and resilience. See Network for Greening the Financial System (2026), "NGFS publishes a report on the macroeconomic and financial impact of extreme weather events", *press release*, 19 May.

9.

Mainly as a result of the war in the Middle East, energy inflation became the main driver of euro area headline inflation remaining above target (increasing to 3.8% in September from 3.2% in August). High temperatures and low water levels during the summer of 2026 disrupted parts of Europe's energy system and added to pressures, contributing to higher wholesale electricity prices. Climate shocks can also affect food prices: ECB research estimates that the extreme summer heat in 2022 increased food prices in Europe by around 0.7 percentage points over the following months. At the same time, the growing share of domestically produced low-carbon electricity, particularly renewables, has helped make the euro area less vulnerable to fossil fuel price shocks and strengthened economic resilience. See Kuik, F., Lis, E and Schäfer, J. (2026), "The uneven journey of wholesale gas and electricity prices to consumer bills", *Economic Bulletin*, Issue 6, ECB; Bates, C., Kuik, F., Wieland, E. and Zekaite, Z. (2026), "Inside the food basket: what is behind recent food inflation?", *Economic Bulletin*, Issue 8, ECB, 2025; and Kotz, M. et al. (2024), "Global warming and heat extremes to enhance inflationary pressures", *Communications Earth & Environment*, 21 March.

10.

A collaboration between the ECB, the London School of Economics and the University of Oxford revealed how an extreme episode of water scarcity could put as much as 24% of euro area output at risk. At the other extreme, floods – earlier this year and in previous years in Europe, especially Spain in 2024, and the devastating catastrophe in Nepal – are also a threat. Nearly 12% of economic output and more than 60% of loans in the euro area face risks due to insufficient flood protection. See Lagarde, C. (2026), "Climate, nature and monetary policy", introductory remarks at the Climate, Nature and Monetary Policy Conference organised by the ECB, Frankfurt School and CETEX, 5 May; and Ceglar, A. et al. (2025), op. cit.

11.

See Lane, P. (2026), "Climate change and monetary policy", keynote speech at the Climate, Nature and Monetary Policy Conference jointly organised by the ECB, the Centre for Economic Transition Expertise and the Frankfurt School of Finance and Management, 5 May.

12.

Continued greenhouse gas emissions will further affect all major climate system components, and many changes will be irreversible on centennial to millennial timescales, especially changes in the ocean, ice sheets and global sea level. See The Core Writing Team, Lee, H. and Romero, J. (2023), *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Geneva.

13.

See European Commission (2026), "EU Mission on Adaptation to Climate Change demonstrates strong progress towards climate resilience", *news article*, 24 September. According to the Commission, the target has already been largely surpassed, with 292 regional and local authorities having implemented climate adaptation measures.

14.

See European Commission (2026), *2026 State of the Union Address by President von der Leyen*, Strasbourg, 16 September.

15.

See Eurostat (2026), *Energy in Europe - 2026 edition*. The energy imports dependency rate is measured by the share of net imports (imports minus exports) in gross inland energy consumption (energy produced plus net imports).

16.

Electricity currently accounts for around 23% of final energy consumption in the European Union, while renewables provide close to half of EU electricity generation. Taken together, these figures show that renewable electricity currently represents only around one-tenth of total final energy consumption, underscoring the considerable potential for further electrification and expansion of renewable generation. See International Energy Agency (IEA) (2026), *Electrification. Special Report*, 22 September; and IEA (2025), *Renewables 2025*, 7 October.

17.

See Arlia, D. and Hutchinson, J. (2026), "From oil to electrons: lessons from the 1970s energy crises", *The ECB Blog*, 7 August.

18.

See IEA (2026), *Electrification. Special Report*, 22 September. The IEA finds substantial scope for further electrification across sectors and notes that, in a scenario where fuel-importing countries accelerate electrification significantly, their combined energy import bill could fall by more than USD 400 billion by 2035 compared with 2025 levels, highlighting the potential gains in resilience and energy security. Moreover, the International Renewable Energy Agency (IRENA) reports that 91% of new renewable power projects commissioned in 2024 were more cost-effective than new fossil fuel alternatives. Solar photovoltaics were, on average, 41% cheaper than the lowest-cost fossil fuel alternatives, while onshore wind projects were 53% cheaper. Meanwhile, battery storage costs have fallen by around 93% since 2010. See IRENA (2025), "91% of New Renewable Projects Now Cheaper Than Fossil Fuels Alternatives", *press release*, 22 July. At the same time, electricity costs remain influenced by the need for substantial investment in transmission and distribution infrastructure, including grid upgrades. See Arlia, D. and Hutchinson, J. (2026), "Drivers of electricity prices across

households and energy-intensive industries and their importance for the EU's decarbonisation objectives", *Economic Bulletin*, Issue 1, ECB.

19.

The IEA estimates that around half of residential fuel consumption, half of oil-based road transport and almost 40% of fossil fuel-based low and medium-temperature industrial heat could be electrified cost-effectively. If the cost-competitive potential were fully exploited, electricity could meet around one-third of global final energy consumption by 2035, compared with 23% in 2025. See IEA (2026), *Electrification. Special Report*, 22 September.

20.

See Kuik, F., Lis, E. and Schäfer, J. (2026), op. cit.

21.

A low-carbon energy mix also contributes to lower inflation volatility. Periods in which euro area inflation significantly exceeded the ECB's price stability target, most notably between 2022 and 2023, but also in 2008 and 2011, were largely associated with energy price shocks. Recent developments serve as a reminder that energy system resilience matters: following the escalation of conflict in the Middle East in early 2026, electricity prices rose less in countries with a larger share of renewable energy generation, such as Spain, than in countries that remained more exposed to fossil fuel price fluctuations. See Kuik, F., Lis, E. and Schäfer, J. (2026), op. cit.

22.

See Parker, M. and Rodrigues, C. (2026), "Overcoming structural barriers to the green transition", *Economic Bulletin*, Issue 1, ECB. See also Ferrando, A., Groß, J. and Rariga, J. (2023), "Climate change and euro area firms' green investment and financing – results from the SAFE", *Economic Bulletin*, Issue 6, ECB; and Köhler-Ulbrich, P., Schuster, Y. and Tushteva, N. (2025), "Climate performance matters for bank credit in the euro area", *The ECB Blog*, 10 November.

23.

See the July 2026 euro area bank lending survey.

24.

See Allayioti, A., Bozzelli, G., Di Casola, P., Mendicino, C., Skoblar, A, and Velasco, S. (2025) "More uncertainty, less lending: how US policy affects firm financing in Europe", *The ECB Blog*, 2 October.

25.

While estimates vary, they all point to very substantial investment needs. The European Commission estimates additional green investment requirements of around €477 billion per year until 2030. ECB analysis points to additional annual green investment needs of around 2.7% to 3.7% of EU GDP

through 2030, based on a range of studies from several institutions. See Nerlich et al. (2025), "Investing in Europe's green future", *Occasional Paper Series*, No 367, ECB, Frankfurt am Main.

26.

According to the July 2026 euro area bank lending survey, banks continued to report that climate change has had an easing impact on their credit standards for transitioning firms, but a tightening impact for high-emission firms without credible transition plans.

27.

See Draghi, M. (2024), *The future of European competitiveness Part A. A competitiveness strategy for Europe*, September; and Letta, E. (2024), *Much More Than a Market*, April. Draghi argues that decarbonisation can be an opportunity for Europe if climate targets are matched by a coherent plan, but warns that uncoordinated policies risk undermining competitiveness and growth. Letta argues that deeper Single Market integration, especially in energy, is essential to deploy clean energy faster and more cost-effectively, reduce investor risk, strengthen resilience and support clean-tech innovation.

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